National Institute for Health and Care Excellence

Final

Renal and ureteric stones: assessment and management

Stents after surgery

NICE guideline NG118

Intervention evidence review (I)

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Final

This evidence review was developed by the National Guideline Centre

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1.1 Review question: Is inserting a stent clinically and cost-effective after surgical treatment in people with renal or ureteric stones?

1.2 Introduction

Ureteric JJ stents are used in stone management to relieve obstruction and uncontrollable pain in an emergency setting. In the elective setting the rationale for use is to reduce the risk of obstruction after stone fragmentation and to enhance stone fragment passage. However JJ stents are associated with adverse effects, with significant stent symptoms affecting patients' quality of life in 80% of cases.

There is no national agreed guidance on the use of stents after surgery, and their use in clinical practice currently varies from always to very rarely. This question was designed to address this variation in practice.

1.3 PICO table

For full details see the review protocol in appendix A.

Table 1: PICO characteristics of review question

Population	People (adults, children and young people) with symptomatic and asymptomatic renal or ureteric stones
Interventions	Insertion of a stent after a surgical procedure (SWL, or URS/RIRS or PCNL)
Comparisons	Surgical procedure (SWL, or URS/RIRS or PCNL) alone
Outcomes	Critical outcomes: • Stone-free state (including residual fragment) • Recurrence • Use of healthcare services (length of stay, readmission, retreatment or ancillary procedure) • Kidney function • Quality of life • Major adverse events (infective complications [sepsis, obstructive pyelonephritis], ureteric injury [ureteral damage, ureteral perforation, ureteral stricture], mortality) • Minor adverse events (infective complications [UTI, fever, infection], ureteric injury [extravasation, submucosal dissection], haemorrhage [any bleeding, transfusion]) • Failure to treat (inaccessible stone, stone not seen/reached) • Stent symptoms (dysuria, irritative symptoms, haematuria, frequency, urgency, nocturia) Important outcomes: • Pain intensity (visual analogue scale)
Study design	Randomised controlled trials (RCTs). If no RCT evidence for children is available, non-randomised studies will be considered.

1.4 Clinical evidence

1.4.1 Included studies

Seventeen studies were included in the review;[3, 8, 10, 13, 19, 20, 27, 29, 31, 42, 45, 66, 70, 78, 80, 82, 84] these are summarised in Table 2 below. There were 11 studies included in the adult, ureteric stone, <10mm strata, and 6 studies included in the adult, ureteric stone, 10-20mm strata. All the evidence compared URS followed by stent placement, versus URS alone. Evidence from these studies is summarised in the clinical evidence summary below (Table 3).

See also the study selection flow chart in appendix C, study evidence tables in appendix D, forest plots in appendix E and GRADE tables in appendix H.

1.4.2 Excluded studies

See the excluded studies list in appendix I.

1.4.3 Heterogeneity

For the comparison of stent after URS versus URS alone in the adult, ureteric, <10mm strata, there was substantial heterogeneity between the studies when they were meta-analysed for 2 of the outcomes for pain (overall pain and flank pain), and three of the stent symptoms outcomes (irritative symptoms, haematuria and dysuria). In the adult, ureteric 10-20mm strata, there was substantial heterogeneity between the studies for the outcomes readmission, and overall pain. Where pre-specified subgroup analyses (see Appendix A:) either did not explain the heterogeneity, or were unable to be performed due to a lack of reporting in the studies, a random effects meta-analysis was applied to these outcomes, and the evidence was downgraded for inconsistency in GRADE.

1.4.4 Summary of clinical studies included in the evidence review

Table 2: Summary of studies included in the evidence review

Study	Intervention and comparison	Population	Outcomes	Comments
Adult, ureteric, <10mm				
Al-Ba'adani 2006[3]	Intervention (n=40): URS using semirigid ureteroscope (8-11Fr), followed by stent placement Comparison (n=45): URS as above followed by no stent placement	n=85 People with ureteric stones Stone size (mean, SD), mm: stent group 9.9 (3.2); no stent group 8.4 (3.1) Age (mean, SD), years: stent group 34.35 (13.36); no stent group 34.36 (15.53) Male to female ratio 69:16 Yemen	Stone-free state (time-point not reported) Length of stay (time-point not reported): hours	Unclear when randomisation took place
Borboroglu 2001[10]	Intervention (n=53): URS followed by stent placement. Ureteroscope size ranged from 6.0-9.5Fr. Holmium: YAG laser with the primary lithotripsy used. A 6Fr stent was the size placed in 92% of patients. The stent was removed 3-7 days post-surgery Comparison (n=60): URS followed by no stent placement	n=113 People with distal ureteral calculi confirmed by non-contrast CT or IVP Stone size (mean, SD): stent group 6.5 (1.5)mm; no stent group 6.6 (1.8)mm	Readmission (36 hours): defined as readmission for unremitting flank pain	Randomisation took place before the procedure

Study	Intervention and comparison	Population	Outcomes	Comments
		Age (mean, SD): stent group 39.8 (13.7); no stent group 42.5 (14.6) Male to female ratio 61:46 United States, Japan		
Cevik 2010[13]	Intervention (n=30): URS using a rigid 8F semirigid ureteroscope and lithotripter. A double-J 4.8F multilength ureteral stent was placed and removed after 3 weeks Comparison (n=30): URS as above with no stent placement	n=60 People with lower or middle impacted ureteral stones Stone size (mean, SD), mm: stent group 9.1 (4.5); no stent group 7.5 (2.1) Age (mean, SD), years: stent group 44.1 (15.2); no stent group 46.5 (12.5) Male to female ratio 38:22 Turkey	Stone-free status (3 months): not defined. Stone free did not include those with ancillary procedures Ancillary procedures (3 months): SWL, reported after stone-free status Length of stay (time-point not reported): days Major adverse events (time-point not reported): ureteral stricture Minor adverse events (time-point not reported): fever Stent symptoms (time-point not reported): irritative symptoms	Excluded those with failed ureteroscopic access to the stone Unclear when randomisation took place
Chen 2002[19]	Intervention (n=30): URS using a 6Fr rigid ureteroscope. Stones were fragmented using a 1.9Fr electrohydraulic probe. A 7Fr	n=60 People scheduled to undergo ureteroscopic lithotripsy	Stone-free state (7 days): not defined, assessed by plain x-ray	Unclear when randomisation took place

Study	Intervention and comparison	Population	Outcomes	Comments
	double pigtail ureteral stent was placed for 3 days after URS Comparison (n=30): URS as above followed by no stent placement	Stone size (mean, SD), mm: stent group 6.26 (1.39); no stent group 6.17 (1.44) Age (mean, range), years: stent group 44.6 (28-72); no stent group 38.8 (26-77) Male to female ratio 41:19 Taiwan	Pain (3 days): pain score for loin discomfort, VAS, 1-10 Stent symptoms (3 days): irritative bladder symptoms	
Cheung 2003[20]	Intervention (n=29): URS using a semirigid 6.5/7Fr semi rigid ureteroscope and holmium laser. At the end of the procedure, a double-J 6Fr 24 or 26cm stent was inserted. The stent was removed 2 weeks after the procedure Comparison (n=29): URS as in the intervention group. No stent was placed	n=58 People with unilateral ureteral stones Stone size (mean, SD), mm: stent group 9.8 (3.7); no stent group 9.6 (4.7) Age (mean, SD), years: stent group 51.2 (15.3); no stent group 53.1 (13.0) Male to female ratio 39:19 Hong Kong	Stone-free state (3 months): not defined, assessed by IVP Minor adverse events (10 days): fever, UTI Stent symptoms (10 days): dysuria, haematuria Pain (3 days): VAS, 0-10	Participants were excluded if there was significant concomitant ipsilateral renal stone load that required further intervention after URS Participants were randomised at the end of the retrograde pyleography
Denstedt 2001[29]	Intervention (n=29): URS using a 6.9Fr semirigid or 7.5Fr flexible ureteroscope and holmium laser. A double pigtail ureteral stent was placed and removed after 1 week	n=58 People who were scheduled for ureteroscopy for ureteral calculus at any ureteral level	Readmission (3 months) Pain (12 weeks): flank pain; VAS; 0-10	Participants were randomised after the stone had been completely fragmented and people

Study	Intervention and comparison	Population	Outcomes	Comments
	Comparison (n=29): URS as above with no stent placement	Stone size (mean, SD), mm: 9 (4) Age (mean, SD), years: stent group 49 (15); no stent group 54 (15) Male to female ratio 36:22 Canada	Pain (1 week): abdominal pain; VAS; 0-10	with ureteral perforation were excluded
El Harrech 2014[31]	Intervention (n=42): URS using 7.5Fr semirigid ureteroscope and a pneumatic lithoclast, followed by double J stent placement. Stents were removed after 3 weeks Comparison (n=38): URS as above followed by no stent placement	n=80 People treated with successful ureteroscopy for distal ureteral stones Stone size (mean, SD), mm: stent group 8.6 (3.4); no stent group 9.6 (3.6) Age (mean, range), years: stent group 44.1 (22-72); no stent group 43.2 (20-76) Gender not reported Morocco	Readmission (time-point not reported) Major adverse events (time-point not reported): ureteral stricture Minor adverse events (time-point not reported): fever, UTI Stent symptoms (time-point not reported): dysuria, hematuria, frequency/ urgency Pain (7 days): bladder pain, VAS, 0-10; flank pain, VAS, 0-10	Only included those with successful ureteroscopy Randomisation took place prospectively

Study	Intervention and comparison	Population	Outcomes	Comments
Prasanchaimontri 2017[66]	Intervention (n=20): URS using semi-rigid ureteroscope and Holmium: YAG laser and laser fiber 356 or 550 micron. Followed by placement of ureteral stent 4.7Fr. Stent was removed after 2 weeks Intervention 2 (n=20): URS as above. Followed by placement of ureteral stent 6Fr. The stent was removed after 2 weeks Comparison (n=20): URS as above. No stent was placed at the end of the procedure	n=60 People with ureteral stones Stone size (mean, SD): 4.7Fr stent group 8.8 (3.6); 6Fr stent group 8.5 (2.7); no stent group 7.7 (2.5) Age (mean, SD): 4.7Fr stent group 57.4 (10.4); 6 Fr stent group 54.7 (11.3); no stent group 59.7 (10.7) Male to female ratio 36:24 Thailand	Stone free state (4 weeks): defined as absence of stone fragments along the ureter Ancillary procedure (time-point not reported): not defined Readmission (time-point not reported): not defined Minor adverse events (2 weeks): UTI, fever Stent symptoms (2 weeks): haematuria Pain (24 hours): VAS, 0-10	Participants were people who showed no progression of stone location after 6 weeks of medical expulsive therapy Unclear if stone free rate includes ancillary procedures Randomisation took place prospectively
Shao 2008[70]	Intervention (n=58): URS was performed with 8Fr/9.8Fr semirigid ureteroscope. Stones were fragmented with the holmium laser in to fragments less than 2mm. A double pigtail 4.7Fr ureteral stent was placed and removed after 2 weeks Comparison (n=57): URS as above but no stent was placed at the end of the procedure	n=115 People with distal or middle ureteral calculi Stone size (mean, SD), mm: stent group 9.5 (2.5); no stent group 9.3 (2.4) Age (mean, SD), years: stent group 47 (10.9); 45.3 (13.2) Male to female ratio 71:44	Stone-free state (3 weeks): assessed using plain x-ray, not defined Adverse events (12 weeks): fever Stent symptoms (12 weeks): haematuria	Patients were randomised at the end of the procedure Stone free status was measured at each postoperative visit until clear

Study	Intervention and comparison	Population	Outcomes	Comments
		China		
Srivastava 2003[78]	Intervention (n=26): URS followed by stent placement. An 8.5F semirigid ureteroscope was used and a pneumatic lithotripter for fragmentation. A double J stent (6F) was then placed. The stent was removed 3 weeks later Comparison (n=22): URS as above followed by no stent placement.	n=48 People who were scheduled for a ureteroscopy for a distal ureteral stone Stone size (mean, SD), mm: stent group 7.58 (1.92); no stent group 7.82 (1.53) Age (mean, SD), years: stent group 36.12 (10.66); no stent group 32.05 (8.49) Male to female ratio 35:13 India	Stone-free state (3 months): defined as no residual stone fragments at radiologic follow up Stent symptoms (3 weeks): dysuria, urgency Pain (1 day): VAS score, 0-10	Randomisation took place before the procedure
Zaki 2011[84]	Intervention (n=99): URS followed by stent placement. Intracorporeal lithotripsy with 8.9Fr ureteroscopy and stone fragmentation with Swiss lithoclast, followed by a DJ stent 6Fr which was removed after 2 weeks Comparison (n=99): URS without stent placement All patients received prophylactic intravenous third generation cephalosporin at induction and continued 5 days on oral quinolone	n=198 People with ureteric stones Stone size (mean, range): stent group 9 (7-15); no stent group 10 (6-16) Age (mean, range): Stent group 41 (23-70); no stent group 45 (21-65) Male to female ratio 114:84 Pakistan	Stone-free state (2 weeks): not defined Readmission (time-point not reported): defined as hospitalisation due to pain Minor adverse events (24 hours): fever Stent symptoms (time-point not reported): irritative symptoms, haematuria	Extracted in the <10mm strata Randomisation took place prospectively

Study	Intervention and comparison	Population	Outcomes	Comments
Adult, ureteric, 10-20mm				
Baseskioglu 2011[8]	Intervention (n=144): URS using rigid 9.8Fr ureteroscope and balloon dilation. Stones were fragmented with a holmium laser or pneumatic lithotripsy. Followed by stent placement Comparison (n=142): URS without stent placement	n=286 People undergoing ureteroscopy for urolithiasis and ureteral orifice dilation Stone size (mean, SD), mm: stent group 12.2 (4.9); no stent group 11.4 (3.75) Age (mean, SD), years: stent group 45.4 (15.9); no stent group 45.2 (16.49) Male to female ratio 103:183 Turkey	Pain (2 weeks): VAS, 0-10 Readmission (time-point not reported) Stent symptoms (2 weeks): dysuria, urgency	Patients with perioperative complications such as residual stones >0.5 cm were excluded Randomisation took place prospectively
Damiano 2004[27]	Intervention (n=52): URS with a semirigid 8.9 Fr ureteroscope, and intracorporeal pneumatic lithotripsy. A double pigtail ureteral 4.8 or 6 Fr stent was placed and removed after 2 weeks Comparison (n=52): URS as above with no stent placement	n=104 People who underwent ureteroscopy for ureteral lithiasis Stone size (mean, SD), mm: stent group 11 (0.9); no stent group 10 (1.2) Age (mean, SD): stent group 44 (16); no stent group 43 (14) Male to female ratio 60:44	Stone-free state (2 weeks) Length of hospital stay (time-point not reported): hours Readmission (time-point not reported) Major adverse events (3 months): ureteral stricture Minor adverse events (3 months): fever, UTI	Unclear when randomisation took place

Study	Intervention and comparison	Population	Outcomes	Comments
		Italy	Stent symptoms (3 months): dysuria, haematuria, frequency/urgency Pain (15 days): VAS, 0-10	
Ibrahim 2008[42]	Intervention (n=110): URS using a 7 Fr to 10.5 Fr semirigid ureteroscope and a holmium YAG laser or Swiss Lithoclast. A 6 Fr stent was placed and removed after 2 weeks Comparison (n=110): URS as above followed by no stent placement All patients received intravenous narcotics and/or diclofenac sodium and oral pain medication. All patients were given prophylactic antibiotics at the time of anesthesia, and then twice daily for 5 days	n=220 People with distal ureteral stones treated with successful ureteroscopy Stone size (mean, SD), mm: stent group 12.4 (2.9); no stent group 13.3 (3.3) Age (mean, SD), years: stent group 39 (11); no stent group 36 (9) Male to female ratio 178:42 Egypt	Recurrence (mean follow up 25 months) Length of stay (time-point not reported): hours Minor adverse events (1 week); fever, UTI Stent symptoms (1 week): haematuria	Excluded those with incomplete stone removal Randomisation took place once the procedure was successfully completed
Kenan 2008[45]	Intervention (n=21): URS using an 8/9.9Fr semirigid ureteroscope and a pneumatic lithotripter to fragment stones. A DJ stent (4.8F) was then placed and removed after 3 weeks Comparison (n=22): URS performed as above with no stent placement	n=43 People with lower ureteral stones larger than 10mm Stone size (mean, SD), mm: stent group 13.28 (2.5); no stent group 12.90 (2.4)	Stone-free state (2 weeks): not defined Length of stay (3 days): days Readmission (time-point not reported)	Randomisation took place prospectively

Study	Intervention and comparison	Population	Outcomes	Comments
		Age (mean, SD), years: stent group 35.25 (9); no stent group 36.09 (9.7) Male to female ratio 24:19 Turkey	Major adverse events (time-point not reported): ureteral stricture Stent symptoms (time-point not reported): haematuria	
Xu 2009[82]	Intervention (n=55): URS using a 7 Fr semi-rigid ureteroscope and laser lithotripsy. A double J stent was then placed and removed after 3 weeks Comparison (n=55): URS followed by no stent placement	n=110 People scheduled for ureteroscopy for distal and middle ureteral calculi Stone size (mean, SD), mm: stent group 11.19 (2.11); no stent group 11.46 (2.24) Age (mean, SD), years: stent group 38.69 (6.00); no stent group 40.04 (5.15) Male to female ratio 70:40 China	Stone-free state (3 weeks) Minor adverse events (4 weeks): fever Major adverse events (4 weeks): ureteral stricture Stent symptoms (4 weeks): dysuria, haematuria, frequency/urgency Pain (4 weeks): flank pain; abdominal pain; VAS	Randomisation took place at the end of the ureteroscopic procedure
Wang 2009[80]	Intervention (n=71): URS followed by stent placement. A 7.0F semirigid ureteroscope was used with pneumatic lithotripsy. A double J 7F stent was placed and removed after 1 week	n=228 People scheduled for ureteroscopy for ureteral stones Stone size (mean), mm: stent group 10.1; no stent group 9.9	Stone-free state (12 weeks) Readmission (time-point not reported): defined as hospitalisation due to genitourinary sepsis	Randomisation took place at the end of the procedure for those with marked edema or polyps formation

Study	Intervention and comparison	Population	Outcomes	Comments
	Comparison (n=67): URS as above followed by no stent placement	Age (mean, range), years: 54.3 (33-83); 54.6 (31-85) Male to female ratio 112:26 Taiwan	Pain (12 weeks): overall pain, voiding flank pain, VAS, 0-10	

See appendix D for full evidence tables.

1.4.5 Quality assessment of clinical studies included in the evidence review

1.4.5.1 Adult, ureteric, <10mm

Table 3: Clinical evidence summary: Stent after URS versus URS alone

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No stent after URS	Risk difference with Stent (95% CI)
Stone free state	684 (8 studies) 2 weeks - 3 months	⨁⨁⨁⨀ MODERATE1 due to risk of bias	RR 0.99 (0.97 to 1.01)	Moderate	
				1000 per 1000	10 fewer per 1000 (from 30 fewer to 10 more)
Length of stay	145 (2 studies) not reported	⨁⨁⨁⨀ MODERATE1 due to risk of bias		The mean length of stay in the control groups was 0.825 days	The mean length of stay in the intervention groups was 0.18 higher (0.05 to 0.31 higher)
Readmission	503 (5 studies) 36 hours - 3 months	⨁⨀⨀⨀ VERY LOW1,2 due to risk of bias, imprecision	RR 0.41 (0.13 to 1.31)	Moderate	
				20 per 1000	12 fewer per 1000 (from 17 fewer to 6 more)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No stent after URS	Risk difference with Stent (95% CI)
Ancillary procedure	120 (2 studies) 3 months	⊕⊖⊖⊖ VERY LOW1,2 due to risk of bias, imprecision	RR 1.21 (0.16 to 9.46)	Moderate	
				17 per 1000	4 more per 1000 (from 14 fewer to 144 more)
Major adverse events (ureteral stricture)	140 (2 studies) time-point not reported	⊕⊖⊖⊖ VERY LOW1,2 due to risk of bias, imprecision	Not estimable8	Moderate	
				0 per 1000	0 per 1000 (from 28 fewer to 28 more)4
Minor adverse events (fever)	571 (6 studies) 1 day - 12 weeks	⊕⊖⊖⊖ VERY LOW1,2 due to risk of bias, imprecision	RR 1.09 (0.66 to 1.8)	Moderate	
				91 per 1000	8 more per 1000 (from 31 fewer to 73 more)
Minor adverse events (UTI)	198 (3 studies) 2-6 weeks	⊕⊖⊖⊖ VERY LOW1,2 due to risk of bias, imprecision	RR 1.57 (0.5 to 5)	Moderate	
				35 per 1000	20 more per 1000 (from 18 fewer to 140 more)
Stent symptoms (irritative symptoms)	318 (3 studies) 3 days	⊕⊖⊖⊖ VERY LOW1,2,5 due to risk of bias, inconsistency, imprecision	RR 3.76 (0.79 to 18.03)	Moderate	
				133 per 1000	367 more per 1000 (from 28 fewer to 1000 more)
Stent symptoms (dysuria)	186 (3 studies) 10 days - 3 weeks	⊕⊕⊖⊖ LOW1,6 due to risk of bias, inconsistency	RR 3.67 (1.49 to 9.08)	Moderate	
				132 per 1000	352 more per 1000 (from 65 more to 1000 more)
Stent symptoms (hematuria)	508 (1 study) 3 days - 12 weeks	⊕⊕⊖⊖ LOW1,7 due to risk of bias, inconsistency	RR 3.51 (1.36 to 9.04)	Moderate	
				57 per 1000	143 more per 1000 (from 21 more to 458 more)
				Moderate	

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No stent after URS	Risk difference with Stent (95% CI)
Stent symptoms (frequency/urgency)	80 (1 study) not reported	⊕⊕⊖⊖ LOW1,2 due to risk of bias, imprecision	RR 2.2 (1.02 to 4.71)	184 per 1000	221 more per 1000 (from 4 more to 683 more)
Stent symptoms (urgency)	48 (1 study) 3 weeks	⊕⊕⊖⊖ LOW1,2 due to risk of bias, imprecision	RR 1.93 (0.98 to 3.83)	Moderate	
				318 per 1000	296 more per 1000 (from 6 fewer to 900 more)
Pain - Overall pain Scale from: 0 to 10.	206 (4 studies) 1 day - 3 months	⊕⊖⊖⊖ VERY LOW1,2,3 due to risk of bias, inconsistency, imprecision		The mean pain - overall pain in the control groups was 1.56	The mean pain - overall pain in the intervention groups was 0.30 higher (0.51 lower to 1.11 higher)
Pain - Flank pain Scale from: 0 to 10.	138 (2 studies) 1-12 weeks	⊕⊕⊕⊖ LOW1,9 due to risk of bias, inconsistency		The mean pain - flank pain in the control groups was 1.19	The mean pain - flank pain in the intervention groups was 0.16 higher (0.40 lower to 0.72 higher)
Pain - Abdominal pain Scale from: 0 to 10.	58 (1 study) 12 weeks	⊕⊕⊕⊖ MODERATE1 due to risk of bias		The mean pain - abdominal pain in the control groups was 0.9	The mean pain - abdominal pain in the intervention groups was 2.6 higher (1.41 to 3.79 higher)
Pain - Bladder pain Scale from: 0 to 10.	80 (1 study) 1 week	⊕⊕⊕⊖ MODERATE1 due to risk of bias		The mean pain - bladder pain in the control groups was 1.9	The mean pain - bladder pain in the intervention groups was 2.90 higher (2.07 to 3.73 higher)

