

OUTCOME OF CLOSE LATERAL INTERNAL ANAL SPHINCTEROTOMY FOR CHRONIC ANAL FISSURE UNDER LOCAL ANESTHESIA

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ABSTRACT

Introduction: Anal fissure is a linear tear in the lower anoderm that presents with moderate to severe pain during and after defecation along with streaks of fresh blood. The pathophysiology is thought to be related to trauma from either the passage of hard stool or prolonged diarrhea. A tear in the anoderm causes spasm of the internal anal sphincter, which results in pain, increased tearing, and decrease blood supply to the anoderm. This cycle of pain, spasm and ischemia

contributes to development of a poorly healing wound that becomes a chronic fissure. The majority of fissures occur in the posterior midline. Ten to 15% occur in the anterior midline. Less than 1% of fissures occur off midline. Multiple fissures are associated with Crohn's disease, Ulcerative colitis and Tuberculosis. Therapy focuses on breaking the cycle of pain, spasm and ischemia. Conservative management includes laxatives, analgesics, local ointments i.e. lignocain or Glyceryl Trinitrate and injection of botulinum toxin(Botox[®]). Surgical therapy is recommended for chronic fissures that have failed medical therapy and patients with associated anorectal pathology needing surgical intervention. Surgical means to treat anal fissure includes manual anal dilatation, sphincterotomy, fissurectomy, and posterior anal flap. Sphincterotomy can either be done by open or closed technique addresses the problem in much controlled way. There are fewer chances of incontinence and bleeding, once the operator is well versed with the technique. This study was aimed to evaluate outcome of closed lateral internal sphincterotomy for chronic anal fissure under local anesthesia and low rate of complications. **Objectives:** The main objective of the study was to determine outcome

of close lateral internal sphincterotomy for chronic anal fissure under local anesthesia. **Main Outcome Measures:** Outcome was measured in terms of symptomatic relief and complication rate occurring during first eight weeks including incontinence to flatus or stool, and hospital stay. Recurrence rate was measured at eight weeks. **Study Design:** Descriptive case series. **Setting:** The study was completed at Department of General Surgery Unit III, Services Hospital, Lahore. **Duration of Study:** Six months starting from April 19, 2013, to October 18, 2013. **Sample Size:** 135 patients with chronic anal fissure fulfilling the inclusion criteria. **Methods:** 135 consecutive patients of chronic anal fissure fulfilling the inclusion criteria were included in this study. All patients were operated and closed lateral internal sphincterotomy was done under local anesthesia. Data was collected on specific proforma and was put to “SPSS” version 16. In the demographic variables the age and sex presented as frequencies and rate, for age mean and standard deviation was given. Symptoms were described as frequency and proportion. Signs will be measured as present or absent and presented as types and proportions. T-test was applied for quantitative variables like age and Chi-squared test for qualitative variables like incontinence and sex. P value of 0.05 or less was taken as significant. **Results:** In this study 100 (70.0%) patients were male and 35 (30%) patients were female with age ranging from 20 to 75 years with mean age of 38.53. Duration of symptoms was more than 6 months. All these patients presented with pain and 55 (88.3%) presented along with constipation as well. In 53(88.3%) of patients fissure was located in anterior midline while 5(8.3%) had fissure in anterior midline and 2(3.2%) had fissure in anterior and posterior midline. Thirteen (21.7%) patients had sentinel tag as well. Adequate pain relief was observed in 68.3% with in 48 hours of surgery. Complete healing of fissure was observed in 96.7% of patients at 6 week. Wound infection was observed in one case. Flatus incontinence was observed in 3.3% of patients that improved up to 10th week. Only one patient presented with recurrence after about one year. **Conclusion:** On the basis of this study, it was conclude that closed lateral internal sphincterotomy is the treatment of choice for chronic anal fissure. It cure fissure in majority of patients with very low rate of complications and excellent rate of fissure healing.

KEYWORDS: Anal fissure, lateral internal sphincterotomy, glyceryl trinitrate.

INTRODUCTION

Anal fissure is one of the most common cause of severe anal pain that may alter the patient's quality of life. It is a linear ulcer, which occurs just distal to dentate line and is characterized by excruciating, severe pain during and after defecation and passage of bright red blood.^[1] It

commonly affects younger age group. The most frequent site for anal fissure is the midline posteriorly. However it can also appear anteriorly.^[1]

The etiology of this condition is controversial but an increase in resting anal pressure is documented in patients with chronic anal fissure and it has been considered as a major pathophysiological factor.^[2]

The pain of anal ulcer is intolerable and always disproportionate to the severity of the physical lesion. Chronic anal fissure is a painful tear in the anal mucosa that fails to heal after six to eight weeks of conservative management.^[3]

Chronic anal fissure usually presents in 3rd and 4th decade of life. It is very distressing condition associated with spasm of internal anal sphincter.^[3] It is common in both sexes and commonly affect young and otherwise healthy individuals, but it can also be found in infants and elderly people.^[4,5] The vast majority of fissures are present in posterior midline and in 10-15% of cases are located in anterior midline. Women of child bearing age have more chances of getting anterior anal fissure specially soon after vaginal delivery.^[6] It is, most probably, result of damage and weakening of the pelvic floor muscles and attenuation of perineal body. Multiple fissures may be found in patients with Crohn's disease, Ulcerative colitis and tuberculosis. The commonest coexistent pathology with anal fissure is haemorrhoids.^[7]

Most of the ulcers are primary and cause is thought to be ischemia of lower anoderm secondary to spasm of internal sphincter as blood vessels traverse through it. The most widely accepted theory regarding the etiology of anal fissure is that it results from the mechanical forces imposed on the anal canal during the passage of stool. Hard stools are commonly implicated, but explosive liquid stools can produce the same results.^[6] Constipation predisposes to the development of anal fissure because of its pressure effect on anal mucosa or may lead to the tear of the anal valve of Ball. Other causes include incorrectly performed haemorrhoidectomy in which too much skin is cut resulting in anal stenosis which gives rise to tear of anal mucosa on subsequent defecation.^[6,7]

A lateral location of a chronic anal fissure or presence of multiple fissures may be evidence of an underlying disease such as Crohn's disease, human immunodeficiency virus, syphilis, tuberculosis or leukemias.^[6]

Acute fissure usually presents as severe pain with defecation and streaks of red blood on stool or toilet paper. Patients may also complain of a sensation of intense and painful anal spasm lasting for hours after a bowel movement. Pruritis ani and mucous discharge may be present in chronic cases.^[2,3,8]

Constipation may be the presenting feature as severe pain associated with defecation causes fear in patient's mind and he prefers to be constipated rather than going through the agony of passing stools. Passage of hard stools further injures the already compromised and damaged anal mucosa. Few patients have diarrhea rather than constipation.

The fissure can be best seen by visually inspecting the anal verge with gentle separation of the gluteal cleft. Digital as well as proctoscopic examination may trigger severe pain, interfering with the ability to visualize the ulcer. The diagnosis is secured by the typical history of pain and bleeding with defecation, especially if associated with prior constipation and confirmed by inspection after gently parting the posterior anus. Fissure should be confirmed under local or general anesthesia before starting any treatment. In acute fissure, edema and inflammation are minimal and spasm of internal anal sphincter is more marked.

Many acute anal fissures heal spontaneously. Those that do not heal, develop secondary changes to the surrounding tissues that indicate the long-standing nature of the condition. In chronic anal fissure, a posterior anal tag known as 'sentinel pile' can be seen hiding in the lower margin of fissure. Edema and inflammation is present and edges of the ulcer can be palpable. Similarly the anal papilla cephalated to the fissure can undergo parallel changes and become enlarged. Furthermore scarring and fibrosis can be seen in some cases and visible internal anal sphincter in the base of the ulcer as white fibers. Occasionally invasive infection will occur, and patient will develop an intersphincteric abscess.^[8,9] A perianal fistula may also develop due to acute suppuration of the fissure.

Treatment options include medical and surgical management.

Medical management includes bulk laxatives with or without lignocain cream, analgesics, hydrocortisone creams and chemical sphincterotomy with glyceryl trinitrate (GTN) or diltiazem cream. The major side effect of GTN cream is severe headache. This is sufficient in many cases to stop treatment. Diltiazem is superior to GTN in this aspect and is being

increasingly used.^[6,10] Medical therapy is effective in most acute fissures, but will heal only approximately 50-60% of chronic anal fissures.

Injection of botulinum toxin into and around anal sphincter causes paralysis of internal sphincter for 2 to 3 months. During this time the anal pressure is low and fissure gets healed in many cases. Main side effect is 10 to 15% of flatus incontinence which improves with time and there is no permanent damage.^[11]

Reassurance and encouragement for not resisting the urge for defecation helps prevent hard stools. Later the patient should be encouraged to acquire and maintain a regular bowel habit of once or twice a day. Application of local anesthetic cream or gel may help avoid the torture experienced in passage of stools in the patients with acute fissures.

Surgical therapy of anal fissure is reserved for patients who have failed medical therapy, or have developed any complication. Many procedures have been devised; most of which involve disruption of the internal sphincter. Surgical options include manual anal dilatation, lateral internal sphincterotomy and posterior anal flap.^[12-15]

Anal dilation was described by Recamier in 1838. It has undergone several variations and modifications. It is performed under general anaesthesia or local anaesthesia. A gradual insertion and dilation to four to eight fingers lubricated with paraffin, lignocaine jelly, or K-Y jelly achieves reduction of internal sphincteric pressure.

Manual anal dilatation is less controlled method and damages both external and internal anal sphincter and do cause unacceptably high level of incontinence. Failure and recurrence rates are also high.^[14,15]

Fissurectomy involves excision of the fissure from the anal canal. The wound is left open without suturing.^[16]

Lateral internal sphincterotomy is a surgical procedure in which only internal anal sphincter muscle is cut in left or right lateral position away from the fissure. Sphincterotomy can be performed using an open or a closed technique. The procedure is successful in healing of fissure in 90 to 95% of cases. It is superior to both GTN and manual anal dilatation.^[11,12] Although it is usually performed under general anesthesia but it can be done as a day case procedure under local anesthesia in out patient department. In this way there is no need for

hospital stay, thus saving expenditure in this era of economic burden.^[17] It is superior to manual anal dilatation in terms of incontinence, soiling of cloths, urinary retention and other complications. Further more there is no risk of fecal incontinence as external sphincter remains intact.^[13-15]

The present study was conducted in General Surgery unit III, Services Hospital, Lahore. It has been noted that manual anal dilatation is still being performed by some surgeons in preference to lateral internal sphincterotomy, resulting in high level of recurrence and complications.

The purpose of this study was to assess closed lateral internal sphincterotomy (CLIS) as a better choice as healing of chronic anal fissure is concerned along with low morbidity (incontinence rate 7.5 %). This will help to setup standard protocols for the treatment of chronic anal fissure and in result having better prognosis.

REVIEW OF LITERATURE

SURGICAL ANATOMY OF ANAL CANAL

The anal canal is the terminal part of the digestive tract, which passes through the perineum between the right and left ischioanal fossae. The canal is about 4 cm long, which extends from the anorectal ring to the anal verge. It is cylindrical in shape, vertically straight and running obliquely downward and backwards. The canal is surrounded by sphincters which keep the lumen closed in the form of an antero-posterior slit.^[18-25] Anorectal ring is a circular lower border of the puborectalis muscle that is palpable by digital rectal examination. It is situated 1 to 1.5 cm above the dentate line and 2 to 3 cm in front and slightly below the tip of the coccyx. The anal verge is the junction between anoderm and perineal skin. It is situated about 4 cm below and in front of the tip of the coccyx in the cleft between the two buttocks.¹⁸

ANAL CANAL MUSCULATURE: (Fig-1)

The muscle of the anal canal can be regarded as forming a tube within a funnel. The sides of the upper part of the funnel are the levator ani muscles and the stem of the funnel is the external sphincter, which is continuous with the levator ani muscle. The tube inside the stem of the funnel is the internal sphincter, which is the thickened continuation of the inner circular layer of rectal muscle. Internally lies the submucosa and mucous membrane.

