OBJECTIVE: Chronic anal fissure is a benign disorder that is associated with considerable discomfort. Surgical treatment in the form of lateral sphincterotomy has long been regarded as the gold standard of treatment. This study compared the open and closed techniques of lateral sphincterotomy in terms of their postoperative outcomes.

METHODS: A prospective, randomized comparative study was conducted between October 2010 and August 2012. A total of 136 patients were randomly assigned to each of two groups. Patients were followed up postoperatively for more than 1 year to assess any complications. The outcomes were compared among the two groups using the Chi-square test and Student t test.

RESULTS: The mean age at presentation was 40.13 years. The male to female ratio was 1.47:1. The typical presentation was painful defecation. Fissures were most often located in the posterior midline and associated with a sentinel pile. Delayed postoperative healing was found in 4.4% of the group of patients undergoing open lateral sphincterotomy. The mean pain score and duration of hospital stay were lower with the closed technique.

CONCLUSION: Closed lateral internal sphincterotomy is the treatment of choice for chronic fissures as it is effective, safe, less expensive, and associated with a lower rate of complications than the open sphincterotomy technique.

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1. Introduction

Anal fissure is a benign yet highly prevalent condition that can cause considerable pain and discomfort. It is a longitudinal split or tear of the anal canal extending proximally from the anal verge towards the dentate line. Although it involves only the epithelial layer of the distal anal canal at the outset, it may eventually involve its full thickness. Fissures occur most often in the posterior midline and less often anteriorly owing to the relatively poor blood supply of the posterior comissural region. Locations other than the midline are involved in fissures arising from underlying conditions such as Crohn’s disease, retroviral illness, or malignancy. Fissures typically involve the internal anal sphincter and this goes into spasm and impedes healing by moving the two margins apart and diminishing the blood supply to the region. This, in addition to the exposure to fecal matter, accounts for the delays in the healing of fissures. When a fissure has been present for more than 6 weeks, it is referred to as chronic. A chronic anal fissure is distinguished by the presence of features such as a sentinel skin tag and hypertrophied anal papilla on examination.

Acute fissures usually heal with conservative measures taken to relieve constipation and the associated pain. CAFs and fissures due to underlying diseases are unlikely to resolve with conservative management. The principle aim of treatment for a CAF is to reduce the tone of the internal sphincter and hence increase the blood flow with subsequent tissue healing. Treatment options include pharmacotherapy and surgery.

Conventional pharmacological treatment uses muscle relaxants, commonly topical drugs and occasionally drugs given by mouth. These drugs include nitrates (glyceryltriminitrate), calcium channel blockers, botulinum toxin, alpha-adrenoreceptor antagonists, beta-adrenoreceptor agonists, and muscarinic agonists. New pharmacological drugs being tested include gonyautoxin, a paralytic neurotoxin derived from shellfish. Conventional and controlled procedures with anal dilators or pneumatic balloons have been developed.

Lateral sphincterotomy has been regarded as the gold standard for the treatment of CAFs. Various studies have shown the superiority of lateral sphincterotomy over posterior sphincterotomy. Newer surgical treatments that have evolved include local flap procedures such as V–Y advancement flaps and rotation flaps. Attempts at fissure revision have led to the development of fissurectomy and fissurotomy procedures. A new method of blunt division of the internal sphincter fibers called sphincterolysis has also been described. Surgical internal sphincterotomy is recommended as the first-line treatment in patients with anal hypertonia. It achieves permanent reduction of hypertonia with the relief of symptoms and is very successful in healing CAFs while causing minimal morbidity. CAF is a relatively benign anorectal condition that causes substantial impairment of a patient’s life.

Consequently, an effective solution with fewer associated complications is required. This study aimed to compare the open and closed techniques of lateral internal sphincterotomy.

2. Methods

2.1. Study design

This study was a prospective, single-masked, parallel-group, clinical randomized comparative study conducted between October 2010 and August 2012.

2.2. Patients and grouping

Sixty-eight patients for the open method and 68 patients for the closed method of lateral internal sphincterotomy were randomly assigned to either procedure using numbers drawn from a table. All patients of both sexes between the ages of 15 and 70 years presenting to our outpatient clinic with a CAF were included in the study. Patients were excluded if they underwent any other anorectal procedure at the time of anal sphincterotomy and if they had a history of previous sphincterotomy or anal dilatation. Other exclusion criteria included fissures associated with inflammatory bowel disease or malignancy.

