

coloproctology 2020 · 42:478–484
<https://doi.org/10.1007/s00053-020-00454-9>
 Published online: 15 April 2020
 © Springer Medizin Verlag GmbH, ein Teil von
 Springer Nature 2020



M. Holzgang · D. Jayne

John Goligher Colorectal Unit, St. James University Hospital, Leeds, UK

Lateral internal sphincterotomy (LIS)—still top gun in chronic anal fissure treatment?

Spotlight on a disputed technique

Anal fissure is a common proctological complaint, with a lifetime risk of 11% [1]. It most often affects young adults and is a cause of morbidity and loss of time from work. Anal fissures are categorized into acute and chronic. Acute fissures are usually amenable to medical treatment, which includes a combination of stool softeners, bulking agents, and topical ointments (glycerol trinitrate, GTN; diltiazem; etc.). If an acute fissure fails to heal within 6–8 weeks, it is said to be chronic in nature and usually requires surgical intervention [2].

The pathophysiology underlying chronic anal fissure is believed to involve spasm of the internal anal sphincter secondary to mucosal injury and inflammation, giving rise to high sphincter pressures and local ischemia, which in turn inhibits mucosal healing. Surgical treatments aim to break this vicious cycle by causing temporary (Botox) or permanent (sphincterotomy) relief of internal sphincter spasm.

A trial of medical therapy is usually advocated for patients with chronic anal fissure, but if this fails, the surgical options include Botox injection into the internal anal sphincter, fissurectomy with/without Botox, anodermal advancement flap, or lateral internal sphincterotomy (LIS). There is disagreement in the colorectal community about which should be the preferred method. The German-speaking community has practically “banned” LIS, due to reports of unacceptably high postoperative incontinence rates [3], whereas LIS is still the preferred option in many other

Western countries, because of excellent healing rates and high patient satisfaction ([4]; **Fig. 1**; **Table 1**).

This paper attempts to unravel the evidence behind the treatment of chronic anal fissure and make the case for LIS as a good option in the majority of patients.

First-line surgical strategy for chronic anal fissure

Why LIS?

During LIS, the internal sphincter is divided to relieve muscle spasm, thereby increasing blood flow to the chronic mucosal ulcer and stimulating healing. The open lateral technique was first described by Eisenhammer in 1959 [10] and further propagated in the 1960s by Parks, after whom the technique was named [11]. The closed technique was advocated by Notaras in 1971 [12]. The predecessor of LIS, posterior sphincterotomy, has been abandoned due to frequent development of a “keyhole deformation” at the 6 o’clock sphincterotomy site rendering patients more prone to incontinence [13, 14].

Many national treatment guidelines still recommend LIS as first-line treatment in chronic anal fissure (**Table 1**). The advantages of LIS are well described in the literature, including high rates of fissure healing (~95%) with rapid pain relief and high patient satisfaction (**Table 2**). Two recent meta-analyses have confirmed these findings, with healing rates of 93% documented by Ebinger et al. [15], and superior healing rates as compared to other treatments

(topical nitroglycerin, botulinum toxin A injection, oral nifedipine) published by Nelson et al. [14].

Fissurectomy vs. lateral internal sphincterotomy

In the German-speaking community, fissurectomy is the preferred surgical fissure treatment. The chronically inflamed mucosal ulcer and any sentinel skin tags are excised, leaving a well-vascularized tissue bed to facilitate healing and an intact internal sphincter muscle to preserve continence [21].

Although the theory behind fissurectomy is sound, the evidence supporting its benefit over LIS is limited. Randomized controlled trials (RCTs) comparing fissurectomy with LIS are scarce. Hancke et al. compared two groups of 30 patients undergoing either fissurectomy alone or fissurectomy + LIS. The success rates were similar in each treatment group, with no significant difference in postoperative incontinence. The authors concluded that addition of sphincterotomy to fissurectomy was unnecessary [21].

Another RCT published by Mousavi et al. compared fissurectomy with LIS. In this group of 60 patients, both fissurectomy and LIS showed excellent healing rates. Whereas patients in the fissurectomy group experienced a slow, gradual improvement in symptoms, patients in the LIS group benefited from immediate symptom relief, which was reflected in a higher patient satisfaction score (LIS 96.6% vs. fissurectomy 87.5%). After a median follow-up of 22 months, 2 pa-