EXTERNAL SPHINCTER

External sphincter is under voluntary control. It is subdivided into deep, superficial and subcutaneous parts.^[18] The rectal end (deep) blends with the puborectalis part of levator ani except in the midline in front where there are no levator ani fibers, here the sphincter fibers alone complete the ring. This region is called the anorectal ring and is palpable on digital rectal examination. The middle part is elliptical rather than round, being attached to the tip of the coccyx at the back and to the perineal body in front (only part of sphincter having bony attachment). The subcutaneous part is a circular ring of fibres whose lower end curves inward to lie below the lower end of the internal sphincters. In life the external sphincter is pink in colour and homogeneous.^[18,19]

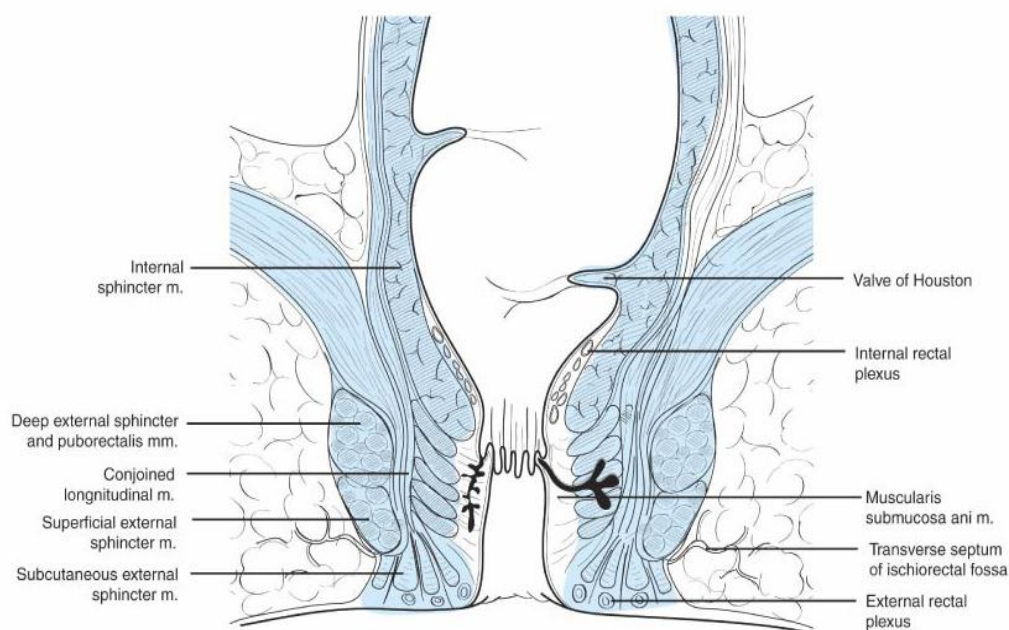


Fig 1: The Diagram Showing Anatomy Of The Anal Canal.

INTERNAL ANAL SPHINCTER

Internal anal sphincter is involuntary in nature and is formed by the thickened continuation of the circular muscle coat of the rectum. It surrounds the upper two third of the anal canal extending from the upper end of the canal to the white line of Hilton.^[18-20] It is 2.5 cm long and 2-5 mm thick. When exposed during life it is pearly white in colour and its individual transversely arranged fibres could be seen clearly.^[18]

Between the internal sphincter and external sphincter muscle mass is found a potential space the intersphincteric plane. It contains the basal part of 8-12 apocrine glands, which can be infected and it also provides access for operation on sphincter muscle.

MUCOUS MEMBRANE (Interior of the Anal Canal)

The interior of the anal canal has important features and can be divided into.

- (a) The upper part about 15 mm long.
- (b) The middle part about 15 mm long.
- (c) The lower part about 8-10 mm long.

Each part is lined by a different type of epithelium.^[24,25]

(A). UPPER PART

This is about 15 mm long and lined by pink columnar epithelium. It is endodermal in origin. The mucosa of the upper anal canal is attached loosely to the underlying structures and covers the internal rectal plexus. Passing downward the mucous membrane clothes 8 to 12 longitudinal folds known as the columns of Morgagni (anal columns), the mucous membrane becomes cubical, and red in colour. Short transverse folds of mucous membrane unite the lower ends of anal columns to each other; these folds are called anal valves. Above each valve there is a depression which is called anal sinus. The anal valves together form a transverse line called pectinate line, which runs all around the anal canal. The anal sinuses are important because one or more of the anal glands usually open in these sinuses especially those situated posteriorly.^[18] These anal glands are situated in the intersphincteric plane from which their ducts perforate the internal sphincter to summit at the crypts. Infection of an anal gland is the most common cause of anorectal abscesses and fistulae.^[22]

The pectinate line is the most important landmark both morphologically and surgically. It represent the site of fusion of proctodeum and post allantoic gut, and the position of the anal membrane, remnants of which may frequently be seen as anal papillae situated on the free margin of the anal valves.^[18,22] The dentate line separates.^[18]

Above

Cubical epithelium;

Autonomic nerves (insensitive);

Portal venous system.

Below

From squamous epithelium;

From spinal nerves (very sensitive);

From systemic venous system.

(B). MIDDLE PART (Transitional Zone)

The next 15-mm of the anal canal is also lined by mucous membrane, but anal columns are not present here. The mucosa has a bluish appearance because of a dense venous plexus that lies between it and muscle coat. This region is referred to as the pecten or transitional zone. The lower limit of the pecten often has whitish appearance because of which it is referred to as the white line of Hilton.^[18,22]

(C). LOWER PART (Cutaneous)

It is about 8-10 mm long and is lined by (squamous epithelium) true skin containing sweat and sebaceous gland.^[18]

ARTERIAL SUPPLY

The anal canal is supplied by three arteries^[18]

1. Superior rectal artery, terminal branch of inferior mesenteric artery,
2. Middle rectal artery, arising from the internal iliac artery,
3. Inferior rectal artery, arising from pudendal artery.

Extensive anastomosis exists between them. Arterial flow in the internal haemorrhoids is essentially of submucosal origin and comes from the superior rectal artery. Due to its extensive anastomosis, the interruption of the arterial supply from above by division of superior and middle rectal arteries does not deprive the anus of its blood supply. (Fig 2)

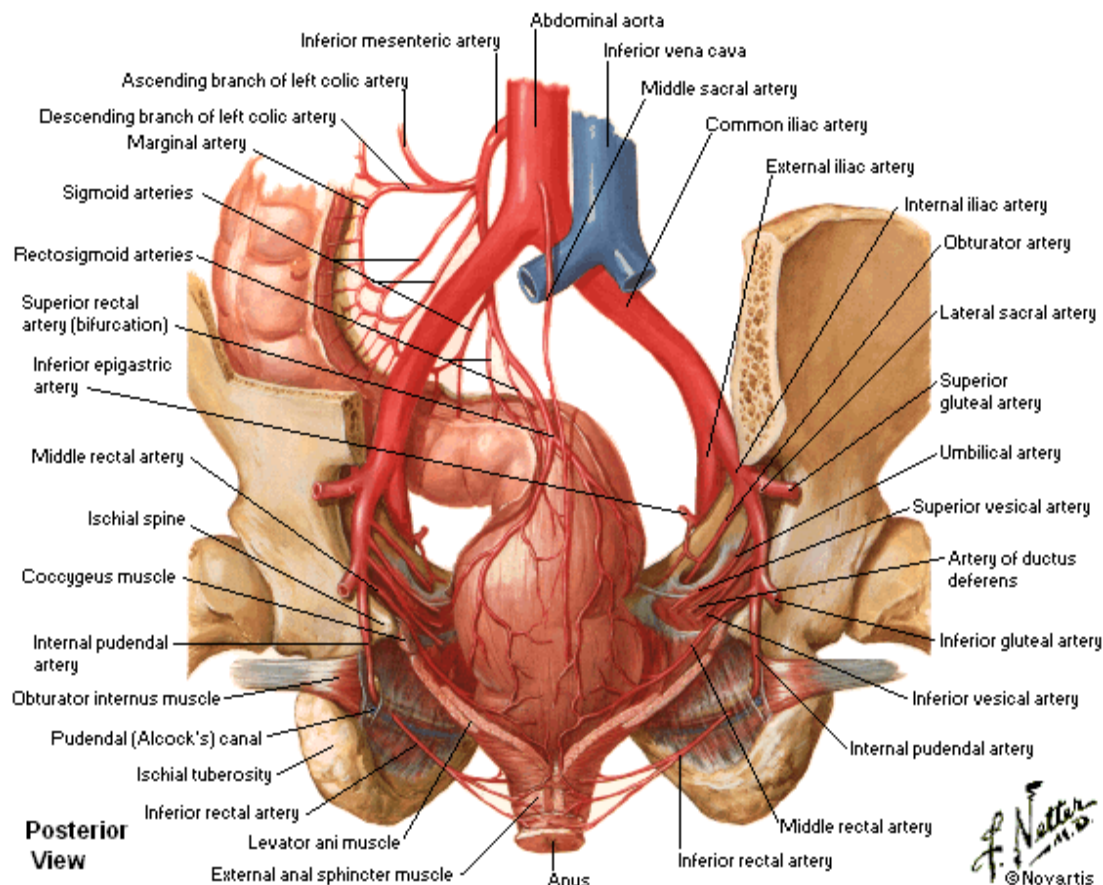


Fig 2: Arterial Supply Of Rectum & Anal Canal.

VENOUS DRAINAGE

Veins are satellite to arteries and have identical names.

The superior and middle rectal veins drain via the inferior mesenteric vein into the portal system and inferior rectal vein drain via the external iliac vein into the caval system. The superior rectal vein drains the upper half of the anal canal. The inferior rectal vein drains the lower half of the anal canal and the subcutaneous perianal plexus of veins.^[18]

The internal rectal venous plexus (internal haemorrhoids) lies in the submucosa of the anal canal. It drains mainly into the superior rectal vein, but communicates freely with the external plexus and thus with the middle and inferior rectal veins. The internal plexus is, therefore, an important site of anatomical portocaval anastomosis.^[18,22]

The external rectal venous plexus lies outside the muscular coat of the anal canal and communicate freely with the internal plexus. The lower part of the external plexus is drained by the inferior rectal vein into the internal pudendal vein and the middle part by the middle

rectal vein into the internal iliac vein and the upper part by the superior rectal vein which continues as the inferior mesenteric vein. (Fig-3)

The anal veins are arranged radially around the anal margin. They communicate with the internal rectal plexus and with the inferior rectal vein. Excessive straining during defecation may rupture one of these veins, forming a subcutaneous perianal haematoma known as external piles.^[22,23]

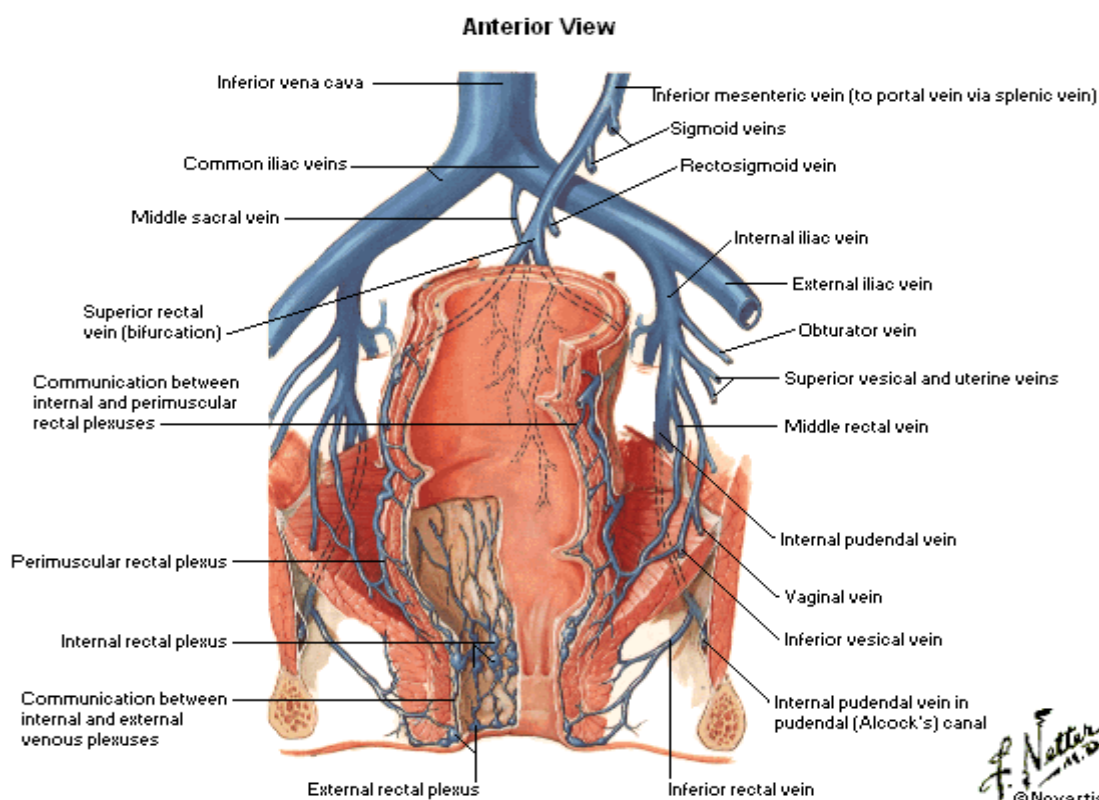


Fig 3: Venous Drainage Of Rectum & Anal Canal.

