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Review article

Current indications, surgical technique and results of anterior sphincter repair as a treatment of faecal incontinence

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A B S T R A C T

Faecal incontinence is a high prevalence disease in the general population. This pathology is commonly under-estimated and causes a great impact on clinical status and on the quality of life of affected patients. The prevalence of faecal incontinence in several studies has been estimated between 2% and 15% of the general population. The prevalence increases if we study selected populations, such as elderly people. The main cause of faecal incontinence is obstetric anal sphincter damage. In the past years, the presence of incontinence due to sphincter lesions, especially the obstetric ones, was an absolute indication of anterior anal sphincter repair. Actually, after knowing the long term follow up results of this technique, as well as the evolving knowledge on faecal incontinence and the development of new diagnostic and therapeutic techniques, this technique might be selected for cases with large sphincter defects. However there is limited information in the current literature on indications, surgical technique and results of anterior sphincter repair. The aim of this review is to analyse scientific evidence on current indications, surgical technique features and results of anterior sphincter repair as a therapy for faecal incontinence, also giving our point of view on controversial issues. A bibliography search was undertaken using Medline database including articles published from January 1985 to January 2009.

Indicacion actual, técnica quirúrgica y resultados de la reparación anterior esfinteriana en el tratamiento de la incontinencia fecal

Palabras clave:
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Reparación anterior del esfínter anal
Esfinteroplastia
Resultados

R E S U M E N

La incontinencia fecal es una enfermedad de elevada prevalencia en la población general. Esta enfermedad, comúnmente subestimada, provoca un gran impacto clínico y en la calidad de vida en los pacientes afectados. Varios trabajos han comunicado una prevalencia de esta enfermedad de entre el 2 y el 15% de la población general, con cifras mucho mayores cuando se refiere a poblaciones seleccionadas, como por ejemplo pacientes con edad avan-

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zada. La causa más frecuente de esta enfermedad es la lesión del aparato esfinteriano anal de origen obstétrico. Clásicamente, la presencia de incontinencia fecal debida a lesiones esfinterianas, sobre todo de origen obstétrico en la mujer, era una indicación indiscutible de reparación anterior del esfínter. Actualmente, después de conocer los resultados a largo plazo de esta técnica, junto a los avances en el conocimiento de la incontinencia fecal y al desarrollo de nuevas técnicas diagnósticas y terapéuticas, esta intervención parece estar indicada para casos más seleccionados con defectos amplios. A pesar de esto, existe escasa literatura médica actualizada sobre estas nuevas indicaciones y sus resultados. El objetivo de este trabajo es exponer la evidencia científica existente en cuanto a la indicación actual, los aspectos de la técnica quirúrgica y los resultados de la reparación anterior esfinteriana en el tratamiento de la incontinencia fecal, y aportar también nuestro especial punto de vista en los aspectos controvertidos. Para esto, se realizó una búsqueda bibliográfica a través de la base de datos Medline en la que incluimos artículos publicados entre enero de 1985 y enero de 2009..

Introduction

Faecal incontinence is the incapacity to retain faecal matter until a time when its expulsion would be personally or socially acceptable.[1] This disease's significant clinical impact and how it affects the quality of life of patients who suffer from it have been documented.[2] There is increasing data that confirm the high prevalence of this commonly underestimated[3,4] disease in the general population. Indeed, the actual prevalence of this disease is hard to determine due to the lack of a standardised definition and patient reluctance in communicating with their own doctor about this disease.[5] Several studies have reported a prevalence for this disease among the general population of between 2% and 15%, with far greater numbers among selected populations with special pathological and social characteristics (the elderly, institutionalised patients or those living in nursing homes, etc.).[6,7]

Faecal incontinence is a multifactorial disease involving several disorders, such as changes in intestinal motility; stool consistency and volume; integrity of the sphincter apparatus, anal canal and innervation system; and finally the patient's state of consciousness.[8,9]