1 Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No stent after URS	Risk difference with Stent (95% CI)

2 Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs.
3 Downgraded by 1 or 2 increments because heterogeneity, I2=83%, p= > 0.1, unexplained by subgroup analysis
4 Risk difference calculated in Review Manager
5 Downgraded by 1 or 2 increments because heterogeneity, I2=91%, p= > 0.1, unexplained by subgroup analysis
6 Downgraded by 1 or 2 increments because heterogeneity, I2=58%, p= > 0.1, unexplained by subgroup analysis
7 Downgraded by 1 or 2 increments because heterogeneity, I2= 65%, p= > 0.1, unexplained by subgroup analysis
8 Could not be calculated as there were no events in the intervention or comparison group
9 Downgraded by 1 or 2 increments because heterogeneity, I2= 67%, p= > 0.1, unexplained by subgroup analysis

1.4.5.2 Adult, ureteric, 10-20mm

Table 4: Clinical evidence summary: Stent after URS versus URS alone

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No stent after URS	Risk difference with Stent (95% CI)
Stone free state	395 (4 studies) 2 weeks - 3 months	⨁⨁⨁⊖ MODERATE1 due to risk of bias	RR 0.99 (0.97 to 1.02)	Moderate	
				1000 per 1000	10 fewer per 1000 (from 30 fewer to 20 more)
Recurrence	220 (1 study) mean 25 months	⨁⊖⊖⊖ VERY LOW1,3 due to risk of bias, imprecision	RR 0.75 (0.17 to 3.27)	Moderate	
				36 per 1000	9 fewer per 1000 (from 30 fewer to 82 more)
Length of stay (days)	367 (3 studies) time-point not reported	⨁⨁⨁⊖ MODERATE1 due to risk of bias		The mean length of stay (days) in the control groups	The mean length of stay (days) in the intervention groups was 0.04 lower (0.09 lower to 0 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No stent after URS	Risk difference with Stent (95% CI)
				was 1.34	
Readmission	571 (4 studies) time-point not reported	⊕⊖⊖⊖ VERY LOW1,2,3 due to risk of bias, inconsistency, imprecision	RR 0.38 (0.07 to 1.97)	Moderate	
				60 per 1000	37 fewer per 1000 (from 56 fewer to 58 more)
Major adverse events (ureteral stricture)	257 (3 studies) 4 weeks - 3 months	⊕⊖⊖⊖ VERY LOW1,3 due to risk of bias, imprecision	RR 1 (0.15 to 6.83)	Moderate	
				0 per 1000	0 more per 1000 (from (30 fewer to 30 more)5
Minor adverse events (fever)	434 (4 studies) 1 week to 3 months	⊕⊕⊖⊖ LOW1,3 due to risk of bias, imprecision	RR 0.73 (0.45 to 1.18)	Moderate	
				127 per 1000	34 fewer per 1000 (from 70 fewer to 23 more)
Minor adverse events (UTI)	324 (2 studies) 1 week - 3 months	⊕⊖⊖⊖ VERY LOW1,3 due to risk of bias, imprecision	RR 0.87 (0.43 to 1.75)	Moderate	
				109 per 1000	14 fewer per 1000 (from 62 fewer to 82 more)
Stent symptoms (dysuria)	500 (3 studies) 2-12 weeks	⊕⊕⊖⊖ LOW1,3 due to risk of bias, imprecision	RR 1.56 (1.18 to 2.06)	Moderate	
				327 per 1000	183 more per 1000 (from 59 more to 347 more)
Stent symptoms (haematuria)	544 (4 studies) 1 week - 3 months	⊕⊕⊖⊖ LOW1,3 due to risk of bias, imprecision	RR 1.55 (1.03 to 2.32)	Moderate	
				141 per 1000	78 more per 1000 (from 4 more to 186 more)
Stent symptoms (urgency/frequency)	214 (2 studies) 1-3 months	⊕⊕⊖⊖ LOW1,3 due to risk of bias, imprecision	RR 1.34 (1.01 to 1.78)	Moderate	
				413 per 1000	140 more per 1000 (from 4 more to 322 more)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No stent after URS	Risk difference with Stent (95% CI)
Stent symptoms (urgency)	286 (1 study) 2 weeks	⊕⊕⊖⊖ LOW1,3 due to risk of bias, imprecision	RR 1.97 (1.06 to 3.68)	Moderate	
				92 per 1000	89 more per 1000 (from 6 more to 247 more)
Pain - Overall pain Scale from: 0 to 10.	628 (3 studies) 2-12 weeks	⊕⊕⊖⊖ LOW1,4 due to risk of bias, inconsistency		The mean pain - overall pain in the control groups was 1.96	The mean pain - overall pain in the intervention groups was 0.20 higher (0.1 lower to 0.50 higher)
Pain - Flank pain Scale from: 0 to 10.	248 (2 studies) 4-12 weeks	⊕⊕⊕⊖ MODERATE1 due to risk of bias		The mean pain - flank pain in the control groups was 0.215	The mean pain - flank pain in the intervention groups was 0.03 higher (0.04 lower to 0.1 higher)
Pain - Abdominal pain Scale from: 0 to 10.	110 (1 study) 4 weeks	⊕⊕⊖⊖ LOW1,3 due to risk of bias, imprecision		The mean pain - abdominal pain in the control groups was 0.24	The mean pain - abdominal pain in the intervention groups was 0.07 higher (0.07 lower to 0.21 higher)

1 Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
2 Downgraded by 1 or 2 increments because heterogeneity, I2=58%, p= > 0.1, unexplained by subgroup analysis
3 Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs.
4 Downgraded by 1 or 2 increments because heterogeneity, I2=69%, p= > 0.1, unexplained by subgroup analysis
5 Risk difference calculated in Review Manager

See appendix F for full GRADE tables.

1.5 Economic evidence

1.5.1 Included studies

One health economic study was identified with the relevant comparison and has been included in this review. [69] This is summarised in the health economic evidence profile below (**Table 5**) and the health economic evidence table in appendix H.

1.5.2 Excluded studies

One economic study relating to this review question was identified but was excluded due to methodological limitations.[68] This is listed in appendix I, with reasons for exclusion given.

See also the health economic study selection flow chart in appendix G.

1.5.3 Summary of studies included in the economic evidence review

Table 5: Health economic evidence profile: Routine stenting versus non-routine stenting following URS

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Seklehner 2017[69] (Austria)	Partially applicable [(a)]	Potentially serious limitations [(b)]	Decision tree model comparing total costs of routine versus non-routine stenting following uncomplicated semi-rigid ureteroscopy. Incorporates cost of surgeries and of complications. Complication rates and resource use from RCTs.	£121	None	Non-routine stenting had a lower cost	Various one-way sensitivity analyses undertaken to find the threshold of cost equivalence when parameters are varied.

Abbreviations: RCT: randomised controlled trial

(a) Non UK. Cost comparison only. No QALYs. Mixed populations of stone sizes and types because various RCTs used for informing complication rates and resource use.

(b) Unclear what time horizon is. Costs may not be as applicable to the UK. No difference in success rates included because of stent or not. Unclear if RCT data is meta-analysed.

1.5.4 Unit costs

Table 6: UK costs of stent procedure (removal in this case)

Parameter	Description	Unit cost
Stent removal cost	LB09D Intermediate Endoscopic Ureter Procedures, 19 years and over	£1,018

Source: NHS reference costs 2016/17 [58]

This has been mapped from OPCS code M292 (Endoscopic insertion of tubal prosthesis into ureter NEC)

1.6 Resource costs

The recommendations made by the committee based on this review (see section **Error! eference source not found.**) are likely to have a substantial impact on resources.

Additional costs could be incurred for the following reasons: the use of stents following a URS is current practice around 70% of the time according to recent UK audit data, therefore a recommendation to not use stents could be cost saving.

1.7 Evidence statements

1.7.1 Clinical evidence statements

Adult, ureteric, <10mm

Eleven studies compared stent use after URS to URS alone. Eight studies reported the outcome stone-free state, and the evidence showed no clinical difference between the two groups (8 studies; n=684). There was no clinical difference between the stent after URS and URS alone groups for the outcomes readmission, ancillary procedure, length of stay, overall pain, flank pain and bladder pain (1-5 studies; n=80-503). There was a clinical benefit of URS alone in terms of abdominal pain (1 study; n=58). In terms of adverse events, there was no clinical difference between the groups for the major adverse event ureteral stricture, or for the minor adverse events fever and UTI (2-6 studies; n=140-571). In terms of the stent symptoms outcomes, the evidence demonstrated a clinical benefit of URS alone for the irritative symptoms, dysuria, haematuria, frequency/urgency, and urgency outcomes (1-3 studies; n=48-508). The quality of the evidence ranged from Moderate to Very Low. The main reasons for downgrading evidence included risk of bias, imprecision and in some cases, inconsistency.

Adult, ureteric, 10-20mm

Six studies compared stent use after URS to URS alone. Four studies reported the outcome stone-free state (4 studies; n=395). The evidence showed no clinical difference between the two groups. There was no clinical difference between the groups in terms of readmission, recurrence, length of stay, overall pain, flank pain and abdominal pain (1-4 studies; n=110-571). In terms of adverse events, there was no clinical difference between the groups for the major adverse event ureteral stricture, or for the minor adverse events fever or UTI (2-3studies; n=257-434). There was a clinical benefit of URS alone for all the stent symptom outcomes (dysuria, urgency, urgency/frequency and haematuria) (2-4 studies; n=214-544).

The quality of the evidence ranged from Moderate to Very Low. The main reasons for downgrading evidence included risk of bias, imprecision and in some cases, inconsistency.

1.7.2 Health economic evidence statements

- One comparative cost analysis found that routine stenting was more costly than non-routine stenting after uncomplicated semi-rigid ureteroscopy (cost difference: £121). This analysis was assessed as partially applicable with potentially serious limitations.

1.8 The committee's discussion of the evidence

1.8.1 Interpreting the evidence

1.8.1.1 The outcomes that matter most

The committee agreed that stone-free state, recurrence, use of healthcare services including remission, length of stay, retreatment and ancillary procedures, kidney function, quality of life, failed technology, major adverse events, minor adverse events and stent symptoms were the outcomes that were critical for decision making. Pain was also considered as an important outcome.

There was no evidence for the critical outcomes of quality of life, failed technology or kidney function.

1.8.1.2 The quality of the evidence

Evidence was reported for stone-free state, recurrence rate, use of healthcare services, major adverse events, minor adverse events, stent symptoms and pain.

All evidence ranged from a GRADE rating of very low to moderate quality. There was inadequate randomisation, leading to the presence of selection bias, and a lack of blinding, resulting in a high risk of bias rating. Additionally, the imprecise nature of the results further downgraded the quality of the evidence. In six outcomes, the presence of heterogeneity unexplained by subgroups resulted in a further downgrade of the quality of the evidence.

1.8.1.3 Benefits and harms

All of the identified evidence was for adults with ureteric stones. There was no evidence identified for the paediatric population. Evidence for people with both symptomatic and asymptomatic stones was searched for; however no evidence was identified for the asymptomatic population. No evidence was found for the use of stents after SWL or PCNL. Additionally, no evidence was identified for the renal stone population. The committee therefore agreed that the recommendations should only apply to adults with symptomatic ureteric stones.

Adults, ureteric, <10mm

The committee considered the evidence for this stratum, and noted that there was no clinical difference between the groups for any of the stone-free state, readmission, ancillary procedures, length of stay or adverse event outcomes. There was no clinical difference between the groups in terms of overall pain and flank pain, but a clinical benefit of no stent in terms of abdominal pain and bladder pain. The committee considered that abdominal and bladder pain is likely to be a measure of stent symptoms, rather than pain relating to a surgical procedure, and therefore it is expected that for these outcomes, there is a benefit of no stent over stenting after surgery. The evidence demonstrated a clinical benefit of no stent

in terms of all stent related symptoms which included dysuria, haematuria, irritative symptoms, frequency and urgency.

The committee noted that the majority of the included studies randomised the participants at the end of the procedure, and that this may have implications in terms of the applicability and validity of the results. It was also noted that many of the papers excluded high risk patients or those with complicated procedures, such as those with mucosal damage, bleeding or ureteral perforation, residual fragments, solitary kidney, and bilateral stones. The committee therefore discussed that the evidence may reflect a low risk population only, which may not be representative of real practice.

The committee noted that the rates of readmission were lower than expected from clinical practice for both the stented and non-stented groups, but considered that this may be due to the population consisting of low risk people.

Adults, ureteric, 10-20mm

The committee noted that there was no clinical difference between the groups in terms of stone-free state, readmission, recurrence, length of stay, pain, or any major or minor adverse events. There was a clinical benefit of no stent in terms of all stent symptoms.

The committee noted that as with the <10mm stratum, the majority of the studies for this stratum also randomised participants at the end of the procedure, and excluded high risk participants or those with complicated procedures. Therefore, the committee noted that the evidence for this stratum may also have implications in terms of applicability and validity.

Overall, the committee concluded that there was no evidence of a benefit of stenting following URS for people with ureteric stones <10mm or 10-20mm. Given the lack of any clinical benefit of stenting, but high risk of stent symptoms, the committee agreed that stents should not be routinely offered for people with ureteric stones <20mm. The committee noted that stents may be considered where further treatment is anticipated, or there is evidence of infection/obstruction, a solitary kidney and/or for a Clavien-Dindo Grade 3 complication.

No evidence was found for ureteric stones >20mm, the committee decided not to make a recommendation for this group because they are a small group and so clinician judgement should be used. Additionally, stents may be used more in larger stones because the size of the stone may require more than one treatment, and stent placement will better facilitate this.

1.8.2 Cost effectiveness and resource use

One economic evaluation was included for this question. This was a comparative costing study from Austria, comparing routine stenting versus non-routine stenting following uncomplicated semi-rigid ureteroscopy for stone removal. A decision tree model was used, with the complications and resource use associated with the interventions identified from RCTs. The study found that non-routine stenting was cheaper than routine stenting. The study was rated as partially applicable because it was non UK, it only compared costs, it was a mixed population because the RCTs informing inputs were covering different types and sizes of stones. The study was rated as having potentially serious limitations for reasons such as; it was unclear what time horizon was, and costs may not be as applicable to the UK.

Another economic evaluation was identified for this question but was excluded because it was based on observational data that was not in keeping with the clinical review. It also reported different findings to that of the clinical review; for example, it did not find any differences in terms of readmission.

All the clinical review data identified involved stenting after URS. A stent following surgery is likely to be inserted at the time of the surgery, but this will involve an additional procedure to remove the stent later on. Therefore it involves more resources than the no stent approach. Stents can also have adverse events, being uncomfortable for patients - which has a quality

of life impact, and also cause infections. Stent symptoms can involve resource use through the patient seeking healthcare advice such as GP time or hospital attendances, and pain relief or other drugs may also be given. If stents cost more, and it is uncertain if they have benefit but may have adverse events, this would imply they are unlikely to be cost effective. The clinical review data only identified a clinical benefit of the stent symptom outcomes (favouring no stent), and for ureteric stones <10mm the pain outcomes also favoured no stent.

The committee discussed the studies and thought it was a limitation that most of the studies seem to randomise after the procedure. This can bias the results because it means patients are excluded that may have complications, which is generally the group that a stent should be reserved for. Therefore although it would appear stents have no benefit being routinely used, the studies do not necessarily provide information on whom to stent. The stone free outcome was also discussed as not being as important as the other outcomes because a stent can make fragments harder to see on imaging when assessing stone free status, and the stent is not necessarily being used to improve stone free rates so this outcome wasn't considered as important.

The committee felt that the evidence provided support to a recommendation on not using a stent routinely. The committee considered making a recommendation outlining when stenting post-surgery should take place, but felt that this should be up to the clinician to decide if a patient is likely to suffer from complications, and did not think it appropriate to list every possible complication in a recommendation.

Stents are currently used in practice after a URS procedure. National audit data suggest this is used in around 70% of cases in adults. The committee commented on the fact that clinicians may feel uncomfortable with changing practice and not using a stent. The benefits and harms section provides more information about the study exclusions which are the populations the committee felt a stent would apply to. This recommendation is likely to lead to cost savings.

No data was identified on children. Committee opinion was that stent use post-surgery in children can be variable in UK practice (about 35-50%) but is lower than in adults. The committee thought it should be up to clinician judgement to decide about the use of stents in children and did not want to make a consensus recommendation without any evidence to help support this.

1.8.3 Other factors the committee took into account

The committee noted from their own clinical experience use of stents is associated with higher rates of infection and pain. Discussion with patients of the possible adverse effects is very important in order to inform patients when considering whether to have a stent. The committee considered that the insertion of stents as a post-surgical procedure is not necessary for the majority of the people, but may be needed where further treatment is anticipated, or there is evidence of infection/obstruction, a solitary kidney and/or for a Clavien-Dindo Grade 3 complication.

The committee noted that there was no evidence for the paediatric population, and discussed current practice for this population. It was noted that children often have a stent inserted after URS regardless of stone size; however that committee agreed that clinicians should use clinical judgement in determining if a stent should be used.

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Appendices

Appendix A: Review protocols

Table 7: Review protocol: Is inserting a stent clinically and cost-effective after surgical treatment in people with renal or ureteric stones?

Field	Content
Review question	Is inserting a stent clinically and cost-effective after surgical treatment in people with renal or ureteric stones?
Type of review question	Intervention review A review of health economic evidence related to the same review question was conducted in parallel with this review. For details see the health economic review protocol for this NICE guideline.
Objective of the review	To find whether inserting a stent after a surgical procedure leads to better outcomes in people with renal and ureteric stones.
Eligibility criteria – population / disease / condition / issue / domain	People (adults, children and young people) with symptomatic and asymptomatic renal or ureteric stones
Eligibility criteria – intervention(s) / exposure(s) / prognostic factor(s)	Insertion of a stent after a surgical procedure (SWL, or URS/RIRS or PCNL)
Eligibility criteria – comparator(s) / control or reference (gold) standard	Surgical procedure (SWL, or URS/RIRS or PCNL) alone
Outcomes and prioritisation	Critical outcomes: • Stone-free state (including residual fragment) • Recurrence • Use of healthcare services (length of stay, readmission, retreatment or ancillary procedure) • Kidney function • Quality of life • Major adverse events (infective complications [sepsis, obstructive pyelonephritis], ureteric injury [ureteral damage, ureteral perforation, ureteral stricture], mortality) • Minor adverse events (infective complications [UTI, fever, infection], ureteric injury [extravasation, submucosal dissection], haemorrhage [any bleeding, transfusion]) • Failure to treat (inaccessible stone, stone not seen/reached) • Stent symptoms (dysuria, irritative symptoms, haematuria, frequency, urgency, nocturia) Important outcomes: • Pain intensity (visual analogue scale)
Eligibility criteria – study design	Randomised controlled trials (RCTs). If no RCT evidence for children is available, cohort studies will be considered.
Other inclusion exclusion criteria	Exclude: Bladder stones Open surgery for renal (kidney and ureteric) stones Laparoscopic nephrolithotomy and pyelolithotomy Non-English language studies

Proposed sensitivity / subgroup analysis, or meta-regression	Strata:
	• Population
	  ○ Adults (≥16 years)
	  ○ Children and young people (<16 years)
	• Stone size:
	  ○ <1 cm
	  ○ 1-2 cm
	  ○ >2 cm
	  ○ staghorn
	• Stone site (not lower/upper pole):
	  ○ Renal stone
	  ○ Ureteric stone
	Subgroups:
	• Symptomatic/ Asymptomatic
	• Pregnant women
	• Lower/non-lower kidney pole
	• Upper/lower ureteric stones
	• Stone composition/hounsfield units
	• Obesity /skin-to-stone distance
	• Neuropathic/ cerebral-palsy /immobility

Selection process – duplicate screening / selection / analysis	Studies are sifted by title and abstract. Potentially significant publications obtained in full text are then assessed against the inclusion criteria specified in this protocol.
Data management (software)	• Pairwise meta-analyses performed using Cochrane Review Manager (RevMan5). • GRADEpro used to assess the quality of evidence for each outcome • Endnote for bibliography, citations, sifting and reference management • Data extractions performed using EviBase, a platform designed and maintained by the National Guideline Centre (NGC)
Information sources – databases and dates	Clinical search databases to be used: Medline, Embase, Cochrane Library Date: all years Health economics search databases to be used: Medline, Embase, NHSEED, HTA Date: Medline, Embase from 2014 NHSEED, HTA – all years Language: Restrict to English only Supplementary search techniques: backward citation searching Key papers: Not known
Identify if an update	Not applicable
Author contacts	https://www.nice.org.uk/guidance/indevelopment/gid-ng10033
Highlight if amendment to previous protocol	For details please see section 4.5 of Developing NICE guidelines: the manual.
Search strategy – for one database	For details please see appendix B
Data collection process – forms / duplicate	A standardised evidence table format will be used, and published as appendix D of the evidence report.
Data items – define all variables to be collected	For details please see evidence tables in Appendix D (clinical evidence tables) or H (health economic evidence tables).

