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ORIGINAL ARTICLE

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Calibrated lateral internal sphincterotomy for chronic anal fissure

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Abstract Lateral internal sphincterotomy is an effective procedure for the treatment of anal fissure, but may affected anal continence. We describe a procedure aimed at tailoring the division of the sphincter according to the degree of the hypertonia and to the sphincter length in order to offer an effective and safe treatment for chronic anal fissure. **Methods** The internal sphincter was divided on the basis of anal manometry. The average of maximum values of resting pressure determined by the stationary motility protocol was considered the reference parameter to measure hypertonia. Mild hypertone was considered to be 50–60 mmHg, moderate hypertone 60–80 mmHg, and severe hypertone >80 mmHg. In case of mild hypertone, 20% of the internal sphincter was divided; in case of moderate hypertone; 40% and 60% for severe hypertone. Calibrated lateral internal sphincterotomy is the division of the internal sphincter based on these parameters. Over 5 years, 388 patients underwent this procedure (197 men, 191 women) with a median age of 43 years (range, 18–80). **Results** Postoperative complications consisted of abscess in 4 patients (1.0%), hemorrhage in 2 patients (0.5%), and pain in 6 patients (1.5%). Follow-up data are available for 261 patients (67.3%). Two months after surgery, 9 patients (3.4%) complained of persistent or recurring pain with or without fissure and 1 (0.4%) complained of gas incontinence. At postoperative manometry, 12 patients (4.6%) revealed persistence of anal resting pressure over 40 mmHg, 9 patients (3.4%) were still symptomatic and 97.6% were cured at a median follow-up of 8 months. An anal resting pressure lower than 30 mmHg was found in 10 patients (3.8%), only one of whom was incontinent. **Conclusions** Calibrated sphincterotomy may represent an effective and safe procedure for the treatment of chronic anal fissure.

Key words Chronic anal fissure • Sphincterotomy • Calibrated sphincterotomy

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Introduction

Lateral internal sphincterotomy (LIS) [1] is the treatment of choice for chronic anal fissure (CAF). This approach, however, worries many surgeons because of the high rate of incontinence disorders reported in many patients, which varies between 8% and 48% [2–9]. In spite of these alarming reports, other surgeons claim that incidence of continence disturbances is limited to 1.5%–2.5% [10–12], and evidence for no permanent continence disorders after lateral sphincterotomy is available [13–15].

Standard sphincterotomy is division of the internal anal sphincter (IAS) from its lower edge to the level of dentate line, but it is not clear what amount of sphincter is cut. It is generally accepted that this distance is about 1.5 cm, but the amount of divided IAS is usually 50%–60% [4–6], and can reach 75% [16, 17]. On the other hand, limited sphincterotomy could be ineffective when the sphincter is long, as in young men, with the persistence or recurrent of fissure or symptoms. The frequency of these complications has been reported to be 3.8% by Oh et al. [12], 4.6% by Lewis et al. [6], 5.1% by Weaver et al. [11], 8% by Nyam

and Pemberton [4], 13.8% by Garcia-Aguilar et al. [5], and 15.4% by Evans et al. [14].

The value of anal resting pressure is underestimated by surgeons; its association with sphincter length can give us, indeed, an idea about the length of sphincterotomy to be performed. Sphincter length and anal resting pressure vary individually and for this reason the sphincter division may be individually tailored. We believe that we cannot base our approach only by digital exploration, as was claimed until a few years ago [18], but we can calibrate the amount of sphincter division on the basis of anorectal manometry results. Since 1980, for a few years, we planned the sphincter section only by the manometrically detected anal resting pressure, without caring for sphincter length [19]. This approach was used by Pescatori et al. [20] in 1988 for spasm-related sphincterotomy. But this first approach proved unsatisfactory, as we neglected the second factor, the sphincter length. A high anal resting pressure associated with a short sphincter is likely to require a shorter sphincterotomy than for a longer sphincter with the same pressure. The need to evaluate both pressure and sphincter length suggested us to calibrate the muscle division as a percentage of sphincter length variable with the degree of anal resting pressure, with the purpose of decreasing the anal resting pressure to about a normal value.