In women, the most frequent case of faecal incontinence is obstetric trauma, after which up to 44% of postpartum women may have varying levels of sphincter dysfunction with a third experiencing varying levels of incontinence.[10,11] Obstetric trauma also represents the most common cause for surgical indication of faecal incontinence.[12] Other major causes include complications of anal surgery, neurological diseases (stroke, brain tumours, multiple sclerosis and degenerative diseases), muscular diseases (myasthenia and amyloidosis), digestive diseases (irritable bowel syndrome, chronic inflammatory diseases and radical proctitis), etc.[8]

As stated previously, there are several factors that contribute to normal continence. However, the important role that the anal sphincter apparatus plays is well known.[1] The internal anal sphincter (IAS), composed of smooth muscle, exhibits a permanent tonic contraction that insures closure of the anal canal at rest.[7] In general, injury to the IAS causes passive faecal incontinence, leaving the patient without any feeling of imminent defecation. The external anal sphincter (EAS) is a complex of striated muscle, which increases anal pressure in a reflexive and voluntary manner when intra-abdominal or intrarectal pressures increase.[7] Injury to the EAS generally translates to urgent faecal incontinence, where the patient cannot prevent defecation that they sense is imminent.[4]

Traditionally, the presence of faecal incontinence with sphincter injuries, especially for obstetric reasons in women, was an unquestionable indication for anterior sphincter repair.[13] This intervention can be carried out immediately (and also a couple of weeks) after sphincter injury or belatedly in patients with old injuries and who consult with a specialist.[10,11]

In this review we refer only to belated repair of the anal sphincter. Currently, due to the long-term results of this technique and the advances in knowledge of faecal incontinence, there is broad consensus in indicating this surgical intervention in patients who have broad defects in the sphincter complex.[14] Despite this, there is little current medical literature on these new indications and their results.

The objective of this paper is to present the scientific evidence regarding the current indication, the aspects of the surgical technique and the results of anterior sphincter repair in the treatment of faecal incontinence, and also provide our particular views on the controversial issues. For this purpose, we conducted a literature search through the Medline database in which we included articles published between January 1985 and January 2009 using the following search terms: *faecal incontinence, anterior sphincter repair, sphincteroplasty, surgery* and *results*.

Types of surgical treatment for faecal incontinence

There is much information on how patients affected by faecal incontinence should be studied, especially in order

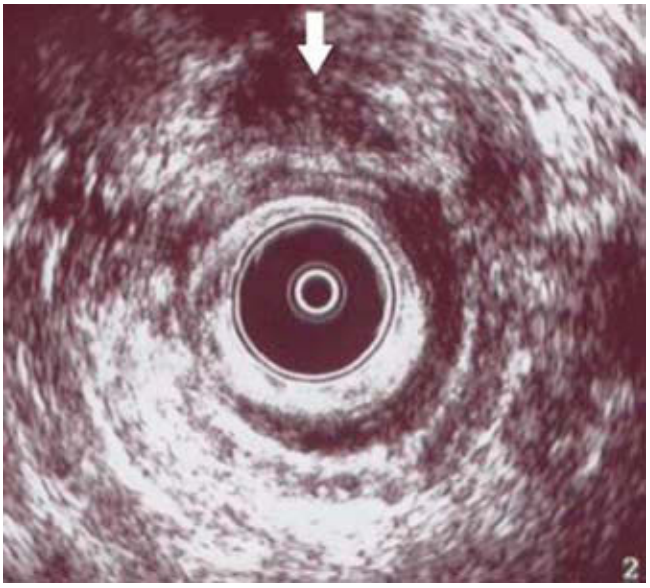

Figure 1 – Endoanal ultrasound image of a patient with faecal incontinence where a large anterior defect in the external and internal anal sphincter is seen.

to properly select the most appropriate type of therapy. We recommend a study that includes at least one imaging technique, preferably endoanal sonography, so as to detect the existence of defects in the IAS and EAS (Figure 1), a functional study with anorectal manometry to evaluate anorectal pressures and finally a neurophysiological study.[15]

By using these methods, patients can be separated into four groups as has recently been published.[16] They could thus be differentiated into: faecal incontinence due to trauma, neuropathy, a combination of the two, and lastly, idiopathy. This classification could be very useful given that the best results from sphincteroplasty are achieved in patients from the first group.

