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Surgery for Faecal Incontinence

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Introduction

Faecal incontinence (FI) is defined as the involuntary loss of faecal material.[1] The condition causes physical problems and emotional distress impacting on almost every sphere of private and public life. The prevalence of incontinence to solid or liquid faeces in adults living in the community is estimated at 1.4%,[2,3] rising with age to approximately 6-7% in elderly people in the community and 10% of patients in elderly care homes.[4,5] Epidemiological data suggest that men and women are equally affected[2,4,6] which is surprising, given that most treatment series comprise a considerable preponderance of women, and suggests that there may be a large number of symptomatic male patients who simply do not present to their medical practitioners. Despite its profoundly negative impact on quality of life, recent data suggest that even if consultation is sought, knowledge of the causes and management of the problem in the wider medical community may be limited.[7] Although the problem induces a feeling of hopelessness in many patients (and perhaps in their practitioners also), there are grounds for optimism. Simple measures can improve symptoms in a high proportion of patients and recently a number of therapeutic options have become available.

Although this article will discuss the surgical options for FI, only 1% of patients with FI will present at a surgical clinic. It is important to emphasise that simple low cost interventions will improve or cure symptoms without having to resort to invasive investigations or treatment in the majority of cases. An essential part of this process is a detailed baseline assessment and clinical examination, aimed at identifying contributory factors and diagnosing conditions that warrant early specialist referral. FI is usually multifactorial and therefore the assumption that a single cause is responsible ("diagnostic overshadowing") should be avoided. The management of FI has recently been the subject of NICE guidance (www.nice.org.uk/CG049), and usefully summarised by Norton.[8]

Surgical Interventions for Faecal Incontinence

If surgical intervention is to be undertaken it is essential that the expected results are discussed openly with the patient, particularly with regard to the long-term durability of certain interventions. It is well recognised, for example, that continence deteriorates with time after anterior sphincter repair (see below). Selection of patients for surgery is based on clinical assessment aided by selected anatomical and physiological investigations. In general, the first question to answer is whether the anal sphincter is intact. Endoanal ultrasound (EUS) is usually the investigation of choice, though depending on local availability MRI may be preferred. EUS has high sensitivity for the detection of both external and internal anal sphincter defects.[9,10] Additional tests of anorectal function include defecography, colonic transit studies, manometry and electromyography and are indicated in selected cases, though much information can be gained by careful clinical examination.

Anal Sphincter Repair

Patients with an external sphincter defect of 90^{o} or more should be considered for elective repair using an overlapping technique. The majority of cases result from sphincter damage at childbirth with the remainder due to surgical intervention for anal fistula or fissure.

Postpartum sphincter damage (ie a third or fourth degree tear) is detected in 1.5-9% of vaginal deliveries and should be suspected in the presence of a recognised tear of the perineal body and perineal skin, although the absence of such a finding does not exclude sphincter damage.[11] Primary repair is usually performed within 24 hours of delivery and the majority of obstetricians carry out an end-to-end repair. In cases of missed sphincter damage or failed primary repair, elective secondary repair is indicated after a minimum interval of three months. This is usually performed by colorectal surgeons using an overlapping technique in which the sphincter ends are mobilised and repaired with interrupted mattress sutures. Although the short-term results of sphincter repair after obstetric injury are satisfactory, the results deteriorate in the medium to long term: approximately 50% of patients are continent to solid stool after five years and 20% at 10 years.[12,13] In the senior author's series, only 45% of patients were satisfied with the long-term operative outcome.[14] Best results are obtained in those incontinent to solid stool. Patients are rarely made continent to gas and urgency may improve only minimally. Passive incontinence due to internal sphincter disruption is not improved. A second sphincter repair procedure for patients who remain symptomatic with a demonstrable residual sphincter defect may be undertaken with reasonable results.[15] A number of factors may be associated with poor results including the presence of pudendal nerve neuropathy, external sphincter atrophy or multiple sphincter defects, but there is poor correlation and these factors are not necessarily predictive.

Pelvic Floor Repair

A number of procedures have been described to attempt to plicate the levator muscles and external sphincter in order to

increase the length of the anal canal and/or restore the normal recto-anal angle, including anterior levatorplasty, post-anal repair, and total pelvic floor repair. Unfortunately mid-term results were poor, leading to the procedure being largely abandoned as sphincter repair was undertaken in preference.[16] Since the intervention was undertaken during a time preceding accurate evaluation of the anal sphincter it is likely that many of the patients selected had occult sphincter defects. Given the limited durability of sphincter repair the longer-term results of the two procedures may not be all that different, but pelvic floor repairs are now rarely performed.