Methods for assessing bias at outcome / study level	Standard study checklists were used to critically appraise individual studies. For details please see section 6.2 of Developing NICE guidelines: the manual The risk of bias across all available evidence was evaluated for each outcome using an adaptation of the 'Grading of Recommendations Assessment, Development and Evaluation (GRADE) toolbox' developed by the international GRADE working group http://www.gradeworkinggroup.org/
Criteria for quantitative synthesis	For details please see section 6.4 of Developing NICE guidelines: the manual.
Methods for quantitative analysis – combining studies and exploring (in)consistency	For details please see the separate Methods report for this guideline.
Meta-bias assessment – publication bias, selective reporting bias	For details please see section 6.2 of Developing NICE guidelines: the manual. [Consider exploring publication bias for review questions where it may be more common, such as pharmacological questions, certain disease areas, etc. Describe any steps taken to mitigate against publication bias, such as examining trial registries.]
Confidence in cumulative evidence	For details please see sections 6.4 and 9.1 of Developing NICE guidelines: the manual.
Rationale / context – what is known	For details please see the introduction to the evidence review.
Describe contributions of authors and guarantor	A multidisciplinary committee developed the evidence review. The committee was convened by the National Guideline Centre (NGC) and chaired by Andrew Dickinson in line with section 3 of Developing NICE guidelines: the manual. Staff from NGC undertook systematic literature searches, appraised the evidence, conducted meta-analysis and cost-effectiveness analysis where appropriate, and drafted the evidence review in collaboration with the committee. For details please see Developing NICE guidelines: the manual.
Sources of funding / support	NGC is funded by NICE and hosted by the Royal College of Physicians.
Name of sponsor	NGC is funded by NICE and hosted by the Royal College of Physicians.
Roles of sponsor	NICE funds NGC to develop guidelines for those working in the NHS, public health and social care in England.
PROSPERO registration number	Not registered

Table 8: Health economic review protocol

Review question	All questions – health economic evidence
Objectives	To identify economic studies relevant to any of the review questions.
Search criteria	• Populations, interventions and comparators must be as specified in the individual review protocol above. • Studies must be of a relevant economic study design (cost-utility analysis, cost-effectiveness analysis, cost-benefit analysis, cost-consequences analysis, comparative cost analysis).

	• Studies must not be a letter, editorial or commentary, or a review of economic evaluations. (Recent reviews will be ordered although not reviewed. The bibliographies will be checked for relevant studies, which will then be ordered.) • Unpublished reports will not be considered unless submitted as part of a call for evidence. • Studies must be in English.
Search strategy	An economic study search will be undertaken using population-specific terms and an economic study filter – see Appendix G *[in the Full guideline]*.
Review strategy	Studies not meeting any of the search criteria above will be excluded. Studies published before 2002, abstract-only studies and studies from non-OECD countries or the USA will also be excluded. Each remaining study will be assessed for applicability and methodological limitations using the NICE economic evaluation checklist which can be found in Appendix G of the 2014 NICE guidelines manual.[56] **Inclusion and exclusion criteria** • If a study is rated as both 'Directly applicable' and with 'Minor limitations' then it will be included in the guideline. An economic evidence table will be completed and it will be included in the economic evidence profile. • If a study is rated as either 'Not applicable' or with 'Very serious limitations' then it will usually be excluded from the guideline. If it is excluded then an economic evidence table will not be completed and it will not be included in the economic evidence profile. • If a study is rated as 'Partially applicable', with 'Potentially serious limitations' or both then there is discretion over whether it should be included. **Where there is discretion** The health economist will make a decision based on the relative applicability and quality of the available evidence for that question, in discussion with the Committee if required. The ultimate aim is to include economic studies that are helpful for decision-making in the context of the guideline and the current NHS setting. If several studies are considered of sufficiently high applicability and methodological quality that they could all be included, then the health economist, in discussion with the Committee if required, may decide to include only the most applicable studies and to selectively exclude the remaining studies. All studies excluded on the basis of applicability or methodological limitations will be listed with explanation as excluded economic studies in Appendix M. The health economist will be guided by the following hierarchies. *Setting:* • UK NHS (most applicable). • OECD countries with predominantly public health insurance systems (for example, France, Germany, Sweden). • OECD countries with predominantly private health insurance systems (for example, Switzerland). • Studies set in non-OECD countries or in the USA will have been excluded before being assessed for applicability and methodological limitations. *Economic study type:* • Cost-utility analysis (most applicable). • Other type of full economic evaluation (cost-benefit analysis, cost-effectiveness analysis, cost-consequences analysis). • Comparative cost analysis. • Non-comparative cost analyses including cost-of-illness studies will have been excluded before being assessed for applicability and methodological limitations.

	Year of analysis: • The more recent the study, the more applicable it will be. • Studies published in 2002 or later but that depend on unit costs and resource data entirely or predominantly from before 2002 will be rated as 'Not applicable'. • Studies published before 2002 will have been excluded before being assessed for applicability and methodological limitations. *Quality and relevance of effectiveness data used in the economic analysis:* • The more closely the clinical effectiveness data used in the economic analysis matches with the outcomes of the studies included in the clinical review the more useful the analysis will be for decision-making in the guideline.

Appendix B: Literature search strategies

The literature searches for this review are detailed below and complied with the methodology outlined in Developing NICE guidelines: the manual 2014, updated 2017 https://www.nice.org.uk/guidance/pmg20/resources/developing-nice-guidelines-the-manual-pdf-72286708700869

For more detailed information, please see the Methodology Review. [Add cross reference]

B.1 Clinical search literature search strategy

Searches were constructed using a PICO framework where population (P) terms were combined with Intervention (I) and in some cases Comparison (C) terms. Outcomes (O) are rarely used in search strategies for interventions as these concepts may not be well described in title, abstract or indexes and therefore difficult to retrieve. Search filters were applied to the search where appropriate.

Table 9: Database date parameters and filters used

Database	Dates searched	Search filter used
Medline (OVID)	1946 – 12 September 2017	Exclusions Randomised controlled trials Systematic review studies Observational studies
Embase (OVID)	1974 – 12 September 2017	Exclusions Randomised controlled trials Systematic review studies Observational studies
The Cochrane Library (Wiley)	Cochrane Reviews to 2017 Issue 9 of 12 CENTRAL to 2017 Issue 8 of 12 DARE, and NHSEED to 2015 Issue 2 of 4 HTA to 2016 Issue 4 of 4	None

Medline (Ovid) search terms

1.	exp urolithiasis/
2.	(nephrolitiasis or nephrolith or nephroliths or urolithias?s or ureterolithias?s).ti,ab.
3.	((renal or kidney* or urinary or ureter* or urethra*) adj3 (stone* or calculi or calculus or calculosis or lithiasis or c?olic*)).ti,ab.
4.	stone disease*.ti,ab.

5.	((calculi or calculus or calcium oxalate or cystine) adj3 (crystal* or stone* or lithiasis)).ti,ab.
6.	or/1-5
7.	letter/
8.	editorial/
9.	news/
10.	exp historical article/
11.	Anecdotes as Topic/
12.	comment/
13.	case report/
14.	(letter or comment*).ti.
15.	or/7-14
16.	randomized controlled trial/ or random*.ti,ab.
17.	15 not 16
18.	animals/ not humans/
19.	exp Animals, Laboratory/
20.	exp Animal Experimentation/
21.	exp Models, Animal/
22.	exp Rodentia/
23.	(rat or rats or mouse or mice).ti.
24.	or/17-23
25.	6 not 24
26.	limit 25 to English language
27.	exp Stents/
28.	stent*.ti,ab.
29.	exp Catheters/ or exp Cannula/
30.	(catheter* or cannul*).ti,ab.
31.	or/27-30
32.	26 and 31
33.	randomized controlled trial.pt.
34.	controlled clinical trial.pt.
35.	randomi#ed.ti,ab.
36.	placebo.ab.
37.	randomly.ti,ab.
38.	Clinical Trials as topic.sh.
39.	trial.ti.
40.	or/33-39
41.	Meta-Analysis/
42.	exp Meta-Analysis as Topic/
43.	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.
44.	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.
45.	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
46.	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
47.	(search* adj4 literature).ab.

48.	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
49.	cochrane.jw.
50.	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.
51.	or/41-50
52.	Epidemiologic studies/
53.	Observational study/
54.	exp Cohort studies/
55.	(cohort adj (study or studies or analys* or data)).ti,ab.
56.	((follow up or observational or uncontrolled or non randomi#ed or epidemiologic*) adj (study or studies or data)).ti,ab.
57.	((longitudinal or retrospective or prospective or cross sectional) and (study or studies or review or analys* or cohort* or data)).ti,ab.
58.	Controlled Before-After Studies/
59.	Historically Controlled Study/
60.	Interrupted Time Series Analysis/
61.	(before adj2 after adj2 (study or studies or data)).ti,ab.
62.	or/52-61
63.	exp case control study/
64.	case control*.ti,ab.
65.	or/63-64
66.	62 or 65
67.	Cross-sectional studies/
68.	(cross sectional and (study or studies or review or analys* or cohort* or data)).ti,ab.
69.	or/67-68
70.	62 or 69
71.	62 or 65 or 69
72.	32 and 40
73.	32 and 51
74.	72 or 73
75.	32 and 71
76.	75 not 74

Embase (Ovid) search terms

1.	exp urolithiasis/
2.	(nephrolitiasis or nephrolith or nephroliths or urolithias?s or ureterolithias?s).ti,ab.
3.	((renal or kidney* or urinary or ureter* or urethra*) adj3 (stone* or calculi or calculus or calculosis or lithiasis or c?olic*)).ti,ab.
4.	stone disease*.ti,ab.
5.	((calculi or calculus or calcium oxalate or cystine) adj3 (crystal* or stone* or lithiasis)).ti,ab.
6.	or/1-5
7.	letter.pt. or letter/
8.	note.pt.
9.	editorial.pt.
10.	case report/ or case study/
11.	(letter or comment*).ti.

12.	or/7-11
13.	randomized controlled trial/ or random*.ti,ab.
14.	12 not 13
15.	animal/ not human/
16.	nonhuman/
17.	exp Animal Experiment/
18.	exp Experimental Animal/
19.	animal model/
20.	exp Rodent/
21.	(rat or rats or mouse or mice).ti.
22.	or/14-21
23.	6 not 22
24.	limit 23 to English language
25.	exp stent/
26.	stent*.ti,ab.
27.	exp catheter/ or exp cannula/
28.	(catheter* or cannul*).ti,ab.
29.	or/25-28
30.	24 and 29
31.	random*.ti,ab.
32.	factorial*.ti,ab.
33.	(crossover* or cross over*).ti,ab.
34.	((doubl* or singl*) adj blind*).ti,ab.
35.	(assign* or allocat* or volunteer* or placebo*).ti,ab.
36.	crossover procedure/
37.	single blind procedure/
38.	randomized controlled trial/
39.	double blind procedure/
40.	or/31-39
41.	systematic review/
42.	meta-analysis/
43.	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.
44.	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.
45.	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
46.	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
47.	(search* adj4 literature).ab.
48.	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
49.	cochrane.jw.
50.	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.
51.	or/41-50
52.	Clinical study/
53.	Observational study/
54.	family study/

55.	longitudinal study/
56.	retrospective study/
57.	prospective study/
58.	cohort analysis/
59.	follow-up/
60.	cohort*.ti,ab.
61.	59 and 60
62.	(cohort adj (study or studies or analys* or data)).ti,ab.
63.	((follow up or observational or uncontrolled or non randomi#ed or epidemiologic*) adj (study or studies or data)).ti,ab.
64.	((longitudinal or retrospective or prospective or cross sectional) and (study or studies or review or analys* or cohort* or data)).ti,ab.
65.	(before adj2 after adj2 (study or studies or data)).ti,ab.
66.	or/52-58,61-65
67.	exp case control study/
68.	case control*.ti,ab.
69.	or/67-68
70.	66 or 69
71.	cross-sectional study/
72.	(cross sectional and (study or studies or review or analys* or cohort* or data)).ti,ab.
73.	or/71-72
74.	66 or 73
75.	66 or 69 or 73
76.	30 and 40
77.	30 and 51
78.	76 or 77
79.	30 and 75
80.	79 not 78

Cochrane Library (Wiley) search terms

#1.	MeSH descriptor: [Urolithiasis] explode all trees
#2.	(nephrolitiasis or nephrolith or nephroliths or urolithias?s or ureterolithias?s):ti,ab
#3.	((renal or kidney* or urinary or ureter* or urethra*) near/3 (stone* or calculi or calculus or calculosis or lithiasis or c?olic*)):ti,ab
#4.	stone disease*:ti,ab
#5.	((calculi or calculus or calcium oxalate or cystine) near/3 (crystal* or stone* or lithiasis)):ti,ab
#6.	(or #1-#5)
#7.	MeSH descriptor: [Stents] explode all trees
#8.	stent*:ti,ab
#9.	MeSH descriptor: [Catheters] explode all trees
#10.	MeSH descriptor: [Cannula] explode all trees
#11.	catheter*:ti,ab
#12.	cannul*:ti,ab
#13.	(or #7-#12)
#14.	#6 and #13

B.2 Health Economics literature search strategy

Health economic evidence was identified by conducting a broad search relating to renal and ureteric stones population in NHS Economic Evaluation Database (NHS EED – this ceased to be updated after March 2015) and the Health Technology Assessment database (HTA) with no date restrictions. NHS EED and HTA databases are hosted by the Centre for Research and Dissemination (CRD). Additional searches were run on Medline and Embase for health economics studies.

Table 10: Database date parameters and filters used

Database	Dates searched	Search filter used
Medline	For health economics 2014 – 9 March 2018	Exclusions Health economics studies
Embase	For health economics 2014 – 9 March 2018	Exclusions Health economics studies
Centre for Research and Dissemination (CRD)	HTA - Inception – 9 March 2018 NHSEED - Inception to March 2015	None

Medline (Ovid) search terms

1.	exp urolithiasis/
2.	(nephrolitiasis or nephrolith or nephroliths or urolithias?s or ureterolithias?s).ti,ab.
3.	((renal or kidney* or urinary or ureter* or urethra*) adj3 (stone* or calculi or calculus or calculosis or lithiasis or c?olic*)).ti,ab.
4.	stone disease*.ti,ab.
5.	((calculi or calculus or calcium oxalate or cystine) adj3 (crystal* or stone* or lithiasis)).ti,ab.
6.	or/1-5
7.	letter/
8.	editorial/
9.	news/
10.	exp historical article/
11.	Anecdotes as Topic/
12.	comment/
13.	case report/
14.	(letter or comment*).ti.
15.	or/7-14
16.	randomized controlled trial/ or random*.ti,ab.
17.	15 not 16
18.	animals/ not humans/
19.	exp Animals, Laboratory/
20.	exp Animal Experimentation/
21.	exp Models, Animal/
22.	exp Rodentia/
23.	(rat or rats or mouse or mice).ti.
24.	or/17-23
25.	6 not 24

26.	limit 25 to English language
27.	Economics/
28.	Value of life/
29.	exp "Costs and Cost Analysis"/
30.	exp Economics, Hospital/
31.	exp Economics, Medical/
32.	Economics, Nursing/
33.	Economics, Pharmaceutical/
34.	exp "Fees and Charges"/
35.	exp Budgets/
36.	budget*.ti,ab.
37.	cost*.ti.
38.	(economic* or pharmaco?economic*).ti.
39.	(price* or pricing*).ti,ab.
40.	(cost* adj2 (effective* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
41.	(financ* or fee or fees).ti,ab.
42.	(value adj2 (money or monetary)).ti,ab.
43.	or/27-42
44.	26 and 43

Embase (Ovid) search terms

1.	exp urolithiasis/
2.	(nephrolitiasis or nephrolith or nephroliths or urolithias?s or ureterolithias?s).ti,ab.
3.	((renal or kidney* or urinary or ureter* or urethra*) adj3 (stone* or calculi or calculus or calculosis or lithiasis or c?olic*)).ti,ab.
4.	stone disease*.ti,ab.
5.	((calculi or calculus or calcium oxalate or cystine) adj3 (crystal* or stone* or lithiasis)).ti,ab.
6.	or/1-5
7.	letter.pt. or letter/
8.	note.pt.
9.	editorial.pt.
10.	case report/ or case study/
11.	(letter or comment*).ti.
12.	or/7-11
13.	randomized controlled trial/ or random*.ti,ab.
14.	12 not 13
15.	animal/ not human/
16.	nonhuman/
17.	exp Animal Experiment/
18.	exp Experimental Animal/
19.	animal model/
20.	exp Rodent/

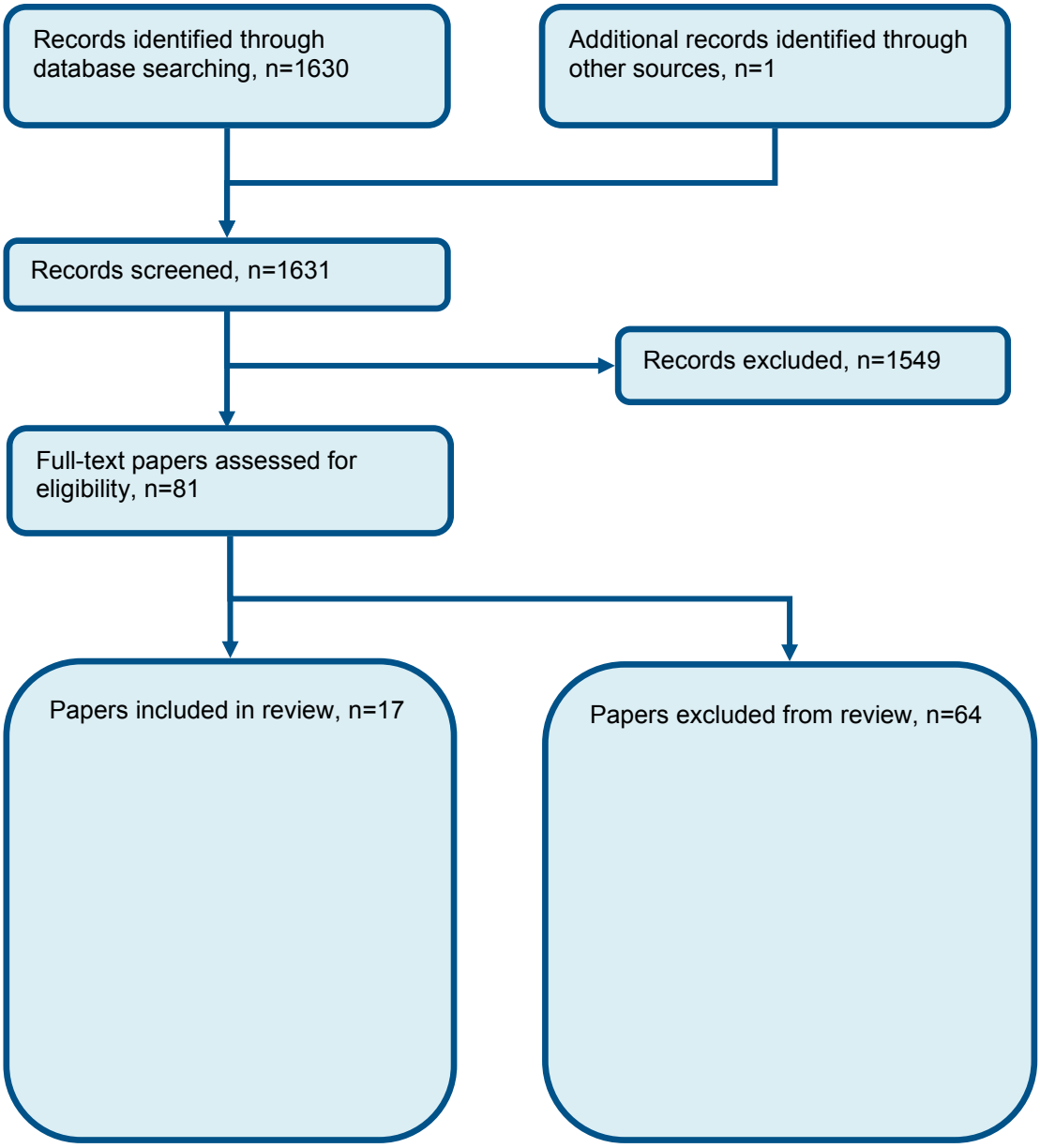
21.	(rat or rats or mouse or mice).ti.
22.	or/14-21
23.	6 not 22
24.	limit 23 to English language
25.	health economics/
26.	exp economic evaluation/
27.	exp health care cost/
28.	exp fee/
29.	budget/
30.	funding/
31.	budget*.ti,ab.
32.	cost*.ti.
33.	(economic* or pharmaco?economic*).ti.
34.	(price* or pricing*).ti,ab.
35.	(cost* adj2 (effective* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
36.	(financ* or fee or fees).ti,ab.
37.	(value adj2 (money or monetary)).ti,ab.
38.	or/25-37
39.	24 and 38

NHS EED and HTA (CRD) search terms

#1.	MeSH DESCRIPTOR urolithiasis EXPLODE ALL TREES
#2.	(((nephrolitiasis or nephrolith or urolithiasis)))
#3.	((((renal or kidney or urinary or ureteric or ureteral or ureter or urethra*) adj2 (stone* or calculi or calculus or calculosis or lithiasis or colic))))
#4.	((stone disease*))
#5.	((((calculi or calculus) adj2 (stone* or lithiasis))))
#6.	(#1 OR #2 OR #3 OR #4 OR #5)

Appendix C: Clinical evidence selection

Figure 1: Flow chart of clinical study selection for the review of Is inserting a stent clinically and cost-effective after surgical treatment in people with renal or ureteric stones?



