NATIONAL INSTITUTE FOR HEALTH AND CLINICAL EXCELLENCE

Overview

Stapled haemorrhoidectomy for the treatment of haemorrhoids

The overview is written by members of the Institute's team of technical analysts. It forms part of the information received by the Appraisal Committee members prior to the first committee meeting. The overview summarises the evidence and views that have been submitted by consultees and evaluated by the Assessment Group, and highlights key issues and uncertainties. In order to allow sufficient time for the overview to be circulated to Appraisal Committee members prior to the first Appraisal Committee meeting, it is prepared before the Institute receives Consultees' comments on the Assessment Report. These comments are therefore not addressed in the overview.

A list of the sources of evidence used in the preparation of this document is given in appendix B.

1 Background

1.1 The condition

Haemorrhoidal tissue is a normal component of the anal canal and is composed predominantly of vascular tissue, supported by smooth muscle and connective tissue. It functions as a compressible lining which allows the anus to close completely.

Internal haemorrhoids (also known as piles) are located beneath the lining of the anus and occur when the haemorrhoidal tissue of the distal rectum and anal canal prolapses. Haemorrhoids can cause anal itching and irritation, bleeding during bowel movements and perianal pain. They sometimes protrude from the anus during bowel movements or may prolapse or extend outside the anus. Internal haemorrhoids are usually classified according to the degree of prolapse, although this may not reflect the severity of the patient's symptoms. First degree haemorrhoids bleed but do not prolapse. Second degree haemorrhoids prolapse on straining during bowel movements, and reduce spontaneously. Third degree haemorrhoids prolapse on straining and require manual reduction. Fourth degree haemorrhoids are prolapsed and cannot be manually reduced.

External haemorrhoids can also occur. These are located near the anus and, although they cannot prolapse, can bleed when ruptured.

A number of factors are known to be associated with the development of haemorrhoids, including increasing age, pregnancy and childbirth, chronic constipation, chronic diarrhoea, and hereditary factors.

Haemorrhoids are estimated to affect between 4.4% and 24.5% of the UK population. Between 2002 and 2003, a total of 23,664 procedures listed as "main operations on haemorrhoids" were performed in England and Wales.

1.2 Current management

First degree internal haemorrhoids are generally treated non-surgically, by changing bowel habit, diet and lifestyle and using stool softeners or laxatives. Second degree haemorrhoids are treated in the same way, but non-excisional interventions such as injection sclerotherapy, rubber band ligation and infra-red coagulation can also be used.

Surgical haemorrhoidectomy is considered to be the best treatment for third and fourth degree haemorrhoids and for prolapsed second degree haemorrhoids that have not responded to non-operative interventions.

The commonly conducted surgical techniques use scalpel, diathermy or laser to perform an open (Milligan-Morgan) or closed (Ferguson) haemorrhoidectomy. The Milligan-Morgan procedure involves dissection of the haemorrhoid and ligation of the vascular pedicle. The wounds are left open to heal naturally. The Milligan-Morgan procedure is thought to be relatively safe and effective for managing advanced haemorrhoidal disease, but because the anodermal wounds are left open, healing is delayed which may result in discomfort and prolonged post-operative morbidity.

The Ferguson procedure is a modified version of the Milligan-Morgan technique, in which the wound is closed with a continuous suture to promote healing.

A number of post-operative complications are associated with surgical haemorrhoidectomy. The short term complications include pain, urinary retention, bleeding and perianal sepsis. Long term complications include anal fissure, anal stenosis, incontinence, fistula, and the recurrence of haemorrhoidal symptoms.

2 The technology

Stapled haemorrhoidectomies involve stapling haemorrhoids into their original position. The original technique left the haemorrhoidal tissue to shrivel over time, which could result in thrombosis and infection. The technique was modified so that haemorrhoidal tissue was repositioned and excess prolapsing tissue removed. Stapled haemorrhoidectomy is also known as PPH (procedure for prolapse and haemorrhoids), stapled anopexy, stapled prolapsectomy, stapled mucosectomy and stapled haemorrhoidopexy and has been conducted in the UK for the last 2–3 years.

Two devices were covered in this appraisal:

- Ethicon Endo-Surgery (EE-S) (Johnson & Johnson) has developed a circular stapler specifically for haemorrhoidectomy, the HCS33 device, of which the PPH01 and PPH03 models are currently in circulation.
- The Autosure stapler (Tyco Healthcare) can be used to perform haemorrhoidectomies when used in conjunction with the STAM kit adaptor. Tyco Healthcare did not provide a submission.

3 The evidence

3.1 Clinical effectiveness

The Assessment Report lists a total of 28 studies, 19 of which were also included in the EE-S submission. Nine studies were not included by EE-S for the following reasons: two did not use the Milligan-Morgan or Ferguson procedure as a comparator, two did not meet EE-S methodological quality criteria, four studies did not specify the reason for exclusion, and data from one study were unavailable.

The EE-S submission included 29 studies. The Assessment Report did not include 10 of these studies: seven because a stapling device specifically designed for haemorrhoidectomy was not used and one because the outcomes were not reported in the paper. The reason for exclusion was not specified for two studies.