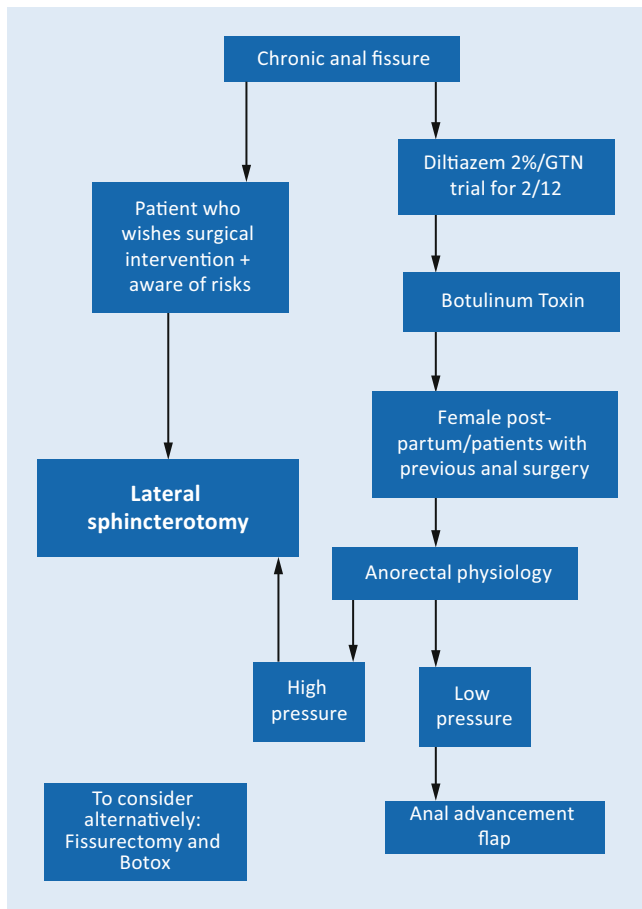


Fig. 1 ◀ UK algorithm for anal fissure treatment. GTN glycerol trinitrate

tients reported incontinence for flatus in the fissurectomy group, but none in the LIS group. The authors conclude that LIS should be the preferred surgical technique for chronic anal fissure [16]. In a meta-analysis by Nelson et al., LIS was less likely to result in treatment failure as compared to fissurectomy. Additionally, there was no significant difference in continence disturbance between the two techniques [4].

Incontinence after LIS

The elephant in the room?

The reporting of postoperative incontinence after LIS is inconsistent. The meta-analysis by Ebinger et al. documented an overall incontinence rate after LIS of 9.4%. It included studies with incontinence rates varying widely between 0 and 44%, suggesting differences in surgical technique and/or patient selection. The impact of incontinence on patient satisfaction and quality of life was not

assessed, nor was the duration of incontinence (transient or permanent) [15]. A US study investigated the outcomes of LIS with particular regard to fecal incontinence (FI) [18]. Five hundred patients were evaluated by questionnaire after LIS, with a medium follow-up of 72 months. The fissure healing rate was excellent at 96%, with symptom relief achieved on average by 3 weeks, and a recurrence rate of only 8%. However, 45% of patients reported some form of incontinence during the postoperative period. In long-term follow-up, the incontinence rate dropped, with 6% suffering incontinence to flatus, 8% minor fecal soiling, and 1% incontinence to solid stool, indicating that incontinence was mostly transient and minor. Accordingly, only 3% of patients reported a negative impact on quality of life.

Another study by Hasse et al. analyzed short- and long-term outcomes of 209 patients undergoing LIS matched to a control group with no previous proctological history. In the LIS group, 15% of patients

reported some degree of incontinence at 12 weeks postoperatively. Incontinence was classified as mild in 11%, moderate in 6.9%, and severe in only about 1%. Patient satisfaction after 12 weeks was high, at 95%. In longer-term follow-up (median of 124 months), however, the number of patients affected by incontinence increased, as did its severity (7.7% mild, 9.6% moderate, 4.3% severe), and patient satisfaction dropped to 73%. The follow-up data of the control group revealed an overall incontinence rate of only 3.8%, with 2.4% classified as mild, 1.4% as moderate, and 0% as severe. The authors concluded that LIS should serve as a “salvage procedure,” with fissurectomy recommended as the first-line treatment in chronic anal fissure [17].

A recent meta-analysis evaluating the outcomes of around 4500 patients who had undergone either open or closed LIS, with a follow-up ranging from 24 to 124 months, reported continence disturbance in up to 48% of patients. Incontinence was mostly minor (flatus incontinence/seepage) and transient, with frank incontinence to stool being reported in only 1% of patients [22].

A recent study from Turkey undertook a retrospective analysis of 417 patients treated with LIS for chronic anal fissure. Only 8 patients (1.9%) developed incontinence problems. Interestingly, 7 affected patients were females who had undergone previous vaginal delivery; the 1 male patient suffering incontinence had undergone prior anorectal surgery. In 5 patients, incontinence resolved completely, with 3 patients continuing to suffer incontinence to liquid stool after 4 months [19].