LYMPHATIC DRAINAGE

Lymph from the upper half of the anal canal flows upward to drain into the para-rectal lymph nodes which ultimately drain into para-aortic lymph nodes. Lymph from the lower half of the anal canal drains on each side first into the superficial and then into deep inguinal group of lymph nodes.^[18]

NERVE SUPPLY

The dentate line separates the internal and external haemorrhoidal plexus. It is an important landmark because it serves as a guide to the site where the sensation of pain is perceived. The

limit beyond which pain is no longer perceived is located 1 to 2 cm above the dentate line.^[18,22,23]

The inferior rectal branches of the pudendal nerve (somatic) supply the external sphincter and also provide the sensory supply for the lower end which like skin is highly sensitive. Autonomic nerves pass to the internal sphincter and upper end. Sympathetic fibres from the pelvic plexus, with preganglionic cell bodies in the first two lumbar segments of the spinal cord, causes contraction of the internal sphincter, and the pelvic splanchnic (parasympathetic) nerves relax it.

HISTORICAL BACKGROUND

Operation involving the incision of sphincter muscle around the anus have been performed since the early 19th century but many of the earlier writers failed to appreciate that the divided muscle was the internal sphincter.^[26] Internal anal sphincterotomy was popularized by Eisenhammer,^[26,27] who described an open posterior approach during which the fissure was also excised. The posterior technique was widely adopted in the UK and the USA,^[27-29] but this operation has fallen into disfavour because the fissures may take several weeks to heal.^[30] Furthermore, a persistent keyhole deformity may be produced which can be very difficult to treat surgically.^[31] The posterior scar tends to create a gutter which is often associated with incontinence of mucus and flatus and also causes troublesome faecal soiling.^[32,33] Posterior fissurectomy carries a 37% risk of at least sporadic impairment in continence and persistent soiling.^[34] The practice of excising the entire fissure was abandoned since excision is unnecessary provided the internal sphincter is adequately divided. However, excision may again have a place if island advancement flaps are used for treatment of chronic fissures where there might be a risk of incontinence after sphincterotomy.^[35,36] Nevertheless, fissurectomy may be attended by a higher incidence of abscess and stenosis, as well as impaired continence.^[16,28] Hence sphincterotomy is now used at a site away from the fissure, usually through a lateral approach either as an open operation or a subcutaneous closed technique.^[37]

Hughes^[39] reported satisfactory results if the fissure was excised and followed by immediate application of a split skin graft. However, this is an extensive procedure with no guarantee of the graft taking for what is usually a simple problem. Alternative and simpler techniques to cover the defect after excision are now practiced. The most widely used is the island advancement flap^[39,40] but other procedures may be more applicable, particularly the V-Y

advancement flap, the rational advancement flap and mucosal advancement techniques.^[41,42] These techniques are still best reserved for cases of recurrent fissure after a previous anal dilatation or sphincterotomy or in patients with a deficient sphincter where there might be a risk of iatrogenic incontinence. These procedures are also applicable to cases of fissure occurring secondary to anal skin loss, for instance following haemorrhoidectomy complicated by anal stenosis.^[28,43,44]

Posterior internal sphincterotomy has now been almost entirely superseded by the lateral approach, either as an open operation or as a closed subcutaneous technique.

Lateral internal sphincterotomy avoids a keyhole deformity and the fissure usually heals extremely quickly. The operation may involve a single division of the internal sphincter or multiple radial sections. It may be performed under local anaesthesia using local infiltration, caudal anaesthesia or the epidural route. Using local infiltration, the operation can be performed in the office^[17,29] or outpatient department.^[45] The concept of immediate therapy using local anaesthetic after consultation and diagnosis is extremely attractive.^[46] However, the results of clinical trials have now persuaded that local anaesthesia is inferior to a short general anaesthetic for internal sphincterotomy.^[47-49] Furthermore, in view of the risk of iatrogenic incontinence it is said that in future the first approach will be topical application of a nitrate preparation.

Most surgeons in the UK still perform either a subcutaneous or open lateral sphincterotomy under general anaesthesia. However, in Europe and North America there are some strong advocates.^[50-52] for the subcutaneous and open technique as an outpatient procedure under local anaesthesia. Furthermore, the proponents of this operation report excellent results.^[53,54]

ETIOLOGY & PATHOGENESIS

The pathogenesis of chronic anal fissure is poorly understood. Surgical dogma is that the passage of a hard stool traumatizes the anal mucosa. This is a plausible initiating factor but does not explain why only 1 in 4 patients reports constipation, and the onset of symptoms follows a bout of diarrhea in 4% to 7 % of instances.^[1-3,55]

There may be a dietary association because individuals consuming a diet low in fiber appear to be at increased risk of developing anal fissures.^[56] Alternative theories of pathogenesis leading to the development of chronic fissures have been postulated.

Trauma during Labour

Of patients with chronic anal fissures, 11% develop symptoms after childbirth.^[6] The risk increases with traumatic deliveries, and the fissures are commonly in the anterior midline. Shearing forces from the fetal head on the anal mucosa may be significant in this group of patients. Postpartum the anal mucosa may become tethered to the underlying muscle, rendering it more susceptible to trauma, and this has been cited as a possible causative factor. Both theories on the mechanism of trauma are speculative and difficult to substantiate. This group of patients with postpartum fissures tend not to display the raised resting anal canal pressures generally associated with other patients with chronic fissures.

Internal Anal Sphincter Hypertonia

The resting pressure in the anal canal is largely a function of the internal sphincter, which is in a continuous state of partial contraction that is nerve-mediated through alpha-adrenergic pathways and caused by inherent myogenic tone.^[57,58] Relaxation of this smooth muscle occurs automatically in response to rectal distention, the so-called rectoanal inhibitory reflex. Acetylcholine through muscarinic receptors and beta-adrenergic stimulation mediate relaxation in isolated strips of internal sphincter.^[59] The same effect is observed in response to electric field stimulation through a nonadrenergic, noncholinergic neuronal pathway, and nitric oxide has been shown to be the neurotransmitter responsible.^[59-63]

Patients with chronic anal fissures generally have raised resting anal pressures caused by hypertonicity of the internal anal sphincter, but the causative mechanisms are unclear.^[64-68] A long high-pressure zone in the anal canal and ultraslow waves are seen more commonly in fissure patients than in healthy controls, and there may be an abnormal rectoanal inhibitory reflex.^[69] The administration of pharmacologic agents that relax the internal anal sphincter, effectively reducing anal canal pressure, can lead to healing in most chronic fissures. This effect on the muscle appears to be reversible, however, because resting anal pressures return to pretreatment values after a fissure has healed.^[70] These findings suggest that the internal sphincter hypertonia and consequent anal spasm may predate the onset of the fissure. The anal spasm probably is not a response to pain because the application of topical local anesthetic to a fissure alleviates the discomfort but does not reduce the anal spasm.^[65,67]

Gibbons and Read^[64] documented resting pressures that exceeded the normal range within the anal canal, whereas maximal pressure recorded during a voluntary contraction of the sphincter were no higher than in control subject. They noted that it was unlikely that high

resting pressure recorded in patients with chronic anal fissures when probe of varying size were used were caused by spasm but probably represented a true increase in basal sphincter tone. They further proposed that elevated sphincter pressures may cause ischemia of the anal lining, possibly resulting in the pain of anal fissures and their failure to heal.

Kuijpers^[83] who also found elevated resting anal pressures in patients with fissures, support the concept of elevated sphincter pressure rather than spasm.

Local Ischemia

Chronic anal fissure has been described as an ischemic ulcer. The distal anal canal receives its blood supply from the inferior rectal arteries, branches of the internal pudendal arteries. In cadaver studies, angiography of the inferior rectal vessels has shown a paucity of arterioles at the posterior commissure of the anal canal in 85% of cases, the site for which fissures appear to have a predilection.^[71,72] Blood flow to the distal anal canal, measured by laser Doppler flowmetry, is correlated inversely with anal pressure and increases as pressures fall. It has been shown that general anesthesia, sphincterotomy, and the application of topical glyceryl trinitrate (GTN) ointment in patients with anal fissure all lower resting anal pressure, while increasing the local tissue perfusion in the distal anal canal.^[57] Because lateral internal sphincterotomy and topical GTN successfully heal 90% and 70% of fissures, the local blood supply before treatment may have been inadequate for healing to occur.^[73-78] It is possible that blood vessels traversing the hypertonic internal sphincter en route to the anal mucosa may be compressed, resulting in compromised perfusion of the anal mucosa and fissure. Because the spasm in the anal canal in patients with chronic anal fissures appears to predate the fissure, this would support an ischemic basis for chronic anal fissure and imply that some individuals may be predisposed toward developing anal fissure.^[64,79]

Histologic examination of biopsy specimens of internal anal sphincter taken from the base of chronic fissures and at sites remote from it has shown fibrosis in all regions.^[80] This finding has led to the hypothesis of an underlying inflammatory process in which myositis occurs early on with subsequent fibrosis. The fibrosis itself may be secondary to ischemia. Despite various theories, the cause of chronic anal fissures and the cause of anal spasm associated with the condition remain somewhat uncertain.

Using angiographic, histologic, and dissection methods Klosterhalfen et al^[71] demonstrated that in 85% of specimens the posterior was perfused more poorly than the other portion of the

anal canal and postulated that this finding may play a role in the pathogenesis of fissure in ano. They suggested that vessels passing through the sphincter muscle are subjected to contusion during periods of increased sphincter tone and that the resulting decrease in blood supply might lead to a pathogenetically relevant ischemia at the posterior commissure.

Internal Sphincter Abnormality

A primary internal sphincter disturbance may be a contributory etiologic factor. Internal anal sphincter supersensitivity to (bete-2) agonist has been observed in patient with chronic anal fissure.^[80] This may be induced by a prolonged absence of the neurotransmitter, by abnormalities at neurotransmitter or metabolic level, or by a modification of cholinergic and adrenergic receptors. Internal anal smooth muscle relaxation can be inhibited by stimulation of nonadrenergic noncholinergic enteric neurons, parasympathetic muscarinic receptors or sympathetic beta adrenoceptors, and by inhibition of calcium entry into the cell. Sphincter contraction depends on an increase in cytoplasmic calcium and is enhanced by sympathetic adrenergic stimulation.

So when trying to determine a rational treatment for fissure in ano, the surgeon must bear in mind the abnormality in the internal sphincter.

CLASSIFICATION OF FISSURE

Anal fissures are classified in two following groups.

1. Primary fissure
2. Secondary fissure

PRIMARY FISSURE

A primary anal fissure is a benign superficial ulcer in the anal canal. A primary fissure involves only the anal mucosa below the dentate line. If it extends more proximally, it is almost certainly secondary to some other disorder. A primary fissure is therefore usually about 1cm in length and overlies only the lower third of the internal sphincter. At its lower end there may be a tag of edematous skin. This tag is known as a 'sentinel pile'. Primary fissure may be acute or chronic.^[81]

a) Acute Primary Anal Fissure

An acute fissure is superficial and the base is formed by loose connective tissue; commonly the transverse fibers of the internal sphincter are not seen. A sentinel pile may not be present

and there is rarely a hypertrophied anal papilla (chronic fissure). The edges of the ulcer are sharply demarcated and there is no induration, sepsis, oedema or cavitation. Acute fissures often heal spontaneously and they occur commonly in children, young adults and in the puerperium. The results of surgical treatment are more successful in acute fissure.^[82]

b) Chronic Primary Anal Fissure

Any patient with persistent symptoms for more than six weeks usually has a chronic fissure. The edges of a chronic fissure are indurated and sometimes undermined; the internal sphincter is usually easily visible at the base. Later, the ulcer becomes wider and the external aspect becomes edematous owing to lymphatic obstruction. Progressive edema gives rise to characteristic skin tag and a hypertrophied anal papilla at the inner margin on the dentate line.^[83]

SECONDARY FISSURE

Secondary fissures are those that arise in association with some other pathology such as Crohn's disease, anal tuberculosis, AIDS or a previous anal operation.^[7,84] Fissure Complicating Crohn's disease and tuberculosis and peri-anal sepsis. The fissure of Crohn's disease is often a cavitating ulcer with extensive local destruction and sepsis.^[85]

Secondary fissures tend to be progressive, become chronic and rarely heal with conservative or surgical therapy.

