ORIGINAL ARTICLE

LONG-TERM CLINICAL AND MANOMETRIC COMPARISON BETWEEN SURGICAL AND CHEMICAL SPHINCTEROTOMY FOR TREATMENT OF CHRONIC ANAL FISSURE

By
Hamdy Abd Elhady,[1] Ibrahim Othman,[1] Mohamed Hablus,[1] Taha Ismail,[1] Mohamed AboRyia,[1] Mahmoud Selim[2]
[1]Departments of General Surgery, [2]Internal Medicine, Tanta University, Egypt

Correspondence to: Ibrahim Othman, Email: ibrahimothman000@yahoo.com

Aim: *comparison between surgical and chemical sphincterotomy for treatment of chronic anal fissure.*
Methods: *160 patients were equally randomly divided into 4 groups treated by: lateral internal sphincterotomy (Group I), local Diltiazem ointment (Group II), local Glyceryl trinitrate ointment (Group III), or injection of Botulinum toxin into the internal anal sphincter (Group IV). Anal manometry was measured before and 3 months after treatment. Patients were followed up for 5 years.*
Results: *Mean time for complete pain relief was 5.68±7.77 days (Group I), 15.7 ± 5.87 days (Group II), 15.6 ± 5.90 days (Group III) and 2.67 ± 3.60 days (Group IV). Mean healing time was 4.48±1.20 weeks (Group I), 5.12±1.13 weeks (Group II), 5.00±1.12 weeks (Group III) and 5.06±1.31 weeks (Group IV). Mean resting and squeeze anal pressures decreased significantly after sphincterotomy. Recurrence rate was 10% in Group I, 65% in Group II, 57.5% in Group III and 52.5% in Group IV.*
Conclusion: *Lateral internal sphincterotomy is easy and satisfactory, with minimal complications and recurrence. Medical sphincterotomy is safe, and easy, with mild complications. Its effect is reversible. Relapse after it is common. It is worth trial before surgery or in patients that cannot or unwilling to undergo surgery.*

Keywords: *Internal sphincterotomy, Diltiazem, Glyceryl trinitrate, Botulinum toxin.*

INTRODUCTION

Anal fissure is a common painful condition that causes significant morbidity mostly in young adults. It is a split in the skin of the distal anal canal that may progress to form a chronic linear ulcer. The classic symptoms are intense pain on or after defecation and anal bleeding.

Anal fissure may be either acute or chronic. Acute fissures could be treated conservatively with dietary modification. Chronic anal fissure usually need surgical interference.(1) It is accepted that chronic anal fissure is the result of poor anodermal perfusion. Local ischemia is due to elevated resting anal pressures commonly associated with fissures, acting on an area that has inherently poor vascular supply. Treatment thus aims to lower resting sphincter pressures increasing perfusion and promoting wound healing.(2)

Anal dilatation has been considered an efficient simple procedure with rapid and effective symptomatic relief. It has a high recurrence rate and may cause uncontrolled tearing of the sphincter with resulting disturbed continence.(3)

Fissurectomy with posterior internal sphincterotomy is considered less effective than lateral sphincterotomy. It has largely been abandoned because of the presumed longer period of wound healing and a higher incidence of disturbed continence.(4)

Chronic anal fissures have traditionally been managed with lateral internal sphincterotomy. It promises rapid relief of pain. It is simple to perform, and most patients

are satisfied with the result. Lateral sphincterotomy may be performed by an open or closed technique under general or local anesthesia.[1] Opponents believe it to be associated with incontinence and it does not take into account normal weakening of the sphincter with age as well as the possibility of future anorectal surgery or obstetrical trauma. The risk of incontinence may be lifelong.[2]

Less invasive strategies have been adopted to induce sphincter relaxation. Topical agents including nitroglycerin, diltiazem hydrochloride, nifedipine, or Botulinum toxin injected into the internal sphincter reduce internal sphincter pressures, resulting in a temporary or "chemical or medical sphincterotomy" until the fissure heals. It is gaining increasing popularity for the treatment of anal fissures.[2,5]

Diltiazem is a calcium channel blocker widely used as anti angina and antihypertensive agent blocking slow type l calcium channels in vascular smooth muscle to cause relaxation and vasodilatation. It also causes relaxation of smooth muscle cells in other tissue and decreases resting anal pressure in chronic anal fissure.[6]

Glyceryl trinitrate produces smooth muscle relaxation via an alteration of potassium activated channels in the cell membrane. It has been shown to improve blood supply to the site of fissure.[6]

Botulinum toxin causes denervation of the internal anal sphincter by preventing the release of acetylcholine from presynaptic nerve terminals. Paralysis occurs within few hours, but the transmission of neuromuscular impulses resumes after the growth of new axon terminals. Temporary weakness of the internal anal sphincter occurs for three to four months.[7]

The aim of this study is to compare the efficacy of Surgical versus chemical sphincterotomy for treatment of chronic anal fissure.