Injectable Bulking Agents

The success of injection of bulking agents in urinary incontinence in women has prompted a similar approach in patients with passive incontinence due to internal sphincter dysfunction. A variety of materials including collagen, silicone, PTFE, carbon-coated beads and autologous fat have been used to augment the submucosa or sphincter layers of the anal canal. Results are satisfactory in the short term and the procedure appears to be safe, simple, inexpensive and repeatable. However, at five year follow-up Maeda et al reported no difference in baseline incontinence scores following silicone injection although patient satisfaction and some quality of life scores were improved.[17] The most promising approach for this intervention seems to be to restore anal canal symmetry in patients with faecal leakage/soiling due to internal anal sphincter defects, some small studies showing a durable improvement in continence scores at 18-28 months.[18,19] However, very few randomised blinded trails are available. Of those that do exist, no benefit was found versus. saline placebo for injection of a silicone biomaterial after three months.[20] Given the profusion of reports and materials using this technique there is a real need for randomised studies in this area.

Radiofrequency

The principle of treatment is to generate heat in submucosal tissues causing the contraction of collagen fibres and therefore lumenal stricture. The technique has been used with success in gastro-oesophageal reflux disease.[21] The SECCA® procedure (Curon Medical, Sunnyvale, California) delivers temperature-controlled radiofrequency to the anal canal via four electrodes housed in an anoscopic handpiece, usually as a day surgery procedure. Early reports of the technique showed a modest improvement in incontinence and quality of life scores[22,23] despite unchanged anal morphology or manometry.[24,25] One of these early cohorts of 19 patients has now been followed to five years and sustained improvement in incontinence and quality of life scores documented.[26] As yet there are no randomised blinded trials.

Sacral Nerve Stimulation (SNS)

SNS has been used to treat patients with FI since 1994. The technique was first used in 1988 in patients with urinary incontinence, in whom it was noted that FI also improved. It is minimally invasive, safe and successful. Not all patients benefit to the same degree, but in some the achievement of complete continence is life changing. A distinct advantage of the technique compared to other surgical interventions is that patient selection is integrated into the implantation procedure. Under local or general anaesthesia, peripheral nerve evaluation (PNE) is performed by percutaneous electrode insertion via the sacral foramina (usually S3) and positioned to achieve the best motor response, identified by visible sphincter contraction. In patients exhibiting an appropriate muscle response, the electrode is secured in position, connected to an external pulse generator controlled by the patient and the therapeutic effect is then determined over a two-week trial period. The threshold for proceeding to permanent electrode implantation is a 50% improvement in either the number of episodes or incontinence-free days. Implantation of the permanent system requires a further procedure to place the permanent electrode and a subcutaneous pulse generator which is controlled by the patient using a hand-held device.

The mode of action of SNS is not known. Studies have shown evidence for augmented resting anal canal pressures and rectal distensibility[27] and reduction of corticoanal excitability.[28] It is likely that SNS action in FI causes a parasympathetic and/or somatic afferent effect resulting in neuromodulation at spinal and possibly more central level. The procedure has been used successfully in spinal cord injury.[29] Although an intact external anal sphincter was thought to be a prerequisite for success, recent studies have demonstrated good results in patients with external sphincter defects.[30,31] At present a substantial morphological muscular defect is a contraindication for SNS therapy.

A recent systematic review comprising six studies reported that of 266 patients who underwent PNE, 149 (56%) proceeded to permanent stimulator implantation.[32] Following definitive implantation, complete continence was reported in 55%, with 90% having more than 50% improvement in incontinence. Morbidity was minimal and most frequently related to electrode migration. Although there is no long-term data available, the studies which have reported results in the medium term suggest that therapeutic improvement is sustained in at least 80% of patients at 80 months.[30]

There is increasing published economic evidence for SNS. Although the cost of the device is high, associated costs of implantation, complications and follow-up are low. Recent NICE guidance stated that at a cost of between £6,500 and £10,500, SNS would be cost-effective if longer-term clinical outcomes are shown to be as positive as the early results. The procedure is more cost-effective than dynamic graciloplasty or colostomy[33] and has been estimated to cost approximately £15,000 per QALY gained.[34]

Neosphincter

Patients in whom SNS has failed or those with a substantial morphological defect may be offered a neosphincter in the form of a dynamic graciloplasty or artificial anal sphincter. Both interventions are associated with considerable morbidity. Patients need to be highly motivated and aware of the possibility of failure due to evacuatory problems or recurrent sepsis, ultimately necessitating a permanent colostomy.

a) Dynamic Graciloplasty

Chetwood first described substituting the anal sphincter with the gluteus maximus muscle over 100 years ago.[35] The technique has since been modified and refined to use the gracilis muscle, which unlike the glutei has a negligible role in movement and posture. In order to convert the type II fast twitch fibres of skeletal muscle to the slow twitch fatigue-resistant fibres of the anal sphincter, conditioning with constant low-frequency electrical current is applied via an implanted stimulator. The gracilis muscle is mobilised preserving its proximal neurovascular pedicle and repositioned to encircle the anal canal with its distal tendon anchored to the contralateral

ischial tuberosity. After eight weeks of conditioning the patient can control continence using an external magnet to switch the stimulator on and off to allow evacuation as required.