The Assessment Group stated that the quality of the studies varied and all had some methodological flaws. Of the 28 studies listed in the Assessment Report, two reported that patients were blind to the surgical procedure and 10 studies reported use of an appropriate method of randomisation or allocation concealment. However, two studies did not follow up more than 80% of patients, five did not provide details of follow-up and one study did not recruit the required number of participants in order to be adequately powered for the primary outcome.

The 19 randomised controlled trials (RCTs; n = 3008) included in the Assessment Report and the EE-S submission were mainly evaluations of stapled haemorrhoidectomies using the HCS33 device. Information on the type of stapling device used was unavailable for six studies and a mechanical suture device was used in one study. Stapled haemorrhoidectomy was carried out in 50% of patients across all studies. Of those undergoing conventional haemorrhoidectomy, 20.9% had the Ferguson procedure. All studies were published in peer reviewed journals (in full or abstract form), two were carried out in the UK and seventeen were conducted in other European countries.

3.1.1 Short term post-operative pain

Table 1 provides details of the studies identified in the Assessment Report and the EE-S submission which measured short term post-operative pain up to 3 days after surgery. All studies included people with grade 2–4 haemorrhoids. Post-operative pain was assessed by use of a visual analogue scale (VAS) score where patients were asked about current pain, measured on a continuous scale of 0 (no pain) to10 (worst pain imaginable). All studies reported a lower VAS pain score with stapled haemorrhoidectomy compared to conventional haemorrhoidectomy (table 1).

Table 1 Results of the randomised controlled trials (RCTs) evaluating short term post-operative pain up to 3 days

Study	N	Time point	Device	Comparator intervention	Mean difference VAS score (SH v CH) (95% confidence interval)
Ascanelli 2005	100	12 hours	Mechanical suture	M & M +D	-5
Shalaby 2001	200	24 hours	PPH01	M & M	-5.10 (-5.39 to -4.81)
Pavlidis 2002	80	24 hours	PPH01	M & M	-1.70 (-1.87 to -1.53)
Cheetham 2003	31	24 hours	PPH01	M & M	-2.80 (-5.88 to 0.28)
Bikhchandani 2005	84	24 hours	PPH01	M & M	-2.72 (-3.41 to -2.03)
Correa-Rovelo 2002	84	24 hours	Not recorded	M & M + D	-2.70 (-3.30 to -2.10)
Basdanis 2005	95	24 hours	PPH01	M & M + D	-3
Palimento 2003	74	24 hours	PPH01	M & M + D	-2
Hertzer 2002	40	24 hours	PPH01	Ferguson	-3.60 (-5.60 to 1.60)
Correa-Rovelo 2002	42	24 hours	PPH01	Ferguson	-2.70 (-3.30 to -2.10)
Lau 2004	24	2 days (mean)	PPH01	M & M + D	0.90 (-0.72 to 2.52)
Cheetham 2003	31	3 days	PPH01	M & M	-4.3
Bikhchandani 2005	84	3 days	PPH01	M & M	-2.98(-3.75 to -2.21)
Van de Stadt 2005	40	3 days	PPH01	M & M	-2.1 (NR)
Krska 2003	50	3 days	Not recorded	M & M	-3.4 (NR)
Kairaluoma 2003	60	3 days	PH01	M & M + D	-0.50 (-1.61 to 0.61)
Senagore 2004	156	3 days	PPH01	Ferguson	-1.5
Hertzer 2002	40	3 days	PPH01	Ferguson	-4.6
Ho 2000	119	In hospital	PH01	M & M + D	-0.50 (-1.61 to 0.61)
Ren 2002	90	Unclear	PPH01	M & M	-4.20 (-4.82 to -3.58)

Abbreviations: SH – stapled haemorrhoidectomy, CH – conventional haemorrhoidectomy, M & M + D – Milligan-Morgan procedure and diathermy

EE-S undertook two meta-analyses. The first, a meta-analysis of four studies measuring pain 24 hours post-operatively, identified a significantly greater reduction in early post-operative pain with stapled haemorrhoidectomy compared with conventional Milligan-Morgan haemorrhoidectomy (weighted mean difference in VAS score –3.33, 95% CI -5.37 to -0.85). The second, a meta-analysis of two studies, resulted in a statistically significantly greater reduction in early post-operative pain with stapled haemorrhoidectomy compared with the Ferguson haemorrhoidectomy (weighted mean difference in VAS score = -2.77, 95% CI -3.35 to -2.20).

The Assessment Group did not carry out a meta-analysis because of the high degree of heterogeneity between the studies of short term post-operative pain.

Post-operative pain after 10–15 days was also reduced with stapled haemorrhoidectomy compared with conventional haemorrhoidectomy in all RCTs listed (table 2). However meta-analyses were not carried out because of statistical heterogeneity.