Appendix D: Clinical evidence tables

Study	Al-ba'adani 2006[3]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=85)
Countries and setting	Conducted in Yemen; Setting: Not reported
Line of therapy	Unclear
Duration of study	Not clear:
Method of assessment of guideline condition	Unclear method of assessment/diagnosis
Stratum	Adults (≥16 years), ureteric stone <1 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Not reported
Exclusion criteria	Not reported
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): stented group 34.35±13.36; non-stented group 34.36±15.53. Gender (M:F): 69:16. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Not stated / Unclear 5. Stone composition/hounsfield units: Not stated / Unclear 6. Uteric stone: Not stated / Unclear
Indirectness of population	No indirectness
Interventions	(n=40) Intervention 1: Stent after surgery - URS. The procedure was carried out under general anesthesia and by direct entering of the ureter without prior dilatation of the ureter, as a semirigid ureteroscope was used, which is graduated between 8-11Fr. The patients were randomly categorized into 2 groups according to leaving a stent to the end of the procedure or not. . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness (n=45) Intervention 2: Ureteroscopy or RIRS - Semi-rigid or flexible. The procedure was carried out under general anesthesia and by direct entering of the ureter without prior dilatation of the ureter, as a semirigid ureteroscope was used, which is graduated between 8-11Fr. The patients were randomly categorized into 2 groups according to leaving a stent to the end of the procedure or not. . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Length of stay at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Length of stay (hours) at Not reported; Group 1: mean 25.5 Hours (SD 9.8); n=10, Group 2: mean 20.5 Hours (SD 7.1); n=45
Risk of bias: All domain - High, Selection - Very high, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Stone free state at Not reported; Group 1: 39/40, Group 2: 45/45
Risk of bias: All domain - Very high, Selection - Very high, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcomes not reported by the study	Quality of life at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Adverse events at Define; Pain intensity at Define; Hospitalisation at Define

Study	**Baseskioglu 2011[8]**
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=505)
Countries and setting	Conducted in Turkey; Setting: Not reported
Line of therapy	1st line
Duration of study	Intervention + follow up: 1 year
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: Patients were diagnosed by IVU (Intravenous urography), plain KUB (Kidney, ureter, bladder) X-ray, US (Ultrasonography), and CT (Noncontract abdominal computed tomography)
Stratum	Adults (≥16 years), ureteric stone 1-2 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients from two institutions, undergoing ureteroscopy for urolithiasis,

Exclusion criteria	Exclusion criteria were previous ureteroscopy or stenting, evidence of active infection, pregnancy, suspicion of urothelial cancer, and age under 18 years old. Patients with perioperative complications were also excluded. A complicated procedure was defined as one causing mucosal damage, bleeding or ureteral perforation, or with residual stones >0.5 cm, or ureteral stones over 2 cm in size which mostly causes prolonged operation time (>1.5 h). Patients in whom ureteral orifice dilatation was not indicated were also excluded.
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): Stent group 45.4 ± 15.9; no stent group 45.2 ± 16.49. Gender (M:F): 103:183. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Non-pregnant 5. Stone composition/hounsfield units: Not stated / Unclear 6. Uteric stone: Not stated / Unclear (Distal 75.9%; mid 18.5%; proximal 5.6%).
Indirectness of population	No indirectness
Interventions	(n=144) Intervention 1: Stent after surgery - URS. Procedures were done under general or spinal anesthesia according to the decision of the anesthesiologists after discussion with patients. After cystoscopy, the ureteral orifices were visualized and a safety guide wire was placed retrogradely. Rigid, 9.8 Fr ureteroscopes (Wolf Medical Instruments IL, USA) were used in both centres. Balloon dilatation of the ureteral orifices was not performed in patients in whom 9.8 Fr ureteroscopes were easily passed through the ureteral orifice during first attempt. Balloon dilatation of the ureteral orifice was done in all other patients enrolled in the study. For this purpose, UromaxTM (18Fr-4 cm from Boston Scientific, USA) Balloon dilatators were applied for approximately two or 3 min. Stones were completely fragmented with SphinxTM (Lisa laser products, Lindau) holmium laser or CalcusplitTM (Karls Storz, Germany) pneumatic lithotripsy devices. Stones were extracted by grasper forceps. Followed by stent placement. Duration Not applicable . Concurrent medication/care: All patients were given a single prophylactic dose of 400 mg ciprofloxacin intravenously.. Indirectness: No indirectness (n=142) Intervention 2: Surgery alone - URS. Procedures were done under general or spinal anesthesia according to the decision of the anesthesiologists after discussion with patients. After cystoscopy, the ureteral orifices were visualized and a safety guide wire was placed retrogradely. Rigid, 9.8 Fr ureteroscopes (Wolf Medical Instruments IL, USA) were used in both centres. Balloon dilatation of the ureteral orifices was not performed in patients in whom 9.8 Fr ureteroscopes were easily passed through the ureteral orifice during first attempt. Balloon dilatation of the ureteral orifice was done in all other patients enrolled in the study. For this purpose, UromaxTM (18Fr-4 cm from Boston Scientific, USA) Balloon dilatators were applied for approximately two or 3 min. Stones were completely fragmented with SphinxTM (Lisa laser products, Lindau) holmium laser or CalcusplitTM (Karls Storz, Germany) pneumatic lithotripsy devices. Stones were extracted by grasper forceps. No stent was placed at the end of the procedure. Duration Not applicable.

	Concurrent medication/care: All patients were given a single prophylactic dose of 400 mg ciprofloxacin intravenously.. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Hospitalisation at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Rehospitalisation at Not reported; Group 1: 5/144, Group 2: 4/142
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 0; Group 2 Number missing: 0

Protocol outcome 2: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Stone-free state at 3 months; Group 1: 140/144, Group 2: 139/142
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 0; Group 2 Number missing: 0

Protocol outcome 3: Pain intensity at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Pain at 2 weeks; Group 1: mean 2.93 (SD 1.26); n=144, Group 2: mean 2.79 (SD 1.13); n=142; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 0; Group 2 Number missing: 0

Protocol outcome 4: Stent symptoms at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: dysuria at 2 weeks; Group 1: 29/144, Group 2: 13/142
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 0; Group 2 Number missing: 0
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: urgency at 2 weeks; Group 1: 26/144, Group 2: 13/142
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 0; Group 2 Number missing: 0

Protocol outcomes not reported by the study	Quality of life at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Adverse events at Define; Length of stay at Define

Study	Borboroglu 2001[10]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=113)
Countries and setting	Conducted in Japan, USA; Setting: Not reported
Line of therapy	Unclear
Duration of study	Intervention + follow up:: 4 weeks
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: Either non contrast CT or intravenous pyelogram
Stratum	Adults (≥16 years), ureteric stone <1 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients who were 18 years or older and had distal ureteral calculi amenable to ureteroscopic management
Exclusion criteria	Patients who had a ureteral stent placed preoperatively
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): stent group 39.8 (13.7); no stent group 42.5 (14.6). Gender (M:F): 61:46. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Not stated / Unclear 5. Stone composition/hounsfield units: Not stated / Unclear 6. Ureteric stone: Lower ureteric stones
Indirectness of population	No indirectness
Interventions	(n=53) Intervention 1: Stent after surgery - URS. Ureteroscope size ranged from 6.0 to 9.5 Fr. Ureteroscopic baskets ranged from 3.0 to 4.5 Fr. The holmium YAG laser was the primary intracorporeal lithotrite used at all institutions except one, where electrohydraulic lithotripsy was used. Intraoperative ureteral dilation was primarily done with balloon dilation (15 and 18 Fr balloons), although in a minority of cases tapered semirigid dilation was used. The use of a dangler on the end of the stent to facilitate removal postoperatively was left to the discretion of the staff urologist. The vast majority of stents used were 6Fr in diamter, with the appropriate length determined by the surgeon intraoperatively. Stents were removed 3-10 days postoperatively. Duration Not applicable. Concurrent medication/care: Patients received intravenous narcotics, and/or ketorolac tromethamine and oral pain medication. Indirectness: No indirectness (n=60) Intervention 2: Surgery alone - URS. Same procedure as group 1, but no stent was placed at the end of the procedure. Duration Not applicable. Concurrent medication/care: Patients received intravenous narcotics, and/or ketorolac tromethamine and oral pain medication. Indirectness: No indirectness

Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS Protocol outcome 1: Hospitalisation at Define - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Readmission to hospital at 36 hours; Group 1: 0/53, Group 2: 4/54 Risk of bias: All domain - High, Selection - High, Blinding - Low, Incomplete outcome data - High, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 0; Group 2 Number missing: 6	
Protocol outcomes not reported by the study	Quality of life at Define; Treatment success (stone free state, clinically insignificant residual fragments) at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Adverse events at Define; Pain intensity at Define; Length of stay at Define

Study	**Cevik 2010[13]**
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=60)
Countries and setting	Conducted in Turkey; Setting: Not reported
Line of therapy	1st line
Duration of study	Intervention + follow up: 3 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: Not reported
Stratum	Adults (≥16 years), ureteric stone <1 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients with impacted ureteral stones who underwent ureteroscopic lithotripsy
Exclusion criteria	Patients with non-impacted stones, upper ureteral stones, radiolucent stone that made follow-up difficult, a solitary functioning kidney, significant concomitant ipsilateral renal stone load that necessitated further intervention after ureteroscopy, ureteral steinstrasse, preoperative ureteral stent placement or nephrostomy drainage, concomitant ureteral obstruction secondary to other causes such as stricture, failed ureteroscopic access to the stone, and intraoperative ureteral perforation
Recruitment/selection of patients	Not reported

Age, gender and ethnicity	Age - Mean (SD): Stent group 44.1 (15.2); unstented group 46.5 (12.5). Gender (M:F): 38:22. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Not stated / Unclear 5. Stone composition/hounsfield units: Not stated / Unclear 6. Uteric stone: Not stated / Unclear (Lower 75%; middle 25%).
Indirectness of population	No indirectness
Interventions	(n=30) Intervention 1: Stent after surgery - URS. The procedure was performed with the patient in the lithotomy position under general anesthesia. Patients underwent ureteroscopic pneumatic lithotripsy for lower and middle ureteral impacted calculi. The operation was performed with a rigid 8F semirigid ureteroscope without ureteral dilation. The ureteroscope was introduced just below the stone, and confirmation of its relation to the edematous and hyperemic ureteral mucosa was obtained by C-arm fluoroscopic imaging in cases where direct vision of the stone could not be obtained. After disintegration of the stone with the lithotripter, a safety zebra guidewire was placed. The fragments were removed with a grasping forceps or appropriate basket catheters. After removal of the stone fragments, retrograde ureterography was performed to exclude perforation, and real-time fluoroscopic examination was performed for reassurance of the completeness of the stone removal. Double J 4.8F multilength ureteral stents were placed cystoscopically. All stents were cystoscopically removed at the third post operative week. . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness (n=30) Intervention 2: Surgery alone - URS. he procedure was performed with the patient in the lithotomy position under general anesthesia. Patients underwent ureteroscopic pneumatic lithotripsy for lower and middle ureteral impacted calculi. The operation was performed with a rigid 8F semirigid ureteroscope without ureteral dilation. The ureteroscope was introduced just below the stone, and confirmation of its relation to the edematous and hyperemic ureteral mucosa was obtained by C-arm fluoroscopic imaging in cases where direct vision of the stone could not be obtained. After disintegration of the stone with the lithotripter, a safety zebra guidewire was placed. The fragments were removed with a grasping forceps or appropriate basket catheters. After removal of the stone fragments, retrograde ureterography was performed to exclude perforation, and real-time fluoroscopic examination was performed for reassurance of the completeness of the stone removal. . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Length of stay at Define

- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Length of stay at Not reported; Group 1: mean 0.9 Days (SD 0.6); n=30, Group 2: mean 0.8 Days (SD 0.4); n=30 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: Protocol outcome 2: Treatment success (stone free state, clinically insignificant residual fragments) at Define - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Stone free at 3 months; Group 1: 29/30, Group 2: 29/30 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: Protocol outcome 3: Use of healthcare services/retreatment at Define - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Ancillary procedures at 3 months; Group 1: 1/30, Group 2: 1/30 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: Protocol outcome 4: Adverse events at Define - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Fever at Not reported; Group 1: 3/30, Group 2: 2/30 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Urinary retention at Not reported; Group 1: 0/30, Group 2: 1/30 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: Protocol outcome 5: Stent symptoms at Define - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Stent related irritative symptoms at Not reported; Group 1: 28/30, Group 2: 3/30 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:	
Protocol outcomes not reported by the study	Quality of life at Define; New stone formation/incidence of stones/recurrence at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Pain intensity at Define; Hospitalisation at Define

Study	Chen 2002[19]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=60)
Countries and setting	Conducted in Taiwan; Setting: Not reported
Line of therapy	Unclear
Duration of study	Intervention + follow up: 28 days
Method of assessment of guideline condition	Unclear method of assessment/diagnosis
Stratum	Adults (≥16 years), ureteric stone <1 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients scheduled for ureteroscopic lithotripsy, how had not undergone any prior surgical management, such as ESWL or urinary stenting/diversion. Other inclusion criteria were stone 6-10mm, absence of polyp and stricture in the ureter and no mucosal injury or perforation during the operation.
Exclusion criteria	Not reported
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (range): stent group 44.6 (28-72); no stent group 38.8 (26-77). Gender (M:F): 41:19. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Not stated / Unclear 5. Stone composition/hounsfield units: Not stated / Unclear 6. Ureteric stone: Lower ureteric stones (80% lower; 6.7% middle; 13.3% upper).
Indirectness of population	No indirectness
Interventions	(n=30) Intervention 1: Stent after surgery - URS. The operation was performed with spinal anesthesia or intravenous sedation according to anesthesiologist preference or patient request. A 6Fr Wolf rigid ureteroscope was used in all patients with direct access to the calculi without ureteral dilation. All stones were disintegrated with a 1.9Fr electrohydraulic probe until fragments were smaller than 2mm in diameter which allowed for easy passage. No basket or stone retractor was used for stone removal. A 7Fr double pigtail ureteral stent was placed in the stented group for 3 days after ureteroscopy. The stent size was the same as that used by some urologists in the United States or Europe. . Duration Not applicable. Concurrent medication/care: Post operatively, patients were provided with prescriptions for 500mg acetaminophen orally as needed and extra 100mg propionic acid upon request. . Indirectness: No indirectness (n=30) Intervention 2: Surgery alone - URS. URS performed as in group 1, but no stent was placed at the

	end of the procedure. . Duration Not applicable. Concurrent medication/care: Post operatively, patients were provided with prescriptions for 500mg acetaminophen orally as needed and extra 100mg propionic acid upon request. . Indirectness: No indirectness
Funding	Funding not stated
RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS Protocol outcome 1: Treatment success (stone free state, clinically insignificant residual fragments) at Define - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Stone-free state at 7 days; Group 1: 30/30, Group 2: 30/30 Risk of bias: All domain - Very high, Selection - Very high, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Baseline details: Difference in age: stent group 44.6 (10.5); no stent group 38.8 (11.8); Group 1 Number missing: ; Group 2 Number missing: Protocol outcome 2: Pain intensity at Define - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Pain (loin discomfort) at 3 days; Group 1: mean 2.3 (SD 2.22); n=30, Group 2: mean 2.3 (SD 1.93); n=30; VAS 0-10 Top=High is poor outcome; Comments: Baseline scores: stent group 7.1 (1.03); no stent group 6.33 (1.81) Risk of bias: All domain - High, Selection - Very high, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Baseline details: Difference in age: stent group 44.6 (10.5); no stent group 38.8 (11.8); Group 1 Number missing: ; Group 2 Number missing: Protocol outcome 1: Stent symptoms at Define - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: irritative bladder symptoms at 3 days; Group 1: 25/30, Group 2: 4/30 Risk of bias: All domain - Very high, Selection - Very high, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Baseline details: Difference in age: stent group 44.6 (10.5); no stent group 38.8 (11.8); Group 1 Number missing: ; Group 2 Number missing:	
Protocol outcomes not reported by the study	Quality of life at Define; Hospitalisation at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Adverse events at Define; Length of stay at Define

Study	**Cheung 2003[20]**
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=58)
Countries and setting	Conducted in Hong Kong (China); Setting: Not reported
Line of therapy	Unclear

Duration of study	Intervention + follow up: 3 months
Method of assessment of guideline condition	Unclear method of assessment/diagnosis
Stratum	Adults (≥16 years), ureteric stone <1 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	People with unilateral ureteral stones, irrespective of stone load, location and severity of obstruction
Exclusion criteria	People with a radiolucent stone that made follow up by plain radiograph difficult, a solitary functioning kidney, significant concomitant ipsilateral renal stone load that required further intervention after ureteroscopy, ureteral steinstrasse, preoperative ureteral stenting or nephrostomy drainage, concomitant ureteral obstruction secondary to other causes such as stricture, failed ureteroscopic access to the stone, and intraoperative ureteral perforation
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): stent group 51.2 (15.3); unstented group 53.1 (13.0). Gender (M:F): 39:19. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Not stated / Unclear 5. Stone composition/hounsfield units: Not stated / Unclear 6. Ureteric stone: Not stated / Unclear (Mixed: 18/58 upper; 7/58 middle; 33/58 lower).
Indirectness of population	No indirectness
Interventions	(n=29) Intervention 1: Stent after surgery - URS. The procedure was a performed with the patient under either general or spinal anesthesia as decided by anesthesiologists after discussion with patients. A safety guidewire was inserted into the ureter by cystoscopy under fluoroscopic control. The ureteroscope was introduced without dilation of the ureteral orifice. Only semirigid ureteroscopes (6.5/7Fr) were used in all cases. Stones were broken by holmium laser into fragments less than 2mm, as assess by comparison with the laser fiber. Basket retrieval of the fragments into the bladder was performed at surgeon discretion. A retrograde pyelogram was done through the ureteroscope after lithotripsy to exclude ureteral perforation and to assess the presence of contrast material at the stone impaction site. The severity of stone impaction, ureteral trauma and edema were assessed endoscopically by a visual analogue scale where 0 represented none and 2 represented severe degree. The presence of severe ureteral trauma and edema at the end of the procedure did not exclude the patient from the study unless ureteral perforation was found on retrograde pyelography. In the stent group, a 6Fr24 or 26cm double -J stent was used at the end of retrograde pyelography . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness (n=29) Intervention 2: Surgery alone - URS. URS as in the stent group. At the end of the procedure no stent

	was placed. . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Stone free at 3 months; Group 1: 28/29, Group 2: 28/29
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Adverse events at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Fever at 10 days; Group 1: 3/29, Group 2: 3/29
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: UTI at 10 days; Group 1: 1/29, Group 2: 1/29
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Pain intensity at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Pain at 3 days; Group 1: mean 2.7 (SD 1.7); n=29, Group 2: mean 1 (SD 1.4); n=29; VAS 0-10 Top=High is poor outcome; Comments: No baseline values given
Risk of bias: All domain - Very high, Selection - Very high, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Baseline details: No baseline reported for pain; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 4: Stent symptoms at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Dysuria at 10 days; Group 1: 23/29, Group 2: 2/29
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Hematuria at 10 days; Group 1: 16/29, Group 2: 1/29
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcomes not reported by the study	Quality of life at Define; Hospitalisation at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Length of stay at Define

Study	**Damiano 2004[27]**
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=104)
Countries and setting	Conducted in Italy; Setting: Not reported
Line of therapy	1st line
Duration of study	Intervention + follow up: 6 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: Plain abdominal x-ray and/or ultrasound
Stratum	Adults (≥16 years), ureteric stone 1-2 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	People who underwent ureteroscopy for the treatment of ureteral lithiasis. People had mid-ureteral and distal calculi. For upper ureteral calculi removal, ureteroscopic treatment was mainly suggested after failure of SWL or the patients' specific request. Other inclusion criteria were absence of polyp, suggestive of urothelial cancer, and stricture in the ureter and no mucosal perforation during operation
Exclusion criteria	Patients were excluded from the study when stone size was greater than 2cm, previous ureteroscopy had been performed and had failed for treatment of the same stone or there was a history of sepsis, renal failure, solitary kidney or pregnancy,
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): stent group 44 (16); no stent group 43 (14). Gender (M:F): 60:44. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Non-pregnant 5. Stone composition/hounsfield units: Not stated / Unclear 6. Ureteric stone: Not stated / Unclear (Mixed: upper 15.4%; mid 27.9%; lower 56.7%).
Indirectness of population	No indirectness
Interventions	(n=52) Intervention 1: Stent after surgery - URS. The procedure was performed by the same surgeon with the patient under either general or epidural anesthesia, as decided by anesthesiologists after discussion with

	patients. A safety 0.035 inch guidewire was inserted into the ureter through cystoscopy under fluoroscopic control. Retrograde pyelography was performed in selected cases when ureteroscope progression was difficult. A semirigid ureteroscope (Wolf 8.9Fr) was used in all cases. Ballistic intracorporeal lithotripsy was performed and attempts were made to remove stone fragments in the ureter, although small fragments (<3mm) were largely left to pass spontaneously. In all cases of fragmentation the site of impaction was inspected for ureteral perforation. In the stent group, following ureteroscopy, a double pigtail ureteral 4.8 or 6Fr polyurethane stent was placed through an ureteroscopic operative channel or over a guidewire under fluoroscopic monitoring. No patients had a stent with a suture. Stent was removed 2 weeks after the procedure. . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness (n=52) Intervention 2: Surgery alone - URS. The procedure was performed by the same surgeon with the patient under either general or epidural anesthesia, as decided by anesthesiologists after discussion with patients. A safety 0.035 inch guidewire was inserted into the ureter through cystoscopy under fluoroscopic control. Retrograde pyelography was performed in selected cases when ureteroscope progression was difficult. A semirigid ureteroscope (Wolf 8.9Fr) was used in all cases. Ballistic intracorporeal lithotripsy was performed and attempts were made to remove stone fragments in the ureter, although small fragments (<3mm) were largely left to pass spontaneously. In all cases of fragmentation the site of impaction was inspected for ureteral perforation. No stent was placed at the end of the procedure.. Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Length of stay at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Hospitalisation time at Not reported; Group 1: mean 26 Hours (SD 4); n=52, Group 2: mean 27 Hours (SD 5); n=52
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Hospitalisation at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Rehospitalisation at Not reported; Group 1: 0/52, Group 2: 12/52
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Stone free state at 15 days; Group 1: 52/52, Group 2: 52/52

Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 4: Adverse events at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Fever at 3 months; Group 1: 11/52, Group 2: 16/52
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: UTI at 3 months; Group 1: 8/52, Group 2: 8/52
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Ureteral stricture at 3 months; Group 1: 2/52, Group 2: 2/52
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 5: Pain intensity at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Pain at 3 days; Group 1: mean 3.2 (SD 2); n=52, Group 2: mean 5.7 (SD 2.2); n=52; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - Very high, Selection - High, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Pain at 7 days; Group 1: mean 2.6 (SD 1.7); n=52, Group 2: mean 3.1 (SD 1.5); n=52; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - Very high, Selection - High, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Pain at 15 days; Group 1: mean 2.7 (SD 1.8); n=52, Group 2: mean 2.9 (SD 1.7); n=52; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - Very high, Selection - High, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 6: Stent symptoms at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Dysuria at 3 months; Group 1: 28/52, Group 2: 22/52
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: frequency/urgency at 3 months; Group 1: 30/52, Group 2: 24/52
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Hematuria at 3 months; Group 1: 10/52, Group 2: 8/52
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low,

Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:	
Protocol outcomes not reported by the study	Quality of life at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; New stone formation/incidence of stones/recurrence at Define