Nevertheless, in the presence of traumatic faecal incontinence the first treatment indicated is conservative. Basically these measures consist of changes in the diet and individual habits of the patient and the prescription of antidiarrhoeal drugs such as loperamide.[17,18]

The rehabilitation of the pelvic floor through *biofeedback* techniques often complements the initial treatment or is used when initial measures are not effective.[7,19] Between 30% to 50% of the patients will not respond to conservative measures, which will indicate the need for surgical treatment.[17,20]

In the last three decades since the Parks et al studies were published with the first series of patients with anterior repair of the anal sphincter, as it's known today, many surgical techniques have been described for the treatment of faecal incontinence although some of them have no more than historical interest at present.[21]

The different surgical techniques for the treatment of faecal incontinence can be classified as interventions designed to correct pelvic floor anomalies, interventions designed to create a new anal sphincter or neosphincter, sacral root stimulation treatment, interventions designed to adequately irrigate the colon in an antegrade manner, and finally, interventions designed to correct anal sphincter abnormalities.[17] The anterior sphincter repair that is aimed towards this last objective is based on the repair of defective muscle, above all in the frequent cases of women with obstetric injuries.[17,22,23]

Current indication for anterior sphincter repair

Anterior repair of the anal sphincter is an elective surgical technique when there is evidence of a defect in the anal sphincter apparatus as primary cause for faecal incontinence in the patient.[10,24] By this we mean there is a defect in the EAS detected by imaging scans and there are no other causes such as a neurological disease that may be responsible for the clinical condition (for example, multiple sclerosis).[25]

Traditionally, an indication for delayed surgical repair of the anal sphincter was any injury that caused faecal incontinence of liquid or solid stools (and not just gases), and where, through physical examination and ultrasound, an injury is found that can be detected by imaging techniques, above all those that had an extension of greater than 90° of the circumference.[26] The American Society of Colon and Rectal Surgeons considers as surgical indication those symptomatic patients with localised defects, without defining exactly the minimum size of the injury detected as indication for this surgery.[25]

However, the published results for this technique, which will be discussed later in detail, have shown that the structural defect is not always the cause of the patient's functional state, and therefore, the current trend is for the sphincter repair to be indicated for more extensive injuries.[27] This is especially important considering that this procedure has non-negligible morbidity.[12,28]

The problem stems from how to describe the extent of sphincter injuries in order to analyse what the absolute indication (if it exists) is for surgical repair. Our group has recently introduced the Starck et al[29] classification into our clinical practice for rating the degree of severity of injuries visualised by endoanal ultrasound depending on whether one or both sphincters are affected throughout the anal canal. This ultrasound classification may be used in the future to more accurately determine the degree of extension of injuries and establish a basis for the indication of sphincteroplasty in these patients.[24]

There is no doubt that indications for anterior repair of the anal sphincter are those injuries that, due to their extension, constitute anatomical defects evident during the physical examination, and not so much defects visualised in the ultrasound.[30] We refer in particular to injuries that cause a total lack of anal closure or total loss of the rectovaginal septum, which behave as true rectovaginal cloaca and for which non-surgical treatments, such as *biofeedback* and sacral root stimulation, do not offer any benefit.[10,31]

Recently, sacral root stimulation has been indicated for use in patients with faecal incontinence and relatively small defects in the anal sphincter, with satisfactory clinical

results.[32,33] This procedure would avoid a treatment with high morbidity for patients who for years had been indicated for anterior repair of the anal sphincter. However, we should wait for the results of randomised clinical trials that may provide information about the characteristics that patients should have if they are to be included in this alternative therapy.[30]

Preoperative preparation for anal sphincter repair

Even today there are no published randomised clinical trials that measure the need for performing an anterograde colonic preparation before surgery. In their absence, the majority of authors still recommend performing a standard preparation of the patient the day before surgery. In our opinion, the lack of evidence and the discomfort it brings patients allow us to recommend eliminating the anterograde colonic preparation and simply using a cleansing enema the night before or the same day.