Nelson et al. conclude in their meta-analysis that the risk for incontinence after LIS is around 5% and is mostly minor (incontinence to flatus). They argue that operative procedures have improved, with the overall incontinence risk now lower than reported in older studies [4].

Several groups have focused on the effect that incontinence after LIS has on quality of life. Hyman followed 35 patients after LIS over a period of 2 years. The Fecal Incontinence Severity Index was measured pre- and postoperatively. Only 3 patients showed a deterioration

coloproctology 2020 · 42:478–484 <https://doi.org/10.1007/s00053-020-00454-9>
© Springer Medizin Verlag GmbH, ein Teil von Springer Nature 2020

M. Holzgang · D. Jayne

Lateral internal sphincterotomy (LIS)—still top gun in chronic anal fissure treatment? Spotlight on a disputed technique

Abstract

Background. Anal fissure is one of the most common proctological complaints. If the fissure persists for more than 6–8 weeks, it is termed a chronic fissure and will most likely need surgical intervention. Surgical partial transection of the internal sphincter muscle, lateral internal sphincterotomy (LIS), is still seen as the gold standard procedure for chronic anal fissure in many parts of the world, especially in the Anglo-American community. In contrast, the German-speaking surgical community favors fissurectomy ± application of Botox, as some studies report high postoperative incontinence rates after LIS.

Objective. This paper aims to give an overview of the literature on LIS and its outcomes and

answer the question, “Is LIS still the gold standard surgical approach for chronic anal fissure?”

Material and methods. A literature search for “sphincterotomy,” “internal sphincter,” and “anal fissure” was performed in PubMed. For the purpose of this overview article, randomized controlled trials (RCTs), meta-analyses, up-to-date guidelines, and retrospective cohort studies were taken into account.

Results and conclusion. LIS produces excellent rates of fissure healing (~95%), quick symptom relief, and high patient satisfaction. Incontinence after LIS is mostly described as mild and transient. In the authors’ view, open LIS is therefore rightfully still

the gold standard procedure for treatment of chronic anal fissure in the majority of patients. A conservative approach with limited division of internal sphincter muscle is preferred. For patients with preexisting sphincter weakness and an increased risk of incontinence, further preoperative diagnostic assessment (anal manometry, endoanal ultrasound) is recommended. In this high-risk group, alternative surgical options might be preferred.

Keywords

Postoperative incontinence · Conservative sphincterotomy · Anorectal surgery · Fissurectomy · Botulinum toxin injection

Die laterale internus Sphinkterotomie (LIS) – nach wie vor ein Topshot in der Behandlung der chronischen Analfissur? Eine umstrittene Technik im Fokus

Zusammenfassung

Hintergrund. Die Analfissur ist eine der häufigsten proktologischen Diagnosen. Besteht sie länger als 6–8 Wochen wird sie zur chronischen Fissur, welche in der Regel eine operative Intervention benötigt. Vor allem im englischsprachigen Raum wird die chirurgische Durchtrennung eines Teils des internen Sphinktermuskels, die laterale Internus Sphinkterotomie (LIS), nach wie vor als „Goldstandard“ in der chirurgischen Behandlung angesehen. Dies steht im Kontrast zur deutschsprachigen chirurgischen Gemeinschaft, welche der Fissurektomie ± Botoxinjektion den Vorzug gibt, da nach LIS zum Teil eine hohe Inkontinenzrate beschrieben wird.

Ziel. Aufbereitung der aktuellen Literatur rund um LIS – ist der Status von LIS als Goldstandard-Therapie in der chronischen Analfissur nach wie vor vertretbar?

Material und Methoden. Aktuelle Literatur rund um LIS wurde in „pubmed“ identifiziert. Dabei wurden sowohl RCT, Metaanalysen, aktuelle Guidelines, sowie retrospektive Kohortenstudien berücksichtigt.

Ergebnisse und Diskussion. Die Vorteile von LIS bestehen in einer ausgezeichneten Heilungsrate (~95%), einer prompten Symptomlinderung und dementsprechend hoher Patientenzufriedenheit. Postoperative Inkontinenz nach LIS wird meist als mild und transient beschrieben. Die Autoren vertreten daher die Meinung, dass eine

offene, laterale Sphinkterotomie nach wie vor dem „Gold Standard“ der chirurgischen Fissurbehandlung entspricht. Dabei wird ein „konservativer Approach“ mit limitierter Muskeldurchtrennung bevorzugt. Bei Patienten mit Verdacht auf bereits bestehende Sphinkterschwäche werden weitergehende präoperative Abklärungen (Manometrie, endoanaler Ultraschall) empfohlen. Bei dieser „Risikogruppe“ kann ein Ausweichen auf alternative chirurgische Techniken sinnvoll sein.