Study	Denstedt 2001[29]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=58)
Countries and setting	Conducted in Canada; Setting: Not reported
Line of therapy	1st line
Duration of study	Intervention + follow up: 12 weeks
Method of assessment of guideline condition	Unclear method of assessment/diagnosis
Stratum	Adults (≥16 years), ureteric stone <1 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Adults 18 years or older were considered eligible if they were scheduled for ureteroscopy for ureteral calculus at any ureteral level
Exclusion criteria	Patients were excluded from study when stone size was greater than 2cm, previous ureteroscopy had been performed and had failed for treatment of the same stone, or there was a history of urinary tract infection, sepsis, renal failure, solitary kidney or pregnancy. Patient were also not considered eligible if a ureteral stent was in place at the time of treatment or if one had been indwelling up to 30 days before definitive ureteroscopy for the same stone
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): stent group 49 (15); no stent group 54 (15). Gender (M:F): 36:22. Ethnicity: Not reported
Further population details	1. Kidney pole: 2. Neuropathic/ cerebral-palsy /immobility: 3. Obesity /skin-to-stone distance: 4. Pregnant women: 5. Stone composition/hounsfield units: 6. Uteric stone:
Indirectness of population	No indirectness
Interventions	(n=29) Intervention 1: Stent after surgery - URS. Surgery for the ureteral stone was performed in standard fashion using general anesthesia and a 6.9Fr semirigid or 7.5Fr flexible actively deflectable ureteroscope with a safety guide wire within the ureter. Generally, rigid ureteroscopy was done for distal ureteral stones and most mid ureteral stones, while the flexible ureteroscope was used for most calculi in the upper ureter. Stones were fragmented with the holmium laser in all patients except one who was treated with electrohydraulic lithotripsy. A holmium laser pulse energy of 0.6 to 1.2 J and pulse frequency of 5 to 10 Hz was used for laser lithotripsy. Patients were randomised after the stone had been fragmented to less than 3mm for uncomplicated procedures and when the operating urologist thought that no circumstances were present in which a stent should normally be placed (significant edema or tissue reaction causing ureteral obstruction). No attempt was made to remove stone fragments with baskets or graspers. In the stent group, a double pigtail ureteral stent was placed in the treated ureter under fluoroscopic monitoring. The stent was

	removed at the first visit at 1 week using flexible cystoscopy. . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness (n=29) Intervention 2: Surgery alone - URS. Same procedure as group 1, but at the end of the procedure no stent was placed. The safety wire was removed from the ureter and the procedure was terminated. Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness
Funding	Other (Supported by a grant from the Innovations for Patient Care Research Fund, financial and/or other relationship with Boston Scientific and Cook Urological)

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Hospitalisation at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Rehospitalisation at 12 weeks; Group 1: 1/29, Group 2: 0/29
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Stone-free state at 12 weeks; Group 1: 29/29, Group 2: 29/29
Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Pain intensity at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Flank pain at 1 week; Group 1: mean 4.1 (SD 2.9); n=29, Group 2: mean 1.7 (SD 2.5); n=29; VAS 0-10 Top=High is poor outcome; Comments: Baseline not reported
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Flank pain at 6 weeks; Group 1: mean 1 (SD 2); n=29, Group 2: mean 0.25 (SD 0.6); n=29; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Flank pain at 12 weeks; Group 1: mean 0.2 (SD 0.5); n=29, Group 2: mean 0.28 (SD 0.7); n=29; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Abdominal pain at 1 week; Group 1: mean 3.5 (SD 2.9); n=29, Group 2: mean 0.9 (SD 1.5); n=29; VAS 0-10 Top=High is poor outcome; Comments: Baseline not reported
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low,

Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Abdominal pain at 6 weeks; Group 1: mean 0.6 (SD 2); n=29, Group 2: mean 0.3 (SD 0.6); n=29; VAS 0-10 Top=High is poor outcome Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Abdominal pain at 12 weeks; Group 1: mean 0.1 (SD 0.3); n=29, Group 2: mean 0.1 (SD 0.2); n=29; VAS 0-10 Top=High is poor outcome Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:	
Protocol outcomes not reported by the study	Quality of life at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Adverse events at Define; Length of stay at Define

Study	**El harrech 2014[31]**
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=117)
Countries and setting	Conducted in Morocco; Setting: Not reported
Line of therapy	Unclear
Duration of study	Intervention + follow up: Mean follow up 12 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: KUB and renal ultrasonography with NCCT or IVP
Stratum	Adults (≥16 years), ureteric stone <1 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients treated with successful ureteroscopy for distal ureteral stones
Exclusion criteria	Not reported
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (range): stent group 41.85 (22-72); no stent group 43.2 (20-76). Gender (M:F): Gender not reported. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Not stated / Unclear 5. Stone composition/hounsfield units: Not stated / Unclear 6. Uteric stone: Not stated / Unclear

Indirectness of population	No indirectness
Interventions	(n=42) Intervention 1: Stent after surgery - URS. Ureteroscopy was done with a 7.5 Fr semirigid ureteroscope. One 0.038-inch guide wire was inserted via cystoscopy under fluoroscopic guidance. The cystoscope was removed and a semirigid ureteroscope was passed into the ureter over the working guide wire with non-prior ureteral dilation. The pneumatic lithoclast (Swiss LithoClast)was used to fragment the offending calculus into pieces in all cases requiring lithotripsy. The stents used in the study were 7 Fr in diameter. Patients who had a double J stent had removal after 3 weeks. Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness (n=38) Intervention 2: Surgery alone - URS. Ureteroscopy was done with a 7.5 Fr semirigid ureteroscope. One 0.038-inch guide wire was inserted via cystoscopy under fluoroscopic guidance. The cystoscope was removed and a semirigid ureteroscope was passed into the ureter over the working guide wire with non-prior ureteral dilation. The pneumatic lithoclast (Swiss LithoClast)was used to fragment the offending calculus into pieces in all cases requiring lithotripsy. No stent was placed at the end of the procedure. . Duration Not applicable. . Concurrent medication/care: Not reported. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Hospitalisation at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Re hospitalisation at Not reported; Group 1: 0/79, Group 2: 1/38
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Stone free at 4 weeks; Group 1: 79/79, Group 2: 38/38
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Adverse events at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Fever at Not reported; Group 1: 5/79, Group 2: 3/38
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: UTI at Not reported; Group 1: 5/79, Group 2: 3/38
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Ureteral stricture at Not reported; Group 1: 0/79, Group 2: 0/38
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 4: Pain intensity at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Pain (flank) at 48 hours; Group 1: mean 4.3 (SD 2.196); n=79, Group 2: mean 4.7 (SD 1.9); n=38; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Pain (flank) at 1 week; Group 1: mean 2.366 (SD 1.334); n=79, Group 2: mean 2.1 (SD 1.4); n=38; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Pain (bladder) at 48 hours; Group 1: mean 5.113 (SD 2.307); n=79, Group 2: mean 2.2 (SD 1.4); n=38; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Pain (bladder) at 1 week; Group 1: mean 3.723 (SD 2.448); n=79, Group 2: mean 1.9 (SD 1.1); n=38; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 5: Stent symptoms at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Dysuria at Not reported; Group 1: 19/79, Group 2: 5/38
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Hematuria at Not reported; Group 1: 6/79, Group 2: 2/38
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Frequency/urgency at Not reported; Group 1: 27/79, Group 2: 7/38
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcomes not reported by the study	Quality of life at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Length of stay at Define

Study	Hussein 2006[41]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=56)
Countries and setting	Conducted in Egypt; Setting: Urology Department
Line of therapy	Unclear
Duration of study	Intervention + follow up: 6 months
Method of assessment of guideline condition	Unclear method of assessment/diagnosis
Stratum	Adults (≥16 years), ureteric stone 1-2 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients undergoing ureteroscopy for distal ureteric stones, with clear evidence of bilharzial ureters. The patients had either one or more of the following: ureteric calcification in the plain X-ray film, segmental dilatation of the ureter in intravenous urography or bilharzial lesions in the urinary bladder and the ureter seen in cystoscopy and ureteroscopy
Exclusion criteria	Patients with active bilharzial lesions or any suspicion of ureteric stricture were excluded from the study. Also, patients were excluded when stone size was greater than 2 cm, on finding polyps suggestive of urothelial cancer, in mucosal perforation during operation and in cases of extensive manipulation
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): stent group 39.4 (11.2) years; no stent group 37.8 (9.6) years. Gender (M:F): 49:7. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Not stated / Unclear 5. Stone composition/hounsfield units: Not stated / Unclear 6. Ureteric stone: Lower ureteric stones
Indirectness of population	No indirectness
Interventions	(n=28) Intervention 1: Stent after surgery - URS. Under either general or spinal anaesthesia, all patients underwent initial formal cystoscopy. The ureteric orifices were identified and retrograde pyelography was done. The intramural parts of the ureter were dilated using 18-Fr balloon dilators. An ureteroscope (8.2 Fr) was introduced to identify the stone, and intracorporeal pneumatic lithotripsy was used for fragmentation of the stone. Fragments were extracted using dormia baskets and stone graspers. After successful uncomplicated stone fragmentation and extraction, patients were randomized into two groups. Group A included 28 patients in whom double J 6-Fr polyurethane stents were placed for 3 weeks. Group B included 28 non-stented patients. A urethral catheter was fixed for 24 h and patients were discharged after removal of the urethral catheter.. Duration Not applicable. Concurrent medication/care:

	Patients were administrated an intraoperative prophylactic intravenous antibiotic which was continued orally for 1 week postoperatively. Indirectness: No indirectness (n=28) Intervention 2: Surgery alone - URS. URS as in group 1. No stent was placed at the end of the procedure. . Duration Not applicable. Concurrent medication/care: Patients were administrated an intraoperative prophylactic intravenous antibiotic which was continued orally for 1 week postoperatively. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Hospitalisation at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Readmission at Not reported; Group 1: 0/28, Group 2: 0/28
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Stone-free at 15 days; Group 1: 28/28, Group 2: 28/28
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Adverse events at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Fever at 1 month; Group 1: 5/28, Group 2: 6/28
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: UTI at 1 month; Group 1: 13/28, Group 2: 7/28
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 4: Stent symptoms at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Frequency at 1 month; Group 1: 16/28, Group 2: 10/28
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Urgency at 1 month; Group 1: 15/28, Group 2: 6/28
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Hematuria at 1 month; Group 1: 9/28, Group 2: 6/28 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:	
Protocol outcomes not reported by the study	Quality of life at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Pain intensity at Define; Length of stay at Define

Study	**Ibrahim 2008[42]**
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=220)
Countries and setting	Conducted in Egypt; Setting: Not reported
Line of therapy	Unclear
Duration of study	Intervention + follow up: mean (SD) follow-up 25 (9) months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: KUB with renal ultrasonography with NCCT or IVP
Stratum	Adults (≥16 years), ureteric stone 1-2 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	People treated with successful ureteroscopy for distal ureteral stones. All patients were 18 years or older and had distal ureteral calculi amenable to ureteroscopic management
Exclusion criteria	Patients were excluded from the protocol if they had a ureteral stent placed preoperatively, stone removal was not completed or there was evidence of ureteral perforation at the end of the procedure when ureteral stenting would normally be performed. Exclusion criteria also included complex ureteral stones expected to require prolonged intraoperative procedures, such as stones greater than 1.5cm, multiple large stones, evidence of active infection, solitary kidney and suspected additional ureteral pathology e.g. ureteral stricture.
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): stent group 39 (11); no stent group 36 (9). Gender (M:F): 178:42. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Not stated / Unclear 5. Stone composition/hounsfield units: Not stated / Unclear 6. Ureteric stone: Lower ureteric stones
Indirectness of population	No indirectness

Interventions	(n=110) Intervention 1: Stent after surgery - URS. Patients received epidural or general anesthesia, as determined by the patient and anesthesiologist. When required, ureteral dilation was done to 15 Fr using a uromax balloon dilator. Standard ureteroscopic stone extraction was done using a dormia basket or forceps with or without intracoporeal lithotripsy. A holium YAG laser or Swiss lithoclast ballistic energy was used through a 7Fr to 10.5Fr graduated semirigid ureteroscope. The stent used in the study was 6Fr in diameter with the appropriate length determined by the surgeon intraoperatively based on patient height. The stent was left in for two weeks. . Duration Not applicable. Concurrent medication/care: Patients received intravenous narcotics and/or diclofenac sodium and oral pain medication. All patients were given prophylactic antibiotics at the time of anesthesia induction (a single dose of 1gm cetriaxone intravenously, and 500mg ciprofloxacin tablets were given twice daily for 5 days). Indirectness: No indirectness (n=110) Intervention 2: Surgery alone - URS. Same procedure as group 1 but at the end of the procedure, no stent was placed. Duration Not applicable. Concurrent medication/care: Patients received intravenous narcotics and/or diclofenac sodium and oral pain medication. All patients were given prophylactic antibiotics at the time of anesthesia induction (a single dose of 1gm cetriaxone intravenously, and 500mg ciprofloxacin tablets were given twice daily for 5 days). Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Length of stay at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Initial hospitalisation at Mean 25 months; Group 1: mean 28 Hours (SD 5); n=110, Group 2: mean 29 Hours (SD 6); n=110
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Recurrence at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Stone recurrence at Mean 25 months; Group 1: 3/110, Group 2: 4/110
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Adverse events at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Fever at 1 week; Group 1: 8/110, Group 2: 10/110
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: UTI at 1 week; Group 1: 5/110, Group 2: 7/110

Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: Protocol outcome 4: Stent symptoms at Define - Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Macroscopic hematuria at 1 week; Group 1: 6/110, Group 2: 5/110 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:	
Protocol outcomes not reported by the study	Quality of life at Define; Treatment success (stone free state, clinically insignificant residual fragments) at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Mortality at Define; Pain intensity at Define; Hospitalisation at Define

Study	Kenan 2008[45]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=43)
Countries and setting	Conducted in Turkey; Setting: Not reported
Line of therapy	Unclear
Duration of study	Intervention + follow up: 3 months
Method of assessment of guideline condition	Inadequate method of assessment/diagnosis: All patients were assessed by whole blood count, BUN, serum creatinine, urinalysis, urine culture, a plain abdominal x-ray, excretory urography and renal ultrasonography, or by retrograde pyelography if needed
Stratum	Adults (≥16 years), ureteric stone 1-2 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	People with lower ureteral stones larger than 1cm.
Exclusion criteria	Patients with a history of sepsis, renal failure, bilateral ureteral stones, solitary kidney, multiple ureteral stones or pregnancy were excluded. Patients detected intraoperatively with severe mucosal injury, ureteral perforation, migration of large stone fragment to the kidney and failed access were also excluded.
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): stent group 35.25 (9); no stent group 36.09 (9.7). Gender (M:F): 24:19. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Non-pregnant 5. Stone composition/hounsfield units: Not stated / Unclear 6. Uteric stone: Lower ureteric stones
Indirectness of population	No indirectness
Interventions	(n=21) Intervention 1: Stent after surgery - URS. A 8/9.8Fr Wolf semi rigid ureteroscope with a 5 f working channel was used in all patients under general anesthesia. No patients required dilation of the ureteral orifice or intramural ureter. The stone was fragmented with a pneumatic lithotripter. Additional forceps application was used to remove fragments >4mm. Endoscopic inspection was done at the end of the procedure to rule out any residual calculi >4mm or trauma. The operative times were calculated from the time the cystoscope was introduced to the final removal of all endoscopes. In the stented group, a DJ stent (4.8F) was placed through the ureteroscopic operative channel or over a guidewire via the cystoscope. . Duration Not applicable . Concurrent medication/care: All patients received intravenous first generation cephalosporin preoperatively, which was maintained for 7 days with an oral quinolone. . Indirectness: No indirectness

	(n=22) Intervention 2: Surgery alone - URS. A 8/9.8Fr Wolf semi rigid ureteroscope with a 5 f working channel was used in all patients under general anesthesia. No patients required dilation of the ureteral orifice or intramural ureter. The stone was fragmented with a pneumatic lithotripter. Additional forceps application was used to remove fragments >4mm. Endoscopic inspection was done at the end of the procedure to rule out any residual calculi >4mm or trauma. The operative times were calculated from the time the cystoscope was introduced to the final removal of all endoscopes. No stent was placed at the end of the procedure. Duration Not applicable. Concurrent medication/care: All patients received intravenous first generation cephalosporin preoperatively, which was maintained for 7 days with an oral quinolone. . Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Length of stay at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Hospitalisation time at Not reported; Group 1: mean 1.76 Days (SD 0.7); n=21, Group 2: mean 1.68 Days (SD 0.7); n=22
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Hospitalisation at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Re-hospitalisation at Not reported; Group 1: 1/21, Group 2: 1/22
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Stone free state at 2 weeks; Group 1: 21/21, Group 2: 22/22
Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 4: Adverse events at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Ureteral stricture at Not reported; Group 1: 0/21, Group 2: 0/22
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 5: Pain intensity at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Flank pain at Not reported; Group 1: mean 1.95 (SD 0.8); n=21, Group 2: mean 1.77 (SD 0.6); n=22; VAS 0-10 Top=High is poor outcome

Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: - Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Lower abdominal pain at Not reported; Group 1: mean 1.52 (SD 0.6); n=21, Group 2: mean 1.54 (SD 0.7); n=22; VAS 0-10 Top=High is poor outcome Risk of bias: All domain - High, Selection - High, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: Protocol outcome 6: Stent symptoms at Define - Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Hematuria at Not reported; Group 1: 9/21, Group 2: 7/22 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:	
Protocol outcomes not reported by the study	Quality of life at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; New stone formation/incidence of stones/recurrence at Define

Study	Prasanchaimontri 2017[66]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=60)
Countries and setting	Conducted in Thailand; Setting: Hospital
Line of therapy	Unclear
Duration of study	Intervention + follow up: 4 weeks
Method of assessment of guideline condition	Unclear method of assessment/diagnosis
Stratum	Adults (≥16 years), ureteric stone <1 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients who underwent URSL for ureteral stones. The indications for URSL were stones larger than 6mm, renal deterioration, no progression of stone location after 6 weeks of medical expulsive therapy, intractable pain and recurrent UTI.
Exclusion criteria	Patients who were younger than 18 years old, pregnant, or had clear indication for postoperative stenting such as ureteral perforation, solitary kidney, and infection
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): 4.7Fr stent group 57.4 (10.4); 6 Fr stent group 54.7 (11.3); no stent group 59.7 (10.7). Gender (M:F): 36:24. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Non-pregnant 5. Stone composition/hounsfield units: Not stated / Unclear 6. Uteric stone: Not stated / Unclear (Mixed: 55% lower, 45% upper).
Indirectness of population	No indirectness
Interventions	(n=40) Intervention 1: Stent after surgery - URS. The surgery was performed under general anesthesia. The semi-rigid ureteroscope (6.0/7.5Fr) was used with Holmium:YAG laser and laser fibre 365 or 550 micron. The power was set at 5 to 10 Watt. Stone was fragmented until there were no fragments larger than 2mm. The fragments were left in situ without extraction. At the end of the procedure, a ureteral stent 4.7 FR/21-32 cm or ^Fr/22 to 30cm was obtained. Stent removal was scheduled in the next two weeks. . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness (n=20) Intervention 2: Surgery alone - URS. The surgery was performed under general anesthesia. The semi-rigid ureteroscope (6.0/7.5Fr) was used with Holmium:YAG laser and laser fibre 365 or 550 micron. The power was set at 5 to 10 Watt. Stone was fragmented until there were no fragments larger than 2mm.

	The fragments were left in situ without extraction. At the end of the procedure, no stent was placed. Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness
Funding	Academic or government funding (Supported by the Faculty of Medicine Siriraj Hospital, Mahidol University)

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Hospitalisation at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Readmission at Not reported; Group 1: 1/40, Group 2: 0/20
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low; Indirectness of outcome: No indirectness ; Baseline details: Gender: no stent group, % female = 60%; stent group, % female = 30%. Number of people with no hydronephrosis: no stent group 5%, stent group 22.5%; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Stone free state at 4 weeks; Group 1: 34/40, Group 2: 19/20
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low; Indirectness of outcome: No indirectness ; Baseline details: Gender: no stent group, % female = 60%; stent group, % female = 30%. Number of people with no hydronephrosis: no stent group 5%, stent group 22.5%; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Use of healthcare services/retreatment at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Ancillary procedures at Not reported; Group 1: 0/40, Group 2: 1/20
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low; Indirectness of outcome: No indirectness ; Baseline details: Gender: no stent group, % female = 60%; stent group, % female = 30%. Number of people with no hydronephrosis: no stent group 5%, stent group 22.5%; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 4: Adverse events at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: UTI at Not reported; Group 1: 5/40, Group 2: 0/20
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low; Indirectness of outcome: No indirectness ; Baseline details: Gender: no stent group, % female = 60%; stent group, % female = 30%. Number of people with no hydronephrosis: no stent group 5%, stent group 22.5%; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Fever at 24 hours; Group 1: 9/40, Group 2: 4/20
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low; Indirectness of outcome: No indirectness ; Baseline details: Gender: no stent group, % female = 60%; stent group, % female = 30%. Number of people with no hydronephrosis: no stent group 5%, stent group 22.5%; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 5: Pain intensity at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Pain at 24 hours; Group 1: mean 0.35 (SD 0.669); n=40, Group 2: mean 0.5 (SD 0.9); n=20; VAS 0-10 Top=High is poor outcome

Risk of bias: All domain - Very high, Selection - High, Blinding - Very high, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low; Indirectness of outcome: No indirectness ; Baseline details: Gender: no stent group, % female = 60%; stent group, % female = 30%. Number of people with no hydronephrosis: no stent group 5%, stent group 22.5%; Group 1 Number missing: ; Group 2 Number missing: Protocol outcome 6: Stent symptoms at Define - Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Hematuria at Not reported; Group 1: 15/40, Group 2: 1/20 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low; Indirectness of outcome: No indirectness ; Baseline details: Gender: no stent group, % female = 60%; stent group, % female = 30%. Number of people with no hydronephrosis: no stent group 5%, stent group 22.5%; Group 1 Number missing: ; Group 2 Number missing:	
Protocol outcomes not reported by the study	Quality of life at Define; New stone formation/incidence of stones/recurrence at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Length of stay at Define

Study	Shao 2008[70]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=115)
Countries and setting	Conducted in China; Setting: Not reported
Line of therapy	1st line
Duration of study	Intervention + follow up: 12 weeks
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: Plain x-ray of the kidneys, ureters and bladder
Stratum	Adults (≥16 years), ureteric stone <1 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Patients with distal or middle ureteral calculi with stones less than 2cm
Exclusion criteria	Stone size larger than 2cm; previous failure in the performance of ureteroscopy for the treatment of the same stone; a history of sepsis; renal failure; solitary kidney; pregnancy; suspicion of urothelial cancer; preoperative ureteral stenting; stricture in the ureter and mucosal perforation during the operation
Recruitment/selection of patients	Consecutive
Age, gender and ethnicity	Age - Mean (SD): stent group 47 (10.9); 45.3 (13.2). Gender (M:F): 71:44. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Non-pregnant 5. Stone composition/hounsfield units: Not stated / Unclear 6. Ureteric stone: Lower ureteric stones (Distal 76% or middle 24%).
Indirectness of population	No indirectness
Interventions	(n=58) Intervention 1: Stent after surgery - URS. All procedures were done using epidural anesthesia. Ureteroscopy was done with an 8 Fr/9.8 Fr Wolf semirigid ureteroscope. The ureteroscope was introduced without dilation of the ureteral orifice. Stones were fragmented with the holmium laser in all patients. Holmium laser pulse energy of 1.0-1.2 J, and pulse frequency of 10-12 Hz were used for laser lithotripsy. Stones in the ureters were completely fragmented to particles less than 2mm and stone fragments were not attempted to remove with graspers, instead stone fragments were left in situ, following spontaneous passage. In the stented group, a double pigtail ureteral stent was placed in the treated ureter under the zebra guide wire and the size of double pigtail stent was 4.7 Fr/26cm. Usually the stents were removed 2 weeks postoperatively using cystoscopy. Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness (n=57) Intervention 2: Surgery alone - URS. The same procedure was used as the stented group, except at

	the end of the procedure no stent was placed. . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Stone free state at 3 weeks; Group 1: 58/58, Group 2: 57/57
Risk of bias: All domain - Very high, Selection - Low, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Adverse events at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Fever at 3 weeks; Group 1: 2/58, Group 2: 0/57
Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Stent symptoms at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: hematuria at 3 weeks; Group 1: 43/58, Group 2: 8/57
Risk of bias: All domain - High, Selection - Low, Blinding - High, Incomplete outcome data - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcomes not reported by the study	Quality of life at Define; Hospitalisation at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Pain intensity at Define; Length of stay at Define