Table 2 Results of the randomised controlled trials (RCTs) reporting 10–15 day post-operative pain

Study	N	Time point (days)	Device	Comparator	Mean difference SH v CH (95% CI)
Chung 2005	88	7 (mean)	PPH01	M & M +HS	-2
Thaha 2004	182	7 (mean)	Stapling gun (type NR)	Ferguson	-1.20 (-1.94 to -0.46)
Ascanelli 2005	100	10	PPH01	M & M +D	-3
Cheetham 2003	31	10	PPH01	M & M+D	-1.6
Boccasanta 2001	80	10	PPH01	M & M	-1.1
Van de Stadt 2005	40	14	PPH01	M & M	-1.3
Kairaluoma 2003	60	14	PPH01	M &M +D	-1.47
Ho 2000	119	14	PPH01	M & M +D	-1.00 (-2.25, 0.25)
Kraema 2005	50	14	Not recorded	M & M + L	-0.1
Correa-Rovelo 2002	84	14	Stapling gun (type NR)	Ferguson	-2.60 (-3.22, -1.98)
Senagore 2004	156	14	PPH01	Ferguson	-1.0
Bikhchandani 2005	84	15	PPH01	M & M	-0.84 (-1.24, -0.44)

Abbreviations: SH – stapled haemorrhoidectomy, CH – conventional haemorrhoidectomy, M & M + D – Milligan-Morgan and diathermy, M & M + L – Milligan-Morgan and laser, M & M + HS – Milligan-Morgan and Harmonic Scalpel

3.1.2 Wound healing time

The EE-S provided details of one study which compared wound healing time after stapled haemorrhoidectomy and the Milligan-Morgan procedure The mean wound healing time was 7.0 days for stapled haemorrhoidectomy and 30.5 days for the Milligan-Morgan procedure.

The Assessment Group carried out a meta-analysis of nine trials reporting the number of unhealed wounds up to 6 weeks post-operatively. It was found that there were significantly fewer patients with unhealed wounds at 6 weeks after stapled haemorrhoidectomy compared to conventional haemorrhoidectomy (odds ratio [OR] = 0.08, 95% CI 0.03 to 0.19, $p < 0.001$). A meta-analysis of four of these studies showed, however, that there were significantly fewer patients with unhealed wounds at 12 weeks after stapled haemorrhoidectomy (OR = 0.15, 95% CI 0.002 to 1.28, $p = 0.08$).

3.1.3 Bowel function

The EE-S submission cited one study which identified a significantly shorter time to pain-free bowel movement after stapled haemorrhoidectomy compared with conventional haemorrhoidectomy (10 vs 12 days, $p = 0.01$).

The Assessment Group identified seven studies which reported a shorter time to first bowel movement following stapled haemorrhoidectomy compared with conventional haemorrhoidectomy. A meta-analysis of three of these trials found the weighted mean difference in time to first bowel movement between stapled and conventional haemorrhoidectomy was -0.33 days (95% CI -0.48 to -0.17). However, the Assessment Group also cited two studies which did not show a difference in time to first bowel movement between stapled and conventional haemorrhoidectomy.

3.1.4 Patient satisfaction/health-related quality of life

The EE-S submission identified three studies which measured patients' quality of life. None of these studies identified a statistically significant difference between stapled and conventional haemorrhoidectomy. The Assessment Group identified 14 studies which reported patient preference, or level of satisfaction (Assessment Report table 5.26 page 84). The majority of the studies did not identify a preference for either stapled or conventional haemorrhoidectomy, but five studies reported greater patient satisfaction with stapled haemorrhoidectomy within the first year after the procedure was carried out. One study reported greater patient satisfaction with conventional haemorrhoidectomy approximately 4 years post-operatively.

3.1.5 Post-operative bleeding

EE-S undertook two meta-analyses: A meta-analysis of 18 studies comparing stapled haemorrhoidectomy with the Milligan-Morgan procedure and a meta-analysis of 4 studies using the Ferguson procedure as comparator, both at less than one month after surgery. There was a trend towards less peri/post-operative bleeding with stapled haemorrhoidectomy than with the conventional procedure, but the differences were not statistically significant.

The Assessment Group undertook two meta-analyses: A meta-analysis of 2 studies found a statistically significantly lower level of post-operative bleeding with stapled compared to conventional haemorrhoidectomy 14 days post-operatively (OR= 0.43, 95% CI 0.24 to 0.76). A meta-analysis of 6 studies identified a greater incidence of bleeding 6-8 weeks after surgery with stapled haemorrhoidectomy, but this finding was not statistically significant (pooled OR= 1.75, 95% CI 0.97 to 3.14).

EE-S and the Assessment Group carried out a series of meta-analyses to compare mid- and long-term levels of post-operative bleeding between stapled and conventional haemorrhoidectomy. None of these analyses (or any of the individual studies) found a statistically significant difference between the surgical procedures.

3.1.6 Recurrent prolapse

EE-S undertook two meta-analyses: A meta-analysis of 18 trials in people with grade 2-4 haemorrhoids found a statistically significantly greater odds of post-operative prolapse with stapled compared to conventional haemorrhoidectomy (OR=4.64 , 95% CI 2.55 to 8.44); a meta-analysis of 4 studies in people with grade 3 haemorrhoids identified a higher level of prolapse with stapled haemorrhoidectomy, but this finding was not statistically significant (pooled OR= 1.02, 95% CI 0.14 to 7.48).