PATIENTS AND METHODS

This study was done in the Department of General Surgery, Tanta University Hospitals during the period from April 2002 to September 2008 on 160 patients with chronic anal fissure divided into four equal groups through computer randomization program (www.randomization.com). Patients having other anal pathology (i.e., inflammatory bowel diseases, hemorrhoids, anal fistula or anal abscess), cardiac patients, pregnant or planning to be pregnant patients were excluded from this study. Full explanation of procedures and patient consent were assured before inclusion in the research. The study protocol was approved by the Department of General Surgery, Tanta University Hospitals.

Group I: Group I consisted of 40 patients treated surgically by open lateral internal sphincterotomy. Spinal or general anesthesia was used. The patients were put in lithotomy position. The perianal region was prepared with disinfectant solution and draped in the usual fashion. Proctoscopic examination was carried out as an initial step. Small circumanal incision was made outside the anal verge. The distal internal anal sphincter was grasped with forceps and bluntly freed. The lower one third to one half was divided with scissors or diathermy. Meticulous hemostasis was then insured. The wound was closed with interrupted sutures. All patients were allowed to resume their normal activities within 48 hours.

Group II: This group included 40 patients treated by local application of Diltiazem ointment 2% twice daily for 4 to 6 weeks. The active principle was obtained from 10 Diltiazem 120mg capsules incorporated into 60 ml lanolin base to give an ointment with a final concentration of 2%.

Group III: This group included 40 patients treated by local application of 0.2 % Glyceryl trinitrate ointment twice daily for 4 to 6 weeks. The active principle was obtained from nitroglycerine ampoules incorporated into lanolin base to give an ointment with a final concentration of 0.2%.

Group IV: This group included 40 patients treated by injection of Botulinum toxin into the internal anal sphincter. The 100-U vials of type A lyophilized botulinum (Botox, Allergan, Inc, Irvine, California, USA) were diluted in saline to a concentration of 50 U per milliliter immediately before injection. With a 25-G needle, a total of 20 U was injected into the internal sphincter guided under direct vision and digital examination as two injections of equal volume (0.2 ml), one on each side of the internal anal sphincter. No sedation or local anesthesia was used during the procedure.

All patients in our study were followed up in visits at 2 weeks intervals for 8 weeks, then every month for 6 months. Telephone follow up was made every 3 months for further 5 years. Patients lost during the follow up (13 patients) were excluded from this study and replaced by new patients taking the same treatment. Patients were asked about the presence or absence of pain and bleeding on defecation, and about the appearance of any side effects.

Anal manometry: Anal manometry was performed before treatment and three months after treatment using Sandhill Anorectal manometry (Sandhill scientific, Colorado, USA) with solid state anorectal manometry probe. With the patient in the left lateral position with flexed knees and hips, the probe was introduced into the anal canal to measure resting and squeeze pressures in mm Hg.

Statistical Analysis: Statistical analyses were conducted with SPSS Statistical software (SPSS Inc, Chicago, Illinois,

USA). The results are expressed as means ±Standard deviation. Differences between the research groups were compared with use of ANOVA test, followed by Bonferroni as post-hoc test. P values of less than 0.05 were considered statistically significant.

RESULTS

One hundred and sixty patients, 88 males (55%) and 72 females (45%), were included in our study. The age of patients ranged from 17 to 70 years. Pain on defecation was the main presenting symptom in all patients. Constipation and bright red bleeding were less common presentations, while pruritus and mucous discharge were much less common. The position of the fissure was posterior most patients. Table 1.

