

How to do it: delayed sphincteroplasty for obstetric anal sphincter injury

Obstetric anal sphincter injuries (OASIS) are a common cause of faecal incontinence in women. Obstetric trauma can lead to disruption of the anal sphincter complex or damage to the nerve supply.¹ Symptoms can arise immediately after delivery or have an onset many years postpartum. Patients may report faecal urgency and incontinence to flatus, liquid, and solid faeces, in addition to sexual dysfunction and emotional distress.^{2,3} The anterior sphincter defect may be occult and unrecognized at the time of delivery or result from a breakdown of a primary repair.^{1,4} In patients presenting remote from delivery, a non-operative approach, such as dietary measures and biofeedback, is usually the first-line management. For those with persistent symptoms, delayed sphincteroplasty is a surgical option for the repair of OASIS.⁵ Different variations of the technique have been reported in the literature. We describe our approach to a delayed sphincteroplasty in detailed steps.

A 35-year-old female presented with faecal urgency and incontinence to liquid stool and flatus. She was 8 months post-partum (G4P2) following a singleton vaginal delivery. She suffered a grade 3c perineal tear following a precipitous labour. The perineum and sphincter were repaired at the time in the operating theatre. Post-repair, she experienced second-daily passive and urge faecal incontinence with post-defaecation soiling. Her St Mark's incontinence score was 13. There was only some improvement in her function with the introduction of supplementary fibre and pelvic floor exercises. Clinical examination revealed loss of the perineal body and significant attenuation of the anal canal anteriorly with an almost cloaca-like defect. Her background history included obesity and insulin resistance. Endoanal ultrasound revealed a 40% defect in the anterior internal and external anal sphincters (IAS and EAS). Anorectal physiology studies demonstrated reduced IAS and EAS pressures. She underwent a delayed sphincteroplasty and formation of a defunctioning colostomy combined with an anterior vaginal wall repair and perineorrhaphy.

The patient underwent sodium picosulfate bowel preparation. She was placed in lithotomy, under general anaesthesia, with an indwelling urinary catheter. Intravenous cephazolin and metronidazole was administered, and the abdomen, perineum and buttocks were prepared with Betadine and draped. A transverse incision was made between the vaginal and anal skin. A Lone Star (Endotherapeutics, Macquarie Park, NSW, Australia) was utilized for skin retraction. Using diathermy and sharp dissection, the anal skin and mucosa were mobilized from the underlying anterior fibrotic scar tissue. This plane was developed semi-circumferentially towards 3 and 9 o'clock to identify the retracted EAS. The retracted free edge of the EAS was mobilized to the level of the levator ani. Deep to the EAS, the free edge of the IAS