The Assessment Group undertook a series of meta-analyses of studies reporting levels of prolapse at different time points after haemorrhoidectomy. Four of the analyses identified a statistically significantly greater odds of recurrent prolapse with stapled compared to conventional haemorrhoidectomy between 1 and 8 weeks (OR=8.57, 95% CI 1.73 to 15.50), between 3 months and under 1 year (OR= 4.68, 95% CI 1.11 to 19.71), between 16 months and 2 years (OR= 6.25, 95% CI 1.53 to 25.54) and between 1.2 and 3.8 years (OR=4.34, 95% CI 1.67 to 11.28). A meta-analysis of 7 studies did not identify a statistically significant difference in rates of prolapse between stapled and conventional haemorrhoidectomy 12 months post-operatively (OR=3.20, 95% CI 0.71 to 14.45). Two studies which examined rates of prolapse after 5 years reported no events in either of the treatment arms.

3.1.7 Need for re-intervention

EE-S undertook two meta-analyses: A meta-analysis of 14 studies identified statistically significantly greater odds of re-surgery (for any haemorrhoid-related cause) with stapled compared with Milligan-Morgan haemorrhoidectomy at any time point (OR= 2.29, 95% CI 1.23 to 4.25); a meta-analysis of 3 studies did not find significantly increased odds of re-surgery between stapled and Ferguson haemorrhoidectomy in people with grade 3 haemorrhoids.

The Assessment Group undertook a series of meta-analyses of studies reporting levels of re-surgery and re-intervention at different time points after haemorrhoidectomy. Four of the analyses identified statistically significantly greater odds of re-surgery or reintervention with stapled hemorroidectomy: re-surgery for prolapse at 3–12 months (OR=4.09, 95% CI 1.05 to 23.60), re-intervention for prolapse at 3–46 months (OR= 6.78, 95% CI 2.00 to 23.00), and re-intervention for bleeding at 12–46 months (OR=7.44, 95% CI 1.27 to,43.43). One analysis of 6 studies identified greater odds of any non-excisional intervention with stapled haemorrhoidectomy at 12–18 months, but the finding was not statistically significant (OR =1.52, 95% CI 0.43 to 5.34). An analysis of 2 studies identified smaller odds of intervention for skin tag removal less than 12 months after stapled haemorrhoidectomy, but this finding was not statistically significant (OR= 0.99, 95% CI 0.14 to 7.15).

3.1.8 Other post-operative complications

Neither the Assessment Group nor EE-S found conclusive evidence of any significant differences between stapled and conventional haemorrhoidectomy in terms of anal incontinence and anal stenosis. The Assessment Group examined the incidence of a range of other post-operative complications and itching at different time points (table 3) but no statistically significant differences between stapled and conventional haemorrhoidectomy were identified.

3.1.9 Duration of hospital stay

EE-S undertook a meta-analysis of 5 studies which compared stapled haemorrhoidectomy to the Milligan-Morgan haemorrhoidectomy. The weighted mean difference in length of hospital stay was -1.25 days (95% CI -1.50 to -1.00).

Sixteen studies identified by the Assessment Group for this outcome reported mean duration of hospital stay ranging from 0.75 to 5.8 days after stapled haemorrhoidectomy and 0.92 to 11.2 days after conventional haemorrhoidectomy. A total of 14 studies reported a shorter hospital stay with stapled haemorrhoidectomy. The Assessment Group did not carry out a meta-analysis as statistical heterogeneity was identified.

3.1.10 Operating time

The EE-S estimate of average surgery time was obtained from a meta-analysis of five studies which showed that the weighted mean surgery time was 18.49 minutes for stapled haemorrhoidectomy and 28.20 minutes for conventional haemorrhoidectomy (weighted mean difference -9.71 95% CI -3.60 to -15.82).

The Assessment Group conducted a meta-analysis of 11 studies which showed that the weighted mean difference in operating time was estimated to be -13.71 minutes (95% CI -13.00 to 14.41).

3.1.11 Time to return to work/normal activity

The Assessment Group stated that 20 trials reported the time to resume normal activity/return to work. A total of 19 reported a shorter time to resume normal activity/return to work after stapled haemorrhoidectomy and one reported no difference between stapled and conventional haemorrhoidectomy.

Table 3 Summary of clinical effectiveness (adapted from table 5.27 page 85 of the Assessment Report), indicating the more effective procedure

	Time point			
Outcome	**< 6 weeks**	**6 weeks to 12 months**	**12 months**	**> 12 months**
Pain	SH	neither	neither	neither
Bleeding	neither	neither	neither	neither
Haemorrhage	neither	n/a	n/a	n/a
Prolapse	CH	CH	neither	CH
Urinary retention	neither	n/a	n/a	n/a
Operating time, hospital stay, time to first bowel movement, return to work/normal activity	SH	n/a	n/a	n/a
Faecal incontinence, faecal urgency, anal stenosis/anastomotic stricture, pelvic sepsis	neither	neither	neither	neither
Anal fistula	neither	-	neither	-
Anal fissure, haemorrhoidal thrombosis	neither	neither	-	-
Wound infection, systemic infection	neither	n/a	n/a	n/a
Wound healing	SH	n/a	n/a	n/a
Symptom control, reintervention - overall	n/a	neither	neither	neither
Reintervention – for prolapse, reintervention – requiring CH	n/a	-	CH	CH
Reintervention – for complications	n/a	-	neither	neither
Reintervention – requiring non-excisional intervention	n/a	-	neither	neither

Abbreviations: CH – conventional haemorrhoidectomy SH – stapled haemorrhoidectomy

3.2 Cost effectiveness

No published economic evaluations were identified by EE-S or the Assessment Group.