Schlüsselwörter

Postoperative Inkontinenz · Konservative Sphinkterotomie · Anorektale Chirurgie · Fissurektomie · Botulinumtoxin-Injektion

in continence score, with only 1 patient reporting a deterioration in quality of life [23]. Another study analyzed quality of life in 244 patients after open LIS. Some degree of incontinence was reported in 8 and 3% of patients after 2 and 12 months follow-up, respectively. The Gastrointestinal Quality of Life score improved regardless of complications or continence disturbances. Only 1.2% of patients reported a deterioration in the Fecal Incontinence Quality of Life score [24].

Taking an overview of the above data, one can conclude that incontinence symptoms are suffered by a minority of patients undergoing LIS. A small proportion of patients, however, will experience continence disturbance, but this tends to be minor and transient. This suggests that there is a small subset of patients for whom LIS should be recommended only after appropriate counselling. In the majority of patients with chronic

anal fissure, LIS is a safe and effective first-line treatment option.

Groups at risk

Most studies did not assess patients’ preoperative continence levels. Some authors argue that certain patient groups are at a higher risk of postoperative incontinence after LIS than others. For example, Nyam et al. concluded that females were more likely to develop incon-

Table 1 National guidelines on anal fissure treatment

Title	Country	Year	Recommended surgical treatment	Comments
<i>Guía de practica clinica sobre el manejo de la fisura anal</i> , Alonso-Coello P et al., <i>Gastroenterologia y Hepatologia</i> , 2008, Vol 31, Pt 10 [5]	Spain	2008	LIS (open or closed; level B) Fissurectomy recommended in patients with no sign of hypertonic sphincter (level C)	Patients need to be made aware of a low risk of mild/transient incontinence
<i>The management of patients with primary chronic anal fissure: a position paper</i> , Altomare et al., <i>Tech Coloproctol</i> 2011, 15:135–141 [6]	Italy	2011	LIS (open or closed) surgical option of choice. LIS is superior to fissurectomy and posterior sphincterotomy because it is associated with faster healing, less pain, and less postoperative incontinence	But: recommended prudence in certain patient groups like the elderly, multiparous women, (..), patients with previous proctologic surgery
<i>AWMF, Leitlinien der Deutschen Gesellschaft für Koloproktologie</i> , Raulf F et al., 2008 [7]	Germany	2008	Fissurectomy is first choice surgical treatment. LIS much criticized for reported incontinence rates	Postoperative incontinence rates after LIS cited as 1–11% for solid stool, 1–22% for liquid stool, 1–35% for flatus
<i>The Management of Anal Fissure: ACPGBI Position Statement</i> , Cross K et al., <i>Colorectal Disease</i> 2008, 10 (Suppl. 3), 1–7 [1]	UK	2008	“LIS should be used when medical management fails in men or women with normal to high resting tone. An alternative may be fissurectomy and botulinum toxin. In patients with low anal resting tone, an anal advancement flap is a preferable option”	But: algorithm mentions: IF female post-partum or male with previous anal surgery → anal physiology assessment → if high pressure → LIS, if low pressure → anal advancement flap
<i>Clinical Practice Guidelines for the Management of Anal Fissures</i> , American Society of Colon and Rectal Surgeons, Stewart D et al., <i>Dis Colon Rectum</i> 2017; 60: 7–14 [8]	USA	2017	Of all surgical options, lateral internal sphincterotomy is the treatment of choice for chronic anal fissures Strong recommendation based on high-quality evidence, 1A	Excluded are patients with higher risk for FI: (...) “patients such as women with prior obstetrical injuries, patients with IBD, and patients who have undergone previous anorectal operations or who have a documented anal sphincter injury”
<i>ACG Clinical Guideline: Management of Benign Anorectal Disorders</i> , Wald A et al., <i>Am J Gastroenterol</i> 2014; 109:1141–1157 [9]	USA	2014	LIS, a procedure that can be performed under general, spinal, or local anesthesia, remains the surgical treatment of choice for refractory anal fissures	Because of the low but real incidence of incontinence from LIS, surgeons continue to explore alternatives to LIS, but none is standard

