# National Institute for Health and Care Excellence

## IP1925 Minimally invasive fusionless posterior approach surgery to correct idiopathic scoliosis in children and young people

**IPAC date: 13th April 2023**

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| 1 | Consultee 1<br>Company OrthoPediatrics | | Currently 554 patients are implanted with the system containing an extender component.<br><br>However at the date of this review is subject to publication | Thank you for your comment. |
| 2 | Consultee 1<br>Company OrthoPediatrics | 2.3 | Common techniques for correction of adolescent idiopathic scoliosis (AIS) involve posterior arthrodesis of all motion segments that are instrumented, including the curve apex and several segments both proximal and distal to the apex in order to control the curve and optimize the correction.<br><br>Long fusions carry the potential of earlier adjacent segment degeneration, instability, discomfort, or pain. Ref 1, 2<br><br>Constructs traditionally consist of vertically attached rigid rod-screw connections with a high density of pedicle screws, typically realigned with a combination of derotational and translational techniques. Although effective at correcting the deformity, this treatment immobilizes the entire length of the spine spanned by the instrumentation to assist with promoting fusion, resulting in | Thank you for your comment.<br>2.3 is a simple summary of current treatments which does cover spinal fusion surgery. |

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| | | | permanent loss of motion of all instrumented levels.<br><br>Ref 1 Harding J, Charosky S, Vialle R, Chopin DH. Lumbar disc degeneration below a long arthrodesis performed for scoliosis in adults) to L4 or L5. Eur Spine J. 2008;17(2):250–254. [PMC free article] [PubMed] [Google Scholar]<br>Ref 2 Marks M, Newton P, Petcharaporn M, Bastrom T, Shah S, Betz R, Lonner B, Miyanji F. Postoperative segmental motion of the unfused spine distal to the fusion in 100 patients with adolescent idiopathic scoliosis. Spine (Phila Pa 1976) 2013;37(10):826–832. [PubMed] [Google Scholar] | |
| 3 | Consultee 1<br>Company OrthoPediatrics | 2.4-2.6 | Note: *To align the text in the 2 online consultation documents please can we use the same text for accuracy*<br><br>Note: *Can we move the reference to "self-ratcheting" as this has been changed in a revised IFU as the reference was leading to confusion amongst the surgical teams regarding the action of the device and the surgical procedure.*<br><br>The procedure is done under general anaesthesia, and fluoroscopic guidance using a posterior unilateral approach. The concave side of the spinal curve is exposed through an incision around the apex of the curve. Two-three pedicle screws are inserted into the vertebral bodies through the pedicle above and below the apex of the spinal | Thank you for your comment.<br>Text in both the overview and draft guidance has been aligned for accuracy.<br><br>**IPAC amended section 2.5 and 2.6 as follows:**<br>*2.5 The procedure is done under general anaesthesia and fluoroscopic guidance using a posterior unilateral approach. The concave side of the spinal curve is exposed through an incision around the apex of the curve. Two pedicle screws are inserted into the vertebral bodies through the pedicle above and below the apex of the spinal curvature to serve as anchor points. A ratchet rod with an extender and 2 polyaxial joints (that allow a degree of spinal motion) is then fixed to the spine with pedicle screws that are implanted around the apex of the curve. Distraction during surgery is applied with a manual* |

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| | | | curvature to serve as anchor points.An adjusting ratcheting rod with an extender and 2 polyaxial joints (that allow a degree of spinal motion) is then fixed to the spine with pedicle screws that are implanted around the apex of the curve. Distraction during surgery is applied with a manual instrument to expand the rod and to the curve of the spine. After the procedure people are allowed to weight bear during everyday activities.<br><br>Note: *Please remove the reference to continued lengthening as in clinical practice the maximal device distraction is achieved during surgery.*<br><br>Limited further distraction has been seen in clinical practice. The additional statement around further extension has been removed in the amended in the IFU to reflect this change in surgical practice | *instrument to expand the rod and to straighten the spine. After the procedure, people are allowed to weight bear during everyday activities.*<br><br>*2.6 About 2 to 3 weeks after surgery, people are advised to exercise daily. This is to allow the rod additional unilateral elongation so there may be further gradual straightening of the spine while the person continues to grow. Because the procedure does not involve any spinal fusion, spinal motion is preserved. This minimises length of hospital stay and recovery time.* |
| 4 | Consultee 1<br>Company OrthoPediatrics | 2.4 | Please note the indications for Mid-C:<br>The MID-C System is indicated for use in:<br><br>• Patients with adolescent idiopathic scoliosis (AIS) having a single curve and classified as Lenke 1 (thoracic major curve) or Lenke 5 (thoracolumbar/lumbar major curve), having a Cobb angle of up to 60 degrees which reduces to less than or equal to 30 degrees on lateral side-bending radiographs, and thoracic kyphosis less than 55 degrees as measured from T5 to T12. | Thank you for your comment.<br>**IPAC amended section 2.4 as follows:**<br>*Minimally invasive fusionless posterior-approach surgery to correct idiopathic scoliosis is intended to treat AIS in selected people aged 8 years to 17 years whose bones have not fully matured. It is mainly used for correction of flexible single curves (a thoracic major curve or thoracolumbar or lumbar major curve) with a Cobb angle measuring up to 60 degrees, reducing to less than or equal to 30 degrees on lateral side-bending radiographs and thoracic kyphosis less than 55 degrees (as measured from T5 to T12).* |