3.2.1 EE-S economic model

EE-S submitted a cost-utility analysis comparing stapled haemorrhoidectomy with Milligan-Morgan haemorrhoidectomy. The model included patients with grade 3 and 4 haemorrhoids and the following health states: full recovery without recurrent prolapse, recurrent prolapse which can be self-treated, and recurrent prolapse requiring re-surgery (the latter of which may be followed by no further prolapse or a second recurrent prolapse). Complications or symptoms other than prolapse were not included. The average time from initial surgery to recurrence of prolapse was assumed to be 120 days and the waiting time from recurrence with severe symptoms to re-intervention was assumed to be 10 days. The model followed a 1 year time horizon and it was stated that there was little evidence of any therapy effect between stapled and open haemorrhoidectomies beyond 12 months. The economic evaluation was undertaken from a UK NHS perspective.

The EE-S base-case resulted in an incremental cost of £191 and 0.009 incremental quality adjusted life years (QALYs) for stapled haemorrhoidectomy compared with conventional haemorrhoidectomy, with an incremental cost-effectiveness ratio (ICER) of £22,416 per QALY. At a willingness to pay (WTP) of £30,000 per QALY there was a greater than 70% probability that stapled haemorrhoidectomy was the more cost-effective option.

EE-S carried out a number of one-way sensitivity analyses including cost of surgery, cost of hospital stay, percentage of inpatient episodes, mean inpatient length of stay, percentage of patients suffering recurrent prolapse, time to recurrent prolapse, probability of re-surgery following recurrent prolapse and physical functioning score. ICERs of £30,000 per QALY or more were found when there was no surgery time saved using stapled haemorrhoidectomy, when the cost of hospital stay was £100 per day, when the percentage of inpatient episodes was 0%, when all stapled haemorrhoidectomy patients incurred an inpatient stay, when the weighted mean difference of inpatient length of stay between stapled and conventional haemorrhoidectomy was 2.2, and when 20% patients suffered recurrent prolapse.

However, when the cost of the haemorrhoidal stapler was discounted by 30%, the ICER decreased to £6,970.

The Assessment Group identified some limitations in the EE-S model.

- Time horizon: all relevant costs and consequences associated with treatment may cover a period longer than 12 months; the assumption of 10 days to re-surgery is optimistic; the assumption of a 120 day recovery period may be too long. These assumptions imply only short duration of disutility when re-prolapse occurs. On the other hand, mild symptoms were assumed to persist for the rest of the year, with the same disutility as severe symptoms. Thus recurrence of mild symptoms incurred a greater QALY loss in the model than recurrence of severe symptoms.

- The model did not use all the available evidence from the RCTs to estimate pain and other outcomes, but instead used only one study each for SF-36 and VAS scores.

- The model did not consider complications and symptoms other than prolapse.

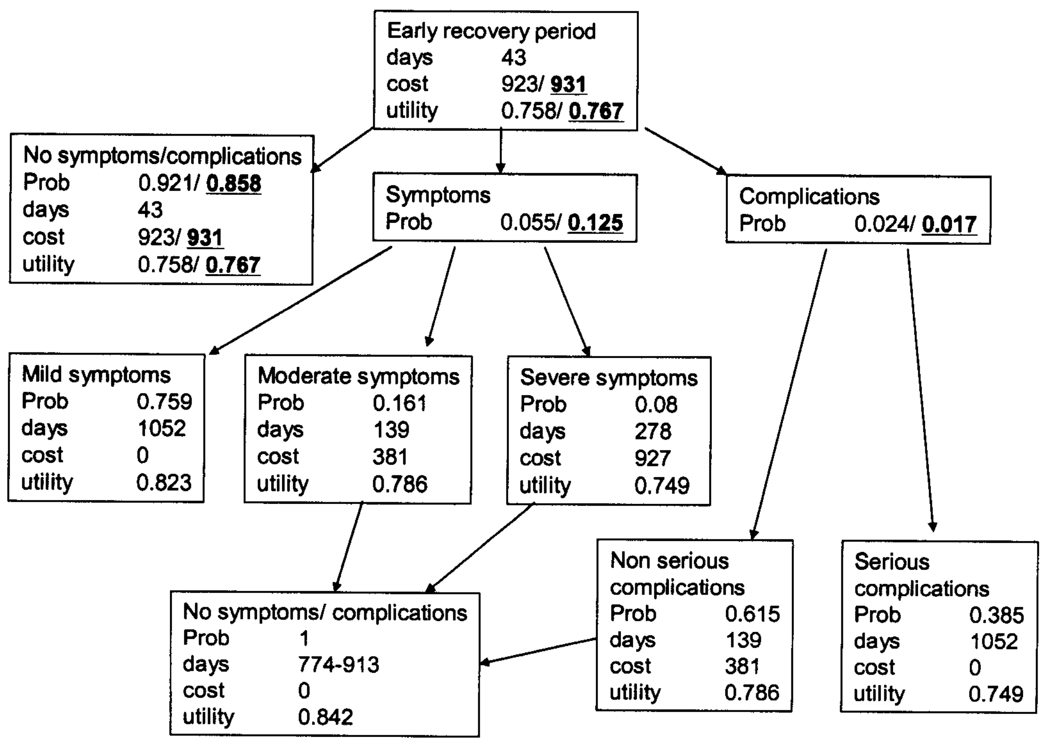
- Because data were lacking around the utility in the early post-operative period and following treatment failure, EE-S used their own calculations to establish utility values (see appendix A, table 9). However, the EE-S model did not incorporate sensitivity analyses on alternative ways to estimate utility.