CLINICAL PRESENTATION

The patient having fissure in ano can present with.

Pain is the cardinal feature of fissure in ano in the anus during and after defecation.^[1-3,86] The pain usually is described as a sharp, cutting or tearing sensation during the actual passage of stool. Subsequently the pain may be less severe and may be described as a burning or gnawing discomfort that may persist from a few minutes to several hours. Because of the anticipated pain, the patient may not defecate when the natural urge occur, that leads to harder stool, with subsequent bowel movement more painful. A relentless cycle may ensue with the individual living from one bowel movement to the next.

Bleeding is very common with fissure in ano but is not invariably present. The blood is bright red and usually scant in amount.^[87] Blood is not mixed with stool; it may be noted on the toilet tissue.

Some patients have a large sentinel pile that draw their attention to the anus. In such circumstances, patients usually complain of a painful external hemorrhoid.^[87]

Constipation is usually the accompanying symptom as well as an initiating symptom of anal fissure.^[87,88]

Discharge may lead to soiling of the underclothes and to increased moisture on the perianal skin, with resulting pruritus ani, although pruritus may occur independently of any discharge.^[88]

The clinical of entity of painless, nonhealing fissures may be annoying to both patient and surgeon. The patient may experience some bleeding from time to time, but symptoms may not be severe enough to recommend operative treatment.

DIFFERENTIAL DIAGNOSIS

Most conditions in patients presenting with anal pain, swelling, or bleeding are usually easily distinguished.^[84] Thrombosed hemorrhoids or perianal abscess are readily seen. However, certain other conditions may require more careful discrimination.

Anorectal Suppuration

Intersphincteric abscess is of great importance as it can closely mimic a fissure. An intersphincteric fistulous abscess with out an external opening is usually situated posteriorly in the mid anal canal between the internal and external sphincter.^[86]

It causes great pain that may last for many hours after defecation. A diagnostic clue to the Intersphincteric abscess is that the pain usually does not completely go away. Little if any thing seen externally, but during the examination exquisite tenderness will be elicited over the abscess, which itself may not be palpable.

Pruritus Ani

Pruritus Ani with superficial cracks in the anal skin may sometimes prove a source of difficulty because many patients with anal fissure develop pruritus as a result of the discharge irritating the perianal skin. However, the skin in pruritus ani shows only superficial cracks extending radially from the anus, and these cracks never extend up to the dentate line. Therefore, digital examination of the rectum does not elicit pain, and there is no true anal spasm or tenderness.

Fissure in Inflammatory Bowel Disease

Anal fissure associated with ulcerative colitis are often situated off the midline and may be multiple. These fissures, as well as being broad, are surrounded with inflamed skin. This inflammation should alert the surgeon to an associated proctocolitis, which can be diagnosed if a view of the rectal mucosa can be obtained through endoscopy.

Anal and perianal ulceration frequently occurs with Crohn's disease. The ulcer is often much more extensive than an idiopathic fissure. If a lesion is suspected, biopsy frequently reveals the histologic features of Crohn's disease. Sigmoidoscopy may, in fact, be normal because the involved intestine may be more proximal. Despite the opinion of some authors, Crohn's fissures are not always painless.

Carcinoma Anus

Squamous cell carcinoma of the anus or adenocarcinoma of the rectum may involve the anal skin, at which time considerable pain with defecation may occur. Palpation, however, may detect a great degree of induration, and a biopsy should be performed from any suspected lesion.^[89]

Specific Infectious Perianal Conditions

Syphilitic fissures may be caused by either primary chancres or condylomata lata. In its initial stage, a chancre may closely resemble an ordinary fissure but acquire much induration at its margin, and the inguinal lymph nodes become enlarged. A highly characteristic feature is a symmetric lesion on the opposite wall of the anal canal. Suspected lesion can be diagnosed by a dark field examination. Anal condylomata lata may occur at the anal orifice, as well as in the perianal region, and may cause multiple anal fissures. Secondary skin lesions and mucous patches, however, are usually present, and the Wassermann reaction is strongly positive. Contrary to popular belief, syphilitic lesions in the anal region are not always painless.

A troublesome ulcer in the anal region is rare. When it occurs, it tend to enlarge and develop undermined edges. Differentiating this lesion from Crohn's disease may be very difficult; however, the tuberculous ulcer is usually associated with pulmonary tuberculosis. Performing a biopsy and guinea pig inoculations may be necessary. After antituberculous chemotherapy has been administered, these lesion may be treated the same way as an idiopathic fissure.

Hematologic Conditions

Leukemic infiltration is extremely painful and usually is the sign of the advanced phase of the malignant disease. No treatment is indicated except for drainage of abscesses.

Miscellaneous Conditions

An anal abrasion is a rubbing off, or scraping off, of the skin of anal canal. It is a mild disorder that can be differentiated from a fissure as they are usually superficial in location and do not have sentinel pile or anal papilla and it is usually a transient condition.

When no local disease is found in the anal region, other diagnosis should be considered like

- Proctalgia fugax
- Coccygodynia
- Rectal crises of tabes
- Psychoneurosis

Proctalgia fugax may cause severe pain but usually awake the patient at night, is of short duration, and is not necessarily related to bowel movements.

EVALUATION OF PATIENT WITH FISSURE

History

The principal symptoms in adults are anal pain, bright-red bleeding, perianal swelling and occasionally, mucous discharge.

Lab Studies

Include a complete blood picture to check for infection and hematocrit.

Anorectal Examination

- Position of the Patient

The examining position depends upon the habit of the practitioner and the age of the patient.

- a. Left lateral position^[20]
- b. Knee-elbow position^[20]

In most patients it is possible to make a diagnosis of anal fissure by inspection alone. The patient is usually anxious and may be in pain; also, patients are naturally fearful of having a rectal examination and the perianal skin is usually puckered by spasm of the internal and external anal sphincters and tightly held buttocks. A recent study reported that sublingual

administration of 0.4mg of glyceryl trinitrate made it possible to perform a rectal examination in 13 of 16 acute fissure patients in whom rectal examination had been quite impossible beforehand.^[88] This is further evidence of the role of nitric oxide and internal sphincter hypertonia in acute anal fissure.

- Inspection

Despite excessive sphincter activity, it is usually possible to see a small skin tag as well as a small amount of discharge or blood on the perineum. If the patient is reassured, it is usually possible to part the buttocks gently. It would be quite painful to attempt a rectal examination or proctoscopy at this stage.

- Palpation

Only after careful inspection has failed to reveal a fissure should the surgeon attempt a rectal examination. Rectal examination can be achieved, sometimes without too much pain, by introducing the finger well away from the usual fissure site. Intense spasm of the sphincters is usually a prominent feature. The fissure may be felt as an irregular, painful, depression near the anal margin. In chronic fissures, rectal examination is often comparatively painless and a palpable abnormality is common.

If it is initially obvious that a rectal examination is going to be too painful for the patient, it should be abandoned.

- Proctoscopy

Proctoscopy is sometimes quite impossible with conventional adult instruments in acute anal fissure. If proctoscopy and sigmoidoscopy are painful, the examination should be deferred and performed under general or local anaesthetic prior to definitive treatment.^[89]

- Sigmoidoscopy

The proportion of patients with abnormalities on sigmoidoscopy depends on the length of rectum, which can be viewed and the number of patients having an endoscopy. Abnormalities on sigmoidoscopy in 11% of patients with a fissure were found. These abnormalities included distal proctitis, metaplastic adenomatous polyps, anal condylomata, Crohn's disease and anal tuberculosis.^[89]

MANAGEMENT OF FISSURE

Many fissures are short lived and can heal spontaneously.^[90] In others, treatment is necessary as patients feel a lot of pain during defecation.

Every patient should be fully evaluated regarding diagnosis and suitability for both medical or surgical management and treatment should be individualized.^[50]

Following are different treatment options.

Medical Treatment

Acute anal fissures

Medical treatment is most likely to be effective in patients with acute fissures. The higher failure rate of medical therapy for chronic anal fissure has led to the recent investigation of several pharmacological agents as alternative therapy to surgical therapy.^[91]

The following methods are usually advocated for the treatment of acute anal fissures.

1. The medical treatment aims at avoidance of hard stools and pain relief. Bulking agents are the most commonly used by most physicians because of low cost and easy availability. The widespread availability of phyllium or methylcellulose preparations has replaced the use of unprocessed bran to a large extent.^[6,91]
2. Sitz baths are often recommended in reducing the pain associated with anal fissure. It provide temporary symptomatic relief by soothing effect of warm water that may be cause little decrease in anal canal pressure produced in patients with fissures in this setting.^[6,91]
3. Adequate analgesia is similarly necessary to break the vicious cycle of pain that lead to hypertonia of internal anal sphincter. A suitable dose of analgesic taken about half an hour before going for deecation gives a good amount of post defecation pain relief.
4. Stool softening agents are usually added in the regimen as soft and formed stools negotiate the rectum and anal canal in non-traumatic physiologic maneuver. Plenty of oral fluids also help in keeping the stools soft.
5. Reassurance and encouragement for not resisting the urge for defecation help prevent hard stools. Later the patient could be encouraged to acquire and maintain a regular bowel habit of once or twice a day. Application of local anesthetic cream or gel may help avoid the torture experienced in passage of stools in the patients with acute fissures. Ointments containing opiates, xylocain, amethocain, and cinchocain to relieve pain, belladonna to alleviate sphincter spasm and silver nitrate to promote healing have been in vogue since

long. These mixtures are introduced on the finger or a short rectal bogie to ensure a thorough application over the desired part of the fissure.^[92] The modern practice is to insert the ointment over an anal dilator, which in addition helps relieve sphincter spasm. The possible complications of this treatment include pruritus due to allergy with the anesthetic agents and loss of anal dilator in the rectum.^[93]

Recurrent, slow to heal and atypical anal fissures in unusual location should raise the possibility of tuberculosis, Crohn's disease and homosexual insult. These lesions should be subjected to cultures and biopsy. Tuberculous ulcers respond well to anti-tuberculous chemotherapy. Anorectal disease is common in Crohn's disease, and fear prevails of pelvic sepsis and fistula formation if surgery is undertaken. Management varies from being conservative to fairly aggressive depending on severity of disease. "Gay bowel syndrome" is the term used for varied, multiple and recurrent anorectal pathology seen in homosexuals. Anal fissures in homosexuals and in HIV patients should be cautiously approached, as the sphincter may not be in spasm. These fissures ulcerate and might produce a perianal or recto-vaginal fistula. Sphincterotomy, in such cases can make situation worse than better.^[94]

Chronic or complicated anal fissures

The above mentioned approaches do not prove effective in the chronic variety of fissures in ano. These chronic or complicated fissures usually do not respond to conservative treatment. A definitive therapy is needed to tackle this stubborn malady. The fissure is labeled as chronic or complicated if it fulfils the following criteria.^[94]

1. Fissure that fail to respond to medical treatment.
2. Presence of an external skin tag is noticed.
3. If a fibrous anal polyp is present.
4. Presence of hemorrhoid is visible.
5. Induration is indicated at the edges of fissure.
6. Exposed fibers of the internal sphincter at the floor of the fissure, with infected base.
7. Post fissure fistula

It has been experienced that fissure, complicated by any of the above factors, neither heal spontaneously nor does it respond to conservative therapy.^[95]

Pharmacological agents can be used to temporarily reduced internal sphincter tone, and therefore MARP.⁹¹The pharmacological agents in common use for non surgical treatments of

anal fissure are Calcium channel blockers, nifedipine and diltiazem hydrochloride in oral or gel forms, alpha-1 adrenoceptor antagonist, indoramin and glyceryl trinitrate.^[96] Hydrocortisone cream reduces the inflammation and pain at the site of fissure and is useful initial option in infants and children. Oral analgesics or local analgesic suppositories will help reduce pain and inflammation. Stool softeners can help initially in healing of fissure and reducing the discomfort during defecation.^[2,3,96]

In infants, treatment of constipation and maintaining soft stool also help in fissure healing.^[97] Diarrhea is avoided and good anal hygiene should be maintained by changing the diapers frequently. Use of moist wipe instead of dry, perfumed tissue paper also helps in healing and prevention of fissure.

