International Journal of Surgery 12 (2014) 1141–1145

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original research

Comparison of skin incisions used for open lateral internal sphincterotomies – Radial versus circumferential incisions: A retrospective cohort study

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HIGHLIGHTS

- Lateral internal sphincterotomy (LIS) is a popular surgical treatment for fissure-in-ano.
- Radial or circumferential incisions are used for LIS, based on the surgeons' preference.
- We compared the two types of incisions used during LIS.
- Circumferential skin incisions are associated with shorter healing times than radial incisions.

ARTICLE INFO

Article history:
Received 15 August 2014
Accepted 3 September 2014
Available online 16 September 2014

Keywords:
Lateral internal sphincterotomy
LIS
Incision
Anal fissure
Wound

ABSTRACT

Introduction: Lateral internal sphincterotomy (LIS) is a safe and effective surgical treatment, commonly used in patients with chronic anal fissures (CAFs). Although LIS is a simple surgical technique, it may cause several complications. Open LIS is usually performed through an incision made in the intersphincteric groove; radial or circumferential incisions, used according to the surgeon's preference. However, differences in clinical outcomes and wound healing, based on type of skin incision, are unclear. We investigated incision site wound healing and other clinical outcomes, after open LIS, according to the type of skin incision employed. **Methods**: We retrospectively reviewed the data of the electronic medical records of 602 patients who underwent open LIS for CAFs between March 2005 and February 2010 at Yang Hospital, Seoul, Korea. **Results**: Of the 602 patients, 298 patients received radial incisions and 304 received circumferential incisions. Circumferential incisions of the anus reduced the wound healing time compared to radial incisions (19.1 vs. 24.0 days, $p < 0.001$). There were no significant differences between the groups in wound complications such as perianal abscess, fistula, or cellulitis. Clinical outcomes including recurrence, persistence of fissures, and continence problems were also similar between the groups. **Conclusions**: Our study shows that circumferential skin incisions, during LIS, are associated with shorter healing times than radial incisions.

1. Introduction

Lateral internal sphincterotomy (LIS) is a safe, effective, and popular surgical treatment for chronic anal fissures (CAFs), and can be performed by either an open or a closed technique [1]. The method originally described by Eisenhammer in 1959 was performed by the open technique, which divides the internal sphincter through an opened wound made on the intersphincteric groove [2]. The open technique was also used by Parks [3] with a "circumferential incision" along the anal verge in the intersphincteric groove, but Ray et al. [4] used a "radial incision" during LIS. Later, the closed technique was introduced by Notaras [5] and Hoffmann and Goligher [6]. They divided the internal sphincter, using a narrow-bladed scalpel by palpation without direct vision. There have been many studies comparing the open and closed techniques. Some authors reported that LIS performed by the

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http://dx.doi.org/10.1016/j.ijsu.2014.09.005
1743-9191/

closed technique had lower complication rates than that by the open technique [7–9], but others reported that both of the techniques had no meaningful differences in complications [10–13]. Therefore, until now, no definitive guidelines have been shown on the choice of the open or closed technique for performing LIS. Despite lacking absolute guidelines, many surgeons still favor the open technique for LIS [14].

Most surgeons who prefer the open LIS procedures use either the radial [4,10,15] or the circumferential incision [3,8,16], based on their individual experience and preference. Although there have been some reports about various surgical techniques that could promote wound healing after open LIS [15,16], there has been only one publication comparing the two types of incisions used for open LIS: Ersoz et al. reported that parallel (circumferential) incision significantly reduced wound healing time and itching sensation, compared to vertical (radial) incision [17]. They suggested that the change of the wound shapes and the degree of the fecal contamination during defecation could be the possible reasons for their results. However, since their report, there have been no further studies comparing the two types of incisions. Therefore, we planned this study to confirm the influence by the direction of the incisions used for the open LIS on wound healing.

We hypothesized that the degree of fecal contamination of the LIS incision sites during defecation would affect wound healing after LIS and the radial incision wound would be more vulnerable to fecal contamination than the circumferential incision wound. Thus, we investigated wound healing and clinical outcome differences related to the two types of LIS-associated incisions to verify our hypothesis.