2.3. Data collection

Following approval of the study protocol by the institutional ethical committee, written informed consent was obtained in the language understood by the patient. On admission, clinical details and examination findings were recorded on standardized forms. These details included a history of symptoms such as constipation, bleeding from the rectum, discharge, and soiling in addition to past clinical and treatment history. Fissures failing to heal within 6 weeks despite straightforward dietary measures, fissures with indurated margins and a lack of granulation tissue with secondary features such as a sentinel skin tag, hypertrophied anal papilla, or a degree of anal stenosis were all classed as CAFs.

2.4. Surgical procedures

Both surgical procedures were carried out in the lithotomy position under general, regional, or local anesthesia. In open sphincterotomy, the anal canal was visualized with an anoscope, a longitudinal incision was made in the anoderm, and the distal half of the internal anal sphincter was divided under direct vision followed by closure of the mucosa. In the closed technique, a stab incision was made with a Von Graffe’s blade, either into the intersphincteric groove or into the submucosa. The cutting edge of the blade was rotated toward the internal sphincter and a partial sphincterotomy was completed. The skin stab incision was left open.
2.5. Postoperative management

Prophylactic antibiotics in the form of metronidazole and a second generation cephalosporin were administered by mouth to all patients for 1 week postoperatively. A single dose of a nonsteroidal anti-inflammatory drug was injected intramuscularly on recovery and was repeated if additional analgesia was needed. Analgesic drugs given by mouth were also used as needed. The patients resumed eating a high fiber diet by mouth on the day of the operation. Laxatives or stool softeners for given for 2–3 weeks. The wound and perianal area were inspected for bruising or hematoma 8–12 hours after the operation. Patients were followed up to assess any complications of these procedures (pain, infection or abscess formation, incontinence, soiling, and recurrence) and to determine the mean duration of stay in hospital in the groups with open or closed sphincterotomy. Pain was measured using a visual analog scale representing an intensity of pain from 0 (no pain) to 10 (worst imaginable pain) and was assessed at 12 and 24 hours after the operation. Patients were followed up once a week for 2 weeks and then every 2 weeks for another 6 weeks to monitor fissure healing. They were subsequently followed up monthly by telephone questionnaire or by examination for at least 1 year. If the patients developed any related complications, they were called in for a consultation and evaluated.

2.6. Statistical analysis

The Chi-square test was used to compare sexes, fissure position, symptoms at presentation, and postoperative complications in the two groups. The Student t test was used to compare age, postoperative pain, and length of stay. Quantitative variables such as age and time are presented as mean ± standard deviation values. Hypothesis testing was carried out by applying the Chi-square test at the p < 0.05 level of significance.

3. Results

The age of our study population was 40.13 ± 12.37 years, with comparable mean ages in women (38.42 ± 12.32 years) and men (41.30 ± 12.35 years). The maximum number of patients was in the 56–70 year age group. The mean age of patients was comparable in the two groups (p = 0.482). The ages of patients who underwent open and closed sphincterotomies were 39.38 ± 12.96 years and 40.88 ± 11.80 years, respectively. The study population consisted of 30 (44.1%) women and 38 (55.9%) men in the closed sphincterotomy group and 25 (36.2%) women and 43 (63.2%) men in the open sphincterotomy group (Table 1).

Preoperatively, pain during defecation was the predominant symptom seen in 37 (54.4%) patients in the closed sphincterotomy group and 31 (45.6%) patients in open sphincterotomy group. Pain during defecation with associated bleeding from the rectum was seen in 16 (23.5%) patients in the closed sphincterotomy group and 20 (29.4%) patients in the open sphincterotomy group. Constipation with associated bleeding from the rectum was seen in nine (13.2%) patients in the closed sphincterotomy group and three (4.4%) patients in the open sphincterotomy group (Table 1).

