A comparative study between lateral internal anal sphincterotomy and botulinum toxin injection in the treatment of chronic anal fissure

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Abstract

Background and objective: The gold standard for the treatment of chronic anal fissure is lateral internal sphincterotomy. Botulinum toxin injection provides temporary alleviation of sphincter spasm and allows the fissure to heal. This study aimed to compare the outcomes of lateral internal sphincterotomy and botulinum toxin injection treatments in patients with uncomplicated chronic anal fissure.

Methods: A prospective comparative study was carried out at the surgical unit of Erbil teaching hospital, Erbil, Kurdistan Region of Iraq, from January 2017 to February 2018. Fifty-five patients were enrolled in this study. Five patients were excluded, and the remaining 50 patients were equally divided into two groups. Group A was managed with lateral internal sphincterotomy and group B with botulinum toxin. Postoperative pain relief, bleeding, fissure healing, incontinence, and relapse after six weeks and three months of follow-up were compared.

Results: One month after treatment, 12% of the lateral internal sphincterotomy group had bleeding, while none of the botulinum toxin group ($P = 0.234$). Two patients (8%) of the lateral internal sphincterotomy group had pain while one (4%) of the botulinum toxin group ($P >0.999$). Three months after treatment, 4% of the lateral internal sphincterotomy group had bleeding, while none of the botulinum toxin group ($P >0.999$). None of the lateral internal sphincterotomy group had pain while one (4%) of the botulinum toxin group ($P >0.999$). Regarding healing, 96% of the lateral internal sphincterotomy group healed, while 92% in the botulinum toxin group ($P >0.999$).

Conclusion: The outcome of lateral internal sphincterotomy and botulinum toxin were nearly the same, but lateral internal sphincterotomy required hospitalization, period off work, and risk of anesthesia. These risks were absent in botulinum toxin injection.

Keywords: Chronic anal fissure; Lateral internal sphincterotomy; Botulinum toxin; Complications.
Methods

A prospective comparative study was carried out in the surgical unit of Erbil teaching hospital, located in Erbil, Iraq, from January 2017 to February 2018. The inclusion criteria were history of symptoms of more than three months (bleeding per rectum, pain during defecation and itching, etc.), induration of edges of fissure with no edema/inflammation, sentinel pile, hypertrophied anal papilla, and a chronic anal fissure lasting more than six weeks. The exclusion criteria were pregnancy, cardiovascular disease or heart failure, antihypertensive medications, recurrent anal fissure after previous sphincterotomy, prior history of anal surgery, and other benign anorectal diseases with inflammatory bowel diseases. Out of 55 consecutive patients enrolled in this study, five patients were excluded from the study because of the loss of follow-up. The remaining 50 patients with uncomplicated chronic anal fissures with failure of conservative treatment were equally divided into two groups. Group A was managed with lateral internal sphincterotomy and group B with botulinum toxin. Patients were divided randomly into two groups using the Microsoft Excel computer program. The diagnosis of the anal fissure was based on the following clinical criteria: evidence of circumscribed ulcer, with a large sentinel tag of skin, indurations at the edges, and exposure of the horizontal fibers of the internal anal sphincter and symptoms lasting for more than six weeks. After giving informed consent, eligible patients underwent treatment randomly with either lateral internal anal sphincterotomy or botulinum toxin A. Botulinum toxin A (Botox, Allergan, Irvin, UK) was diluted in 0.5ml saline solution. Each patient received Botulinum toxin (for a total of 20 unit) administered as divided doses through the internal anal sphincter at 3, 9 and 12 o’clock and injection for an equal volume on each side of the fissure, by a so-called insulin syringe with a short, thin needle (10 mm, 26
Fifty patients participated in the study, 25 patients underwent lateral internal sphincterotomy, and 25 patients got botulinum toxin. Most patients reported severe pain after defecation, and each had a posterior anal fissure with a large sentinel tag of skin and some with exposed internal anal sphincter fibers. Presenting complaints in these patients were painful defecation and constipation in 46 (92%) patients, bleeding per rectum in 50 (100%) patients, discharge per rectum in 25 (50%) patients, sentinel pile in 30 (60%) patients, and pruritus in 13 (26%) patients. In this study, 46 (92%) patients had posterior midline fissure, and 4 (8%) had anterior midline fissure. The mean age (±SD) of the patients was 39.52±4.55 years, ranging from 18-65 years. Table 1 shows that the largest proportion of the whole sample (26%) aged 38-47 years, and 24% aged 48-57 years, but there was no significant difference between the two groups (P = 0.957). The majority (72%) of the sample were males (80% in the lateral internal sphincterotomy group and 64% in the botulinum toxin group), but the difference was not significant between the two groups (P = 0.208). The male:female ratio was 2.57:1.