Study	Srivastava 2003[78]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=48)
Countries and setting	Conducted in India; Setting: Not reported
Line of therapy	Unclear
Duration of study	Intervention + follow up: 3 months
Method of assessment of guideline condition	Unclear method of assessment/diagnosis
Stratum	Adults (≥16 years), ureteric stone <1 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Adult patients were included if they were scheduled for ureteroscopy for distal ureteral stone (below the sacroiliac joint)
Exclusion criteria	Patients were excluded from the study if the stone was >15mm; there was a history of sepsis or renal failure; there were bilateral distal stones; or the patient had a solitary kidney. Patients who had an indwelling ureteral stent at the time of ureteroscopy were also excluded
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): stent group 36.12 (10.66); no stent group 32.05 (8.49). Gender (M:F): 35:13. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Not stated / Unclear 5. Stone composition/hounsfield units: Not stated / Unclear 6. Ureteric stone: Lower ureteric stones
Indirectness of population	No indirectness
Interventions	(n=26) Intervention 1: Stent after surgery - URS. Surgery was performed under general or regional anesthesia in a standard fashion. After cystoscopy, a 0.035 inch guidewire was passed up to and coiled in the renal pelvis. We did not perform ureteral dilatation routinely, but sequential dilatation using Teflon dilators was done whenever required in both groups. An 8.5 F wolf semirigid ureteroscope was used for all the procedures. The stones were fragmented with pneumatic lithotripsy if required or extracted in to under vision with the help of a basket. At the end of the procedure, a double J stent (6F/26cm) was placed under fluoroscopic guidance. The stent was removed after 3 weeks. . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness (n=22) Intervention 2: Surgery alone - URS. URS performed as in group 1, but no stent was placed at the end of the procedure. At the end of the procedure, the safety guidewire was removed. A folley catheter was

	left indwelling until the next morning. . Duration Not applicable. Concurrent medication/care: Not reported. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus STENT

Protocol outcome 1: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Stone free state at 3 months; Group 1: 21/21, Group 2: 19/19
Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - High, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 5; Group 2 Number missing: 2

Protocol outcome 2: Pain intensity at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Pain at 1 day; Group 1: mean 2.23 (SD 1.07); n=26, Group 2: mean 2.45 (SD 0.74); n=22; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 0; Group 2 Number missing: 0

Protocol outcome 3: Stent symptoms at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Urgency at 3 weeks; Group 1: 16/21, Group 2: 7/19
Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - High, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 0; Group 2 Number missing: 0
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Dysuria at 3 weeks; Group 1: 18/21, Group 2: 5/19
Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - High, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: 0; Group 2 Number missing: 0

Protocol outcomes not reported by the study	Quality of life at Define; Hospitalisation at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Adverse events at Define; Length of stay at Define

Study	Wang 2009[80]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=228)
Countries and setting	Conducted in Taiwan; Setting: Not reported
Line of therapy	Unclear
Duration of study	Intervention + follow up: 12 weeks
Method of assessment of guideline condition	Unclear method of assessment/diagnosis
Stratum	Adults (≥16 years), ureteric stone 1-2 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	People undergoing ureteroscopy for ureteral stones
Exclusion criteria	Stone diameter was greater than 15mm, history of sepsis or renal failure, bilateral ureteral stones, solitary kidney
Recruitment/selection of patients	Consecutive
Age, gender and ethnicity	Age - Mean (SD): stent group 10.1; no stent group 9.9. Gender (M:F): 112:26. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Not stated / Unclear 5. Stone composition/hounsfield units: Not stated / Unclear 6. Uteric stone: Lower ureteric stones (Mixed: upper 11%; middle 35%; lower 54%).
Indirectness of population	No indirectness
Interventions	(n=71) Intervention 1: Stent after surgery - URS. A 7.0 Wolf semirigid ureteroscope was used for all the procedures without ureteral dilatation, under direct vision and intravenous general anesthesia. The stones were fragmented with pneumatic lithotripsy, if required or extracted under vision with the help of a basket. Intraoperative data included intraoperative findings, operative time and outcome. Patients with marked edema or polyps formation were randomised. In the stented group, a double J stent (7 F) was placed by body height under cystoscopy. Stent was removed 1 week later. . Duration Not applicable. Concurrent medication/care: All patients were prescribed pipemic acid trihydrate 250mg twice per day for 2 weeks and allowed to use sublingual buprenorphine 0.2mg on demand. Indirectness: No indirectness (n=67) Intervention 2: Surgery alone - URS. The same procedure as in the stented group was used, except at the end of the procedure, no stent was placed. Duration Not applicable. Concurrent medication/care: All patients were prescribed pipemic acid trihydrate 250mg twice per day for 2 weeks and allowed to use

	sublingual buprenorphine 0.2mg on demand. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Hospitalisation at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Hospitalisation at 12 weeks; Group 1: 1/71, Group 2: 5/67
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Stone free state (no residual stone fragments) at 12 weeks; Group 1: 71/71, Group 2: 67/67
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Pain intensity at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Pain at 1 day; Group 1: mean 3.3 (SD 1.06); n=71, Group 2: mean 2.1 (SD 1.05); n=67; VAS 0-10 Top=High is good outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Pain at 6 weeks; Group 1: mean 1.31 (SD 0.75); n=71, Group 2: mean 0.5 (SD 0.59); n=67; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Pain at 12 weeks; Group 1: mean 0.59 (SD 0.52); n=71, Group 2: mean 0.18 (SD 0.39); n=67; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcomes not reported by the study	Quality of life at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Adverse events at Define; Length of stay at Define

Study	Xu 2009[82]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=110)
Countries and setting	Conducted in China; Setting: Department of Urology of West China Hospital
Line of therapy	Unclear
Duration of study	Intervention + follow up: 3 months
Method of assessment of guideline condition	Adequate method of assessment/diagnosis: Stone location and size were assessed by a plain abdominal radiography and intravenous pyelogram, or retrograde pyelography if needed
Stratum	Adults (≥16 years), ureteric stone 1-2 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	Adults, 18 years or older were considered eligible for the study if they were scheduled for ureteroscopy for distal and middle ureteral calculi.
Exclusion criteria	Patients were excluded from the study when they had a stone size was larger than 2 cm, a history of sepsis, renal failure, solitary kidney, multiple ureteral stones, pregnancy, or previous ureteroscopic lithotripsy in the same position. Patients who were detected intra-operatively with severe mucosal injury, and ureteral perforation were also considered not eligible.
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (SD): Stent group 38.69 ± 6.00; non-stented group 40.04 ± 5.15. Gender (M:F): 70:40. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Non-pregnant 5. Stone composition/hounsfield units: Not stated / Unclear 6. Ureteric stone: Lower ureteric stones (81.8% distal; 18.2% middle).
Indirectness of population	No indirectness
Interventions	(n=55) Intervention 1: Stent after surgery - URS. The patients were randomized into stented and non-stented groups at the end of the ureteroscopic procedure. A 7 Fr Wolf semi-rigid ureteroscope (Yong Xu, Chengdu, China) was used in all patients under general anesthesia. Laser lithotripsy was delivered using a pulsed 100-watt holmium laser. A 365-μm laser fiber was used. Te laser energy was generally applied at a setting of 1.0-1.2 Joules, and the pulse frequency was used at a setting of 10-12 Hertz. All the stones were completely fragmented to particles less than 2mm. No attempt was made to remove stone fragments with baskets, or graspers. Instead, stone fragments were left in situ, allowing spontaneous passage. If the stone cannot be fragmented to bits less than 2 mm, additional forceps application should be used to remove the bits. A double-J stent (4.8 Fr/26 cm) was placed through the working channel. Usually the double-J stents

	was cystoscopically removed at the third post-operative week.. Duration Not applicable. Concurrent medication/care: Patients with slight pain received oral diclofenac (75 mg), and with severe pain, received intramuscular dolantin (50 mg).. Indirectness: No indirectness (n=55) Intervention 2: Surgery alone - URS. he patients were randomized into stented and non-stented groups at the end of the ureteroscopic procedure. A 7 Fr Wolf semi-rigid ureteroscope (Yong Xu, Chengdu, China) was used in all patients under general anesthesia. Laser lithotripsy was delivered using a pulsed 100-watt holmium laser. A 365-µm laser fiber was used. Te laser energy was generally applied at a setting of 1.0-1.2 Joules, and the pulse frequency was used at a setting of 10-12 Hertz. All the stones were completely fragmented to particles less than 2mm. No attempt was made to remove stone fragments with baskets, or graspers. Instead, stone fragments were left in situ, allowing spontaneous passage. If the stone cannot be fragmented to bits less than 2 mm, additional forceps application should be used to remove the bits. . Duration Not applicable. Concurrent medication/care: Patients with slight pain received oral diclofenac (75 mg), and with severe pain, received intramuscular dolantin (50 mg). Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Stone free state at 3 weeks; Group 1: 54/55, Group 2: 55/55
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Adverse events at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Ureteral stricture at 6 months; Group 1: 0/55, Group 2: 0/55
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Fever at 4 weeks; Group 1: 5/55, Group 2: 7/55
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Pain intensity at Define
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Flank pain at 48 hours; Group 1: mean 4.57 (SD 1.76); n=55, Group 2: mean 3.62 (SD 1.57); n=55; VAS 0-10 Top=High is poor outcome
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Abdominal pain at 48 hours; Group 1: mean 3.12 (SD 1.53); n=55, Group 2: mean 2.28

(SD 1.29); n=55; VAS 0-10 Top=High is poor outcome Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: - Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Abdominal pain at 1 week; Group 1: mean 1.23 (SD 1.05); n=55, Group 2: mean 0.89 (SD 1); n=55; VAS 0-100 Top=High is poor outcome Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: - Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Flank pain at 1 week; Group 1: mean 2.12 (SD 1.71); n=55, Group 2: mean 1.62 (SD 1.41); n=55; VAS 0-10 Top=High is poor outcome Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: - Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Flank pain at 4 weeks; Group 1: mean 0.45 (SD 0.46); n=55, Group 2: mean 0.38 (SD 0.46); n=55; VAS 0-10 Top=High is poor outcome Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: - Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Abdominal pain at 4 weeks; Group 1: mean 0.31 (SD 0.41); n=55, Group 2: mean 0.24 (SD 0.35); n=55; VAS 0-10 Top=High is poor outcome Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: Protocol outcome 4: Stent symptoms at Define - Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Dysuria at 6 months; Group 1: 26/55, Group 2: 18/55 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: - Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Hematuria at 4 weeks; Group 1: 23/55, Group 2: 11/55 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing: - Actual outcome for Adults (≥16 years), ureteric stone 1-2 cm: Frequency/urgency at 4 weeks; Group 1: 29/55, Group 2: 20/55 Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
Protocol outcomes not reported by the study	Quality of life at Define; Hospitalisation at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Length of stay at Define

Study	Zaki 2011[84]
Study type	RCT (Patient randomised; Parallel)
Number of studies (number of participants)	1 (n=199)
Countries and setting	Conducted in Pakistan; Setting: Urology department
Line of therapy	1st line
Duration of study	Intervention + follow up: 3 months
Method of assessment of guideline condition	Unclear method of assessment/diagnosis
Stratum	Adults (≥16 years), ureteric stone <1 cm
Subgroup analysis within study	Not applicable
Inclusion criteria	People having uncomplicated ureteroscopic stone disintegration in ureteric stones, irrespective or size and site of stone
Exclusion criteria	All patients having bilateral ureteric stones, renal failure, solitary kidney, previous failed ureteroscopy, or pregnancy were excluded. Patients who had significant mucosal injury or ureteral perforation intraoperatively were also excluded
Recruitment/selection of patients	Not reported
Age, gender and ethnicity	Age - Mean (range): Stent group 41 (23-70); no stent group 45 (21-65). Gender (M:F): 114:84. Ethnicity: Not reported
Further population details	1. Kidney pole: Not applicable 2. Neuropathic/ cerebral-palsy /immobility: Not stated / Unclear 3. Obesity /skin-to-stone distance: Not stated / Unclear 4. Pregnant women: Non-pregnant 5. Stone composition/hounsfield units: Not stated / Unclear 6. Uteric stone: Not stated / Unclear
Indirectness of population	No indirectness
Interventions	(n=99) Intervention 1: Stent after surgery - URS. Intracoporeal lithotripsy was done with 8.9 Fr rigid ureteroscopy and stone fragmentation was done with Swiss lithoclast under general anesthesia. A safety guide wire 0.032 inch was inserted through cystoscope under fluoroscopic control. Stones were fragmented with pneumatic lithotripsy during procedure. Continuous irrigation was done for better visualisation. At the end of the procedure, patients were randomised into groups. In the stent group, a DJ stent 6 FR 25cm was placed under fluoroscopic guidance either through ureteroscopic operative channel or via cystoscopy.. Duration Not applicable. Concurrent medication/care: All patients received prophylactic intravenous third generation cephalosporin at the time of induction, and continued 5 days on an oral quinolone. Indirectness: No indirectness (n=99) Intervention 2: Surgery alone - URS. Same procedure as group 1, but at the end of the procedure no

	stent was placed. . Duration Not applicable. Concurrent medication/care: All patients received prophylactic intravenous third generation cephalosporin at the time of induction, and continued 5 days on an oral quinolone. Indirectness: No indirectness
Funding	Funding not stated

RESULTS (NUMBERS ANALYSED) AND RISK OF BIAS FOR COMPARISON: URS + STENT versus URS

Protocol outcome 1: Hospitalisation at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Hospitalisation due to pain at Not reported; Group 1: 0/99, Group 2: 1/99
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 2: Treatment success (stone free state, clinically insignificant residual fragments) at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Stone free state at 2 weeks; Group 1: 99/99, Group 2: 99/99
Risk of bias: All domain - Very high, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - High, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 3: Adverse events at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Fever at 24 hours; Group 1: 11/99, Group 2: 12/99
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcome 4: Stent symptoms at Define
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Irritative at 24 hours; Group 1: 30/99, Group 2: 28/99
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:
- Actual outcome for Adults (≥16 years), ureteric stone <1 cm: Hematuria at 24 hours; Group 1: 10/99, Group 2: 8/99
Risk of bias: All domain - High, Selection - High, Blinding - High, Incomplete outcome data - Low, Outcome reporting - Low, Measurement - Low, Crossover - Low; Indirectness of outcome: No indirectness ; Group 1 Number missing: ; Group 2 Number missing:

Protocol outcomes not reported by the study	Quality of life at Define; New stone formation/incidence of stones/recurrence at Define; Use of healthcare services/retreatment at Define; Kidney function at Define; Recurrence at Define; Mortality at Define; Pain intensity at Define; Length of stay at Define

Appendix E: Forest plots

E.1 Adults, ureteric, <10mm

E.1.1 Stent after URS versus URS alone

Figure 2: Stone-free state

Study or Subgroup	Stent Events	Stent Total	No stent Events	No stent Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Al-Ba'adani 2006	39	40	45	45	12.7%	0.97 [0.91, 1.04]
Cevik 2010	29	30	29	30	8.6%	1.00 [0.91, 1.10]
Chen 2002	30	30	30	30	9.0%	1.00 [0.94, 1.07]
Cheung 2003	28	29	28	29	8.3%	1.00 [0.91, 1.10]
Prasanchaimontri 2017	34	40	19	20	7.5%	0.89 [0.76, 1.05]
Shao 2008	58	58	57	57	17.2%	1.00 [0.97, 1.03]
Srivastava 2003	26	26	22	22	7.2%	1.00 [0.92, 1.08]
Zaki 2011	99	99	99	99	29.5%	1.00 [0.98, 1.02]
Total (95% CI)		**352**		**332**	**100.0%**	**0.99 [0.97, 1.01]**
Total events	343		329			

Heterogeneity: Chi² = 3.61, df = 7 (P = 0.82); I² = 0%
Test for overall effect: Z = 1.01 (P = 0.31)

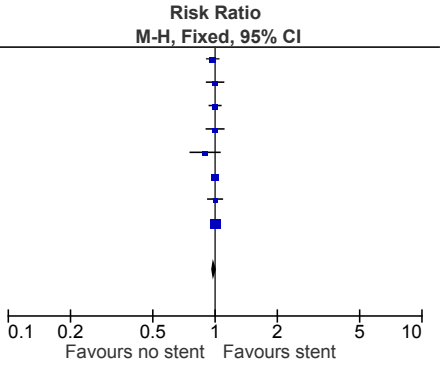


Figure 3: Length of stay (days)

Study or Subgroup	Stent Mean	Stent SD	Stent Total	No stent Mean	No stent SD	No stent Total	Weight	Mean Difference IV, Fixed, 95% CI
Al-Ba'adani 2006	1.06	0.41	40	0.85	0.3	45	73.6%	0.21 [0.06, 0.36]
Cevik 2010	0.9	0.6	30	0.8	0.4	30	26.4%	0.10 [-0.16, 0.36]
Total (95% CI)			**70**			**75**	**100.0%**	**0.18 [0.05, 0.31]**

Heterogeneity: Chi² = 0.51, df = 1 (P = 0.47); I² = 0%
Test for overall effect: Z = 2.68 (P = 0.007)

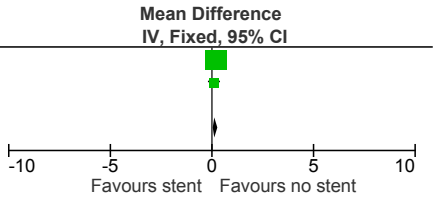


Figure 4: Readmission

Study or Subgroup	Stent Events	Stent Total	No stent Events	No stent Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Borboroglu 2001	0	53	4	54	46.0%	0.11 [0.01, 2.05]
Denstedt 2001	1	29	0	29	5.2%	3.00 [0.13, 70.74]
El Harrech 2014	0	42	1	38	16.2%	0.30 [0.01, 7.21]
Prasanchaimontri 2017	1	40	0	20	6.8%	1.54 [0.07, 36.11]
Zaki 2011	0	99	2	99	25.8%	0.20 [0.01, 4.11]
Total (95% CI)		**263**		**240**	**100.0%**	**0.41 [0.13, 1.31]**
Total events	2		7			

Heterogeneity: Chi² = 3.20, df = 4 (P = 0.52); I² = 0%
Test for overall effect: Z = 1.50 (P = 0.13)

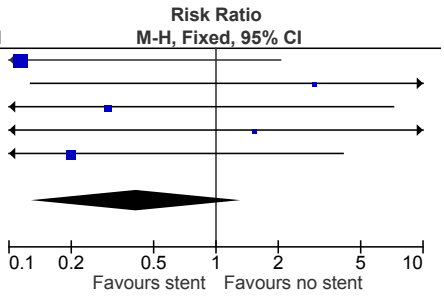


Figure 5: Ancillary procedures

Study or Subgroup	Stent Events	Stent Total	No stent Events	No stent Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Cevik 2010	1	30	1	30	60.2%	1.00 [0.07, 15.26]
Prasanchaimontri 2017	1	40	0	20	39.8%	1.54 [0.07, 36.11]
Total (95% CI)		**70**		**50**	**100.0%**	**1.21 [0.16, 9.46]**
Total events	2		1			

Heterogeneity: Chi² = 0.04, df = 1 (P = 0.84); I² = 0%
Test for overall effect: Z = 0.18 (P = 0.85)

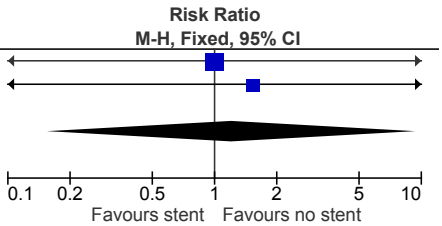


Figure 6: Major adverse events (ureteral stricture)

Study or Subgroup	Stent Events	Stent Total	No stent Events	No stent Total	Weight	Risk Difference M-H, Fixed, 95% CI
Cevik 2010	0	30	0	30	42.9%	0.00 [-0.06, 0.06]
El Harrech 2014	0	42	0	38	57.1%	0.00 [-0.05, 0.05]
Total (95% CI)		**72**		**68**	**100.0%**	**0.00 [-0.04, 0.04]**
Total events	0		0			

Heterogeneity: Chi² = 0.00, df = 1 (P = 1.00); I² = 0%
Test for overall effect: Z = 0.00 (P = 1.00)

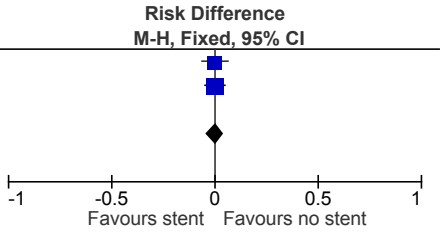


Figure 7: Minor adverse events (fever)

Study or Subgroup	Stent Events	Stent Total	No stent Events	No stent Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Cevik 2010	3	30	2	30	7.7%	1.50 [0.27, 8.34]
Cheung 2003	3	29	3	29	11.5%	1.00 [0.22, 4.55]
El Harrech 2014	3	42	3	38	12.1%	0.90 [0.19, 4.22]
Prasanchaimontri 2017	9	40	4	20	20.5%	1.13 [0.39, 3.21]
Shao 2008	2	58	0	57	1.9%	4.92 [0.24, 100.18]
Zaki 2011	11	99	12	99	46.2%	0.92 [0.42, 1.98]
Total (95% CI)		**298**		**273**	**100.0%**	**1.09 [0.66, 1.80]**
Total events	31		24			

Heterogeneity: Chi² = 1.36, df = 5 (P = 0.93); I² = 0%
Test for overall effect: Z = 0.34 (P = 0.74)

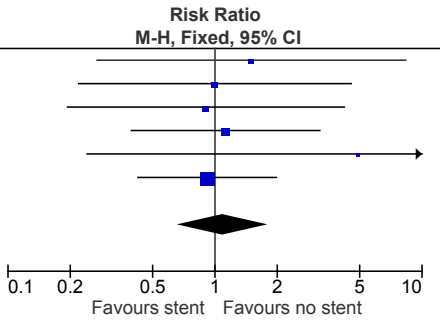


Figure 8: Minor adverse events (UTI)