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| 5 | Consultee 1<br>Company<br>OrthoPediatrics | 2.5 | This has ben removed from the revised IFU as the reference to "self ratcheting" was leading to confusion amongst the surgical teams regarding the action of the device and the surgical procedure. | Thank you for your comment.<br>**IPAC amended section 2.5 as follows:**<br>*The procedure is done under general anaesthesia and fluoroscopic guidance using a posterior unilateral approach. The concave side of the spinal curve is exposed through an incision around the apex of the curve. Two pedicle screws are inserted into the vertebral bodies through the pedicle above and below the apex of the spinal curvature to serve as anchor points. A ratchet rod with an extender and 2 polyaxial joints (that allow a degree of spinal motion) is then fixed to the spine with pedicle screws that are implanted around the apex of the curve. Distraction during surgery is applied with a manual instrument to expand the rod and to straighten the spine. After the procedure, people are allowed to weight bear during everyday activities.* |
| 6 | Consultee 1<br>Company<br>OrthoPediatrics | 2.6 | In clinical practice the maximal device distraction is achieved during surgery.<br>Limited further distraction has been seen in clinical practice and was also reported by Stadhouder.<br><br>The statement around further extension after 2-3 weeks has been removed in the amended IFU to reflect the change in surgical practice | Thank you for your comment.<br>**IPAC amended section 2.6 as follows:**<br>*About 2 to 3 weeks after surgery, people are advised to exercise daily. This is to allow the rod additional unilateral elongation so there may be further gradual straightening of the spine while the person continues to grow. Because the procedure does not involve any spinal fusion, spinal motion is preserved. This minimises length of hospital stay and recovery time.* |
| 7 | Consultee 1 | 3.1 | The commercial in confidence FDA post-Approval Study 24-Month Interim Report: ApiFix Ltd.'s Post-Approval Registry Study to Evaluate the Continued | Thank you for your comments and submitting additional evidence (commercial in-confidence 36-month interim |

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| | Company<br>OrthoPediatrics | | Safety and Probable Benefit of the MID-C System for 5 Years Post Implantation in Adolescent Idiopathic Scoliosis (AIS) (H170001) was shared with the IPAC and available for part 2 of the IPAC meeting.<br><br>The 36 months Status Report "commercial in confidence" is now available<br>The interim results at 36 months with the current Phase IV device and surgical technique from the FDA Post-Approval Study are presented in commercial confidence. The company has enrolled 110 out of the 200 required patients into the study and is ahead of the 36-month enrolment milestone (100 patients).<br><br>Period covered by this report: August 23, 2019 to July 1, 2022<br><br>Interim report month: 36 months. As of July 1, 2022, 17 sites have study IRB approval. Per the study registry data capture and 110 patients enrolled. | post-approval study status report that is not peer-reviewed).<br>The commercial in-confidence FDA post-Approval Study 24 month interim report shared by the consultee for IPAC 1 was discussed by the committee.<br>The 24 and 36 months status reports have not been published in a peer reviewed journal nor available on the FDA domain. So findings from these reports will not be included in the overview. However, the 36 months commercial in-confidence report was considered in part 2 of the IPAC meeting. |
| 8 | Consultee 2<br>Consultancy<br>Market Access & Reimbursement Solutions Ltd (M.A.R.S Ltd) | 3.1 | As discussed, we included data in our comments which we highlighted is strictly commercial and in confidence and for the attention of part 2 of the IPAC committee and will need to be redacted/removed before public consumption.<br><br>I have attached the full interim 36 months report which is “commercial in confidence“. | Thank you for your comments and submitting additional evidence (commercial in-confidence 36-month interim post-approval study status report that is not peer-reviewed).<br>As this report has not been published in a peer reviewed journal, findings from this report will not be included in the overview. However, the commercial in-confidence report was considered in part 2 of the IPAC meeting. |