### Results

Fifty patients participated in the study, 25 patients underwent lateral internal sphincterotomy, and 25 patients got botulinum toxin. Most patients reported severe pain after defecation, and each had a posterior anal fissure with a large sentinel tag of skin and some with exposed internal anal sphincter fibers. Presenting complaints in these patients were painful defecation and constipation in 46 (92%) patients, bleeding per rectum in 50 (100%) patients, discharge per rectum in 25 (50%) patients, sentinel pile in 30 (60%) patients, and pruritus in 13 (26%) patients. In this study, 46 (92%) patients had posterior midline fissure, and 4 (8%) had anterior midline fissure. The mean age (±SD) of the patients was 39.52±4.55 years, ranging from 18-65 years. Table 1 shows that the largest proportion of the whole sample (26%) aged 38-47 years, and 24% aged 48-57 years, but there was no significant difference between the two groups (P = 0.957). The majority (72%) of the sample were males (80% in the lateral internal sphincterotomy group and 64% in the botulinum toxin group), but the difference was not significant between the two groups (P = 0.208). The male:female ratio was 2.57:1.

### Table 1: Baseline characteristics of 50 patients with chronic posterior anal fissure.

| Variable        | Group A (lateral internal sphincterotomy) | Group B (botulinum toxin) | Total | P value |
|-----------------|-------------------------------------------|---------------------------|-------|---------|
| Age (years)     |                                           |                           |       |         |
| 18-27           | 3 (12.0)                                  | 4 (16.0)                  | 7 (14.0) |         |
| 28-37           | 6 (24.0)                                  | 5 (20.0)                  | 11 (22.0) |         |
| 38-47           | 7 (28.0)                                  | 6 (24.0)                  | 13 (26.0) | 0.957†  |
| 48-57           | 5 (20.0)                                  | 7 (28.0)                  | 12 (24.0) |         |
| 58-65           | 4 (16.0)                                  | 3 (12.0)                  | 7 (14.0) |         |
| Gender          |                                           |                           |       |         |
| Male            | 20 (80.0)                                 | 16 (64.0)                 | 36 (72.0) | 0.208*  |
| Female          | 5 (20.0)                                  | 9 (36.0)                  | 14 (28.0) |         |
| Total           | 25 (100.0)                                | 25 (100.0)                | 50 (100.0) |         |

†By the Fisher's exact test. *By the Chi square test.
It is evident in Table 2 that, one month after treatment, 12% of the lateral internal sphincterotomy group had bleeding, while none of the botulinum toxin group had bleeding ($P = 0.234$). Two patients (8%) of the lateral internal sphincterotomy group had pain compared with one patient (4%) of the botulinum toxin group ($P > 0.999$). Three months after treatment, Table 3 shows that one patient (4%) of the lateral internal sphincterotomy group had bleeding, while none of the patients of the botulinum toxin group had bleeding ($P > 0.999$). None of the patients of the lateral internal sphincterotomy group had pain, while one patient (4%) of the botulinum toxin group had pain ($P > 0.999$). Regarding healing, 96% of the wounds of patients of the lateral internal sphincterotomy group healed, compared with 92% of patients of the botulinum toxin group ($P > 0.999$).

**Table 2:** Symptoms in the two groups one month after treatment.

| Variable | Group A (lateral internal sphincterotomy) | Group B (botulinum toxin) | Total | $P$ value* |
|----------|------------------------------------------|---------------------------|-------|------------|
|          | No. (%)                                  | No. (%)                   | No. (%) |            |
| Bleeding |                                         |                           |       |            |
| No       | 22 (88.0)                                | 25 (100.0)                | 47 (94.0) | 0.234      |
| Yes      | 3 (12.0)                                 | 0 (0.0)                   | 3 (6.0)  |            |
| Pain     |                                         |                           |       |            |
| No       | 23 (92.0)                                | 24 (96.0)                 | 47 (94.0) | >0.999     |
| Yes      | 2 (8.0)                                  | 1 (4.0)                   | 3 (6.0)  |            |
| Total    | 25 (100.0)                               | 25 (100.0)                | 50 (100.0) |            |