Fifty-six (82.4%) patients in the closed sphincterotomy group and 65 (95.6%) patients in the open sphincterotomy group presented with a posterior midline anal fissure. Nine (13.2%) patients in the closed sphincterotomy group and two (2.9%) patients in the open sphincterotomy group presented with an anterior midline anal fissure, i.e. at the 12 o’clock position. Fissures were seen at multiple positions in two (2.9%) patients in the closed sphincterotomy group. Induration was present in one (1.5%) patient in each of the closed sphincterotomy and open sphincterotomy groups.

Table 1  Demographic and clinical profiles of patients at presentation.

<table>
<thead>
<tr>
<th></th>
<th>Closed sphincterotomy</th>
<th>Open sphincterotomy</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>30 (44.1)</td>
<td>25 (36.8)</td>
<td>0.382</td>
</tr>
<tr>
<td>Male</td>
<td>38 (55.9)</td>
<td>43 (63.2)</td>
<td></td>
</tr>
<tr>
<td>Symptoms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain during defecation</td>
<td>37 (54.4)</td>
<td>31 (45.6)</td>
<td>0.362</td>
</tr>
<tr>
<td>Pain during defecation with bleeding</td>
<td>16 (23.5)</td>
<td>20 (29.4)</td>
<td></td>
</tr>
<tr>
<td>Perianal pain</td>
<td>–</td>
<td>1 (1.5)</td>
<td></td>
</tr>
<tr>
<td>Constipation or bleeding from the rectum</td>
<td>9 (13.2)</td>
<td>3 (4.4)</td>
<td></td>
</tr>
<tr>
<td>Fissure position</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anterior</td>
<td>9 (13.2)</td>
<td>2 (2.9)</td>
<td>0.068</td>
</tr>
<tr>
<td>Both</td>
<td>1 (1.5)</td>
<td>1 (1.5)</td>
<td></td>
</tr>
<tr>
<td>Multiple</td>
<td>2 (2.9)</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Posterior</td>
<td>56 (82.4)</td>
<td>65 (95.6)</td>
<td></td>
</tr>
<tr>
<td>Induration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>67 (98.5)</td>
<td>67 (98.5)</td>
<td>–</td>
</tr>
<tr>
<td>Present</td>
<td>1 (1.5)</td>
<td>1 (1.5)</td>
<td></td>
</tr>
<tr>
<td>Sentinel pile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>68 (100.0)</td>
<td>68 (100.0)</td>
<td>–</td>
</tr>
<tr>
<td>No</td>
<td>68 (100.0)</td>
<td>66 (97.1)</td>
<td>0.154</td>
</tr>
<tr>
<td>Anal papilla</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>–</td>
<td>2 (2.9)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>–</td>
<td>–</td>
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</tr>
</tbody>
</table>
Two patients who underwent an open sphincterotomy presented with anal papilla ($p = 0.154$) (Table 1).

The mean score on the visual analog scale for the measurement of pain 12 hours after the operation was $5.62 \pm 0.81$ in the closed sphincterotomy group and $6.13 \pm 0.75$ in the open sphincterotomy group ($p < 0.001$). The mean score on the visual analog scale 24 hours after the operation was $2.10 \pm 0.35$ in the closed sphincterotomy group and $2.35 \pm 0.59$ in the open sphincterotomy group ($p = 0.003$). There was a statistically significant difference between the mean duration of hospital stay in the two groups. The mean duration of stay was $2.38 \pm 1.33$ days in patients undergoing closed sphincterotomy compared with $3.38 \pm 2.45$ days in the open sphincterotomy group ($p = 0.004$) (Table 2).

Postoperative incontinence or soiling was not seen in any patient. Most of the patients underwent rapid healing and resolution of their symptoms, with no recurrence noted in either group. Although delayed healing was seen in 4.4% ($p = 0.08$) of the open sphincterotomy patients, none of the patients in the closed sphincterotomy group had either delayed wound healing or an absence of wound healing postoperatively.

4. Discussion

There are many modalities for the treatment of CAFs, but so far surgical lateral internal sphincterotomy remains the gold standard. The treatment of anal fissures by sphincterotomy was first suggested in 1818 by Boyer. Since the introduction of lateral internal sphincterotomy by Eisenhammer in 1951, this procedure has been used with increasing frequency and is now considered the treatment of choice for CAFs. This study compared the open and closed techniques of lateral internal sphincterotomy.