3.2.2 The Assessment Group model

The Assessment Group undertook a cost-utility analysis comparing stapled haemorrhoidectomy with conventional haemorrhoidectomy (Milligan-Morgan or Ferguson technique). The structure of the Assessment Group's model was broadly similar to the EE-S model, but it included a wider definition of symptoms, complications of surgery, both surgical and non-surgical re-interventions, and considered a longer time horizon (appendix A, table 8). The model included the following health states: no symptoms or complications, mild, moderate or severe symptoms, mild complications not requiring re-interventions, moderate or severe complications requiring re-interventions and serious complications for which no re-intervention is feasible (figure 1). Symptoms were defined as prolapse, bleeding, mucus, pain or itching. Complications were defined as faecal urgency or inconsistency persisting for more than 12 months, fistula, anal stenosis or skin tags. Re-intervention was defined as re-surgery, rubber band ligation or sclerotherapy. The average time from initial surgery to onset of symptoms/complications was estimated to be 43 days and the average waiting time from recurrence of moderate to severe symptoms/complications to re-intervention was 277 days (recurrence to outpatient 138 days, outpatient to re-surgery 139 days). The model followed a three year time-horizon. The economic evaluation was undertaken from a health and social care perspective relevant for England and Wales.

Because of the lack of good quality RCTs which recorded either health-related quality of life (HRQoL) or utility in the crucial early post-operative period, utility inputs to the model had to be estimated indirectly (see appendix A, table 9)

Figure 1 Pathway and inputs in the Assessment Group model for stapled haemorrhoidectomy (SH) and conventional haemorrhoidectomy (CH). Where inputs differ between CH and SH, figures in bold indicate the values for SH (Prob = probability)



The Assessment Group's base-case resulted in an incremental cost of £19 and 0.001 fewer QALYs for stapled compared with conventional haemorrhoidectomy. Stapled haemorrhoidectomy was therefore dominated by conventional haemorrhoidectomy. At a WTP of £20,000-30,000 per QALY there was a 45% probability that stapled haemorrhoidectomy was the more cost-effective option.

The Assessment Group carried out a number of one-way sensitivity analyses using their own model and the EE-S model (table 4)

Table 4 Comparison of the assumptions in the Assessment Report and EE-S economic models and the effect on the ICERs. (Adapted from Assessment Report tables 6.24, 6.25, 6.28, 6.29)

	Cost Difference (£)	QALY difference	ICER (£ per additional QALY)
Assessment Group model			
Assessment Group base-case	19	-0.001	CH dominates
Recurrence to re-surgery 60 days (instead of 277 days)	19	-0.0009	CH dominates
Using the EE-S utility mapping	19	0.00108	17662
Probability of recurrence in year 2 and 3 is half the probability in year 1	27	-0.003	CH dominates
15% greater cost per day in hospital	-115	-0.0014	83019*
Theatre time of most optimistic RCT	-152	-0.0014	110311*
1 year time horizon	19	-0.0004	CH dominates
Utility in first 2 weeks valued using Lee algorithm	19	0.0004	43433
EE-S model			
EE-S's base-case	193	0.008	22931
Extrapolation of VAS score using one RCT (Van de Stadt), extrapolated to 6 weeks only (rather than to 1 year) and all re-interventions successful	192	0.004	50018
Surgery to recurrence:120 days. Recurrence to re-surgery:139 days	191	0.003	60336
Extrapolation of VAS score using 10 studies in meta-regression	192	0.001	156706
Extrapolation of VAS score using 10 studies in meta-regression and SF-36 mapped non-linearly to utility (P Kind method and dataset)	192	0	383985
Non-linear mapping of SF-36 to utility of health states	192	0.003	57105
Inclusion of non-serious and serious complications and 277 days wait to re-surgery	151	0.004	37263
Inclusion of non-serious and serious complications and 277 days wait to re-surgery, and non-linear utility mapping	151	0	CH dominates
3 year time horizon	192	0.003	65837
Alternative resource use - length of stay:meta-analysis of N RCTs. Operating time: meta-analysis of N RCTs	86	0.004	22415

* SH less efficacious and less costly

Abbreviations: CH – conventional haemorrhoidectomy SH- stapled haemorrhoidectomy

Table 4 shows that the ICER was very sensitive to the assumptions used, with very small differences in the benefits resulting in big differences in the ICERs. The Assessment Group therefore concluded that overall, none of the economic models used proves clearly that one procedure is more cost-effective than the other.