The need for performing an intravenous antibiotic prophylaxis prior to this type of surgery is also not reflected in randomised clinical trials. Nevertheless, due to the high rates of infection of the surgical site, the majority of authors advise performing a standard prophylaxis, for example with A single dose of metronidazole and a 3rd generation cephalosporin intravenously on the day of the intervention.[31]

The use of intraoperative urinary catheterisation, in some cases during the first hours after surgery, is recommended to avoid abdominal pressure stress and urine retention in the early postoperative period and to prevent further contamination of the surgical area.

In European centres, the most commonly used positions for the patient on the operating table are the gynaecologic and lithotomy (Lloyd-Davis), in which the patient is supine, with legs apart and flexed above the pelvis and resting on the stirrups.[31] However, American specialists often use a prone position (Prone Jack-knife) with the pelvis at rest on a soft support and buttocks separated by adhesive strips. There is no clear consensus on patient positioning and each has different advantages and disadvantages.

For this intervention, either regional (epidural or spinal) or general anaesthesia can be used. A manoeuvre recommended by many authors is the infiltration of the operative site with local anaesthetic preparations with adrenaline or epinephrine diluted to reduce haemorrhaging of the operative site to a minimum. It is true that there is no scientific evidence of this manoeuvre's benefits but it seems to improve the exposure of the anatomical planes. Before using it, however, one should consider the theoretical cardiac risk that its use may imply and, therefore, its indication should be agreed upon with the anaesthesiologist.

Surgical technique

The first manoeuvre consists of the identification of the sphincter injury through digital palpation, which in the case of obstetric trauma is the total disappearance of the posterior perineal pouch or a substitution of it by scar tissue.[34]

Different types of incisions can be used but generally a cutaneous incision from 120 to 180º on the scar area (Figure 2) with dissection progressing about 5cm in depth in order to dissect two flaps: an anterior vaginal and a posterior anorectal. Subsequently, the sphincter scar is identified and released.[23]

A key step here is to continue laterally in order to locate the extent of the muscles and scars, which are progressively released. The edges of the sphincter must be dissected along the end of the scar throughout its thickness. Traction thread may be useful for exposing the various edges. The release must be sufficient to allow for a correct suture of the edges of the sphincter with adequate tension (Figure 3). For this reason, some authors advise keeping the scar tissue.[35] Before this particular myorrhaphy, some authors recommend that the two bundles of the levator ani be approximated using suture points.[35] There is controversy, however, regarding the association of levatorplasty with sphincter repair in women. While some authors consider this an essential manoeuvre, others have detected increased postoperative dyspareunia in patients who have had been operated on with this technique.[36]

This particular anal sphincter repair can be performed using an overlapping technique or a simple direct suture technique.[37] In the former, the two traction threads are used to expose the edges of the sphincter. As they cross over each other, they must be checked for sufficient mobility in order to obtain an overlap of around 2 cm (Figure 4). The simple suture is performed through direct contact of the two edges of the sphincter. The suture of the two muscle ends of the anal sphincter is normally performed with monofilament absorbable sutures (PDS®), although there are other preferences such as using non-absorbable sutures.[31]

Recently, a randomised clinical trial was published in which it was demonstrated that there were no significant

Figure 2 – Diagram showing perianal skin incision (dashed line) that is made in the anterior anal sphincter repair in women.

Figure 4 – Diagram showing the final vision of the suture through the overlay technique of both ends of the external anal sphincter in the anterior anal sphincter repair.