Most of the fissures were found in the middle age group, with 29.4% of patients in the closed sphincterotomy group aged between 41 and 50 years and 30.9% of patients in the closed sphincterotomy group and 3.38 days in the open sphincterotomy group ($p = 0.001$). Patients presented most often with pain during defecation, followed by associated bleeding from the rectum. A lower incidence of bleeding from the rectum was noted by Kortbeek et al. According to Nahas et al., a few patients with constipation associated with bleeding from the rectum were also noted in this series. Most of the patients (89%) presented with posterior midline anal fissures. Other positions seen were anterior midline (8%), i.e. at the 12 o’clock position, and at multiple positions in two patients. A number of previous studies of anal fissures have established the posterior midline to be the most common location. In our study population, although induration was present in only one patient and anal papilla in two patients, sentinel piles were present in all patients.

On comparison of the complication rates of the open and closed sphincterotomy techniques, we found both methods to be effective in the treatment of fissures. No case of incontinence or soiling was noted and most of the patients underwent rapid healing and resolution of their symptoms. Pernklof et al. reported that their complication rate was relatively higher in open compared with closed sphincterotomy. Kortbeek et al. also reported that closed sphincterotomy is effective in the treatment of CAFs with fewer postoperative complications. No case of delayed or absent healing was noted in the closed group, whereas three cases of nonhealing were noted in the open group. No recurrence of CAF, or incontinence to stool or flatus, were noted on long-term follow up in our study.

In a long-term study, Garcia-Aguilar et al. concluded that closed lateral sphincterotomy is preferable to open lateral sphincterotomy as it carries a similar rate of cure with less impairment of control. Nelson concluded that both techniques are equally effective. Cohen and Dehn are in favor of closed lateral sphincterotomy. Arroyo et al. also reported that closed lateral sphincterotomy is effective in the management of CAF, with fewer postoperative complications. Altomare et al. reported that both techniques are equally effective.

The mean pain score on the visual analog scale 24 hours after the operation was significantly lower in the closed sphincterotomy group than in the open sphincterotomy group. There was a statistically significant difference between the duration of hospital stay in the two groups. The mean duration of stay was 2.38 days in the closed sphincterotomy group and 3.38 days in the open sphincterotomy group. Kortbeek et al. and Shafigh and Nadeem concluded in their respective studies that closed sphincterotomy for CAF is effective and may result in significantly less postoperative discomfort, a shorter postoperative length of stay in hospital, and a comparable rate of complications with open sphincterotomy.

### Table 2

<table>
<thead>
<tr>
<th></th>
<th>Closed sphincterotomy</th>
<th>Open sphincterotomy</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual analog scale score 12 h after operation</td>
<td>$5.62 \pm 0.81$</td>
<td>$6.13 \pm 0.75$</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Visual analog scale score 24 h after operation</td>
<td>$2.10 \pm 0.35$</td>
<td>$2.35 \pm 0.59$</td>
<td>0.003</td>
</tr>
<tr>
<td>Duration of hospital stay (d)</td>
<td>$2.38 \pm 1.33$</td>
<td>$3.38 \pm 2.45$</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Data are presented as mean ± standard deviation.
Two large studies have shown a 2.3–3% failure rate at 5 years with a mean fissure healing time of 5.6 weeks. The extent of sphincterotomy may influence the subsequent outcome in terms of healing and incontinence, and it appears reasonable to divide the sphincter for the length of the fissure. It has been suggested that open sphincterotomies are longer than closed sphincterotomies, explaining why they have been shown to have a higher risk of incontinence than the closed technique.

5. Conclusion

The open and closed sphincterotomy techniques are not significantly different in terms of the occurrence of postoperative complications such as incontinence or soiling, recurrence, and healing rates in patients with CAF. Postoperative pain was less in the closed sphincterotomy technique than in the open sphincterotomy technique. Healing was better with a shorter mean duration of stay in the closed sphincterotomy group than in the open sphincterotomy group, along with a reduced overall cost burden. There was statistically significant difference between the mean pain score on the visual analog scale at 12 hours and 24 hours after the operation and the duration of hospital stay in two groups. Closed sphincterotomy is the treatment of choice for CAF and it can be performed effectively and safely with a low rate of complications and a reduced cost burden for the patient.

References