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| 9 | Consultee 1<br>Company OrthoPediatrics | | T Cutibacterium acnes (formerly Proprionibacterium acnes), a commensal skin bacterial speciesis is one of the most prevalent cause of patient infections.<br>C. acnes may enter the surgical field via surgical incision through the pilosebaceous glands in the deeper layers of the skin.<br>The IFU has been updated to recommend that Surgical Site Infection prevention measures should include applying localized antibiotic before wound closure. The antibiotic should be broad enough spectrum to be efficient on Propionibacterium acnes or other common bacteria known to have been responsible for late site infections in your facility.<br>Ref Elston MJ, Dupaix JP, Opanova MI, Atkinson RE. Cutibacterium acnes (formerly Proprionibacterium acnes) and Shoulder Surgery. Hawaii J Health Soc Welf. 2019 Nov;78(11 Suppl 2):3-5. PMID: 31773103; PMCID: PMC6874694 | Thank you for your comment.<br>Infections were reported in the studies included in the overview and some of these needed reoperations.<br><br>Section 3.3 states the key safety outcomes considered by the professional experts and the committee. These include 'osteolysis, pain, infection, metallosis and damage to adjacent structures'. IPAC listed potential safety outcomes and requested information to be collected. |
| 10 | Consultee 1<br>Company OrthoPediatrics | | Destruction of bone (osteolysis) is not supported from Orthopediatrics complaint system or the US registry study, the rate of osteolysis following the MID-C procedure is 0.3% ( Data on file ). | Thank you for your comment.<br>Osteolysis of the pedicle screws was reported in 6 cases in one study (Stadhouder 2021). Surgical revision was done in 3 cases and the device was removed in 4 cases.<br>Section 3.3 states the key safety outcomes considered by the professional experts and the committee. These include 'osteolysis, pain, infection, metallosis and damage to adjacent structures'. IPAC listed potential safety outcomes and requested information to be collected. |

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| 11 | Consultee 1<br>Company OrthoPediatrics | | Generation of wear debris in the MID-C system is expected and is consistent with wear debris generated by other locked and unlocked spinal instrumentation systems (rods and screws). The presence of microscopic wear debris (rated as high as 4 by AnaPath and 3 in their revised reports) in periprosthetic tissues adjacent to the MID-C implants system is expected and is consistent with other locked and unlocked spinal instrumentation systems (rods and screws).<br>In fact, the number and distribution of wear debris in the interstices of fibrous connective tissues seen in representative histopathology images provided by AnaPath for the four explants were very similar to the number and distribution of wear debris with similar growth guidance implant systems which allow for implant motion and subsequent wear, Toth et al. investigating the SHILLA™ Ref . For the four explant patients (091-A002, 091-A007, 021-A001, and 090-A004), a form entitled "Retrieval Implant and Clinical Data" collected important safety data by Orthopediatrics at the time of revision/explant surgery. None of the four patients had evidence of osteolysis, which is a potential safety concern associated with the generation of implant debris. All four of the patients had "normal" assessment of bone quality at the time of revision/explant surgery, indicating the safety consideration that bone quality was not affected by the generation of wear debris. Although the wear debris generated a mononuclear chronic inflammatory response, patients were not aware of this response, and all | Thank you for your comments.<br>Macroscopic and microscopic metal particles were observed in all patients who had revision, around the ratchet and ball-and-socket joints in one study (Stadhouder 2021). The presence of metal debris at revision may indicate possible wear debris problems.<br><br>Section 3.3 states the key safety outcomes considered by the professional experts and the committee. These include 'osteolysis, pain, infection, metallosis and damage to adjacent structures'. IPAC listed potential safety outcomes and requested information to be collected.<br><br>Toth et al (2021) assessed inflammatory response to microscopic wear debris adjacent to screws of the SHILLA Growth Guidance System device. This device is a similar implanted rod and screw system used for early scoliosis correction. IPAC considered your views. |

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| | | | four of the patients went on to “return to normal activity” after revision/explant surgery.<br><br>Toth JM, Ankomah F, Kawakami N, Uno K. A comparison of the inflammatory host response to particulate debris adjacent to unlocked and locked screws of a growth guidance system for early onset scoliosis. Eur Spine J. 2022 Sep;31(9):2301-2310. doi: 10.1007/s00586-022-07271-2. Epub 2022 Jun 13. PMID: 35695968. | |
| 12 | Consultee 1<br>Company<br>OrthoPediatrics | PEQs | Only 2 professional expert questionnaires were received. | Thank you for your comment.<br>NICE seeks the opinion of as many specialist advisers as are deemed appropriate for the procedure. The number of questionnaires that are returned to NICE depends on professional organisations nominating their members, and the number of individual advisers returning their questionnaire to NICE within the required timescale before it is considered by the Committee. For this procedure we received 2 PEQs from specialists. The chair considered that sufficient advice was available to the Committee to make a decision. NICE would like to receive more PEQs and encourage clinicians to submit. |

*"Comments received in the course of consultations carried out by NICE are published in the interests of openness and transparency, and to promote understanding of how recommendations are developed. The comments are published as a record of the submissions that NICE has received, and are not endorsed by NICE, its officers or advisory committees."*