Clinical results after management

Time of complete pain relief: In Group I, 32 patients (80%) reported partial pain relief at the first motion. The mean time for complete pain relief was 5.68±7.77 days. In Group II, 28 patients (70%) reported that they have no pain on defecation by 2 weeks. The mean time for pain relief was 15.7 ± 5.87 days. In Group III 31 patients (77.5%) had no pain on defecation by 2 weeks. The mean time for complete pain relief was 15.6 ± 5.90 days. In Group IV, 36 patients (90%) reported that they have no pain by first defecation. The mean time for complete pain relief was 2.67 ± 3.60 days. The differences are statistically significant except Group I versus Group IV and Group II versus Group III. Table 2.

Time of complete healing: At the first follow up visit after two weeks complete healing was not reached in any group. Mean healing time was 4.48±1.20 weeks in Group I, 5.12±1.13 weeks inGroup II, 5.00±1.12 weeks in Group IIIand 5.06±1.31 weeks inGroup IV. The difference between the four groups was statistically insignificant. Table 3.

Complications: In Group I; Wound infection occurred in two patients (5%), it was cured with systemic antibiotics and Betadine sitz bath. Temporary incontinence to flatus occurred in two patients (5%). They became completely continenent within 12 weeks. In Group II; Headache occurred in 2 patients (5%). Hypotension occurred in 1 patient (2.5%). No healing occurred in 8 patients (20%). In Group III; Headache occurred in 6 patients (15%). Hypotension occurred in 2 patients (5%). No healing occurred in 4 patients (10%). In Group IV; Hematoma after injection occurred in three patients (7.5%). No healing occurred in 4 patients (10%).

Recurrence: Recurrence occurred in four patients (10%) in Group I. They were treated by Diltiazem ointment. Recurrence after stopping of treatment occurred in 26 patients (65%) in Group II, 23 patients (57.5%) in Group III and 21 patients (52.5%) in Group IV. Few of them responded well to another course of treatment. Most patients refused continuation of the medical therapy and asked for operative treatment. They were referred to lateral internal sphincterotomy. Table 4.

Anorectal manometry: Mean resting anal pressure decreased after sphincterotomy in the four groups by 41.55% (Group I), 27.17 % (Group II), 33.13% (Group III) and 35.23% (Group VI). Mean squeeze anal pressure decreased after sphincterotomy in the four groups by 16.01% (Group I), 4.46% (Group II), 6.13% (Group III) and 7.43% (Group VI). The decrease after treatment is statistically significant compared to the pretreatment values in all groups. The decrease after surgical sphincterotomy is statistically significant compared to the other three groups except resting anal pressure after treatment for group I versus group IV. Table 5.

DISCUSSION

Anal fissure occurs is a longitudinal ulcer in the skin lined part of the anal canal. It is clinically differentiated into acute and chronic. The point at which an acute fissure becomes chronic is contentious, but published work suggests fissures lasting for more than two months are undeniably chronic.[5] An acute anal fissure heals spontaneously or in response to medical treatment, while chronic fissure is a recurrent painful condition that needs a long term treatment.[9]

The pathogenesis of this condition is thought to be the result of a cycle of pain, internal sphincter spasm, and pain. Treatment has been aimed decreasing high sphincter pressure in an attempt to break the cycle.[10]

In the group treated by open lateral internal sphincterotomy, there was dramatic immediate relief of pain in 80% of patients. Oh et al[11] reported an immediate relief of pain 95% of those treated by open lateral internal sphincterotomy. Ho and Ho[12] reported relief of pain in 92% of patients after 2 weeks. In our study of Group I 95% of patients showed complete healing of their fissures in 8 weeks. Hananal and Gordon[13] reported a healing rate of 84% in 4 weeks raised to 94.4% in 8 weeks. Lewise et al[14] reported a total healing rate of 95.4%. Kortbeek et al[10] reported a healing rate of 94.4%.

The early postoperative complications of open lateral sphincterotomy in our study were wound infection (5%) and temporary incontinence to flatus (5%) that was completely relieved within 3 months of surgery. The rate of complications reported by Hananal and Gordon[13] was 8.7%. The incidence of temporary incontinence of flatus reported by Hoffmann and Goligher[15] was 12%. Lewis et al[14] reported 6.6% and Ravikumar et al[16] reported 5%. Recurrence of the fissure in the surgical treated group of our study after 5 years was 10%. Lewis et al[14] reported an incidence of recurrence of 4.6%. Oh et al[11] reported a recurrence rate of 1.3% and Hananal and Gordon[13] reported the incidence of recurrence 1.4%. The difference can be explained on basis of the difference in follow up period between the studies.