Study or Subgroup	Stent Events	Stent Total	No stent Events	No stent Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Cheung 2003	1	29	1	29	20.8%	1.00 [0.07, 15.24]
El Harrech 2014	3	42	3	38	65.5%	0.90 [0.19, 4.22]
Prasanchaimontri 2017	5	40	0	20	13.7%	5.63 [0.33, 97.10]
Total (95% CI)		**111**		**87**	**100.0%**	**1.57 [0.50, 5.00]**
Total events	9		4			

Heterogeneity: Chi² = 1.38, df = 2 (P = 0.50); I² = 0%
Test for overall effect: Z = 0.77 (P = 0.44)

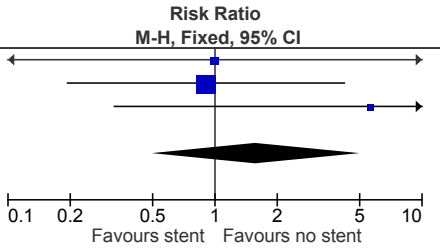


Figure 9: Stent symptoms (irritative symptoms)

Study or Subgroup	Stent Events	Stent Total	No stent Events	No stent Total	Weight	Risk Ratio M-H, Random, 95% CI
Cevik 2010	28	30	3	30	31.4%	9.33 [3.18, 27.42]
Chen 2002	25	30	4	30	32.7%	6.25 [2.48, 15.78]
Zaki 2011	30	99	28	99	35.9%	1.07 [0.69, 1.65]
Total (95% CI)		**159**		**159**	**100.0%**	**3.76 [0.79, 18.03]**
Total events	83		35			

Heterogeneity: Tau² = 1.73; Chi² = 23.34, df = 2 (P < 0.00001); I² = 91%
Test for overall effect: Z = 1.66 (P = 0.10)

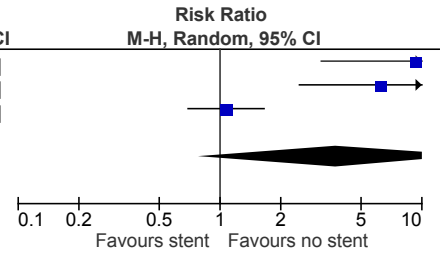


Figure 10: Stent symptoms (dysuria)

Study or Subgroup	Stent Events	Stent Total	No stent Events	No stent Total	Weight	Risk Ratio M-H, Random, 95% CI
Cheung 2003	23	29	2	29	25.3%	11.50 [2.98, 44.37]
El Harrech 2014	11	42	5	38	35.1%	1.99 [0.76, 5.21]
Srivastava 2003	18	26	5	22	39.6%	3.05 [1.35, 6.86]
Total (95% CI)		**97**		**89**	**100.0%**	**3.67 [1.49, 9.08]**
Total events	52		12			

Heterogeneity: Tau² = 0.37; Chi² = 4.74, df = 2 (P = 0.09); I² = 58%
Test for overall effect: Z = 2.82 (P = 0.005)

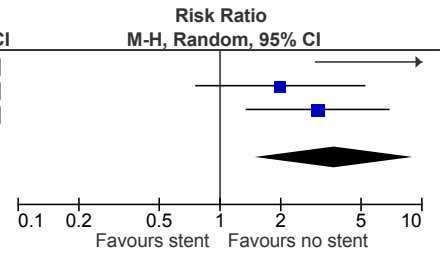


Figure 11: Stent symptoms (haematuria)

Study or Subgroup	Stent Events	Stent Total	No stent Events	No stent Total	Weight	Risk Ratio M-H, Random, 95% CI
Cheung 2003	16	29	1	29	14.0%	16.00 [2.27, 112.87]
El Harrech 2014	3	42	2	35	16.0%	1.25 [0.22, 7.07]
Prasanchaimontri 2017	15	40	1	20	14.0%	7.50 [1.07, 52.81]
Shao 2008	43	58	8	57	29.6%	5.28 [2.73, 10.22]
Zaki 2011	10	99	8	99	26.5%	1.25 [0.51, 3.03]
Total (95% CI)		**268**		**240**	**100.0%**	**3.51 [1.36, 9.04]**
Total events	87		20			

Heterogeneity: Tau² = 0.67; Chi² = 11.29, df = 4 (P = 0.02); I² = 65%
Test for overall effect: Z = 2.60 (P = 0.009)

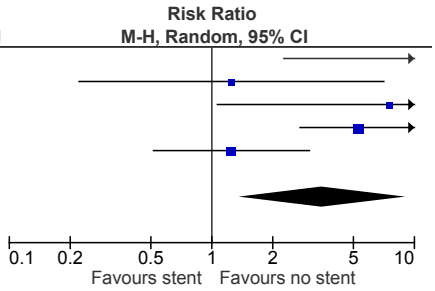


Figure 12: Stent symptoms (frequency/urgency)

Study or Subgroup	Stent Events	Stent Total	No stent Events	No stent Total	Risk Ratio M-H, Fixed, 95% CI
El Harrech 2014	17	42	7	38	2.20 [1.02, 4.71]

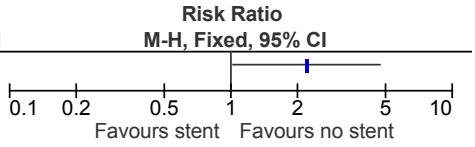


Figure 13: Stent symptoms (urgency)

Study or Subgroup	Stent Events	Stent Total	No stent Events	No stent Total	Risk Ratio M-H, Fixed, 95% CI
Srivastava 2003	16	26	7	22	1.93 [0.98, 3.83]

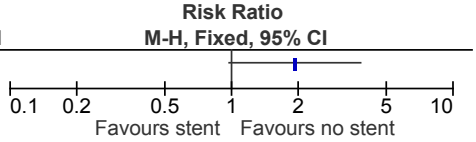


Figure 14: Pain (overall pain; VAS; 0-10)

Study or Subgroup	Stent Mean	Stent SD	Stent Total	No stent Mean	No stent SD	No stent Total	Weight	Mean Difference IV, Random, 95% CI
Chen 2002	2.3	2.22	30	2.3	1.93	30	20.4%	0.00 [-1.05, 1.05]
Cheung 2003	2.7	1.7	29	1	1.4	29	23.9%	1.70 [0.90, 2.50]
Prasanchaimontri 2017	0.35	0.669	20	0.5	0.9	20	28.0%	-0.15 [-0.64, 0.34]
Srivastava 2003	2.23	1.07	26	2.45	0.74	22	27.7%	-0.22 [-0.73, 0.29]
Total (95% CI)			**105**			**101**	**100.0%**	**0.30 [-0.51, 1.11]**

Heterogeneity: Tau² = 0.55; Chi² = 17.81, df = 3 (P = 0.0005); I² = 83%
Test for overall effect: Z = 0.73 (P = 0.46)

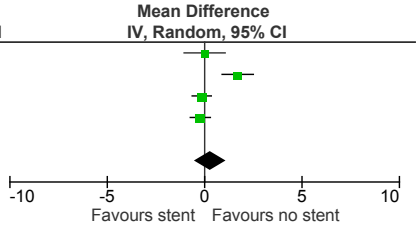


Figure 15: Pain (flank pain; VAS; 0-10)

Study or Subgroup	Stent Mean	Stent SD	Stent Total	No stent Mean	No stent SD	No stent Total	Weight	Mean Difference IV, Random, 95% CI
Denstedt 2001	0.2	0.5	29	0.28	0.7	29	58.8%	-0.08 [-0.39, 0.23]
El Harrech 2014	2.6	1.4	42	2.1	1.2	38	41.2%	0.50 [-0.07, 1.07]
Total (95% CI)			**71**			**67**	**100.0%**	**0.16 [-0.40, 0.72]**

Heterogeneity: Tau² = 0.11; Chi² = 3.06, df = 1 (P = 0.08); I² = 67%
Test for overall effect: Z = 0.56 (P = 0.58)

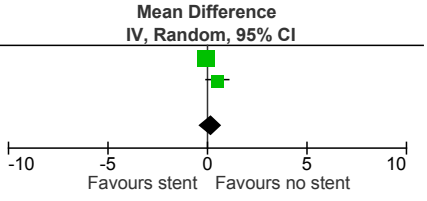


Figure 16: Pain (abdominal pain)

Study or Subgroup	Stent Mean	SD	Total	No stent Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
Denstedt 2001	3.5	2.9	29	0.9	1.5	29		2.60 [1.41, 3.79]

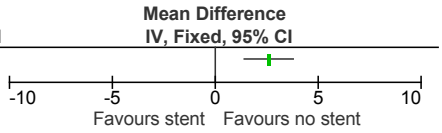
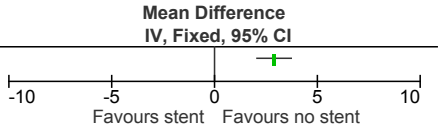


Figure 17: Pain (bladder pain)

Study or Subgroup	Stent Mean	SD	Total	No stent Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
El Harrech 2014	4.8	2.5	42	1.9	1.1	38		2.90 [2.07, 3.73]



E.2 Adults, ureteric, 10-20mm

E.2.1 Stent after URS versus URS alone

Figure 18: Stone-free state

Study or Subgroup	Stent Events	Total	No stent Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Damiano 2004	52	52	52	52	26.3%	1.00 [0.96, 1.04]
Kenan 2008	21	21	22	22	11.0%	1.00 [0.92, 1.09]
Wang 2009	71	71	67	67	34.8%	1.00 [0.97, 1.03]
Xu 2009	54	55	55	55	27.8%	0.98 [0.93, 1.03]
Total (95% CI)		**199**		**196**	**100.0%**	**0.99 [0.97, 1.02]**
Total events	198		196			

Heterogeneity: Chi² = 0.47, df = 3 (P = 0.93); I² = 0%
Test for overall effect: Z = 0.45 (P = 0.65)

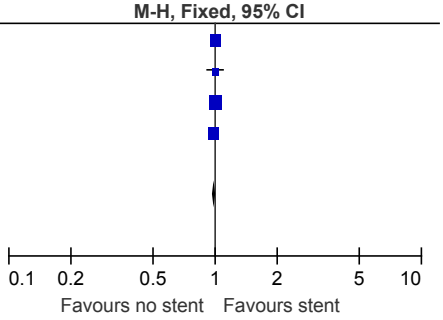


Figure 19: Recurrence

Study or Subgroup	Stent Events	Total	No stent Events	Total	Risk Ratio M-H, Fixed, 95% CI
Ibrahim 2008	3	110	4	110	0.75 [0.17, 3.27]

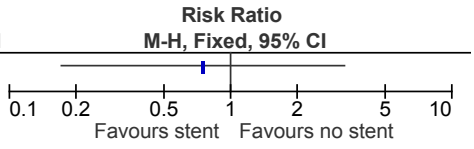


Figure 20: Length of stay (days)

Study or Subgroup	Stent Mean	SD	Total	No stent Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
Damiano 2004	1.08	0.17	52	1.13	0.21	52	40.1%	-0.05 [-0.12, 0.02]
Ibrahim 2008	1.167	0.208	110	1.208	0.25	110	58.6%	-0.04 [-0.10, 0.02]
Kenan 2008	1.76	0.7	21	1.68	0.7	22	1.2%	0.08 [-0.34, 0.50]
Total (95% CI)			**183**			**184**	**100.0%**	**-0.04 [-0.09, 0.00]**

Heterogeneity: Chi² = 0.37, df = 2 (P = 0.83); I² = 0%
Test for overall effect: Z = 1.82 (P = 0.07)

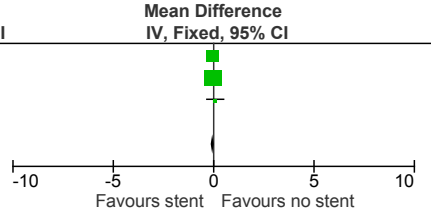


Figure 21: Readmission

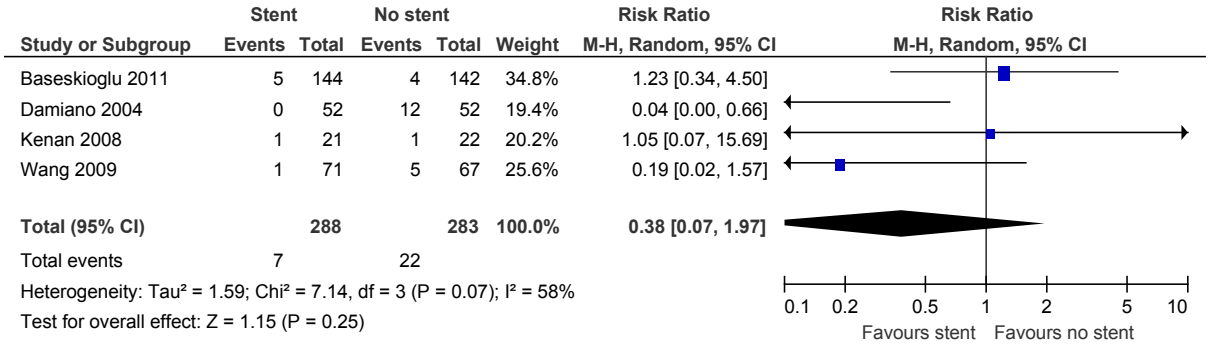


Figure 22: Major adverse events (ureteral stricture)

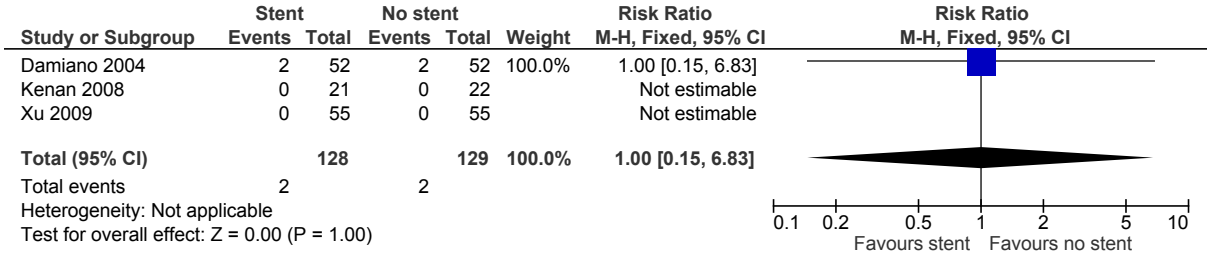


Figure 23: Minor adverse events (fever)

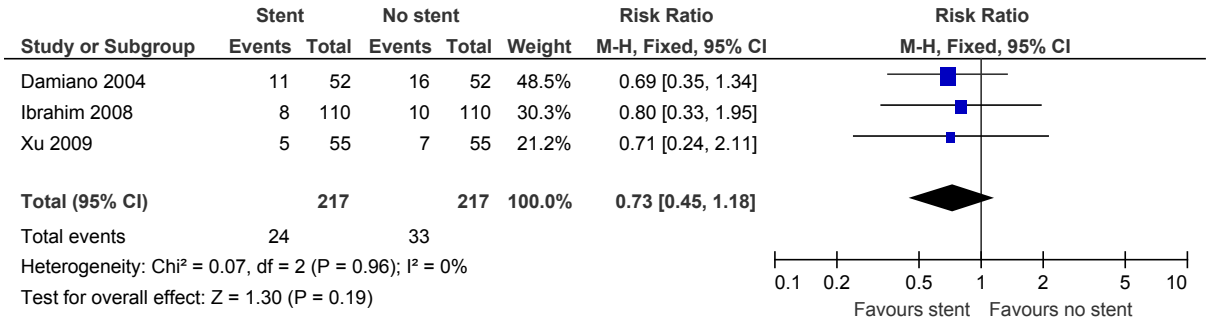


Figure 24: Minor adverse events (UTI)

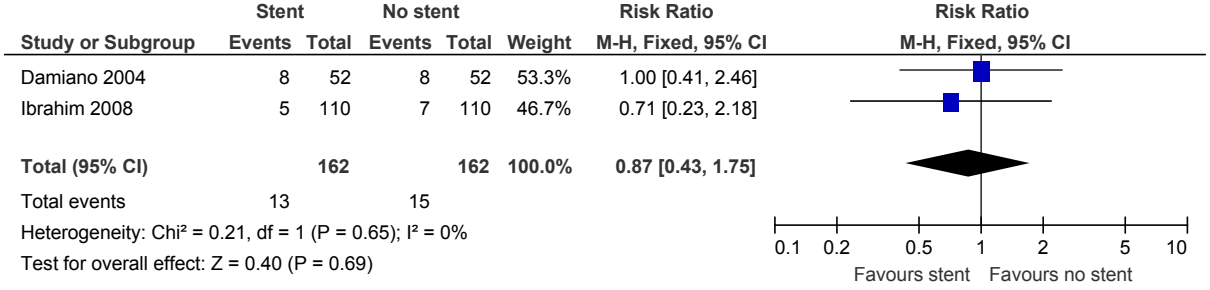


Figure 25: Stent symptoms (dysuria)

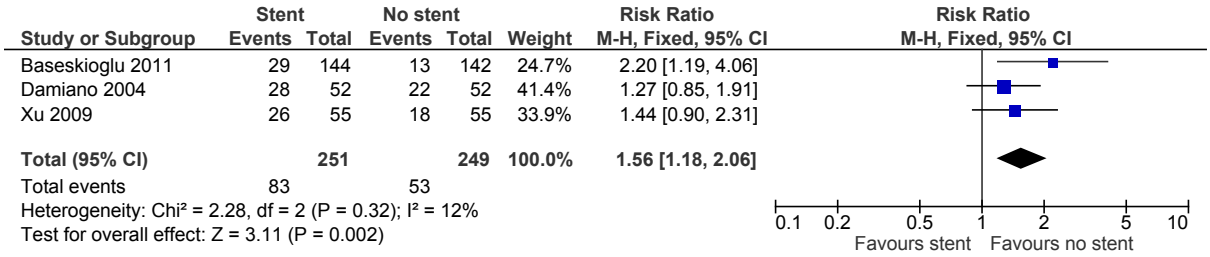


Figure 26: Stent symptoms (haematuria)

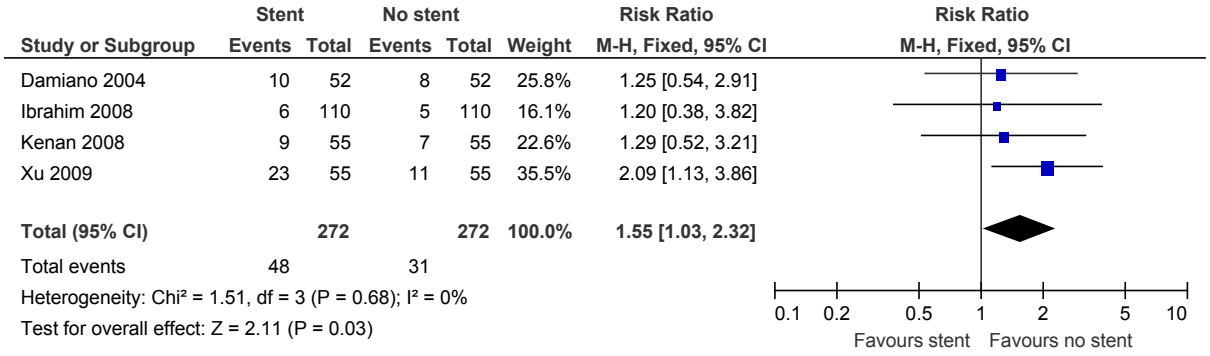


Figure 27: Stent symptoms (urgency/frequency)

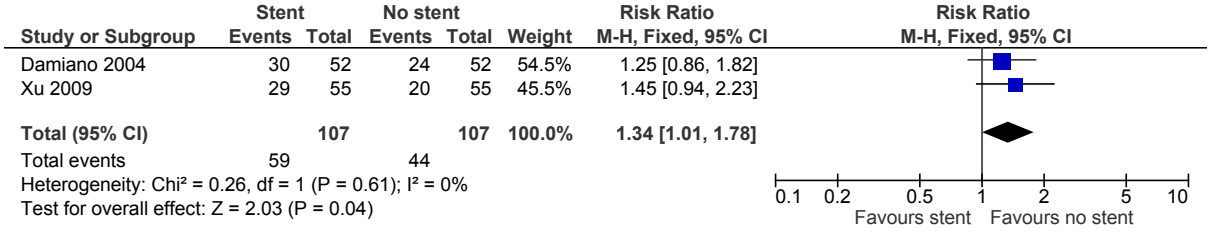


Figure 28: Stent symptoms (urgency)

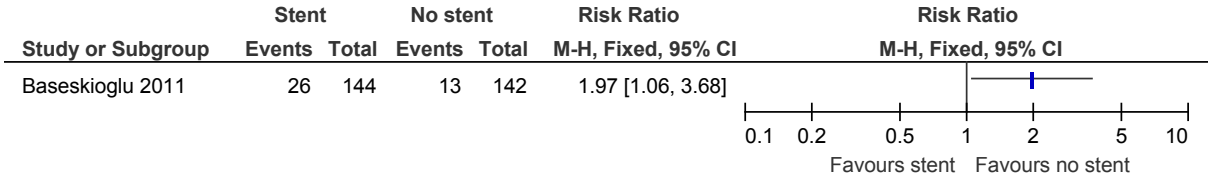


Figure 29: Pain (overall pain; VAS; 0-10)

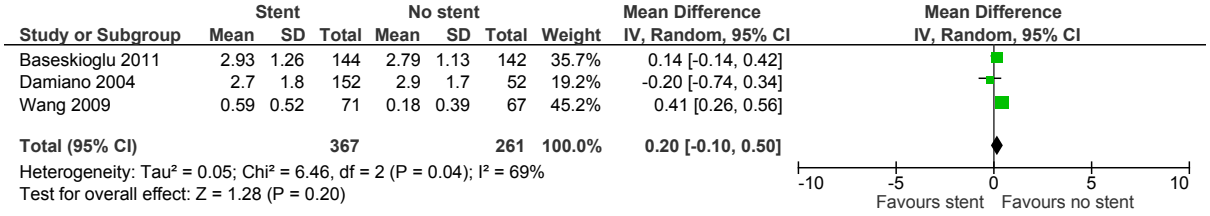


Figure 30: Pain (flank pain; VAS; 0-10)