*By Fisher’s exact test

**Table 3:** Symptoms in the two groups 3 months after treatment.

| Variable | Group A (lateral internal sphincterotomy) | Group B (botulinum toxin) | Total | $P$ value* |
|----------|------------------------------------------|---------------------------|-------|------------|
|          | No. (%)                                  | No. (%)                   | No. (%) |            |
| Bleeding |                                         |                           |       |            |
| No       | 24 (96.0)                                | 25 (100.0)                | 49 (98.0) | >0.999     |
| Yes      | 1 (4.0)                                  | 0 (0.0)                   | 1 (2.0)  |            |
| Pain     |                                         |                           |       |            |
| No       | 25 (100.0)                               | 24 (96.0)                 | 49 (98.0) | >0.999     |
| Yes      | 0 (0.0)                                  | 1 (4.0)                   | 1 (2.0)  |            |
| Healing  |                                         |                           |       |            |
| No       | 1 (4.0)                                  | 2 (8.0)                   | 3 (6.0)  | >0.999     |
| Yes      | 24 (96.0)                                | 23 (92.0)                 | 47 (94.0) | >0.999     |
| Total    | 25 (100.0)                               | 25 (100.0)                | 50 (100.0) |            |

†By Fisher’s exact test
It is evident in Table 4 that 32% and 36% of the wound of patients of the botulinum toxin group healed at two weeks and four weeks, respectively, compared with 16% and 16% of patients of the lateral internal sphincterotomy group, respectively ($P = 0.043$). The table shows that 64% of the wounds of the lateral internal sphincterotomy group healed after six weeks. So, in general, the time of healing is less in the botulinum toxin group. Results showed that the recurrence rate after six months was 20% (5 patients) in the toxin group and 8% (2 patients) in the operation group ($P = 0.417$ by Fisher’s exact test).

**Discussion**

Over the years, various hypotheses have been presented regarding the development of anal fissures. From anal trauma to internal sphincter hypertonia and resultant local ischemia resulting in non-healing have been postulated as the contributing factors. Many treatment options are available for anal fissures, including pharmacological and surgical interventions. Whatever the mode of treatment, the principal aim is to decrease the tone of the internal anal sphincter that increases local blood flow, subsequently leading to healing. Botulinum toxin exerts its effects on the peripheral nerve ending by blockade of sympathetic (noradrenaline mediated) neural output. This is probably a postganglionic action involving a reduction in noradrenaline release at the neuromuscular junction, resulting in flaccid paralysis and causes a transitional period of powerlessness to the internal anal sphincter muscle. Botulinum toxin inhibits contraction of gastrointestinal smooth muscle. Therefore, the toxin is effective in treating anal fissure when injected into the internal anal sphincter, avoiding permanent complications. Chemical denervation with botulinum toxin has been proposed as a noninvasive and less expensive than surgical intervention alternative treatment for chronic anal fissure. Surgery for treating this condition required hospitalization and period off work. There was also the risk of complications of general or spinal anesthesia. Botulinum toxin can be used in the outpatient department to treat chronic fissures. The results showed that lateral internal sphincterotomy and botulinum toxin injection treatment modalities had similar effects (no significant difference) on fissure healing rates. So, we can suggest that lateral internal sphincterotomy and botulinum toxin injection treatments are equally effective in treating patients with chronic anal fissure. In our study, botulinum toxin was faster in fissure healing than lateral sphincterotomy. Previous studies have demonstrated a healing rate ranging from 75 to more than 90 percent, after a single injection of 15 or 20 IU of toxin in the internal anal sphincter.

**Table 4:** Time of healing of fissures in each of the study groups.

| Healing time            | Group A (lateral internal sphincterotomy) | Group B (botulinum toxin) | $P$ value* |
|------------------------|-------------------------------------------|---------------------------|------------|
|                        | No. (%)                                   | No. (%)                   |            |
| After 2 weeks          | 4 (16.0)                                  | 8 (32.0)                  |            |
| After 4 weeks          | 4 (16.0)                                  | 9 (36.0)                  | 0.043      |
| After 6 weeks          | 16 (64.0)                                 | 6 (24.0)                  |            |
| No healing after 3 months | 1 (4.0)                              | 2 (8.0)                   |            |
| Total                  | 25 (100.0)                                | 25 (100.0)                |            |

*By the Chi square test.
Conclusion

Botulinum toxin injection had nearly the same effects as lateral internal sphincterotomy for postoperative pain relief, bleeding, fissure healing, incontinence, and fissure relapse in patients with uncomplicated chronic anal fissure. Moreover, botulinum toxin injection does not require hospitalization, general or spinal anesthesia, and period off work that are needed in the lateral internal sphincterotomy management. Larger scale, randomized controlled trials with long term follow up are needed before making firm conclusions about the advantages of this treatment modality over the conventional methods.

Competing interests

The authors declare no competing interests.

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