Table 1. Clinical data of patients.

	Group I	Group II	Group III	Group IV	Collective data
Age range	20-62	17-65	23-67	19-70	17-70 years
Mean age	31.11 ± 15.73	29.27 ± 17.25	39.47 ± 22.85	37.63 ± 14.67	34.37 ± 20.61
Sex					
Males	26(16.25%)	20 (22.50%)	18(11.25%)	24(15%)	88 (55%)
Females	14(8.75%)	20(22.50%)	22(13.75%)	16(10%)	72 (45%)
Presentation					
Pain	40(25%)	40(25%)	40(25%)	40(25%)	160 (100%)
Constipation	39(24.38%)	40(25%)	40(25%)	38(23.75%)	137 (85.63%)
Bleeding	22 (13.75%)	16 (10%)	26(16.25%)	29(18.13%)	93 (58.13%)
Pruritus	9(5.63%)	19(11.88%)	15(9.38%)	11(6.88%)	54 (33.75%)
mucous discharge	7(4.38%)	10(6.25%)	12(7.50%)	6(3.75%)	35 (21. 88%)
Position of fissure					
Posterior	32 (20%)	35(21.88%)	29(18.13%)	33 (20.63%)	129 (80.63%)
Anterior	3(1.88%)	5(3.13%)	6(3.75%)	4(2.50%)	18 (11.25%)
Combined	5 (3.13%)	0	5(3.13%)	3(1.88%)	13 (8.13%)
Total	**40(25%)**	**40(25%)**	**40(25%)**	**40(25%)**	**160(100%)**

Table 2. Time of complete pain relief.

Time of healing	Group I	Group II	Group III	Group IV
First motion	32 (80%)	0	0	36 (90%)
2 weeks	4 (10%)	28 (70%)	19(47.5%)	3 (7.5%)
3 weeks	2 (5%)	8 (20%)	16 (40%)	0
4 weeks	2 (5%)	4 (10%)	5(12.5%)	1 (2.5%)
Mean time of pain relief (days)	5.68±7.77	15.7± 5.87	15.60± 5.90	2.67± 3.60

F: 50.94.

P: <0.001 (Significant).

Bonferroni post-hoc test: All are significant except Group I versus Group IV and Group II versus Group III (II=III)>(I=IV).

Table 3. Time of complete healing.

Time of healing	Group I	Group II	Group III	Group IV
Two weeks	0	0	0	0
Four weeks	24 (60%)	15 (37.5%)	19(47.5%)	20 (50%)
Six weeks	12 (30%)	16 (40%)	16 (40%)	13 (32.5%)
Eight weeks	2 (5%)	1 (2.5%)	1(2.5%)	3 (7.5%)
No healing	2 (5%)	8 (8%)	4 (10%)	4 (10%)
Mean Time of healing (weeks)	4.48±1.20	5.12±1.13	5.00±1.12	5.06±1.31

F: 2.43.

P-Value: 0.067 (Non Significant).

Table 4. Time of Recurrence.

Time of Recurrence	Group I	Group II	Group III	Group IV
First year		26 (65%)	23 (57.5%)	21 (52.5%)
Second year				
Third year	1 (2.5%)			
Fourth year	2 (5%)			
Fifth year	1 (2.5%)			
Total	4 (10%)	26 (65%)	23 (57.5%)	21 (52.5%)

García-Granero et al[17] evaluated open and closed sphincterotomy as assessed by anal endosonography, with fissure persistence/recurrence and faecal incontinence. Persistence and recurrence rates were 2.9% and 5.7%respectively. Closed sphincterotomy was associated with higher fissure persistence/recurrence rates than open sphincterotomy (12.0% versus 4.6%, p=0.141). Open sphincterotomy was significantly associated with a higher proportion of complete sphincterotomies than closed sphincterotomy (56/65 versus 48/75, p=0.003). Complete sphincterotomy was associated with a lower fissure persistence or recurrence rate (1/104 versus 11/36, p<0.001) but higher incontinence scores (11/104 versus 0/36, p=0.042) than following incomplete sphincterotomy. There was a strongly significant increase in incontinence scores (p<0.001) and decrease in recurrence rates (p<0.001) with increasing length of sphincterotomy.