Application of local creams has poor compliance as it need to be applied frequently. Furthermore, local anesthetics like lignocain dry soon and can cause contact dermatitis in some patients. This further increases inflammation in already diseased area further adding to the problem.^[98]

So poor compliance, low success rate and recurrence of fissure after cessation of treatment, are problems with local ointments.

Some studies are available where alpha receptor antagonists were used but still this is in development.^[99]

Cholinergic receptor agonist is also being evaluated as one treatment option.^[100]

The most commonly used pharmacological agents in the treatment of anal fissure are discussed as follow.

PHARMACOLOGICAL SPHINCTEROTOMY

In recent years, there has been an emerging trend to treat anal fissures by pharmacological means. Physician have turned to these methods because of the concern of complications following operation reported by some authors. of course, not all authors report high complication rates. The new pharmacological therapies have been used to create a reversible reduction of sphincter pressure until the fissure has healed. Novel agents including glyceryl trinitrate (GTN) and isosorbide dinitrate that results in augmented blood supply to the area, calcium channel blockers such as diltiazem (DTZ) or nifedipine, botulinum toxin that result

in chemical denervation of the muscle, muscarinic agonists such as bethanechol, sympathetic neuromodulators such as indoramin, and l-arginine have been studied. A wide variation of results have been reported with the use of these agents and part of the reason for varied results may be due to the fact that some studies have included the patients with acute fissures, some have chronic fissures and often both. The dosage of medication, the frequency of administration and length of follow-up also account for the wide variation of results. Indeed, the definition of a chronic fissure has been arbitrary, often considered to be a fissure present for 6-8 weeks.

Glyceryl trinitrate creams

Local creams of glyceryl trinitrate (0.2% by weight) can be used to temporarily reduce internal sphincter tone and therefore mean resting anal pressure.^[91] The aim of the treatment is to relax the internal sphincter and increase its blood supply.

Nitric oxide is the principal neurotransmitter mediating neurogenic relaxation of the internal sphincter. Therefore the nitric oxide donor trinitrate has been tested, and has gained acceptance in the treatment of anal fissure in both the acute and chronic setting. The topical ointment, diffuses across the skin barrier and cause a reduction in internal sphincter pressure as well as improving anodermal blood flow through the vasodilatory effect on the anal vessels.^[101] Creams are applied twice or thrice daily to anal canal until the fissure has re-epithelialized which usually takes 2 to 3 months.^[91]

Variable results have been reported in the literature. Some of the variability may be attributable to whether patients had acute or chronic fissures and the definition of the chronic fissure. Generally healing rates of between 50% and 80% have been reported in the treatment of chronic fissures.^[100-106]

Advantages

1. Easy to apply and non-irritating and have no chance of continence problem.
2. It is also very effective in fissure of inflammatory bowel disease, where surgery is usually avoided.^[90]
3. Available in different strengths (0.1%, 0.2%, 0.4%) but with no definite advantage of one over the other.^[104]

4. Nitroglycerine can be combined (with 73% success) with pneumatic dilatation of anal canal. Success rate can further be increased with healing rate up to 94% if combining it with injection of botulinum toxin.^[107]
5. It can also be combined with sphincter sparing surgical procedures, thus avoiding incontinence and increasing healing rate.^[108]
6. And of course it do not require any sort of hospital admission.^[103]

Disadvantages

1. Some studies have shown that healing rate achieved by GTN can also be achieved with placebo, thus rendering it doubtful.^[102,109] Many studies have also shown a healing rate of less than 50%.^[110]
2. Headache is one of the major adverse effects of this treatment. It has been reported in 20% to 40% of patients.^[91,106,111] Many patients stop using it for this reason.^[112]
3. Compliance is also a problem both for patients and doctor. It needed to be applied over anal mucosa, that may be painful and maintaining twice daily applications is also difficult. Doctor has to assess repeatedly about the progress of fissure healing by repeated anal examination which is time consuming and labor intensive.^[103,113]
4. Recurrence of fissure is also a problem.^[103] Although exact mechanism is not known, scarring and fibrosis and presence of anal tag are bad prognostic factors favoring recurrence.^[113] These features are present in many patients of the chronic anal fissure so role of GTN in patients with chronic anal fissure is doubtful.^[109]
5. Some patients experience tachyphylaxis, that require increasing concentrations of GTN to maintain the desired effect on the IAS.

CALCIUM CHANNEL ANTAGONIST

Diltiazem Cream

Diltiazem, a Calcium channel blocker is more effective in the treatment of chronic anal fissure than GTN. Jonas et al reported on a group of patients with chronic anal fissure who had failed GTN therapy. Topical 02% Diltiazem was applied to the distal anal canal twice daily. MARP was significantly lowered during therapy, and 49% were healed after 08 weeks of therapy.^[114] Similar results were reported by Carapet et al.^[115] Diltiazem is approximately equally effective in healing of acute fissures. Furthermore, headache is negligible in patients using it, thus increasing compliance and success rates.^[10,114,115]

Nifedipine

Nifedipine, a dihydropyridine, is a calcium antagonist that cause smooth muscle relaxation and vasodilation. L-type calcium channels are the principal calcium channels in the gastrointestinal smooth muscles. It has been used with variable effects in the management of achalasia cardia. In the treatment of anal fissures, 20 mg of Nifedipine is given twice daily. Nifedipine is found effective in relieving the sphincter spasm.^[117] It is known for achieving increase in the local blood supply by an independent mechanism. This allows faster healing. It has been advised that Nifedipine should be avoided in patients who have a history of severe headaches. Nifedipine has little effect on the skeletal muscles and there was no difference in maximum squeeze pressure, which is a function of the external sphincter. Therefore, incontinence does not occur with its use for anal fissures. Interestingly, nifedipine has been used to treat severe anal pain associated with hypertension to a good effect. *One may contemplate a judicious selective use of Nifedipine therapy for patients who have anal fissure and have concurrent hypertension.*

Disadvantages

It is, however, supposed to cause reversible internal anal sphincterolysis. Most of these drugs have a short duration of action and need to be administered 2-3 times daily. Similarly, side effects like headache, palpitations, flushing, dizziness, colicky abdominal pain; ankle edema, reduced taste and smell, nausea and diplopia have been reported.

Botulinum Toxin (BT)

Botulinum toxin, a product of clostridium botulinum, produces a potent neuromuscular blockade. Botulinum is a toxin which is used to weaken the striated muscles by chemical denervation, but also has been shown to weaken the smooth muscles of the gastrointestinal tract.^[118,119] The toxin acts at pre-synaptic terminals to prevent release of acetylcholine, thus interrupting the transmission of neuromuscular impulses until growth of new axon terminal after 2 to 3 months.^[119-120] In anal fissure, healing time ranges roughly from 1 to 3 months so fissures get healed within time provided by botulinum toxin (BT).

Intrasphincteric injection of BT was first described by Jost and Schimrigh and was found to be effective.^[121]

Another advantage is that it can be injected anywhere in and around internal sphincter muscles but anterior injections may be more useful. Scarring and fibrosis in posterior part of IAS may have destroyed nerve terminals rendering anterior injection more useful.^[122]

BT has been showed to be more effective than nitroglycerine ointment in healing of fissure.^[123] It has been shown to be equally effective to LIS with negligible incontinence rates.^[11]

Healing rate in BT is in the range of 70 to 80%.^[11,107] In one study posterior anal tag was excised, tissue base was curetted and then BT injection was given and achieved success rate of 93%. Transient incontinence ranged from 7 to 12%.^[124] It was showed that favorable points in treatment with BT injection were posterior location of fissure, significant reduction in anal pressure after injection and short duration of symptoms i.e. less than 12 months. Further more dose of BT injection can be increased from 20 to 50 units to get healing rate of 90% without causing any increase in complications.^[124]

Botulinum toxin treatments show a trend to progressive recurrence over time with lower healing rates than those initially reported. Minguez et al present the longest-term follow-up (42 months) with relapse of anal fissure in 41.5% of patients.^[125] Another study by Arroyo et al also show progressive rate of recurrence, which starts at 12% in the early months and reaches 53% at 3 years.^[1-3] In surgical sphincterotomy, the recurrence is lower (<10%) and not progressive. This is not surprising, since it could be related to the temporary reversible effect of the toxin contrary to the surgical sphincterotomy.

Botulinum toxin is recommended as the first therapeutic approach in patients older than 50 years or with risk factors for incontinence (women who have had multiple vaginal deliveries, prior anal surgery, prior incontinence, inflammatory bowel disease. etc), despite the higher rate of recurrence associated with this treatment, since it avoids the greater risk of incontinence found in surgical group.^{1,2} Botulinum toxin is also considered a reasonable management option for those patients wishing to avoid permanent sphincter division.^[2,3]

The toxicity of the drug, accidental injection in the surrounding tissue amounting to general poisoning, haematoma and infection reported had discouraged regular use of this therapy.^[125]

MUSCARINIC AGONISTS

Muscarinic agonists provide nitric oxide synthesis in nonadrenergic, noncholinergic neurons. Bethanechol cream 0.1% decrease sphincter pressure by 24% and has been reported to heal fissures in 60% of patients without side effects.^[115]

SYMPATHETIC NEUROMODULATORS

L-Arginine

L-Arginine acts as a substrate for nitric oxide synthase in the production of nitric oxide and has been shown to be effective in the relaxation of the internal sphincter. In a placebo controlled study, Griffin et al,^[166] investigated whether topical L-Arginine gel reduces maximal resting anal pressure in volunteers. Anal manometry was performed 2 hours after application of 400 mg of L-Arginine gel in 25 volunteers. The important findings were noted from the study. First, L-Arginine reduced maximal anal resting pressure by 46%. Second, no side effect occurred, in particular no episode of headache were recorded.

Its onset of action is rapid and duration is at least two hours. L-Arginine may have therapeutic potential but further evaluation is needed before it can be used as a possible alternative treatment for chronic anal fissure.^[167]

Gonyautoxin Injection

It is phyto toxin which is produced by dinoflagellates. It causes paralysis of internal sphincter. In one study acute fissures healed within 15 days and chronic within 30 days with only one relapse.^[126] But there is need for further studies to fully evaluate its benefits and drawbacks.

Topical Sildenafil

Torrabadella et al described manometric analysis of the effect of phosphodiesterase-5 inhibitor, topical sildenafil (Viagra),^[116] in 19 consecutive patients with chronic anal fissure with no previous treatment history. Topical administration of 10% sildenafil was accompanied by significant reduction in anal sphincter pressure (18%). Average onset of action was less than 3 minutes, with maximum effect one minute later. No headache or side effects were noted.

Direct current probe treatment

This method is tried in patients of chronic anal fissures with associated internal hemorrhoids. A study claimed that when the DC probe [Ultroid, Homeron] was applied to the internal hemorrhoids, the patients were relieved of anal pain and healing occurred in 90% of patients.^[127]

However, this mode of treatment requires special equipment and the procedure takes a very long time to be performed [about 10minutes for each hemorrhoid]. Moreover, the mechanism of action on the part of fissure is also not understood. A case of complication in the form of perianal abscess and fistula requiring surgery has been reported following DC probe treatment.^[128]

Endoscopic anal dilatation

In this procedure, anal dilatation is performed with a bi-valve anoscope under local anesthesia as an office procedure.^[129] In the study, 93% patients were found symptom-free one month after the procedure, and only a few had a recurrence.

This procedure is said to be free of discharge or defect of continence either transient or permanent. In another series, a Parks' retractor or a recto sigmoid balloon has been used for sphincter dilatation. Out of 495 patients treated through this procedure, it is reported that in as many as 87- 88% of the patients, the fissures were healed within 3 months.^[130]

As many references are not available in support of this technique, it will be hazardous to comment on the efficacy or otherwise of this procedure.

Chemical cauterization

This is done by using silver nitrate or phenol-in-glycerine. This procedure may be repeated a couple of times until healing occur. It takes about 4 to 8 weeks for complete healing of the fissure.

The toxicity of the drugs, accidental injection in the surrounding tissue amounting to general poisoning, hematoma and infection reported refrained the surgeons from regularly resorting to this method.

SURGICAL TREATMENT OPTIONS

Surgical therapy of anal fissures is reserved for patients who have failed medical therapy or have developed a fissure-fistula.^[91] Different surgical treatments are used with main concern related to fear of incontinence associated with them.^[131]

They include manual anal dilatation, LIS, fissurectomy and anal advancement flap.

Manual anal dilatation (Lord's Procedure)

Anal dilation was described by Recamier in 1838. This was one of the most favored and accepted methods of treating the anal fissures.^[85] The primary cause of attraction for the procedure is its extreme simplicity. Since almost no instruments are needed for this procedure, it could be performed at the primary health centers or inadequately equipped hospitals situated at small townships.