FI fetal incontinence, IBS irritable bowel syndrome

Table 2 Illustration of success rates after lateral internal sphincterotomy

Year	Author	Number of patients	Pain free	Fissure healing rate	Patient satisfaction
2008	Mousavi et al. [16]	32	100% (1 week)	100% (8 weeks)	96%
2004	Hasse et al. [17]	209	93.7% (4 weeks), 97.6% (12 weeks)	90% (12 weeks)	94.7%
1999	Nyam et al. [18]	487	96% (3 weeks)	96% (3 weeks)	98%
2019	Acar et al. [19]	417	91.4% (8 weeks)	94.7% (8 weeks)	92.1%
2015	Vaithianathan et al. [20]	45	–	96% (6 weeks)	–

tinence after a sphincterotomy (females: 53 incontinence vs. males: 33% incontinence), especially after previous vaginal deliveries [18]. As previously mentioned, all 8 patients suffering from incontinence after LIS in Acars’ study either had previous vaginal deliveries or previous anorectal surgery [19]. Elsebea states that LIS could be more invasive than intended in females, because their anal canal is much shorter than in males. He recommends the use of LIS with caution in females who have undergone vagi-

nal deliveries [25]. Several of the national guidelines that favor LIS (Table 1) do so with certain caveats. The Italian guidelines recommend LIS with caution in elderly patients, multiparous women, and patients with previous proctological surgery. The American guidelines exclude patients with previous documented sphincter injuries, anorectal operations, and patients with irritable bowel disease (IBD) from their 1a recommendation for LIS in chronic anal fissure treatment. The UK guidelines recommend preoperative

anorectal manometry in these “high-risk” groups, and advocate alternative surgical treatment such as anal advancement flap if anal sphincter pressures are low (Fig. 1).

Practical aspects of LIS

Open vs. closed

Routine administration of preoperative antibiotics and bowel preparation is not usually necessary. According to patient

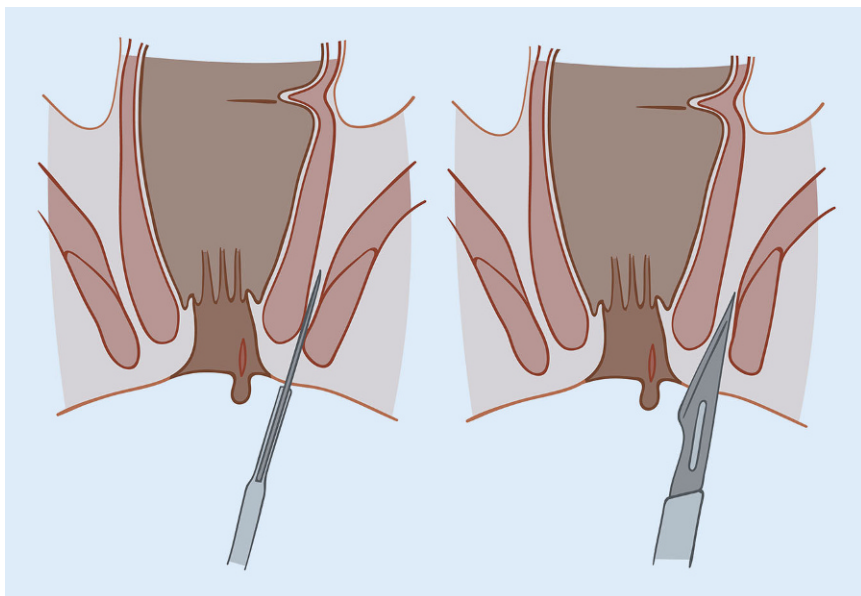


Fig. 2 ▲ Graphic illustration of lateral internal sphincterotomy

and surgeon's preferences, LIS can be performed under local, regional, or general anesthesia. Patient positioning is usually in the lithotomy position, but the procedure can also be performed in the lateral decubitus or prone jack-knife position. The operation usually begins with a careful rectal examination and inspection of the anal canal using a retractor. Some authors regularly excise the fissure and occasional secondary hemorrhoids; others leave the fissure itself untouched.

LIS can be performed using either the open or the closed technique. In the open technique, the anoderm is incised over the intersphincteric groove, usually aided by tension applied to the anal canal using a retractor, and the internal sphincter muscle is divided under direct vision. The sphincterotomy is usually performed in the 3 o'clock position using a knife or diathermy, but can be performed on either side of the anal canal. In the closed technique, a blade is introduced into the intersphincteric groove and the muscle divided without direct visualization, although often aided by a digit in the anal canal to detect a palpable deficiency in the internal sphincter muscle. Local anesthetic infiltration can be used to facilitate postoperative pain relief in both techniques (■ Fig. 2).

Comparing the open and closed technique for LIS, the available literature does

not suggest significant differences in outcomes so far. In the meta-analysis by Nelson et al., no significant difference between the two techniques was found for fissure healing or incontinence rates [14]. A similar finding was reported by Wiley et al., who randomized 79 patients to either open or closed LIS [26].