Patients and methods

Between 1988 and 2003, we performed 388 calibrated internal sphincterotomies for chronic anal fissure (CAF) at our Department. Patients in whom sphincterotomy was performed because of stenosis or associated with other operations, e.g. hemorrhoidectomy or fistulotomy, were excluded. Fissures lasting more than 8 weeks, with thickening of edges, edema, sepsis and cavitation, were considered chronic. Patients underwent anal manometry before and after surgery, and were followed postoperatively for up to 1 year.

At the beginning of our experience, anal manometry was performed using a Gemini 7070 polygraph with a Bentley Trantec 800 transducer and an Asid Bonz 50–300 pump for continuous infusion; later we used an 8-channel Zinetics Polygram 98 (Medtronic, Milan, Italy). We obtained longitudinal resting and squeezing pull-out profiles with a computer-triggered stepper motor at a speed of 0.5 cm per second. Sphincter length was measured as the extension where the average of recorded pressure was higher than 20 mmHg. Maximal average resting pressure (MARP) was measured, as was the point of maximal pressure, defined as the distance from the anus to where the average of registered pressures reached the highest value. The high pressure zone (HPZ) was defined as the area with pressures greater than or equal to 50% of the maximal pressure. We also evaluated the resting pressure by stationary motility protocol. The squeezing pressure was evaluated at the point of maximal pressure detected by longitudinal resting pull-out profile. The sphincter length considered for internal sphincterotomy was the value detected with a continuous pull-out. To determine the extent of internal sphincter division, we considered the maximal value from the average of 8 channel pressures (MARP) detected by the stationary resting motility protocol. The same procedure was performed for the postoperative anal manometry.

Surgical technique

An enema was administered a few hours before operation. Epidural or general anesthesia was performed as agreed by the patient and anesthesiologist. The lithotomy position was preferred. Park's procedure was usually performed [21]. Briefly, the skin was incised for a length of about 2 cm, well outside the anal verge, along the anus circumference. The skin and mucosa were dissected with scissors to clear the extension of internal sphincter to be divided. After identification of the intersphincteric plane, the internal sphincter was dissected free, with scissors, from the external sphincter for the same length as in the previous step.

In our experience, the anal resting tone of an individual without any proctological disease is 30–40 mmHg; in these subjects, the sphincter length varied from 3.0 to 5.5 cm. Lower values may be detected in elderly women and men, in pluriparous women, and in subjects with previous anorectal surgery; higher values may be present in young men. We considered 50–60 mmHg to be mild hypertone; it was corrected by division of 20% of the internal sphincter. Moderate hypertone is between 60 and 80 mmHg; in these cases we divided 40% of the sphincter length. Severe hypertone is over 80 mmHg and required a section of 60% of the sphincter. We did not perform closed sphincterotomy [22], to minimize the risk of sepsis.

Postoperative care and follow-up

One day after surgery, a call for stool was stimulated with a stool softener, and the patient was discharged with the prescription of taking warm baths twice daily. After one week, we tested the patients' conditions by digital exploration. The next control was set two months later when sphincteric function was assessed by anorectal manometry. If the high preoperative resting pressure had lowered to normal (30–40 mmHg), the fissure had healed and no complaints were reported, the following control was set one year later.

We did not perform manometry later than two months after operation, unless there was a recurrence of symptoms [23]. When recurrence of symptoms or fissure was associated with a mild increase of anal resting pressure, we prescribed anal dilation; if the increase of anal resting pressure was severe, re-sphincterotomy was advised.

Results

Over a 5-year period, 388 patients (197 men) of median age 43 years (range, 18–80 years) underwent calibrated internal sphincterotomy for chronic anal fissure. Pain was the most common symptom, reported by 100% of cases; rectal bleeding occurred in 76%, perianal swelling in 50%,

mucous discharge, pruritus and perianal excoriation were occasionally found; 75% of the patients had constipation.