However, it was possible for the Assessment Group to draw the following conclusions. There is reasonable evidence that stapled haemorrhoidectomy is a less painful procedure than conventional haemorrhoidectomy up to 3 weeks after surgery, and that pain recedes in both groups over this period. The probability of complications is low in both groups and differences do not reach statistical significance at the 5% level. Patients offered stapled haemorrhoidectomy are more likely to experience symptoms during the follow-up period. The economic model showed that both procedures had very similar costs and QALYs. With respect to costs, the additional cost of the staple gun was largely offset by savings in operating time and hospital stay. With respect to QALYs, the superior quality of life due to lower pain levels in the early recovery period with stapled haemorrhoidectomy was offset by the higher rate of recurrence in the longer-term, compared with the conventional technique.

The model input parameter that most affects the results is how differences in pain during the early post-operative period should be valued in terms of utility. No good quality data were found to estimate the utility of patients with different degrees of haemorrhoidal symptoms, or for complications such as long term incontinence, therefore utility estimation was associated with a high degree of uncertainty (see appendix A). The weakest of these assumptions relates to the relationship between pain score measured on a VAS scale and the SF-36 summary scores. The Assessment Group's base-case assumes that SF-36 data recorded at 6 weeks after surgery represents the average HRQoL after conventional haemorrhoidectomy during the recovery period, and that after stapled haemorrhoidectomy pain would be reduced but other dimensions of HRQoL would be unchanged. This approach may underestimate the gain in utility from reduced pain after stapled haemorrhoidectomy, especially in the first days after surgery when pain is most acute.

4 Issues for consideration

Stapled haemorrhoidectomy was associated with less pain in the immediate post-operative period, but a higher rate of residual prolapse, prolapse in the longer term and re-intervention for prolapse. Does the Committee consider the stapled procedure to be clinically more effective than conventional haemorrhoidectomy?

With respect to costs, the additional cost of the staple gun was largely offset by savings in operating time and hospital stay. With respect to QALYs, the superior quality of life due to lower pain levels in the early recovery period with stapled haemorrhoidectomy was offset by the higher rate of recurrence in the longer-term, when compared to the conventional procedure.

The differences between QALYs gained from stapled and conventional haemorrhoidectomy were very small, which resulted in pronounced fluctuations of the ICERs in the sensitivity analyses.

No good quality data were found to estimate the utility of patients with different degrees of haemorrhoidal symptoms. Utility estimation was therefore associated with a high degree of uncertainty and the ICERs were very sensitive to the utility values used. EE-S and the Assessment Group used very different methods to derive the utility values. Furthermore, the published studies reporting quality of life did not conclusively show a quality of life benefit for stapled haemorrhoidectomy.

5 Ongoing research

None

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7 Appendix A

Differences in the modelling strategy between the EE-S and the Assessment Group model are outlined in table 5.

Table 5 Comparison of the Assessment Group and EE-S base-case, adapted from Assessment Report tables 6.24 and 6.28

Parameter	Assessment Group's base-case	EE-S base-case
Method of estimation and extrapolation of VAS pain score	Average reduction in pain from CH to SH estimated by meta-regression of 10 RCTs	1 RCT (Van de Stadt) extrapolated to 1 year. Differences in utility are predicted up to about 120 days
Method of valuation of utility in early post-operative period	SF-36 mapped non-linearly to utility (P Kind method and dataset)	VAS mapped to SF-36BP (log-linear assumption). Other SF-36 dimensions from 1 study (Wilson). SF-36 mapped linearly to utility (J Brazier coefficients).
Time horizon of model	3 years	1 year
Health states	No symptoms; Symptoms: Mild, moderate and severe; Complications: non-serious and serious	No symptoms/mild symptoms/ severe symptoms
Sources of health data	No symptoms: Population norm SF-36. Severe symptoms and complications: Weighted average of pre-surgery SF-36 of 3 studies. Utility of no symptoms > mild >moderate > severe	No symptoms: SF-36 dimensions after SH from 1 study (Wilson) scores, assuming no pain. Severe symptoms: SF-36 scores before SH from 1 study (Wilson). Mild symptoms = severe
Valuation of utility of health states	SF-36 mapped non-linearly to utility (Kind method and dataset)	SF-36 dimensions mapped linearly to utility (indirectly via Brazier coefficients)
Source of resource use in hospital of the primary procedure	Length of stay: meta-analysis of 9 RCTs. Operating time: meta-analysis of 11 RCTs	Prob (day case): Length of stay if not day case: Operating theatre time: meta-analysis (N RCTs)
Time to development of	Surgery to recurrence: 43 days. Recurrence to	Surgery to recurrence: 120 days. Recurrence to re-

symptoms and to reintervention	outpatient: 138 days. Outpatient to re-surgery:139 days	surgery: 10 days
Failure of reintervention	All patients with recurrent symptoms are eventually treated successfully	Probability same as failure of primary intervention