Classical, conservative, or tailored LIS?

During a classical LIS, the internal sphincter muscle is divided along the entire length of the anal canal, or at least up to, if not beyond, the dentate line. In recent years, a more conservative approach has been advocated, whereby the internal anal sphincter muscle is divided to a level coinciding with the apex of the fissure. Another option, the so-called tailored sphincterotomy, involves division of the muscle by either 20, 40, or 60% according to preoperative manometric findings, thus allowing the sphincterotomy to be limited to the region of sphincter hypertension [27].

Mentes et al. investigated the effect of classical sphincterotomy in comparison to conservative sphincterotomy. A total of 76 patients were randomized into a classical group (division of muscle up to dentate line or higher) and a conservative group with muscle division up to the fis-

sure apex only. The classical group experienced statistically significantly quicker fissure healing and a 100% healing rate after 12 months, whereas the conservative group showed 13.2% of patients experiencing treatment failure after 12 months (one non-healing, four recurrences). The changes between pre- and postoperative anal incontinence scores were not significantly different between groups; however, a significant change in anal incontinence scores (AIS) compared to baseline could only be observed in the classical group [28]. Some authors have reported lower fissure healing rates with the conservative approach, whilst others have shown a comparable success rate. For example, Garcea et al. demonstrated a 97% healing rate in 60 patients at 6 weeks following conservative sphincterotomy [29]. In their meta-analysis, Nelson et al. reported higher healing rates following classical LIS, with no difference in incontinence rates as compared to conservative sphincterotomy [4].

The tailored or "calibrated" sphincterotomy consists of individualizing sphincterotomy for each patient, depending on the extent of sphincter hypertension. In the study of Rosa et al., 388 patients underwent tailored sphincterotomy over a 5-year period. Whereas 122 patients were lost to follow-up, of the remaining 261, 97% had fissure healing after 8 months. Only 1 patient reported disturbance of continence [27].

Although there is merit in attempting to modify the extent of sphincterotomy to reduce continence disturbance, at least for high-risk patients, the accuracy by which muscle division can be aligned to sphincter hypertension is, in the authors' opinion, questionable.

Posterolateral vs. lateral internal sphincterotomy

Alawady et al. [30] have recently described the concept of posterolateral sphincterotomy, whereby the sphincterotomy is performed at the 5 o'clock position as opposed to the 3 o'clock position in classical LIS. The hypothesis behind this approach is that a greater reduction in sphincter pressure is achieved by sphincterotomy at a posterolateral po-

sition, due to higher resting pressures in this region of the internal sphincter []. Forty-nine patients were randomized to either posterolateral sphincterotomy at 5 o'clock or classical sphincterotomy, whereby the same amount of internal sphincter muscle (8–10 mm) was divided in each group. There was a significantly shorter healing time and lower postoperative pain score in the posterolateral group, as well as a greater reduction in anal pressure as measured by manometry. The incidence of continence disturbance was lower in the posterolateral group, but did not reach statistical significance.

Conclusion

A view from a UK proctology practice

The text below comprises a summary of the authors' practice, derived from experience in a tertiary referral coloproctology unit in the UK and based on the above evidence and national guidelines.

Although the focus of discussion has been on LIS, there is a place for examination under anesthesia (EUA) and Botox in chronic anal fissure. EUA confirms the diagnosis and permits exclusion of other proctological conditions. Botox injection is easy and safe, and, if successful, spares the patient unnecessary sphincterotomy. In patients who relapse following Botox, there is a logical rationale for proceeding with a permanent sphincterotomy. For these reasons, the majority of patients with chronic anal fissure receive a trial of Botox injection prior to proceeding to LIS in our institution.

Open LIS is the procedure of choice in the majority of patients with chronic anal fissure, but this is usually restricted to a conservative rather than a classical sphincterotomy, aiming to minimize the risk of postoperative incontinence. In the authors' opinion, open sphincterotomy is far superior to closed sphincterotomy in terms of the accuracy of muscle division—failure to complete the sphincterotomy will lead to fissure recurrence. The authors' question the accuracy of mapping the extent of sphincterotomy to the degree of high anal canal pressure,

and therefore the validity of the tailored sphincterotomy.

As regards fissurectomy, the authors are skeptical that simply "freshening" the mucosal ulcer is sufficient to bring about fissure healing, because it fails to address the underlying sphincteric hypertension, and believe that fissure recurrence is a too frequent outcome. Similarly, anodermal advancement flap is rarely practiced because of the propensity for anodermal wounds to become infected and breakdown, often leaving the patient in a worse condition.