In Group II treated with 2% Diltiazem ointment, 80% of patients showed complete healing after 8 weeks of treatment. Knight et al[18] in their study of 71 patients reported complete healing in 75% of patients after 8 weeks of treatment. DasGupta et al[19] recorded effective healing in 75% of patients treated with Diltiazem ointment after 8 weeks.

In our group treated by nitroglycerine ointment 87.5% of patients showed complete healing after 6 weeks of treatment, this rose to 90% after 8 weeks. Lund et al,[5] in their study on 21 patients, reported complete healing in 55% of patients after 4 weeks and 90% after 8 weeks of treatment. Waston et al[20] treated 15 patients with nitroglycerine ointment, 6 patients (40%) showed complete healing after 3 weeks and two of the non-healed patients refused to continue treatment. By 6 weeks 9 patients from the remaining thirteen patients in the study who continued the full course of treatment (69.2%) showed complete healing. Fruehauf et al[21] concluded that nitroglycerin ointment was superior to the more expensive and invasive botulinum toxin injection for initial healing of chronic anal fissure, but was associated with more but mild side effects.

Table 5. Mean resting and squeeze anal pressure before and after treatment.

		Group I	Group II	Group III	Group IV
Mean resting anal pressure	Before treatment	122.49 ± 14.45	120.03± 20.57	123.43± 15.09	116.89± 13.32
	F		1.32		
	p		1.32 (Non Significant)		
	3 months after treatment	71.59± 9.89	87.42± 14.85	82.54± 10.65	75.72± 7.94
	F		16.03		
	p		<0.001 (Significant)		
	Bonferroni post-hoc test		All differences are significant except group I versus group IV		
Mean squeeze anal pressure	Before treatment	207.67± 18.71	201.58± 14.68	198.81± 9.34	197.73± 14.84
	F		3.64		
	p		0.014 (Significant)		
	Bonferroni post-hoc test		Group I versus Group III (Significant) Group I versus Group IV (Significant)		
	3 months after treatment	174.41± 8.53	192.57± 16.83	186.62± 12.09	183.03± 10.72
	F		14.96		
	p		<0.001 (Significant)		
	Bonferroni post-hoc test		All differences are significant except group II versus group III & Group III versus Group IV		

Recurrence after botulinum toxin injection in our patients was 52.5%. All recurrences occurred during the first year. In the studies with long follow up, it was possible to find a tendency to progressive recurrence over time after botulinum toxin treatments. Minguez et al[22] presented 42 months long term follow-up with a relapse of anal fissure in 41.5% of patients. Arroyo at al[23] also showed this tendency, since there was a progressive rate of recurrence, which started at 12% in the early months and reached 53% at 3 years. This is not surprising, since it could be related to the temporary reversible effect of the toxin contrary to the surgical sphincterotomy. Arroyo at al[23] found that recurrence occured mainly between 6 and 12 months, so later relapses were not expected. Baraza et al[24] concluded that healing rates for botulinum toxin injection for anal fissure may be improved if combined with fissurectomy.

Some studies describe clinical factors related to recurrence after botulinum toxin injection[22,25] indicating that the more the fissure has become chronic, reversible sphincterotomy does not appear to be sufficient to achieve definitive healing.

Patients with anal fissure present elevated resting anal pressures before treatment. Recurrence was closely related to persistence of anal spasm.[26,27] These differences were also seen when comparing the results of treatment used, since in the surgical sphincterotomy group the reduction in the mean resting and squeeze pressures was more than that of the chemical sphincterotomy groups.

Banerjee[28] suggested that management of chronic anal fissure can begin with conservative treatment, and if it fails the patient should be given a therapeutic trial of Diltiazem ointment. Still refractory patients will require surgery.

In Conclusion we conclude that lateral internal sphincterotomy is satisfactory for treatment of chronic anal fissure, easy to perform in a short time with minimal complications specially its imprint on continence. Recurrence after this mode of therapy is uncommon. Less time is lost from work.

Medical sphincterotomy is accepted method of treatment, safe, easy to use with rapid relief of pain and with mild side effects with no risk of anesthesia and operative complications. Compared with surgical sphincterotomy, its effect on the internal sphincter is reversible. However relapses after this treatment is very common. Medical treatment is worth trial before surgery or in patients that cannot or unwilling to undergo surgery.

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