Anal dilatation helps in healing of the fissure by reducing the anal canal pressure. If performed with due care by avoiding excessive manipulation, it does not cause any damage to the external anal sphincter as feared. In experienced hands, incontinence of stools or flatus is seldom seen.^[133]

This is the simplest procedure in which index and middle finger of each hand is inserted into anal canal and it is stretched gently and carefully, so that anal diameter should never be more than 4 finger breadths. This is performed usually under GA. Great care and judgment is required, so that sphincter is never over stretched.^[12-14, 134-136]

Self- dilatation by dilators is awkward, associated with low patient compliance and high recurrence.^[96,133]

One benefit of manual anal dilatation is that it gives appreciable pain relief. This may be related to laxity of sphincter, as stool can easily pass through the lax sphincter mechanism.^[134] Some studies also show increased healing rates and only negligible complication like flatus incontinence which is also transient.^[137]

But as it is less controlled method, so it can tear both internal and external sphincters, thus causing unacceptably high rates of incontinence. Healing rates are also low and recurrence is high as sphincter may be over or under stretched. It is not recommended now in routine and especially in patients who have weak sphincters. Why to stretch external anal sphincter which

has no role in pathogenesis of anal fissure. Many studies have suggested the incontinence rate of 15 to 30% and also include fecal incontinence which can be very troublesome.^[12-14,138] Furthermore damage to external sphincter is inevitable and this has been proved by many studies.^[138,139]

Fissurectomy

A triangular part of the anoderm is excised along with the fissure itself. This procedure is usually preceded by anal stretch. *Fissurectomy*, by itself, is an incomplete treatment as the anoderm heals very slowly and the factor initiating and/or aggravating the problem - the internal sphincter spasm - is not tackled. When combined with anal dilatation or sphincterotomy, it may make the procedures more effective.^[16]

Howsoever, good and reliable this operation is, it leaves behind a large and rather uncomfortable external wound, which takes a long time to heal.^[140]

Lateral internal Sphincterotomy

The basic aim in the treatment of anal fissure is to lower the resting anal pressure by decreasing the tone of IAS. In LIS the IAS is incised that resulting into decrease in spasm of IAS and it helps in fissure healing.

Lateral internal sphincterotomy restores perfusion to anoderm that result into faster healing of anal fissure along with quick pain relief because of decrease in internal anal sphincter pressure.^[59,141]

LIS is the considered to be the treatment of choice and has healing rates approaching to 90-100%. The problem of incontinence is encountered in < 10% and primarily involves transient incontinence to flatus. Only <1% of patients can have troublesome incontinence disturbing life.^[142,143]

The majority of studies have shown that non-healing, recurrence rates and alterations in continence are lower with lateral internal sphincterotomy as compare to other procedures. Non-healing of fissure or recurrence rates are reported to be up to 1% to 6% of patients in large series^[91, 141, 144] Rate of recurrent fissures is about 40-50% in which IAS has been performed under local anesthesia^[145] due to inadequate control. However, this can be improve by doing sphincterotomy on the contralateral side.

It is controversial that whether it should be done with open or close technique.^[91]

OPEN INTERNAL SPHINCTEROTOMY

Advocates of the open technique suggest that complication rates may be fewer and unhealed and recurrence rates may be lower after open sphincterotomy.^[148]

Both the procedures can be done either under a local anesthesia and spinal or a general anesthesia depending upon personal preference of the surgeon based on his experience and the attitude of the patient.

TECHNIQUE

Open sphincterotomy is usually performed under general anaesthetic as a day procedure; alternatively, regional or topical local anaesthesia can be used. A disposable phosphate enema is usually ordered to empty the rectum before operation. The operation may be performed in the left lateral, lithotomy or jack-knife position. In practice, most European surgeons use the lithotomy position, placing the legs in stirrups, whereas in North America the prone jack-knife position is preferred. If local anaesthesia is used it is advisable to establish venous access so that midazolam or pethidine can also be administered if there is undue pain or anxiety during the operation. It is also advisable to smear some local anaesthetic lignocaine jelly around the fissure and to infiltrate around the fissure as well as at the operation site. If a general anaesthetic is used it is preferable to avoid muscle relaxants and to employ a light inhalational anaesthetic so as to facilitate identification of the intersphincteric plane. Sigmoidoscopy is advised if this has not been performed earlier.^[91]

Most surgeons prefer a 3cm lateral circumferential intra-anal incision to approach the internal sphincter, although Ray et al use a radial incision. The left half of the perianal skin is shaved before the operation and a Parks self-retaining retractor is inserted with the blades in the 6 and 12 O'Clock positions. The intermuscular depression between the internal and external sphincters is defined by palpation, and 30ml of a 1:200,000 solutions of adrenaline with 0.25% bupivacaine is infiltrated into the intersphincteric and submucosal plane proximally as far as the dentate line. A 2-3cm lateral circumferential incision is made over the skin at the site of infiltration. The mucosa of the lower anal canal is freed from the underlying internal sphincter as far as the dentate line by scissors dissection. Care should be taken not to buttonhole the anal mucosa. The intersphincteric plane is then opened using scissors dissection, thus isolating the internal sphincter, which is then divided with scissors up to but

not above the dentate line. After sphincterotomy, the fibers of the internal sphincter will have retracted circumferentially, leaving the external sphincter visible. All visible bleeding points are secured and the skin wound either left open or sutured. In the open operation, tamponade by an anal sponge is usually not necessary.^[91,141-144,146-148]

Patients are prescribed bulk laxatives and non-constipating analgesics after the operation.

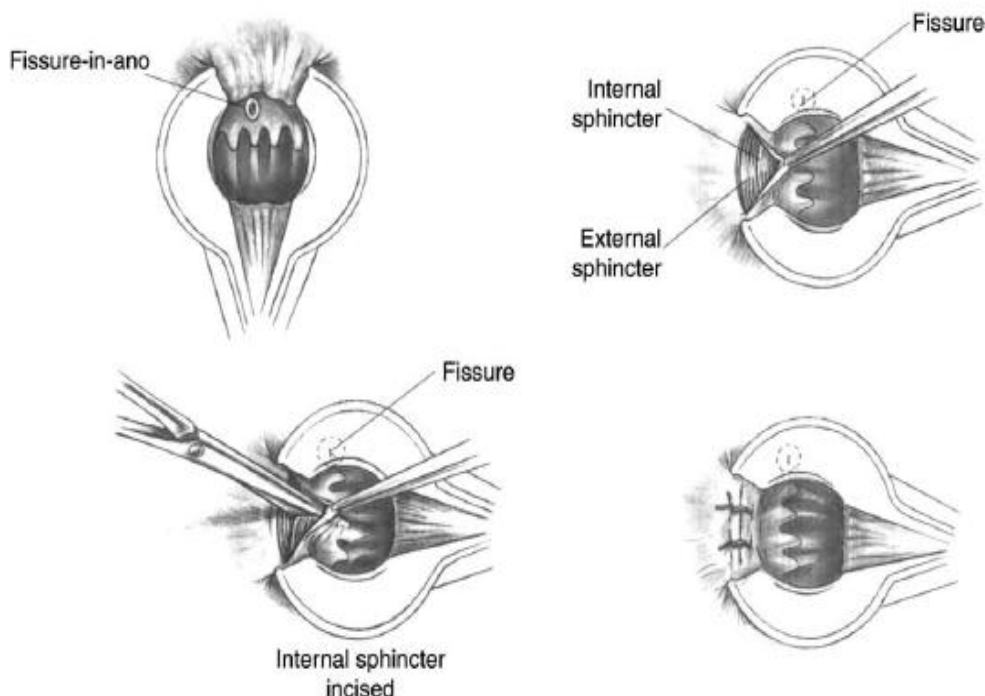


Fig 4: Open Lateral Internal Sphincterotomy.

CLOSED LATERAL INTERNAL SPHINCTEROTOMY

RATIONALE

The advantage of subcutaneous sphincterotomy compared with open sphincterotomy is that there is stab incision, so there is less postoperative pain and a more rapid return to full activity. The operation can readily be performed in the office or in the outpatient department under local anaesthesia. Furthermore there is a lower incidence of incontinence compared with open sphincterotomy.^[91,99,147-149]

TECHNIQUE

The patient is placed in the left lateral position with the buttocks well over the side of the couch. The intersphincteric plane is seen as a gutter just beyond the anal verge after placing the bivalve self retaining retractor. The cataract knife is first inserted into the intersphincteric

groove with the blade lying parallel to the fibers of the internal sphincter as far as the dentate line. The knife is then rotated through 90 degrees with the blade at right-angles to the internal sphincter, facing inwards towards the anal mucosa. The blade is now advanced towards the lumen, taking care not to breach the mucosa. During this manoeuvre the fibres of the internal sphincter will be felt to give way. The knife is now removed and V-shaped defect will be felt. If the procedure has not achieved a palpable deficiency, the operation may need to be repeated on the opposite side of the anal canal. A foam sponge may be inserted so as to minimize postoperative haematoma.^[6,91,134,147,149]

Proponents of the closed technique suggest that CIS is preferable to OIS because it has similar rate of cure with less impairment of control.^[147] But Wiley M, et al say that the technique (closed versus open) does not seem to influence incontinence rates.^[148]

Advantages

1. It has very high healing rates i.e. ranging from 80 to 95%. This is because of long term decrease in resting anal pressure after surgery. Most of the fissures heal with in few weeks ranging from 3 to 12 weeks.^[96,98,122,140,141] Pain relief is quick and patients feel a lot of satisfaction after getting rid of severe pain associated with anal fissure.
2. It can be performed even under local anesthesia in out patient department under bilateral pudendal nerve block. And it is very cost effective.^[17,130-135]
3. Other anorectal procedures like hemorrhoidectomy, excision of anal tag, biopsy of fissure can also be combined with it without causing any increase in morbidity.^[96]
4. It is superior to manual anal dilatation in terms of success rate, recurrence rate and complication.^[12,13,134,135]
5. It has been found to be superior to GTN in terms of fissure healing, recurrence and complication rates.^[110,113,146,147]

Disadvantages

1. Bleeding per rectum that may need readmission.
2. Incontinence to flatus or rarely to stool has been encountered but mostly it is of mild grade 1. It is transient most of the time and do not require any sort of treatment.^[91,127,134,146-149]
3. Mucous discharge and soiling of clothes have been demonstrated in some studies. This is usually temporary and resolve with passage of time.^[149,150]
4. Localized infection and abscess formation can be there.^[150]

5. Open spincterotomy may cause posterior midline keyhole defect that may cause a persistent seepage or difficulty in continence.
6. Uninary retention has also been noted as well.^[150,151]

Many studies have demonstrated that if the cutting of the sphincter is limited to the upper limit of fissure, then risk of incontinence is minimized.^[90]

Some have demonstrated that even full cutting of sphincter up to dentate line does not increase the chances of incontinence.^[152]

Post operative care usually include analgesics and sits bath with mild antiseptic added to plain water.^[96]

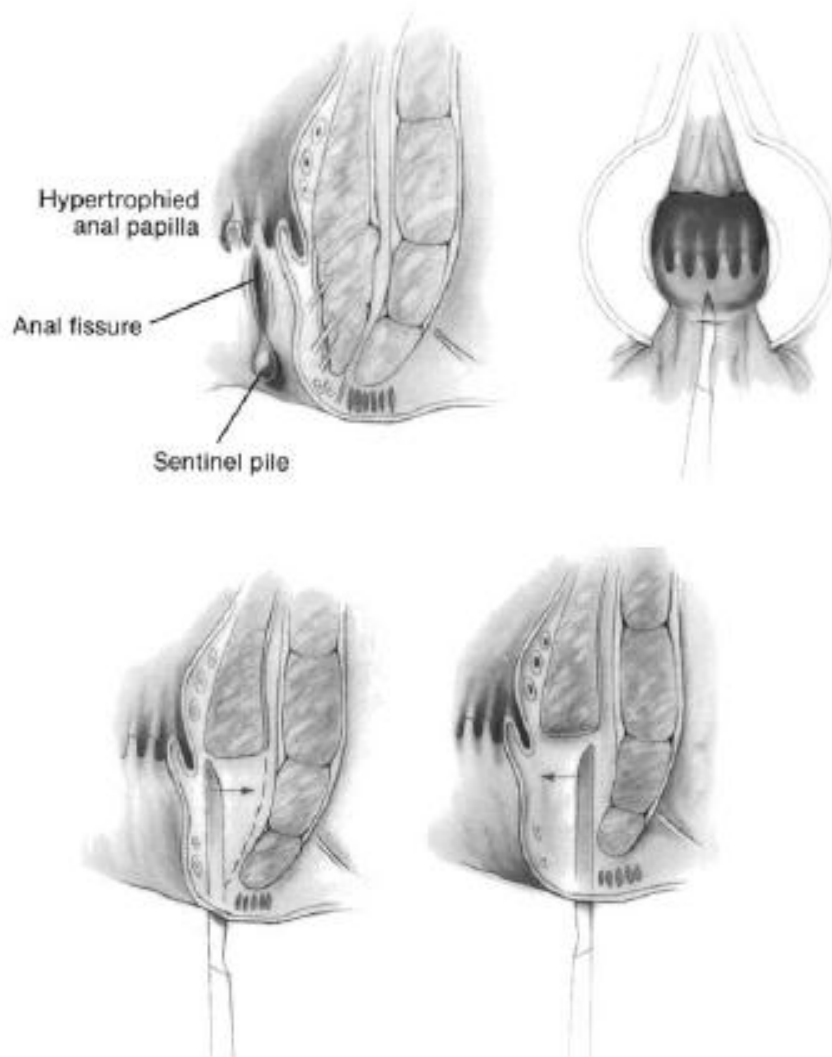


Fig 5: Close Lateral Internal Sphincterotomy.