The authors accept that LIS is not a panacea for all chronic anal fissures. There is clearly a small proportion of patients with existing anal sphincter weakness in whom further muscle division will lead to continence disturbance, even if minor and transient. They therefore take the view articulated in the Association of Coloproctology of Great Britain and Ireland (ACPGBI) guidelines, that any patient with suspected sphincter weakness should be investigated preoperatively by anal manometry and endoanal ultrasound (■ Fig. 1). Evidence of existing sphincter weakness should be a signal to proceed to sphincterotomy with caution, with consideration given to alternative treatments that leave the internal anal sphincter intact.

Corresponding address



M. Holzgang, MD
John Goligher Colorectal Unit,
St. James University Hospital
Leeds, UK
mailto:mel@jmu.ac.uk

Compliance with ethical guidelines

Conflict of interest. M. Holzgang and D. Jayne declare that they have no competing interests.

For this article no studies with human participants or animals were performed by any of the authors. All studies performed were in accordance with the ethical standards indicated in each case.

References

- Cross KL, Massey EJ, Fowler AL, Monson JR (2008) The management of anal fissure: ACPGBI position statement. *Colorectal Dis* 10(Suppl3):1–7
- Dykes SL, Madoff RD (2007) Benign anorectal: anal fissure. In: *The ASCRS textbook of colon and rectal surgery*. Springer, New York, pp 178–191
- Aigner F (2008) Letter to the editor: fissurectomy for treatment of anal fissures. *Dis Colon Rectum* 51:1163
- Nelson RL et al (2011) Operative procedures for fissure in ano. *Cochrane Database Syst Rev*. <https://doi.org/10.1002/14651858.CD002199.pub4>
- Alonso-Coello P et al (2008) Guía de práctica clínica sobre el manejo de la fisura anal. *Gastroenterol Hepatol* 31(10):668–681
- Altomare et al (2011) The management of patients with primary chronic anal fissure: a position paper. *Tech Coloproctol* 15:135–141
- Raulf F et al (2008) AWMF, Leitlinien der Deutschen Gesellschaft für Koloproktologie
- American Society of Colon and Rectal Surgeons, Stewart D et al (2017) Clinical practice guidelines for the management of anal fissures. *Dis Colon Rectum* 60:7–14
- Wald A et al (2014) ACG clinical guideline: management of benign anorectal disorders. *Am J Gastroenterol* 109:1141–1157
- Eisenhammer S (1959) The evaluation of the internal anal sphincterotomy operation with special reference to anal fissure. *Surg Gynecol Obstet* 109:583–590
- Parks AG (1967) The management of fissure in ano. *Hosp Med* 1:737
- Notaras MJ (1969) Lateral subcutaneous sphincterotomy for anal fissure: a new technique. *Proc R Soc Med* 62:713
- Memon AS, Siddiqui FG, Hamad A (2010) Fissurectomy with posterior midline sphincterotomy for management of chronic anal fissure. *J Coll Physicians Surg Pak* 20(4):229–233
- Nelson RL et al (2017) A systematic review and meta-analysis of the treatment of anal fissure. *Tech Coloproctol* 21(8):605–625
- Ebinger et al (2017) Operative and medical treatment of chronic anal fissures—a review and network meta-analysis of randomized controlled trials. *J Gastroenterol* 52:663–676
- Mousavi S, Sharif M, Mhedikha Z (2009) A comparison between the results of fissurectomy and lateral internal sphincterotomy in the surgical management of chronic anal fissure. *J Gastrointest Surg* 13:1279–1282
- Hasse et al (2004) Lateral partial sphincter myotomy as therapy of chronic anal fissure: long term outcome of an epidemiological cohort study. *Chirurg* 75:160–167
- Nyam DC, Pemberton JH (1999) Long-term results of lateral internal sphincterotomy for chronic anal fissure with particular reference to incidence of fecal incontinence. *Dis Colon Rectum* 42(10):1306–1310
- Acar T et al (2019) Treatment of chronic anal fissure: is lateral open sphincterotomy a safe and adequate option? *Asian J Surg* 42:628–633
- Vaithianathan R, Panneerselvam S (2015) Randomised Prospective Controlled Trial of Topical 2% Diltiazem Versus Lateral Internal Sphincterotomy for the Treatment of Chronic Fissure in Ano. *Indian Surg* 77(Suppl 3):1484–1487
- Hancke E, Schwaner S (2003) Chronische Analfissur – Operative Behandlung mit Analdilatation,