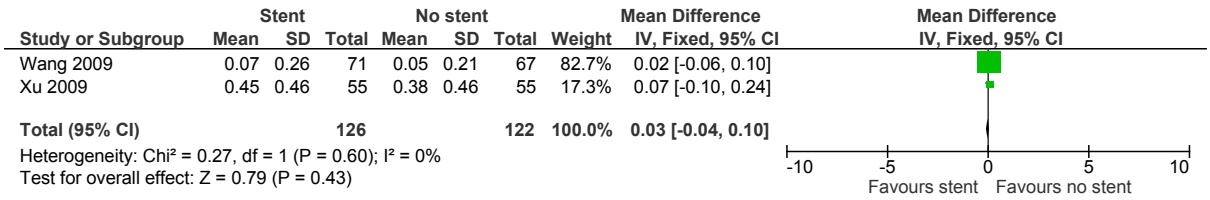
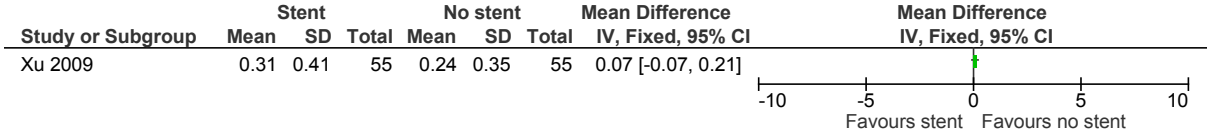


Figure 31: Pain (abdominal; VAS; 0-10)



Appendix F: GRADE tables

F.1 Adults, ureteric, <10mm

Table 11: Clinical evidence profile: Stent after URS versus URS alone

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Stent	No stent after URS - Adult, ureteric, <10mm	Relative (95% CI)	Absolute		
Stone free state (follow-up 2 weeks - 3 months)												
8	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	343/352 (97.4%)	329/332 (99.1%)	RR 0.99 (0.97 to 1.01)	10 fewer per 1000 (from 30 fewer to 10 more)	⊕⊕⊕O MODERATE	CRITICAL
Readmission (follow-up 36 hours - 3 months)												
5	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	2/263 (0.76%)	7/240 (2.9%)	RR 0.41 (0.13 to 1.31)	12 fewer per 1000 (from 17 fewer to 6 more)	⊕OOO VERY LOW	CRITICAL
Ancillary procedure (follow-up 3 months)												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	2/70 (2.9%)	1/50 (2%)	RR 1.21 (0.16 to 9.46)	4 more per 1000 (from 14 fewer to 144 more)	⊕OOO VERY LOW	CRITICAL
Length of stay (follow-up not reported; Better indicated by lower values)												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	70	75	-	MD 0.18 higher (0.05 to 0.31 higher)	⊕⊕⊕O MODERATE	CRITICAL
Pain - Overall pain (follow-up 1 day - 3 months; range of scores: 0-10; Better indicated by lower values)												

4	randomised trials	serious[1]	very serious[3]	no serious indirectness	serious[2]	none	105	101	-	MD 0.30 higher (0.51 lower to 1.11 higher)	⊕OOO VERY LOW	IMPORTANT
Pain - Flank pain (follow-up 1-12 weeks; range of scores: 0-10; Better indicated by lower values)												
2	randomised trials	serious[1]	serious inconsistency[8]	no serious indirectness	no serious imprecision	none	71	67	-	MD 0.16 higher (0.40 lower to 0.72 higher)	⊕⊕⊕O LOW	IMPORTANT
Pain - Abdominal pain (follow-up 12 weeks; range of scores: 0-10; Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	29	29	-	MD 2.6 higher (1.41 to 3.79 higher)	⊕⊕⊕O MODERATE	IMPORTANT
Pain - Bladder pain (follow-up 1 week; range of scores: 0-10; Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	42	38	-	MD 2.90 higher (2.07 to 3.73 higher)	⊕⊕⊕O MODERATE	CRITICAL
Major adverse events (ureteral stricture) (follow-up time-point not reported)												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	0/72 (0%)	0/68 (0%)	-	0 fewer per 1000 (from 28 fewer to 28 more)[4]	⊕OOO VERY LOW	CRITICAL
Minor adverse events (fever) (follow-up 1 day - 12 weeks)												
6	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	31/298 (10.4%)	24/273 (8.8%)	RR 1.09 (0.66 to 1.80)	8 more per 1000 (from 31 fewer to 73 more)	⊕OOO VERY LOW	CRITICAL
Minor adverse events (UTI) (follow-up 2-6 weeks)												
3	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[2]	none	9/111 (8.1%)	4/87 (4.6%)	RR 1.57 (0.50 to 5.00)	20 more per 1000 (from 18 fewer to 140 more)	⊕OOO VERY LOW	CRITICAL
Stent symptoms (irritative symptoms) (follow-up 3 days)												
3	randomised trials	serious[1]	very serious[5]	no serious indirectness	very serious[2]	none	83/159 (52.2%)	35/159 (22%)	RR 3.76 (0.79 to 18.03)	367 more per 1000 (from 28 fewer to 1000 more)	⊕OOO VERY LOW	CRITICAL

Stent symptoms (dysuria) (follow-up 10 days - 3 weeks)												
3	randomised trials	serious[1]	serious[6]	no serious indirectness	no serious imprecision	none	52/97 (53.6%)	12/89 (13.5%)	RR 3.67 (1.49 to 9.08)	352 more per 1000 (from 65 more to 1000 more)	⊕⊕OO LOW	CRITICAL
Stent symptoms (hematuria) (follow-up 3 days - 12 weeks)												
1	randomised trials	serious[1]	serious[7]	no serious indirectness	no serious imprecision	none	87/268 (32.5%)	20/240 (8.3%)	RR 3.51 (1.36 to 9.04)	209 more per 1000 (from 30 more to 670 more)	⊕⊕OO LOW	CRITICAL
Stent symptoms (frequency/urgency) (follow-up not reported)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	17/42 (40.5%)	7/38 (18.4%)	RR 2.20 (1.02 to 4.71)	221 more per 1000 (from 4 more to 683 more)	⊕⊕OO LOW	CRITICAL
Stent symptoms (urgency) (follow-up 3 weeks)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	16/26 (61.5%)	7/22 (31.8%)	RR 1.93 (0.98 to 3.83)	296 more per 1000 (from 6 fewer to 900 more)	⊕⊕OO LOW	CRITICAL

[1] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[2] Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs.
[3] Downgraded by 1 or 2 increments because heterogeneity, I2=83%, p= > 0.1, unexplained by subgroup analysis
[4] Risk difference calculated in Review Manager
[5] Downgraded by 1 or 2 increments because heterogeneity, I2=91%, p= > 0.1, unexplained by subgroup analysis
[6] Downgraded by 1 or 2 increments because heterogeneity, I2=58%, p= > 0.1, unexplained by subgroup analysis
[7] Downgraded by 1 or 2 increments because heterogeneity, I2= 65%, p= > 0.1, unexplained by subgroup analysis
[8] Downgraded by 1 or 2 increments because heterogeneity, I2= 67%, p= > 0.1, unexplained by subgroup analysis

F.2 Adults, ureteric, 10-20mm

Table 12: Clinical evidence profile: Stent after URS versus URS alone

Quality assessment	No of patients	Effect	Quality	Importance

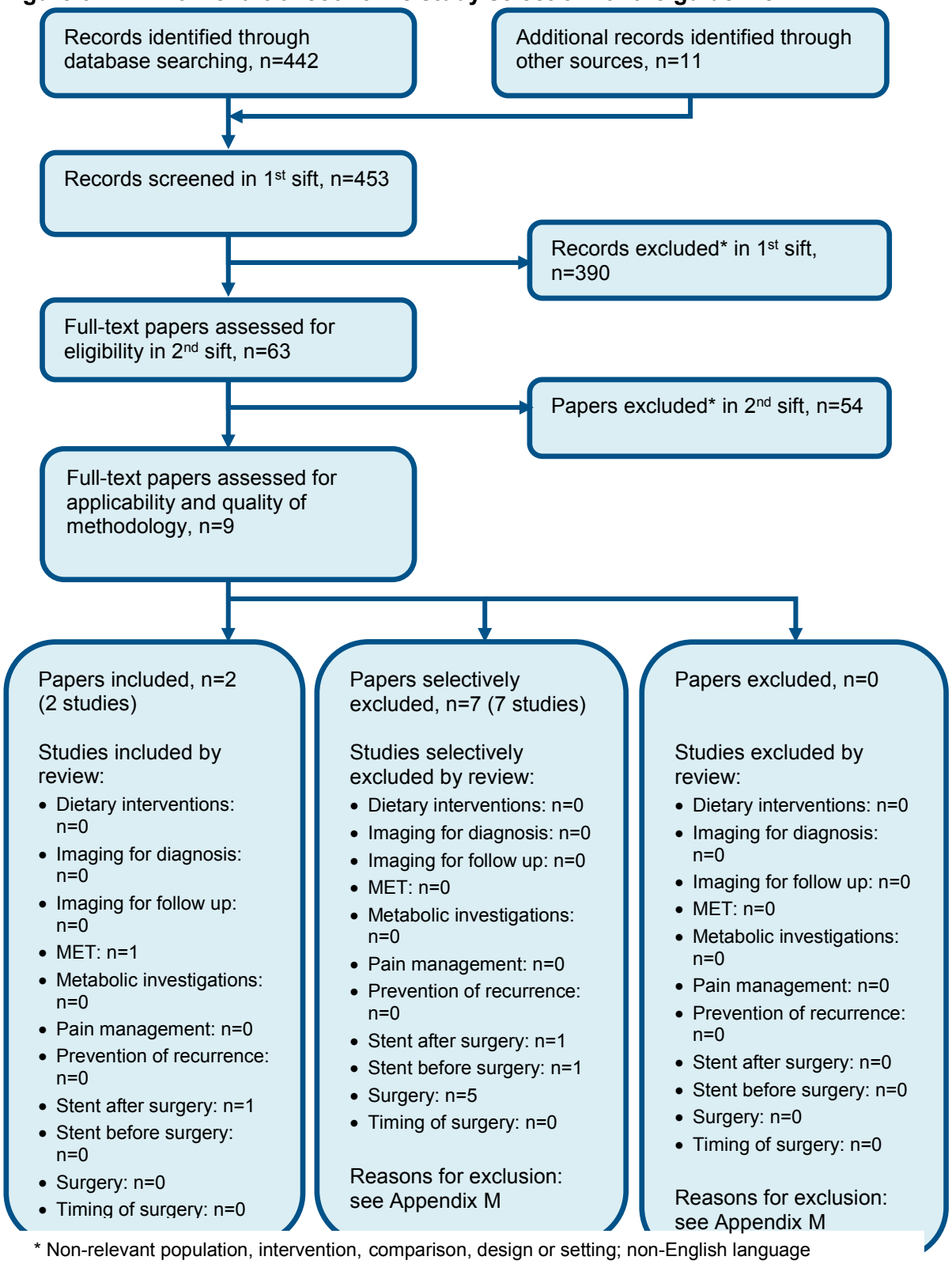
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Stent	No stent after URS - Adult, ureteric, 10-20mm	Relative (95% CI)	Absolute		
Stone free state (follow-up 2 weeks - 3 months)												
4	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	198/199 (99.5%)	100%	RR 0.99 (0.97 to 1.02)	10 fewer per 1000 (from 30 fewer to 20 more)	⊕⊕⊕O MODERATE	CRITICAL
Readmission (follow-up time-point not reported)												
4	randomised trials	serious[1]	serious[2]	no serious indirectness	very serious[3]	none	7/288 (2.2%)	6%	RR 0.38 (0.07 to 1.97)	37 fewer per 1000 (from 56 fewer to 58 more)	⊕OOO VERY LOW	CRITICAL
Recurrence (follow-up mean 25 months)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	3/110 (2.7%)	4/110 (3.6%)	RR 0.75 (0.17 to 3.27)	9 fewer per 1000 (from 30 fewer to 82 more)	⊕OOO VERY LOW	CRITICAL
Length of stay (days) (follow-up time-point not reported; Better indicated by lower values)												
3	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	183	184	-	MD 0.04 lower (0.09 lower to 0 higher)	⊕⊕⊕O MODERATE	CRITICAL
Pain - Overall pain (follow-up 2-12 weeks; range of scores: 0-10; Better indicated by lower values)												
3	randomised trials	serious[1]	serious[4]	no serious indirectness	no serious imprecision	none	367	261	-	MD 0.20 higher (0.1 lower to 0.50 higher)	⊕⊕OO LOW	IMPORTANT
Pain - Flank pain (follow-up 4-12 weeks; range of scores: 0-10; Better indicated by lower values)												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	126	122	-	MD 0.03 higher (0.04 lower to 0.1 higher)	⊕⊕⊕O MODERATE	IMPORTANT
Pain - Abdominal pain (follow-up 4 weeks; range of scores: 0-10; Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[3]	none	55	55	-	MD 0.07 higher (0.07 lower to 0.21 higher)	⊕⊕OO LOW	CRITICAL
Major adverse events (ureteral stricture) (follow-up 4 weeks - 3 months)												
3	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	2/128 (1.6%)	2/129 (1.6%)	RR 1 (0.15 to 6.83)	0 fewer per 1000 (from 30 fewer to 30 more)	⊕OOO VERY LOW	CRITICAL
Minor adverse events (fever) (follow-up 1 week to 3 months)												
3	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[3]	none	24/217 (11.1%)	12.7%	RR 0.73 (0.45 to 1.18)	34 fewer per 1000 (from 70 fewer to 23 more)	⊕⊕OO LOW	CRITICAL
Minor adverse events (UTI) (follow-up 1 week - 3 months)												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	very serious[3]	none	13/162 (8%)	10.9%	RR 0.87 (0.43 to 1.75)	14 fewer per 1000 (from 62 fewer to 82 more)	⊕OOO VERY LOW	CRITICAL

Stent symptoms (dysuria) (follow-up 2-12 weeks)												
3	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[3]	none	83/251 (33.1%)	53/249 (21.3%)	RR 1.56 (1.18 to 2.06)	183 more per 1000 (from 59 more to 347 more)	⊕⊕OO LOW	CRITICAL
Stent symptoms (urgency) (follow-up 2)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[3]	none	26/144 (18.1%)	9.2%	RR 1.97 (1.06 to 3.68)	89 more per 1000 (from 6 more to 247 more)	⊕⊕OO LOW	CRITICAL
Stent symptoms (urgency/frequency) (follow-up 1-3 months)												
2	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[3]	none	59/107 (55.1%)	44/107 (41.1%)	RR 1.34 (1.01 to 1.78)	140 more per 1000 (from 4 more to 322 more)	⊕⊕OO LOW	CRITICAL
Stent symptoms (haematuria) (follow-up 1 week - 3 months)												
4	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	serious[3]	none	48/272 (17.6%)	14.1%	RR 1.55 (1.03 to 2.32)	78 more per 1000 (from 4 more to 186 more)	⊕⊕OO LOW	CRITICAL

[1] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[2] Downgraded by 1 or 2 increments because heterogeneity, I2=58%, p= > 0.1, unexplained by subgroup analysis
[3] Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs.
[4] Downgraded by 1 or 2 increments because heterogeneity, I2=69%, p= > 0.1, unexplained by subgroup analysis

Appendix G: Health economic evidence selection

Figure 32: Flow chart of economic study selection for the guideline



* Non-relevant population, intervention, comparison, design or setting; non-English language

Appendix H: Health economic evidence tables

Study	[Seklehner 2017[69]]			
Study details	**Population & interventions**	**Costs**	**Health outcomes**	**Cost comparison**
Economic analysis: CC **Study design:** Deterministic decision analytic model **Approach to analysis:** Decision tree model comparing total costs of routine versus non-routine stenting following uncomplicated semi-rigid ureteroscopy. Incorporates cost of surgeries and of complications. **Perspective:** Austrian hospital **Time horizon/Follow-up:** NR **Treatment effect duration:**[(a)] NR **Discounting:** Costs: NR; Outcomes: NR	**Population:** Patients undergoing uncomplicated semi-rigid ureteroscopy for stone removal. **Cohort settings:** Start age: NR Male: NR **Intervention 1:** Non-routine stenting following uncomplicated semi-rigid ureteroscopy **Intervention 2:** Routine stenting following uncomplicated semi-rigid ureteroscopy	**Total costs (mean per patient):** Intervention 1: £1,535 Intervention 2: £1,656 Incremental (2−1): £121 (95% CI: NR; p=NR) **Currency & cost year:** Not stated in the paper, assumed to be year of submission to journal of 2016 (presented here as 2016 UK pounds[(b)])] **Cost components incorporated:** Stone removal costs included costs for operating room, urologist, anaesthesia, theatre staff, additional material needed for URS, hospitalisation costs. Stent costs. Costs for unplanned visits, re-hospitalisation and medication.	**None**	**Non-routine stenting had a lower cost** **Analysis of uncertainty:** Several one-way sensitivity analyses were carried out. The cost equivalence threshold was identified for various parameters. For some parameters cost equivalence could not be found, for example; regardless of how low the probability of a UTI, post-operative voiding dysfunctions or pain, or also even if the cost of the stent or its removal costs were zero. However routine stenting would become cheaper if; • hospitalisation after stone removal would be longer without stent placement, • the rate of strictures after non stenting exceeded 4.69% (2.12% in base case), • the rate of post-operative secondary stent placement exceeded 15.93% (1.87% in base case), • the need for re-hospitalisation would be greater after non-stented

				procedures (0.39 days vs 0.16 in base case.)

Data sources

Health outcomes: Tree structure; in patients with stent placement stent was removed via outpatient cystoscopy. In case of stent migration the stent had to be removed with URS. There was a possibility of post-operative stricture; with simple strictures being repaired endourologically, while complex strictures were removed by open surgical repair. Data on the safety of stented versus non-stented URS was found from RCTs through a Medline search. 12 studies in total were included and informed the complication rates. All 12 studies are included in the clinical review. They are across mixed populations and not one particular stone size/type.

Time horizon unclear but likely to be short as comparing surgery costs and its complications.

Cost sources: Cost data for stone removal and complication management were calculated on the base of the author's institution (hospitals in Austria). Stone removal costs included costs for operating room, urologist, anaesthesia, scrub nurse, operating room personnel, additional material needed for URS as well as one day hospitalisation. Costs for the stent were added if it was placed. The costs for each type of procedure are broken down into pre-surgery, surgery and post-surgery phases. The perspective is the public health insurance system, where inpatient and outpatient care is rendered as fixed prices determined by the government. But there were also additional fees added for patients that have private insurance, but these costs are reported separately.

Comments

Source of funding: NR. **Limitations:** Non UK. Cost comparison only. No QALYs. Mixed populations.

Unclear what time horizon is. Costs may not be as applicable to the UK. No difference in success rates included because of stent or not. Unclear if RCT data is meta-analysed. **Other:**

Overall applicability: Partially applicable(c) **Overall quality: Potentially serious limitations**(d)

Abbreviations: CC: comparative costing; 95% CI: 95% confidence interval; NR: not reported; UTI: urinary tract infection; URS: Ureteroscopy

(a) For studies where the time horizon is longer than the treatment duration, an assumption needs to be made about the continuation of the study effect. For example, does a difference in utility between groups during treatment continue beyond the end of treatment and if so for how long.

(b) Converted using 2016 purchasing power parities[62]

(c) Directly applicable / Partially applicable / Not applicable

(d) Minor limitations / Potentially serious limitations / Very serious limitations

Appendix I: Excluded studies

I.1 Excluded clinical studies

Table 13: Studies excluded from the clinical review

Study	Exclusion reason
Aghamir 2008[1]	No outcomes
Al-Awadi 1999[2]	Incorrect interventions
Al-Busaidy 2003[4]	Incorrect interventions
Ali 2001[5]	Incorrect study design
Ali 2004[6]	Incorrect study design
Barnes 2014[7]	Incorrect interventions
Bierkens 1991[9]	Stone size not reported
Byrne 2002[11]	Mixed renal and ureteric stones
Castagnetti 2010[12]	Incorrect study design
Chander 2010[14]	Laparoscopic nephrolithotomy and pyelolithotomy
Chandhoke 2002[15]	Mixed renal and ureteral stones
Chang 1993[16]	Incorrect interventions
Chauhan 2015[17]	Incorrect interventions
Chen 1993[18]	Incorrect study design
Cheung 2000[21]	Incorrect study design
Chew 2004[22]	Incorrect study design
Clayman 2005[23]	Incorrect study design
Corcoran 2008[24]	Incorrect comparison
Crook 2008[25]	Incorrect interventions
Damiano 2005[26]	Not available
Danuser 2014[28]	Not guideline condition
Dudek 2013[30]	Paper not available
Elgammal 2014[32]	Incorrect comparison
Elsheemy 2015[33]	Incorrect interventions
Ghoneim 2010[34]	Incorrect interventions
Gou 2010[35]	Paper not available
Grossi 2006[36]	No outcomes
Gunduz 2017[37]	Incorrect interventions
Gunlusoy 2008[38]	Incorrect interventions
Haleblian 2008[39]	Incorrect study design
Hammady 2011[40]	Incorrect interventions
Hussein 2006[41]	Incorrect population
Jeong 2004[43]	No outcomes
Ji 2012[44]	Incorrect study design
Marcovich 2004[46]	Incorrect interventions
Mercado 2013[47]	Incorrect interventions
Minevich 2005[48]	Incorrect study design
Mohayuddin 2009[49]	Incorrect interventions
Mokhmalji 2001[50]	Incorrect interventions

Study	Exclusion reason
Moon 2011[51]	Incorrect interventions
Musa 2008[52]	Incorrect interventions
Mustafa 2007[53]	No outcomes
Mustafa 2009[54]	Incorrect interventions
Nabi 2007[55]	Incorrect study design
Netto 2001[57]	Overall stone size not reported
Noh 2002[59]	Not in English
Okada 2014[60]	Citation only
Ordonez 2017[61]	Incorrect study design
Ozkan 2015[63]	Incorrect study design
Pais 2016[64]	Incorrect study design
Pengfei 2011[65]	Incorrect study design
Pryor 1990[67]	Mixed renal and ureteric stones
Shao 2010[71]	Paper not available
Sharma 2017[72]	Incorrect interventions
Shen 2011[73]	Incorrect study design
Singh 2008[74]	Incorrect interventions
Sofimajidpour 2016[76]	Paper not available
Sofimajidpour 2016[75]	Incorrect interventions
Song 2012[77]	Incorrect study design
Telha 2010[79]	Incorrect interventions
Wang 2017[81]	Incorrect study design
Younesi Rostami 2012[83]	Incorrect intervention
Zhao 2016[85]	Incorrect interventions. Stone size not reported
Zhou 2017[86]	Incorrect interventions

I.2 Excluded health economic studies

Table 14: Studies excluded from the health economic review

Reference	Reason for exclusion
Rapoport 2007[68]	This study was assessed as partially applicable with very serious limitations because it was a retrospective study and therefore not the right clinical design.