V-Y Anoplasty (Advancement Flap Technique)

In this method, fissure is excised and a square of full thickness flap of perianal skin is mobilized and sutured to the defect. With this technique, the fissure and the adjacent crypt bearing haemorrhoidal tissue are completely excised. A triangular skin flap based outside the anal canal is elevated in continuity with the excised fissure. A broad base with adequate blood supply to the flap must be ensured. The flap is adequately mobilized to avoid tension on the suture line. Meticulous attention is paid to hemostasis to prevent hematoma formation, which increase tension and the chance of infection. The flap is then advanced, and the defect of the skin and anal canal is closed. The risk of recurrence is minimal. There are no complications like incontinence as internal sphincter is left undisturbed. It is particularly useful in patients with weak sphincters because it is very safe and simple.^[153,154] The suitability of this method is being evaluated in old people and women with multiple vaginal deliveries as both these groups have weak and lax perianal muscles.

The major disadvantages to this method are that it involve considerable dissection and requires increased operative time. But this procedure provided a useful alternative for the treatment of symptomatic anal fissures in which a sphincter weakening procedure might jeopardized continence.^[154]

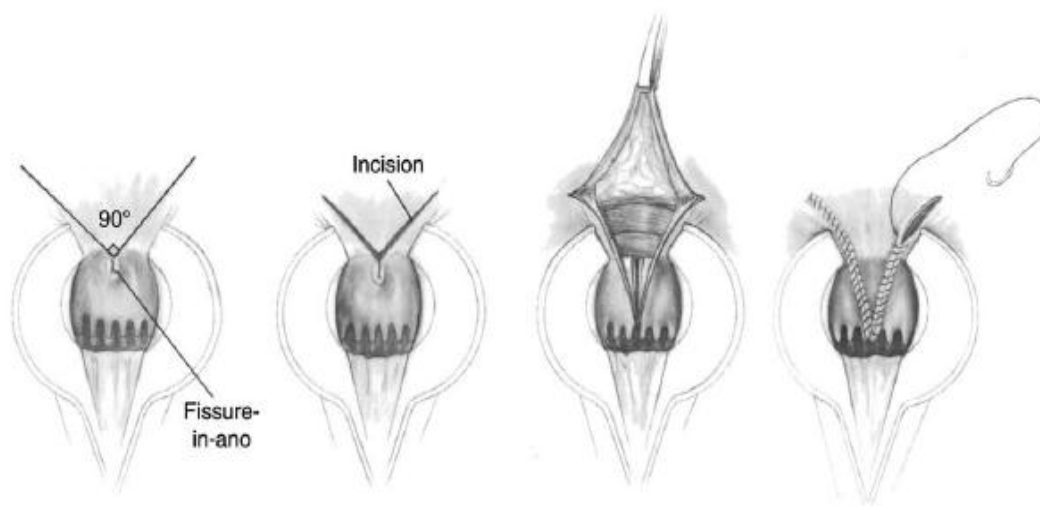


Fig 6: Advancement Flap Technique.

Combined outpatient surgical and cyrotherapeutical treatment

A lateral anal sphincterotomy, which is done under local anesthesia, is followed by fissure curettage with N protosside cryosound.^[155] This is claimed to be a quicker and more effective procedure.

The additional maneuver is not found to have any specific advantage so it could not get any popularity.

Carbon dioxide laser surgery

It involves laser vaporization of the fissure locally. The internal sphincter can be incised using this laser. In long-standing fissures, some degree of anal stenosis is present. It can be used to give relieving incisions in the three quadrants other than the fissure before the fissure is attended.

The high cost of the laser unit seems to be the major deterrent in its wider acceptance.

Closed lateral internal sphincterotomy & radio frequency surgery

In an attempt to improve on the available options, a fusion of method of sphincterotomy with radiofrequency is described. The procedure has been claimed to be effective in cases where the fissure is associated with pathologies like sentinel tags, hypertrophied anal papillae, fibrous polyps, post fissure fistula or internal hemorrhoids which can be tackled simultaneously while the fissure is being treated.^[156,157]

The radio frequency surgical unit used is Ellman Dual Frequency 4MHz by Ellman International [Hewlett , NY], which incorporates threefold function of cutting, cutting, and coagulation or pure coagulation.

It is claimed that the edges of the fibrosed fissure can be refashioned with the help of the radio frequency surgery. The entire procedure is quick and is virtually bloodless.^[158]

Further randomized controlled trials need to be done to analyze long-term results to establish its efficacy.

Others procedures

In one study, fissurectomy was combined with BT injection along with curettage of the fissure base and excision of sentinel tag if present. It has shown promising results particularly

in those patients where GTN has been failed. It is being regarded as a sphincter sparing procedure.^[89] As neither internal nor external sphincter is incised, so chances of complications related to fecal or flatus incontinence are minimal. This is being evaluated in different centers and if early promising results continued to be proved by long term studies, this will become the surgical treatment of choice for chronic anal fissure.

Recurrence of fissure is prevented by avoiding constipation, increased fiber intake in form of unprocessed bran and maintaining good anal hygiene.^[100,159]

MANAGEMENT OF RECURRENT OR PERSISTENT FISSURE IN ANO

In a small percentage of patients in whom the fissure fails to heal or recurrence develops, a number of options are open to the surgeon. In some patients, a recurrent fissure will heal with nonoperative treatment (stool softeners and sitz bath). For the patients with persistent fissure or a recurrent fissure that does not respond to nonoperative management, a number of options are available. One of the other procedure described earlier could be recomended. Since a recurrence of the fissure is generally attributed to an inadequate sphincterotomy, the surgeon could explore the incision and ensure that a complete internal sphincterotomy was accomplished. Second lateral internal sphincterotomy can be performed.

Xynos et al also reported that fissures that fail to heal after lateral internal sphincterotomy can be successfully treated by performing an additional internal sphincterotomy on the opposite side.^[160]

OBJECTIVES OF THE STUDY

The objective of the study was to.

Determine outcome of close lateral internal sphincterotomy for chronic anal fissure in terms of .

- Post operative pain relief as compare with pre operative.
- Post operative bleeding per rectum.
- Occurrence of any septic complications.
- Incontinence to flatus or stool.
- Hospital stay.
- Recurrence

OPERATIONAL DEFINITION

Short-term outcome

It was defined as post-operative complications occurring during first 6 weeks after close lateral internal sphincterotomy including persistent pain on defecation, bleeding per rectum, incontinence to flatus or stool, any septic complication re-admission and recurrence.

Fissure healing

It was defined as the evidence of the scarring at the fissure site.

Recurrence

If there appeared ulcer or cut in previously scarred area, it was taken as recurrence. Recurrence of fissure was noted at 6 weeks in patients where evidence of healing was present at 3 weeks.

MATERIAL AND METHODS

SETTINGS

The study was conducted at the General Surgery Unit III, Services Hospital, Lahore. The problem of chronic anal fissure is common in this area and this hospital drain patients from surroundings of Lahore as well. A good amount of elective and emergency operations are being performed daily. It provides excellent postgraduate teaching facility.

STUDY DESIGN

Descriptive case series.

DURATION OF STUDY

Study was conducted from April 19, 2013, to October 18, 2013.

SAMPLE SIZE

135 patients of chronic anal fissure fulfilling the inclusion criteria were admitted.

SAMPLING TECHNIQUE

Non-probability: Purposive sampling.

SAMPLE SELECTION

Inclusion Criteria

All patients above 20 years of age with chronic anal fissure who failed to respond to medical treatment were included in this study regardless of their sex and duration of symptoms.

Exclusion criteria

- Patients with laterally located fissure.
- Patients with anal fistula, anorectal abscess and rectal cancer.
- Patient with significant hemorrhoidal disease.
- Patients with inflammatory bowel disease.
- Patients with Psychiatric disease.
- Patients with previous anorectal surgery.
- History of anoreceptive intercourse.

DATA COLLECTION PROCEDURE

After approval from ethical review committee of Services Hospital, 135, consecutive patients with symptomatic chronic anal fissure fulfilling the inclusion were included in the study as they get admitted from surgical out-patient department. An informed written consent was obtained from them for performing close lateral internal sphincterotomy under local anesthesia and using their data in research. The demographic information like name, age, sex and address were recorded on a pre-designed structured proforma. Presenting complaints like painful defecation, bleeding per rectum, mucus discharge, constipation, incontinence and pruritis ani were recorded.

Fissure was confirmed by inspection, by aparting the buttocks laterally. Doubtful cases were examined under local anesthesia just before surgery.

General physical examination and systemic examination was done to exclude tuberculosis, syphilis and colorectal carcinoma.

Routine investigation which includes complete blood count, hepatitis screening and X-ray chest poster-o-anterior view were done for all cases. ECG was done for selected cases aged >40 years.

After informed written consent all patients were operated on day of admission. Under local anesthesia, digital rectal examination and proctoscopy were done to confirm fissure and to

rule out other pathologies like anorectal carcinoma, tuberculosis and syphilis. Any co-existing hemorrhoids and posterior anal tags were also noted. Anal tags were removed when present. Then the groove between the internal anal sphincter and external anal sphincter was palpated after placement of bivalve anal retractor. Then number 11 blade was introduced in the intersphincteric groove up to the level of dentate line and then turned towards the lumen, resulting in excision of internal anal sphincter. A decrease in the tension of the blades of the speculum was felt. A dry gauze wick was placed in the incised wound with a xylocain gel soaked pack in the anal canal for pressure effect to control post operative bleeding that was removed in the evening of the operation day. All patients had uneventful postoperative recovery.

All patients were given preoperative antibiotics, analgesics and were discharged within 24 hours after surgery with advice of sits baths, and analgesics as per requirement. Post operative complications occurring during hospital stay like bleeding per rectum any septic complications and incontinence were recorded.

All of them were later followed in OPD at second, fourth and eight weeks after discharge from the hospital.

They were asked for any pain during and after defecation. Inquiry was also made about any involuntary loss of flatus or feces during this period. Frequency and percentages of flatus incontinence were measured at 4 and 8 weeks after discharge from the hospital. Any history of mucus discharge or cloths soiling with mucus or faeces was specifically asked.

Finally anal region was examined for evidence of mucus discharge, fecal incontinence, bleeding per rectum and healing of ulcer. Bleeding per rectum at the time of admission was compared with bleeding at 6 weeks after discharge. Healing was defined as the evidence of scarring at the fissure site and was measured at 3rd and 6th week after discharge. Recurrence of fissure was noted at 6 weeks in patients where evidence of healing was present at 3 weeks. Main outcome measures were fecal or flatus incontinence, per rectal bleeding, pain relief, duration of hospital stays in days, any septic complication, fissure healing and recurrence of the disease.

All above information were collected on proforma attached herewith.

DATA ANALYSIS PROCEDURE

The collected information was entered in SPSS version 16 and analyzed through it. For age mean \pm standard deviation and range was presented. For the categorical variables in the study, frequencies and percentages of qualitative variables i.e. gender, fecal and flatus incontinence, fissure healing and recurrence were determined and presented. For these variables the frequencies were measured for the above variables both at the time of presentation and after the operation. Chi- square test was applied to compare frequencies of pre-operative and post-operative qualitative variables while t-test was applied for quantitative variables like bleeding per rectum and pain score. P value of 0.05 or less was taken as significant.