In the immediate postoperative period, 4 patients (1.0%) had an abscess, 2 (0.5%) had a hemorrhage, and 6 (1.5%) reported pain (Table 1). Treatment was drainage, hemostasis in the theatre and administration of analgesics, respectively.

Follow-up data are available for 261 patients (67.3%) for the period between 2 and 12 months after operation. Late complications (Table 2) included persistence or recurrence of pain, with or without fissure, in 9 patients (3.4%) and gas incontinence in 1 patient (0.4%).

Manometry carried out in 261 patients evaluated 2–12 months after sphincterotomy (median, 8 months) revealed a persistence of high resting pressure (>40 mmHg) for 12 patients (4.6%), but only 9 patients (3.4%) were symptomatic as previously reported; a resting pressure lower than normal (<30 mmHg) was found in 10 patients (3.8%), but gas incontinence concerned 1 patient only (0.3%), as shown in Table 3. Sphincterotomy was successful for 251 patients (96.2%), clinically controlled up to one year after operation. Out of 9 patients presenting with a persistent or recurrent pain, with or without fissure, all with high resting pressure at manometry, 4 healed after re-sphincterotomy, thus reducing the failure rate to 2.3% and increasing the successful outcome rate to 97.7%.

Table 1 Early complications after calibrated internal sphincterotomy in 388 patients

	Patients, n (%)
Abscess	4 (1.0)
Hemorrhage	2 (0.5)
Pain	6 (1.5)

Table 2 Late complications (2–12 months) after calibrated internal sphincterotomy, for 261 patients available for follow-up

	Patients, n (%)
Persistence or recurrence of pain	9 (3.4)[a]
Gas incontinence	1 (0.4)

[a] Of 9 patients with persistent or recurrent pain, with or without fissure, all of them presenting residual high resting pressure, 4 healed after re-sphincterotomy, thus reducing the failure rate to 1.9%

Table 3 Manometric findings after calibrated internal sphincterotomy in 261 patients evaluated at 2–12 months

	Patients, n (%)
High resting pressure (>40 mmHg)	12 (4.6)
Low resting pressure (<30 mmHg)	10 (3.8)

Discussion

Medical management of CAF (basically chemical sphincterotomy) is widely developing to avoid anal incontinence that in the past has been a real complication after surgery. In our experience, many patients refuse dilations because of the pain, the daily administration, and the need for repeated cycles; our practice with glyceryl trinitrate (GTN) ointment 0.2% twice daily for one month led to unsatisfactory results. Only 25% of patients avoided sphincterotomy for more than a year. However, for CAF healing percentages reported with the use of GTN vary betwen 29% and 83% [24–30]. The recurrence rate for fissure within one year, about 30%–50% [27–31], is remarkable, and headhache during GTN administration is not a negligible consequence [24–26, 32–34]. Botulin toxin seems to give better results if administered alone or after GTN [35–40], but it is not easy to handle, because it must be injected into the sphincters and may be followed by anal incontinence lasting a few weeks. After this treatment, the need for internal sphincterotomy drops to about 20%. The use of calcium channel blockers such nifedipine, lecipidine, diltiazem has been also suggested; their administration in patients with CAF is followed by healing in 65%–95% of cases [29, 41–45] but only short-term results (a few weeks) are available.

What heals CAF is a permanent lowering of the high anal resting pressure, which in CAF is often present. This can be achieved only by dividing a part of the internal anal sphincter. Incontinence after internal sphincterotomy for CAF has been attributed to pre-existing sphincteric injuries, to the too extensive internal sphincter division (more than 50%), to external sphinter injury during the procedure, to sphincteric functional impairment with age, to the shorter sphincter in women, and to the key-hole deformity in case of posterior sphincterotomy.