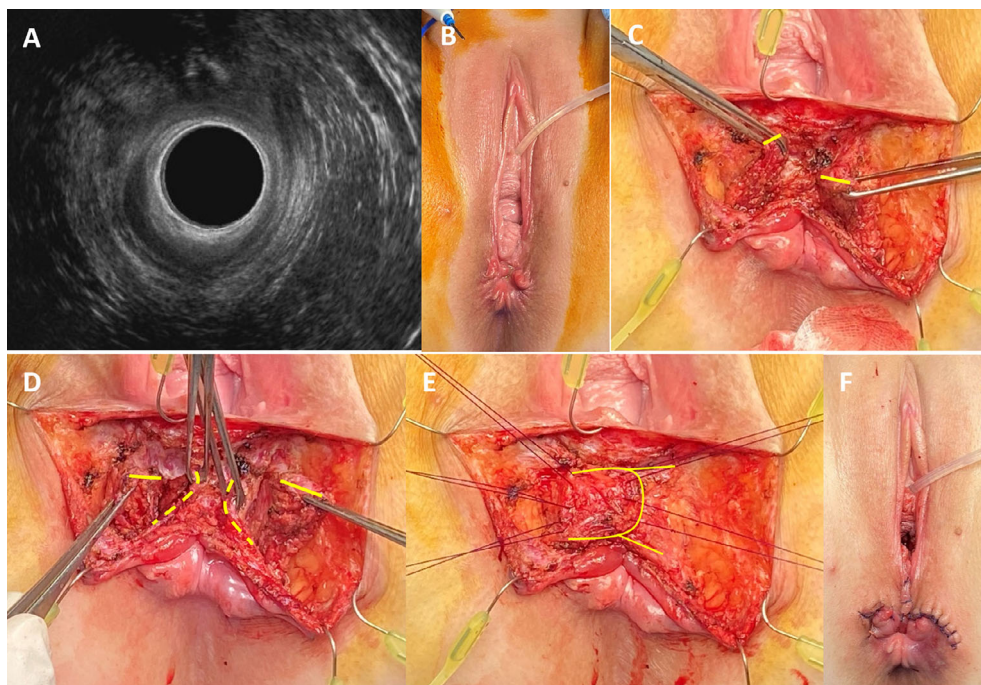
was identified. Limited mobilization of the IAS was undertaken to facilitate approximation. The central anterior scar tissue, now freed from the anal mucosa posteriorly, and IAS and EAS bilaterally, was detached from the vagina and excised to create space for the overlapping repair and planned perineorrhaphy. To ensure a tension-free repair, adequate mobilization of the EAS is necessary. However, overzealous mobilization should be avoided to prevent damage to the anterolateral neurovascular bundles, which we identified and preserved to optimize functional outcomes. The IAS was repaired end-to-end with 2–0 polydioxanone vertical mattress sutures. The mobilized ends of the EAS were grasped with Allis clamps and repaired using an overlapping double-breasted technique with interrupted 2–0 polydioxanone sutures (Fig. 1). The sutures were placed and referenced before tying to distribute tension and minimize risk of muscle tearing. Additional interrupted 3–0 polydioxanone sutures were placed in between mattress sutures to buttress the repair. An anterior vaginal repair using 0 polydioxanone sutures and perineorrhaphy with 0 polyglactin sutures was then performed by the urogynaecologist. The wound was closed with interrupted 2–0 polyglactin to the subcutaneous fat and interrupted 3–0 polyglactin to the skin. A bilateral pudendal nerve block was performed with 0.5% Marcaine with adrenaline. The patient was repositioned into the Lloyd-Davis position to form an end sigmoid colostomy and open Abcarian mucus fistula.

The patient was admitted to the ward for routine postoperative care for 5 days, including stoma education. She was advised to avoid any straining or movements that would stretch her perineum, such as squatting. A minor superficial wound breakdown was noted at the 3-week follow-up. This healed through secondary intention. She is planned to undertake repeat endoanal ultrasound prior to reversal of colostomy (initially planned for 3 months post-repair, now delayed due to COVID-19 restrictions and pregnancy).

Damage to the anal sphincters is not uncommon following vaginal delivery. The incidence is reported between 5% and 10%, however higher rates of occult or unrecognized injuries have been estimated as high as 35% in the literature.^{2,5–7} Anal incontinence will develop in ~30–50% of patients with OASIS, whereas the incidence is halved in parous women without such injuries.^{8–10}

Sphincteroplasty has long been offered to women suffering anal incontinence with a clinically significant sphincter defect. Traditionally, postpartum women with known sphincter defects underwent immediate or delayed surgical repair of their anal sphincter muscles with an end-to-end reapproximation. However, this can be associated with high failure rates.^{5,11} Consequently, Parks and McPartlin introduced an overlapping sphincteroplasty,¹² which has since become the

Fig. 1. (a) Endoanal ultrasound demonstrating the defects in the external and internal anal sphincters spanning from 10 to 2 o'clock. (b) Preoperative photograph highlighting the almost cloacal-like defect with loss of the perineum. (c) Intraoperative photograph revealing the mobilized EAS (cut edge marked in solid yellow, grasped by Allis forceps). (d) the mobilized IAS (marked in dotted yellow, with the free ends grasped by Allis forceps) is repaired. (e) An overlapping repair of the EAS (outlined in solid yellow) is performed using 2-0 polydioxanone sutures. Additional sutures were placed to buttress the repair. (f) Postoperative photograph of the final repair after wound closure.