2. Patients and methods

2.1. Patients

The protocol of this study was reviewed and approved by the Yang Hospital Institutional Review Board. The data for this study were obtained by the review of the electronic medical records (EMR) in Yang Hospital, Seoul, Korea. Data collection was conducted by an independent researcher who was not involved in the surgeries. 1356 patients underwent the open LIS for CAFs from March 2005 to February 2010. Of the 1356 patients, 322 patients who underwent LIS and fissurectomy, combined with sliding skin grafts, and 151 patients who underwent LIS, combined with other anorectal surgical procedures, such as hemorrhoidectomy, were excluded from the study; 16 patients were also excluded from the study because of their histories of previous anorectal operations; 254 patients who underwent LIS were excluded due to their unsutured wounds; and 11 patients were lost to follow-up, thus also excluded. Finally, 602 patients were evaluated as part of this study. Among the included patients, none had disorders that may have affected wound healing, such as anal tuberculosis, Crohn's disease, and ulcerative colitis. The surgeries were performed by 8 certified, experienced colorectal surgeons who have performed benign anorectal operations with more than 5 years of experience in order to minimize bias due to the variation in the surgeons' skills.

The medical records were reviewed, in detail, to determine if postoperative complications had occurred and to confirm wound healing times. Wound healing time was defined as the period required for complete healing of LIS wounds, to the point that LIS site discharge and tenderness were resolved. Unhealed fissures were defined as fissures that did not heal within two months after the surgery. Recurrence was defined as the reappearance of an anal fissure more than 2 months after complete postoperative healing had occurred.

2.2. Preoperative evaluation

All patients underwent initial history and proctoscopic assessment to exclude any coexistent anorectal pathology. Anal tone was checked during a rectal examination, and only patients with anal hypertonia were planned for LIS. Colonoscopy or sigmoidoscopy was performed preoperatively whenever possible; however, for patients with severe pain, which precluded this examination, it was postponed until surgical wounds had healed. Preoperative anorectal manometry was performed, using an eight channel transducer (PIP-4-8SS; Mui Scientific, Ontario, Canada). Maximal resting and squeeze pressures were measured by a stationary pull-through technique.

2.3. Operative technique

All patients were admitted on the day of surgery. Mechanical bowel preparation was not performed preoperatively. Prophylactic parenteral antibiotics were not administered. All procedures were performed in the prone jackknife position, under spinal anesthesia. The buttocks were retracted, laterally, using plasters. The surgical site was cleansed with 10% povidone-iodine, and, at the discretion of the surgeon, the area may or may not have been infiltrated with 0.25% bupivacaine (1:200,000 in epinephrine). All patients underwent open LIS. According to the preference and experience of each surgeon, a radial or circumferential incision, approximately 1–1.5 cm long, was made just distal to the intersphincteric groove on the lateral aspect of the anus (Fig. 1a, b). The anoderm was separated from the internal sphincter up to the dentate line using mosquito forceps, and the distal internal sphincter was divided up to the level of dentate line, using electric diathermy under direct vision; hemostasis was achieved using standard unipolar electrocautery. Each skin incision was closed using one or two chromic catgut sutures.

2.4. Postoperative management and follow-up

The patients were discharged two days after surgery and allowed to consume a regular diet. They were instructed to take sitz baths 2–3 times/day; oral metronidazole (250 mg, three times daily for 2 weeks), analgesics, and stool softeners, such as a psyllium seed preparation, were also prescribed. The patients were examined in the surgical outpatient clinic one week after surgery, and subsequent follow-ups were scheduled every 1–2 weeks until healing was complete. After complete healing was achieved, each patient was reexamined after one month. The patients were instructed to return to the outpatient clinic in the event of any inconvenient symptoms.

For patients who were not followed clinically for more than one year after surgery, long-term follow-up was performed by telephone. Telephone consultants called the patients to assess the development of symptoms, such as anal pain, bleeding on defecation, gas or fecal incontinence, fecal soiling, and other anal discomforts.

2.5. Statistical methods

Statistical analyses were performed using SPSS, version 12.0 (SPSS, Chicago, IL, USA). Student's *t*-test was used to compare ages, body mass indexes, healing times, and follow-up periods between the 2 groups of patients; Pearson's χ^2 test was used to compare sex, fissure location, LIS location, and recurrence. Postoperative complications, except recurrence, were compared between groups using Fisher's exact test. All presented values are two-tailed; a p-value <0.05 was considered statistically significant.