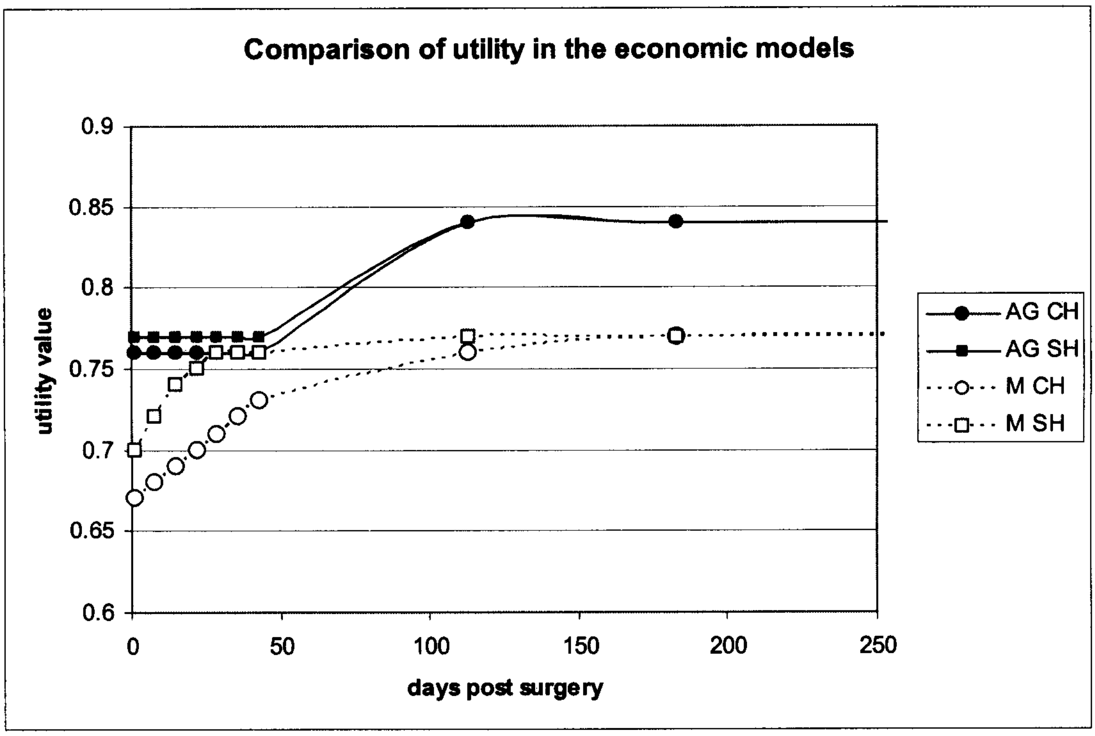
Methods employed to estimate utilities

EE-S and the Assessment Group agreed that it was not possible to calculate utilities directly, as the necessary information (patient preference data measured by a validated instrument alongside VAS pain scores) was not available in one single study. EE-S and the Assessment Group used different methods to estimate utilities as summarised in table 6. The resulting utility values for the post-operative recovery period are illustrated in figure 2.

Table 6 Comparison of the approaches used to estimate utilities

Method	Assessment Group	EE-S
Estimate VAS	Meta-regression to estimate proportionate treatment effect of SH (10 RCTs)	1 RCT recording VAS every day for 3 weeks after SH and CH (Van de Stadt), extrapolated over 6 weeks
Estimate SF-36 at 6 weeks	HODaR SF-36 data 6 weeks after surgery (Currie represents average HRQoL during recovery period after CH)	1 RCT recording 4 of the 8 dimensions of the SF-36 at 6 weeks after SH and CH (Wilson)
Map VAS pain to SF-36	Assume 35% less pain on average corresponds with 35% reduction in SF-36BP after SH (on a log-odds scale)	Assume SF-36BP would have changed over 6 weeks according to a mapping between VAS and SF-36 BP (linear on a log-scale)
Change in other dimensions of the SF-36	Other dimensions of HODaR data are unchanged	SF-36 Role physical score is 90 after SH and 95 after CH (Wilson)
Map SF-36 to utility	Matching SF-36 dimensions to utility using Health Survey for England dataset, calculated by the mean EQ5D TTO index in accordance with the methods employed by Kind	Cross-sectional dataset of patients aged 39 to 67 who were registered with a general practitioner in Sheffield SF36 algorithm was used to calculate the utility for each individual in the dataset, using linear regression and based indirectly on the Brazier SF-6D algorithm.

Figure 2: Comparison of utility values used by the manufacturer (M) and the Assessment Group (AG) adapted from Assessment Report table 6.14 and figure 6.4



6 Appendix C: Sources of evidence considered in the preparation of the overview

A The Assessment Report: Burch J, Epstein D, Baba-Akbari A, Weatherby H, Fox. D, Golder S, Jayne D, Drummond M, Woolacott N (University of York). Stapled Haemorrhoidectomy (Haemorrhoidopexy) for the treatment of Haemorrhoids. February 2007

B Submissions from the following organisations:

I Manufacturer/sponsors:

- Ethicon Endo-Surgery

II Professional/specialist and patient/carer groups:

- Continence Foundation

III Shalaby R. Desoky A. Randomized clinical trial of stapled versus Milligan-Morgan haemorrhoidectomy. British Journal of Surgery (2001) 88, 1049-53