Figure 3 – Diagram showing the suture through the overlay technique after the release of both ends of the external anal sphincter in the anterior anal sphincter repair.

differences between direct suture of the two muscle ends and their overlap, although these results need to be confirmed before always employing this technique.[35]

At the completion of the repair, it is recommended that the wound be irrigated abundantly with diluted povidone-iodine to reduce the risk of infection. Subsequently, closure of the subcutaneous tissue and cutaneous closure are performed. Some authors, like us, believe that it can be sometimes useful to leave the cutaneous wound with one of the points open or with a small drainage in order to avoid the accumulation of liquid and a subsequent abscess of the wound, which can cause a total dehiscence of the wound[31] (Figure 5).

Figure 5 – Diagram showing the suture of the skin after the completion of an anterior anal sphincter repair.

With the evolution of the surgical technique for sphincter repair, new dilemmas and debates have followed. The most pressing issue is the need to individually repair the IAS prior to repairing the EAS.[34] Even if it is necessary, the majority of authors do not consider the need of this manoeuvre on the IAS due mostly to the difficulty of its dissection because of its minimal thickness. However, other authors consider that IAS injury is not a negative predictive success factor in surgical repair if the latter is repaired through simple suture in the same surgical act.[38] Other groups opt for a more extension dissection of the intermuscular plane and a repair by overlapping IAS.[34,39] Despite this controversy, there is currently insufficient scientific evidence to advise systematic isolated repair of the IAS in sphincter repair surgery.

A randomised clinical trial demonstrated that it is not necessary to perform a protective colostomy in anal reconstructive surgery.[40,41] Therefore, our opinion is also

that systematic colostomy is not justified in the surgical treatment of faecal incontinence, including cases of complex procedures and reintervention.

Postoperative care

Some authors suggest that after surgery the patient should be given an early diet rich in fibre, abundant water and be prescribed laxatives if necessary. This is all aimed towards preventing hard consistency among the first stools, which can in theory cause a tearing in the surgical sutures or simply cause painful defecation for the patient.

Intestinal rest, that is, avoiding the oral intake of food for a few days after surgery as a method for protecting the surgical suture is traditionally recommended for up to five days after this procedure. In a randomised clinical trial, Nessim et al demonstrated how this manoeuvre was not necessary for the postoperative stage of sphinteroplasty.[42]

Immediate surgical complications include infection of the surgical wound (24%) and wound dehiscence (10%).[31] The importance of this last complication is that it can subsequently lead to functional failure of the surgery and major complications such as rectovaginal fistulae, which may require further surgery. To avoid the infection of the surgical wound becoming an abscess that might cause negative functional consequences, it is recommended that the wound be reopened at the slightest clinical suspicion of infection.

Functional results

Monitoring of patients should be done through clinical evaluation of faecal incontinence with the known systems of severity and the quality-of-life evaluation associated with faecal incontinence. Although there is no consensus among experts, the Wexner[44] and St Mark's Hospital[45] scoring systems are the most used in clinical evaluation, and the scale described by Rockwood et al[2] for quality-of-life associated with faecal incontinence is a useful tool for evaluating quality of life, given that it was validated for the Spanish language a few years ago.[46]

The first patient series published in the 1970s and 1980s provided very encouraging results for this surgical technique, especially in studies with a clinical follow-up of less than 3 years, reporting satisfactory results in 70%-80% of the patients operated.[17,47,48] Table 1 displays the most relevant published series with short-term follow-up. These early experiences determined that for many years the majority of patients with faecal incontinence and sphincter defects were to be operated on.

Subsequently, and with experience, it was observed that these results were not confirmed in studies that had long-term follow-up of patients who had been operated on, where we now observe an invariable clinical deterioration after 3 years.[17,27,49-52] Table 2 presents the results of more relevant series in patients with follow-up greater than three years.

Some studies have observed an improvement in the quality of life of operated patients without a clear clinical improvement of functional symptoms. This characteristic feature of functional gastrointestinal disorders greatly complicates obtaining useful data when analysing the published series.[53]

The authors indicate that possible causes for the poor long-term results of this surgical technique may be the possibility of inadvertent nerve damage during surgery (or during childbirth prior to the intervention) or progressive deterioration of sutured muscle fibres.[27,48] Despite this, it is not precisely known what preoperative prognostic factors determine patient outcomes and therefore endorse these hypotheses.