The procedure is technically challenging and the complication rate is high, with infection being the most frequent early problem.[36] After at least two years, 60-70% of patients are continent or significantly improved.[37-39] There is a high rate of complications requiring revisional surgery, so patients must be well-motivated.[40] The procedure deserves consideration in the severely affected patient and has been undertaken to avoid permanent colostomy in young patients after abdominoperineal excision for rectal cancer[41] and in patients with congenital anorectal malformation.[42]

b) Artificial Bowel Sphincter

The device consists of an inflatable cuff placed around the anal canal, a pressure-regulating balloon and a control pump placed in the scrotum of men or the labia majora of women. The balloon maintains cuff pressure and hence closure of the anal canal until activation of the pump deflates the cuff by returning fluid to the balloon to allow defecation. The implantation procedure is prone to infective complications which may necessitate device removal and a functioning sphincter is achieved in approximately 50% of cases.[43-45] Nevertheless in those with a functional device there is significant improvement in incontinence and quality of life scores.[44 46]

Malone Antegrade Continent Enema (MACE)

Malone first introduced the procedure in 1990 to treat faecal incontinence in children. A non-refluxing channel is created to allow antegrade administration of enemas to empty the colon and hence prevent faecal leakage. An appendicostomy concealed in the umbilicus is the simplest method but if the appendix has been removed ileal or colonic conduits can be fashioned. The procedure should be considered in patients where FI is associated with constipation due impaired rectal evacuation or colonic dysmotility. Results are good in 50-60% of cases.[47,48] Unlike neosphincter procedures, the surgery involved in MACE is relatively simple; the difficulty lies in maintaining patient compliance for administration of enemas and daily stoma catheterisation (necessary to avoid stenosis). Patients have to be highly motivated and involved in formulating their own care plans. Good stoma nurse support is essential. Recently the procedure has been reported in association with perineal colostomy in younger patients requiring abdominoperineal resection for rectal cancer as an alternative to abdominal colostomy, with good results.[49,50]

Colostomy

A colostomy may be the option of last resort for the patient in whom all other options have failed. Although a stoma has the apparent advantage of simplicity, stomas have considerable physical and emotional impact and are associated with progressive long-term problems including parastomal herniation. Even after colostomy formation, patients may be incontinent of rectal mucous or suffer defunction proctitis. Nevertheless, for some patients a colostomy is a positive advance in comparison to the social isolation of FI.[51]

Practical approach to surgical decision making

If a patient presents with faecal incontinence, the perineum must be inspected for perineal descent to identify possible rectal prolapse. Tone and contraction are assessed and an endoanal ultrasound scan performed. If there is a defect of 90 degrees or greater a sphincter repair is considered if there is adequate contraction of the residual muscles. Even if one accepts that the results will not be sustained then repair should be considered particularly in younger women who have suffered obstetric injuries relatively recently. If a long period has elapsed since the injury and incontinence has developed recently, then it is probable that other factors are to the fore, and repair should not be rushed into.

If there is no muscular contraction then irrespective of whether or not there is an abnormality of pudendal latency, it is likely that there is denervation and a repair is likely to fail. A trial of sacral nerve stimulation is then the treatment of choice if intervention is to be considered.

Those patients who leak after defaecation may be aided by simple irrigation with a 50ml enema bottle. In addition, we use rectal irrigation for a substantial number of patients with combined evacuatory and continence disorders. This is because sphincter repair is commonly complicated by difficulty with rectal emptying so conservative treatment may have fewer complications. Clearly if this is not successful, then SNS can be evaluated.

Multiple choice questions

1. Faecal incontinence is
a. More common in females
b. Usually caused by a specific surgical intervention
c. More common in elderly patients
d. May be associated with chronic constipation

a. False b. False c. True d. True

2. Obstetric trauma to the external anal sphincter
a. Can be identified by endoanal ultrasound following up to 35% of normal vaginal deliveries
b. Is frequently asymptomatic
c. Is a complication of grade 4 perineal tears only
d. Should never be repaired primarily

a. True b. True c. False d. False

3. The following are true regarding indications for surgery
a. Anterior sphincter repair gives best results in patients with symptoms of urgency and incontinence to gas
b. SNS is contraindicated in cases of severe perineal tissue loss
c. The results of sphincter repair improve with time
d. Malone appendicostomy is indicated for patients with faecal incontinence due to chronic constipation and evacuatory problems

a. False b. True c. False d. True

4. The following are true
a. A dynamic graciloplasty should be considered as the procedure of choice in a patient with faecal incontinence secondary to chronic constipation
b. Funding for SNS in Scotland is controlled by individual health boards
c. Injectable bulking agents may be indicated in defects of the internal rather than the external anal sphincter
d. Pudendal nerve dysfunction is an absolute contraindication to sphincter repair

a. False b. True c. True d. False

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