In 1998, Garcia Aguilar et al. [46] evaluated the extension of IAS section for fissure with endoanal ultrasonography in incontinent and continent patients, and found that the percentage of the sphincter cut was 75% in the former and 57% in the latter; the external sphincter was thinner at the site of operation in incontinent patients; this suggested surgical injury to the external sphincter. The conclusion is that incontinence following internal sphincterotomy may be due to a wide sphincter division, perhaps more than the surgeon had intended, especially in women.

Limiting the sphincter division to the fissure length is an artifice proposed by Littlejohn and Newstead [10] (tailored sphincterotomy). A review of 287 operations showed continence disturbances in 2.5%, and persistence or recurrence of fissure in 4.8%. Tailored sphincterotomy is a short internal sphincterotomy without a manometric study evaluation. Spasm-reated sphincterotomy, as performed by Pescatori et al. [20], seems to reduce the risk of anal incontinence. We proposed in 1982 [19] to base the length of the internal

sphincterotomy on the anorectal manometric findings; at the beginning we considered the high degree of anal resting pressure the only parameter for operation, but after a few years, and with the improvement of our manometric instruments, we were compelled to consider the sphincter length, manometrically evaluated, as a second parameter. We "calibrate" internal sphincterotomy using these two parameters, which associated with the squeezing pressure, give a real idea of the anal sphincter function. Postoperative assessment is both clinical and manometric. From these, we found that results are stabilized after two months, because manometric findings from 135 patients at two months and one year after sphincterotomy showed no variations. Most of our patients had fissure healing and only one complained of minor incontinence, a positive functional outcome when compared to the that reported by most authors following standard sphincterotomy [2–9]. The amount of internal sphincter division based on manometric findings may perhaps be a matter of debate, but we believe that each patient must be tested before and after operation with a manometric study.

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Invited comment

This paper commendably attempts to pragmatically utilize a morphological approach in symptomatic chronic anal fissure patients to internal anal sphincter division selectively based on inherent preoperative resting tone, with what can only be described as excellent clinical results both in terms of fissure-related outcome and anal function. The authors state that there is tremendous variability in the reported incidence of leakage after internal sphincterotomy and this may have to do in part with the difference between chart-related reviews of outcome (which are notorious for underestimating significant postoperative incontinence) and more dedicated prospective assessments of functional results and quality of life following such minor but important anorectal surgery [1]. It is interesting that chronic anal fissure, which represents an archetypal proctological illness for manometric and anatomic study, is still so poorly understood. The causes for postoperative incontinence in these patients (and indeed its preoperative predictability) are multifactorial and, although implicating the actual amount of sphincter cut, may also impugn the preoperative constitutive distribution of the overlapping subcutaneous external anal sphincter [2], inherent differences in the reactivity of the rectoanal inhibitory reflex in fissure patients [3] and even a more complex interplay between voluntary and resting functions after sphincterotomy where it has been noted that there are reproducible variations between continent and incontinent outcomes which occur irrespective of the coronal length of divided internal sphincter [4, 5]. All this may occur on a background of internal anal sphincterotomy which far exceeds that originally intended (tailored or not), particularly in women with short preoperative anal canal lengths [6]. As has been shown by Renzi et al. [7], it may well be that it is the physiological importance of the sphincter which is divided rather than its morphological length that may govern outcome for fissure surgery; a point not lost on Rosa and colleagues here. In addition it should also be appreciated that the mere presence of demonstrable muscle anatomically, however that is imaged, does not *ipso facto* mean that it is contributory to recorded pressure [8] and this may imply that some patients with preoperative normotonia may still fare badly after limited sphincterotomy. Clearly there are some patients with poor functional outcome where excessive sphincter has not been divided and where there is neither a problem of external sphincter damage or of postoperative anal closure. It is only through prospective randomized controlled trials comparing the physiological and functional effects of tailored sphincterotomies with pre- and postoperative manometric and morphological changes that the 'holy grail' of defining *before* surgery which patients are likely to fare badly post-sphincterotomy will be achieved.

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