- Exzision der Analfissur versus laterale Sphinkterotomie. *coloproctology* 25:95–105
22. Garg P, Garg M, Menon G (2013) Long-term continence disturbance after LIS for chronic anal fissure: a systematic review and meta-analysis. *Colorectal Dis* 15:e104–e117
 23. Hyman N (2004) Incontinence after lateral internal sphincterotomy: a prospective study and quality of life assessment. *Dis Colon Rectum* 47(1):35–38
 24. Mentès et al (2006) Results of lateral internal sphincterotomy for chronic anal fissure with particular reference to quality of life. *Dis Colon Rectum* 49(7):1045–1051
 25. Elsebae M (2007) A study of fecal incontinence in patients with chronic anal fissure: prospective, randomized, controlled trial of the extent of internal anal sphincter division during lateral sphincterotomy. *World J Surg* 31:2052–2057
 26. Wiley et al (2004) Open vs. closed lateral internal sphincterotomy for idiopathic fissure-in-ano: a prospective, randomized, controlled trial. *Dis Colon Rectum* 47(6):847–852
 27. Rosa et al (2005) Calibrated LIS for chronic anal fissure. *Tech Coloproctol* 9(2):127–131
 28. Mentès et al (2005) Extent of lateral internal sphincterotomy: up to the dentate line or up to the fissure apex. *Dis Colon Rectum* 48(2):365–370
 29. Garcea G et al (2003) Results following conservative lateral sphincterotomy for the treatment of chronic anal fissures. *Colorectal Dis* 5(4):311–314
 30. Alawady M, Emile S, Abdelnaby M, Elbanna H, Farid M (2018) Posterolateral versus lateral internal anal sphincterotomy in the treatment of chronic anal fissure: a randomized controlled trial. *Int J Colorectal Dis* 33:1461–1467

Aktuelle Bücher zur Kolon- und Rektumchirurgie



MRT-basierte Chirurgie des Rektumkarzinoms

M. Kreis, P. Asbach (Hrsg) 1. Aufl. 2020, XV, 159 S., 123 Abb., Hardcover 99,99€, eBook 79,99€, ISBN 978-3-662-58158-2

In systematischer Form und mit umfangreichem Bildmaterial gibt dieses Buch eine Einführung, wie die MRT-Diagnostik für das Staging und die Therapiewahl beim Rektumkarzinom eingesetzt werden kann:

- Welche therapeutischen Schlüsse lassen sich aus den MRT-Befunden ableiten?
- Welche Fragen kann der MRT-Befund beantworten und welche nicht?
- Welche chirurgischen Fragestellungen sollte der Radiologe bei der Durchführung der MRT-Diagnostik berücksichtigen?

<https://www.springer.com/de/book/9783662581582>

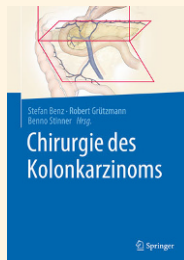


Chirurgie des intestinalen Stomas

I. Ilesalnieks (Hrsg) 1. Aufl., XIV, 207 S., 106 Abb., eBook 39,99€, Softcover 49,99€, ISBN 978-3-662-59122-2

Alle Aspekte der Chirurgie intestinaler Stomata sind in diesem Buch detailliert und praxisorientiert beschrieben. Ausführlich sind die Technik der Stomaanlage und der Stomarückverlagerung bei endständigen und doppelläufigen Ileo- und Kolostomata dargestellt, einschließlich der präoperativen Vorbereitung und der postoperativen Betreuung der Patienten, sowie die möglichen Komplikationen und das Vorgehen bei einzelnen Indikationen. Auch hochaktuelle Verfahren wie das kontinente Ileostoma und die perkutane endoskopische Kolostomie sind berücksichtigt.

<https://www.springer.com/de/book/9783662591222>



Chirurgie des Kolonkarzinoms

S.R. Benz, R. Grützmann, B. Stinner (Hrsg) 1. Aufl., VI, 730 S., 224 Abb., eBook 66,99€, Hardcover 84,99€, ISBN 978-3-662-60452-6

Die operativen Strategien beim Kolonkarzinom nach dem Konzept der kompletten mesokolischen Exzision werden von renommierten Experten dargestellt, mit vielen technischen Details und Tricks für den operativen Alltag. Auch die nichtoperativen Behandlungsaspekte sind ausführlich berücksichtigt. Mit vielen illustrativen intraoperativen Bildern, zahlreichen aufwändigen graphischen Darstellungen von Therapiealgorithmen und der chirurgischen Anatomie wird ein sehr eingängiges didaktisches Konzept verfolgt. Dieses wird durch ein separates Bildkapitel vervollständigt, das u.a. das für die laparoskopische Hemikolektomie rechts entwickelte Open-Book-Modell enthält.

<https://www.springer.com/de/book/9783662604526>