Some authors recommend further examination using imaging techniques, such as endoanal ultrasound, on patients who have poor results, as the patient may once again have a sphincter defect that is indicative of surgery.[31,54] Indeed, several series have been published on patients who underwent a second or third anal sphincter repair, known as resphincteroplasty, with encouraging clinical results.[17,55]

Complementing the surgical treatment with functional rehabilitation sessions of the pelvic floor through *biofeedback* seems to have the potential of improving the results of this technique.[12] Above all, taking into account that not only will it have a beneficial effect in terms of functionality, but will also, in our opinion, educate the patient in certain aspects relevant

Table 1 – Series of patients with anterior anal sphincter repair for faecal incontinence with postoperative follow-up of less than 3 years

Author	n	Follow-up, months	Excellent or good results, %
Elton at al[59]	20	13	80
Engel et al[13]	55	15	79
Fleshman et al[60]	55	12	72
Jacobs et al[61]	30	7-60	83
Norderval et al[62]	71	27	41
Oliveira et al[47]	55	29	71
Osterberg et al[48]	20	12	50
Pinta et al[63]	39	22	31
Sizler et al[64]	31	1-36	74

Table 2 – Series of patients with anterior anal sphincter repair for faecal incontinence with postoperative follow-up greater than 3 years

Author	n	Follow-up, months	Excellent or good results, %
Barisic et al[49]	65	80	48
Bravo et al[50]	191	120	40
Londono-Shimmer et al[65]	94	60	50
Malouf et al[27]	55	77	49
Morren et al[66]	55	40	56
Rothbarth et al[67]	39	39	62
Zorcolo et al[51]	93	70	55
Halverson et al[52]	71	69	25
Maslekar et al[43]	64	84	80
Karoui et al[37]	74	40	46

to the results, such as special diets and the rehabilitation of the defecatory habit.

Outcome predictors after anterior repair of external anal sphincter

In the last 10 years there have been several studies that attempted to study the presence of factors that could predict clinical outcome after anal sphincter repair.

The results of these studies are difficult to interpret because most of the series include a small number of patients with very heterogeneous baseline characteristics. Furthermore, the follow-up is short on many occasions and the lack of data based on functional examinations and the standardised and validated questionnaire on the severity of faecal incontinence does not allow us to draw clear conclusions.[56,57]

Oberwalder et al[38] determined that a pre-existing IAS injury does not preclude success in an anterior repair when compared to an isolated EAS defect. Therefore, patients who present combined injury of both sphincters can be considered as good candidates for this type of surgery. In 1998 Gilliland et al[58] did not find a correlation between the number of previous childbirths, an antecedent of prior sphincteroplasty, the aetiology and duration of incontinence, the extension of the injury observed through ultrasound and the results of the surgery. In the same study, a correlation was observed between prior injury of the pudendal nerves and negative long-term surgical results, which was confirmed in later studies. Finally, some authors have reported that the results of preoperative anorectal manometry may be predictive of the outcome of surgery.[56]

Regarding the surgical technique, Baig et al concluded in their review of predictors of successful outcome of sphincter repair surgery that the optimum conditions before surgery are the absence of prior surgery, the preservation of the scar, the absence of injuries to the pudendal nerves, preserved rectal sensitivity in a young patient, not being obese and an isolated EAS defect.[22,31,56]

In conclusion, sphincteroplasty is a surgical technique indicated for cases of faecal incontinence of liquid or solid stools whose pathophysiologic origin is a traumatic injury to the EAS. Above all, it is indicated for those cases in which one can exclude other causes that are different from sphincter injury. Predictors of poor outcome with this technique are mainly the presence of associated neurological injuries.

Conflict of interest

The authors affirm that they have no conflicts of interest.

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