preferred technique in secondary repairs. Good short-term results of overlapping sphincteroplasty have been published with complete anal continence reported in 50–90% of patients.^{13,14} However, studies evaluating long-term results, although sparse, generally demonstrate decreased effectiveness of the repair over time.^{5,15,16} Parks' initial description did not involve separate identification and repair of the IAS. Although these steps are routinely undertaken in primary sphincter repair,¹⁷ mobilization of the IAS from the EAS has not been traditionally undertaken in delayed sphincter repair, due to concern the additional dissection may risk further devascularization or denervation of valuable remnant muscle fibres. However, Berg *et al.* reported an improvement in anal continence in approximately two-thirds of patients with delayed repair of OASIS at a median follow-up of 44.5 months with independent suturing of the anal sphincters.¹⁰ Furthermore, 61.5% of participants at long-term follow-up had an intact anal sphincter repair on endoanal ultrasound and this group demonstrated a statistically significant mean reduction in their St. Mark's score. We have therefore employed an overlapping technique with independent repair of the sphincters.

During traditional delayed sphincteroplasty, the anterior scar tissue is divided transversely, with the scarred ends sutured in an overlapping configuration. The fibrous scar tissue between the disrupted ends of the sphincter muscle it is used as an anchor for suture placement rather than muscle.^{12,18} Intramuscular tears pose a technical challenge due to the risk of suture pullout.¹⁹ However, in the repair of large skeletal muscle tears during orthopaedic surgery, the direct suturing of separated muscle ends has demonstrated faster regeneration, improved function post-repair and less scar formation.^{20,21} Muscle biomechanics improve further with the incorporation of epimysium.²² In this repair, we excised the excess devascularized, non-functional scar tissue spanning the healthy muscle ends. Furthermore, adequate mobilization of the EAS permitted tension-free overlapping repair without need for scar tissue 'anchors'.

Several additional variations in sphincteroplasty technique have been described in the literature. No comparative study has demonstrated a clear superiority of any particular method. These modifications include suture material and size, suturing technique used to reapproximate the muscles, and method of skin reconstruction. Polydioxanone and polyglactin sutures are commonly utilized to repair the anal sphincters without significant difference in failure rates or complications.²³ Non-absorbable sutures are less commonly used due to the potential risk of infection or discomfort from suture ends.¹ Both 2-0 and 3-0 sutures have been used.^{24,25} We prefer a monofilament with reasonable tensile strength, and chose 2-0 polydioxanone sutures. Different suturing techniques have been described, including simple interrupted, mattress sutures, and 'W stitches'.^{10,18,24} Perineorrhaphy, particularly in patients with cloacal deformities, through reapproximation of the perineal muscles has been advocated to improve symptoms of anal incontinence and quality of life.^{4,18} The perineal skin, depending on the degree of disruption, has also been reconstructed in a variety of ways, ranging from simple closure, loose closure to allow drainage, gauze packing with healing through secondary intention, and flap repairs.^{10,25,26}

Faecal diversion via colostomy is routinely advocated by some in the hope of mitigating wound complications and repair failure.^{12,27} However, a recent study has shown no benefit in wound healing from faecal diversion.²⁸ The authors do not undertake routine diversion colostomy. In this case, the patient requested diversion for immediate relief of incontinence and its associated trauma. We advocate thorough discussion, with patient-centred decision-making. In the absence of a colostomy, a post-operative bowel management regimen with stool softeners is recommended.¹ Post-operative wound infections occur in ~25% of patients and has been associated with poorer functional outcomes and dehiscence of the internal anal sphincter repair.^{10,29} Wounds with a high bioburden risk progression from contamination and colonization to 'critical

colonization' and infection.³⁰ We recommend close clinical follow-up and early intervention to address sepsis as required.

OASIS are a feared complication of childbirth. It can be unrecognized, and lead to distress and suffering in women for many years postpartum. A delayed sphincteroplasty is an appropriate surgical technique which may improve the patient's quality of life. The technique has evolved over time, and currently there are multiple albeit small variations to it. We have presented our approach to a delayed sphincteroplasty, a method fundamentally rooted in the identification, careful dissection and separate repair of both anal sphincter muscles.

Written informed consent has been obtained from the patient for publication.

Acknowledgements

Open access publishing facilitated by University of New South Wales, as part of the Wiley - University of New South Wales agreement via the Council of Australian University Librarians.

Author contributions

Ferdinand Ong: Conceptualization; writing – original draft; writing – review and editing. **Kim-Chi Phan-Thien:** Conceptualization; supervision; writing – review and editing.

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doi: 10.1111/ans.17650

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