RESULTS

A total of 60 cases were subjected to close lateral internal sphincterotomy. All patients were followed-up at 1st, 3rd and 6th weeks after discharge from the hospital.

Age of the patients ranges from 20 to 65 years with the mean age of 38.53 ± 11.37 . The maximum number of patients belong to age group of 31-40 (38.3%).(Table 1)

42 (70.0%) patients were male and 18 (30.0%) were female.(Table 2)

About 88.3% Of patients had fissure in anterior midline while 8.3% had in anterior midline and only 3.2% of patients presented with simultaneous anterior and posterior fissure. (Table 3)

Clinical presentations are documented in Table 4.

Painful defecation was present in all patients. Constipation and bleeding per rectum were present in 88.3% and 91.7%% respectively. Anal tag was present in 21.7% of cases. Pruritus ani was present in 17 (28.3%) of patients. No patients presented with incontinence to stools. The difference between preoperative and postoperative pain score presented in (Table 6).

Bleeding per rectum at admission and 6 weeks after close lateral internal sphincterotomy is presented in (Table 7). A total of 55 (91.7%) patients presented with bleeding per rectum at admission while only 2 (3.3%) persistently had complain of small amount of bleeding PR and the P value is 0.000 (<0.0001) between preoperative and postoperative rate that is highly significant.

Duration of hospital stays in days is presented in (Table 8).

41 (68.33%) of patients had adequate pain relief about 48 hours after operation and another 19 (31.7%) were discharged with mild pain. A P value for the differences of frequencies between preoperative and post operative pain (according to numerical rating scale) was 0.000 (< 0.0001) that is quite significant.

Flatus incontinence after 3 and 6 weeks of CLIS is presented in (Table 9). At 3 weeks 4 (6.7%) patients had flatus incontinence and at six weeks only 2 (3.3%) of patient had incontinence to flatus that also improve after about 10 weeks. This reflects that flatus incontinence was transient that improved with time.

No patient had complained of cloths soiling at 6 weeks after close lateral internal sphincterotomy.

Fissure healing at 3 and 6 weeks after CLIS is presented in Table 10. In 45 (75%) of patients fissure was healed at 3 weeks after closed lateral internal sphincterotomy. And at 6 week 58 (96.7%) had healed fissure.

One patient presented with recurrence after about one year of close lateral internal sphincterotomy. No patient needed readmission during follow-up period.

Sentinel pile in which cases it was present was also removed with out any significant difference in results.

Table 1: Basic demographic data of patients with anal fissures. (Age).

(n=60)

Age Group	No. of Cases	Percentage	Mean \pm SD
20-30	14	23.3%	38.53 \pm 11.37
31-40	23	38.3%	
41-50	17	28.3%	
51-60	3	5.0%	
61-70	3	5.0%	
Total	60	100%	

Table 2: Basic demographic data of patients with anal fissures. (Gender).

(n=60)

Gender	No. of Cases	Percent
Male	42	70%
Female	18	30%
Total	60	100%

Table 3: Clinical presentations of patients with chronic anal fissures (n=60).

Presentation		No. of cases	Percentages
Painful defecation	Yes	60	100%
	No	0	0%
Bleeding PR	Yes	55	91.7%
	No	05	8.3%
Constipation	Yes	53	88.3%
	No	7	11.7%
Pruritis Ani	Yes	17	28.3%
	No	43	71.7%
Sentinel Tag	Yes	13	21.7%
	No	47	78.3

Table 4: Location of fissure in patients with anal fissures (n=60)

Location	No. of Cases	Percentage	Cumulative %
Anterior	5	8.3%	8.3
Posterior	53	88.3%	96.7
Anterior & Posterior	2	3.3%	100.0
Total	60	100.0	

Table 5: Pain Score at Admission to Hospital (n=60)

Pain Score	No. of Cases	Percentage	Mean
Moderate(4-7)	21	35%	2.65
Severe(8-10)	39	65%	
Total	60	100%	

Table 6: Pain Score at 48 hours, 3rd and 6th week Post-operatively (n=60)

Pain Score	Mean	SD	P
Pre operative	2.66	0.48	<0.0001
At 48 Hours	1.08	0.28	
3 rd Week	0.0667	0.25	
6 th Week	0.05	0.22	

P value is less than 0.0001, which is highly significant between pain at admission and discharge.

Table 7: Bleeding per rectum at admission and six weeks after CLIS (n=60).

Bleeding PR		No. of Cases	Percentage	<i>P</i>
At Admission	Present	55	91.7%	<0.0001
	Absent	5	8.3%	
At 6 th week	Present	2	3.3%	
	Absent	58	96.7%	

P value is quite significant i.e. <0.001 as measured by application of paired t-test.

Table 8: Duration of hospital stay in Days (n=60).

Hospital Stay(Days)	No. of Cases	Percentage	Mean
2	33	55%	2.65
3	24	40%	
4	2	3.3%	
5	1	1.7%	

Table 9: Flatus incontinence at 3 and 6 weeks after CLIS (n=60).

Incontinence to Flatus		No. of Cases	Percentage
At 3 rd Week	Yes	4	6.7%
	No	56	93.3%
At 6 th Week	Yes	2	3.3%
	No	58	96.7%

Table 10: Fissure healing 3rd and 6th weeks after CLIS (n=60).

Healing of Fissure		No. of Cases	Percentage
At 3 rd Week	Yes	45	75%
	No	15	25%
At 6 th Week	Yes	58	96.7%
	No	2	3.3%

DISCUSSION

This study have shown the significant reduction in post operative pain score when compared with pre operative and the *P* value is <0.0001. Similarly there is significant reduction in post operative bleeding per rectum as it is clearly indicated by *P* value less than 0.0001. Incontinence to flatus was found to be around 3.3% at 6 week that was transient as it improved after about 10 weeks. And only one patient had wound infection that also settled by oral antibiotics. Though no patient presented with recurrence from those who have healed fissure at about 3 weeks during study follow up of 6 weeks but one patient presented after one year of CLIS with recurrence. From the above mentioned results it can be concluded that CLIS is a safe and reliable procedure as it has a better outcome in terms of better healing and fewer complications in patients with chronic anal fissure who do not responding to conservative treatment.

This can be explained as follow.

In close lateral internal sphincterotomy only internal anal sphincter is incised. That decrease the basal tone on internal anal sphincter providing quick pain relief, that is one of the most satisfactory thing for the patient as his/her agony is over. Further more decrease in spasm of anal canal musculature improves blood supply to anoderm leading to early healing of fissure. As there is no damage to external anal sphincter, so there are no chances of fecal incontinence. As the internal sphincter is cut, the anus may not close completely and pressure is also decreased. This may cause flatus incontinence or mild seepage of mucous can be there. This can be avoided if incision in the internal anal sphincter is limited to the upper limits of fissure.^[99]

CLIS have high rates of anal fissure healing with a low recurrence rate.^[108,151-154,155] Lord's procedure also known to have good healing rate but as it is not a controlled procedure and it varies from person to person, the degree of force applied that can result in to unwanted fracture of the internal as well as external anal sphincter. Therefore it has significantly high risk of minor incontinence as compare to sphincterotomy^[122] (12.5% to 24.3% after anal stretch versus 4.8% after lateral internal sphincterotomy).^[85, 92] Presence of persistent fissure has also been noted down in significant number of patient underwent anal dilatation.^[93,120] A method combining the age-old technique of manual dilatation followed by radio surgery is found to be useful for refreshing the edges of the fissure and to tackle pathologies such as sentinel pile, small internal piles or hypertrophied anal papillae.^[116] But it is not cost effective and is a time consuming procedure.

In addition to pain, CAF influences psychological, social and physical well-being of the effected individual. LIS not only eliminates anal pain, but it also restores many aspect of quality of life.^[123]

Lateral internal sphincterotomy is gaining its well repute and being recommended as gold standard because of increased success rates and minimal complications.^[134,144,154] Several studies have reported that there were no significant differences in pain scores or in incontinence rate between open and closed internal sphincterotomy.^[140,148,150,152] Although the postoperative pain score was higher in open technique.^[101] On the other hand, it has been suggested that open sphincterotomies are longer than closed ones, explaining why they seem to have a higher risk of incontinence than the closed technique.^[120,122] Morbidity and recurrence rate are comparable with either technique, even if performed under local

anesthesia, which can be used effectively as an alternative to general anesthesia and also has several socioeconomic advantages.^[124,125] In anal fissure, healing time ranges roughly from 4 to 12 weeks.^[74]

In present study fissure healing was present in approximately 52 (96.7%) patients at 6 weeks after CLIS (Table 10). These results are comparable to many studies.^[96,111,123,134,135] All these study reinforce the results of the present study.

Many other National and International studies have shown more than 90% healing rates and at the same time achieved very low recurrence rates in patients of chronic anal fissure treated by lateral internal sphincterotomy.^[110,112,133,146,157]

Nearly all above mentioned authors have used general or spinal anesthesia although some have used local anesthesia. Nearly all of them have used similar perioperative measures. Post operative care was also similar as nearly all of them advised sits baths with tap water and some mild anti-septic solution added to it. This is comparable to the present study.

The follow up protocol were also comparable as, pain relief, flatus and fecal incontinence, cloth soiling and fissure healing were defined nearly similarly and recurrence declaration was also similar. Although follow up time was up to 6 weeks in present study, which is less as compared to other studies, but many fissures, heal and many of the recurrences can be seen during this time. However short follow up time in present study may miss some of the recurrences. These studies are also comparable to present study regarding mean age and gender distribution of patients.

Recurrence rate for lateral internal sphincterotomy ranges from 1.3 to 13.1% in some international studies.^[154,169] This difference may be related to the aggressive or conservative approach of the surgeons. In a study from Turkey, healing rate in lateral internal sphincterotomy was 82% which is due to conservative approach during surgery to prevent incontinence.^[99] In present study recurrence rate was measured in patients in whom fissure was healed at 3 weeks. As fissure was healed in 45 out of 60 patients at 3rd week follow-up so recurrence rate was measured in 45 patients. One patient presented with recurrence after about one year of CLIS.

In present study there was adequate pain relief in 41 (68.3%) patients after about 48 hours of surgery. Rest of the 16 (26.66%) patients were discharged with mild pain and 3 (5%) patients

were discharged with moderate pain while at admission 39 (65%) patients presented with severe pain. This shows quick pain relief in majority of the patients which is also supported by other studies.^[93, 94] Montes et al showed that time required for pain relief postoperatively was 1.37 ± 1.01 (range=1-8) days. They achieved pain relief in all cases, and non-healing did not occur in any case.^[170]

According to a systematic review of randomized surgical trials the overall risk of postoperative incontinence was about 10% and this was mostly incontinence to flatus, while there are no reports delineating the duration of this problem (if it is permanent or transitory).^[112,148] Nevertheless it is still controversial if minor degrees of incontinence could be a symptom of chronic anal fissure or the sequel of lateral internal sphincterotomy.^[128]

In order to avoid such postoperative complications, medications were developed that effectively cause a chemical sphincterotomy and heal many fissures¹⁶⁹. The pharmacological agents, such as nitroglycerin ointment, injection of botulinum toxin and calcium channel blockers either given as tablets or applied topically, produce a temporary or reversible sphincterotomy reducing the sphincter pressure only until the fissure is healed.^[108,112,170]

However chemical sphincterotomy seems to be less effective than CLIS in curing chronic anal fissures due to the side effects and the frequency of repeating doses.^[109, 120,143,153,161] Long term follow up is not available for chemical sphincterotomy and therefore the risk of recurrent anal fissure in the future is unknown. In addition surgery is the treatment of choice when pharmacological therapy fails or fissure recur frequently.^[162] If we analyze the studies with longer follow-up times,^[161,163] it is possible in botulinum toxin treatments a trend to progressive recurrence over time with longer healing rates than those initially reported. Minguez et al^[100] present the longest-term follow-up (42 months) with a relapse of anal fissure in 41.5% of patients. In surgical sphincterotomy, the recurrence is lower (<10%) and not progressive. This is not surprising, since it could be related to the temporary reversible effect of the toxin contrary to the surgical sphincterotomy.

In present study, no fecal incontinence was observed in any patient. This is obviously due to the fact that EAS remain intact as it should be in CLIS so maintaining continence to feces.

Flatus incontinence was only transient in CLIS. At 3 weeks 4 patients (6.7%) had flatus incontinence which was reduced to 2 (3.3%) at 6 weeks. Arroyo et al showed progressive

decrease in flatus incontinence in their study. Flatus incontinence was 7.5% at 02 months and it decreased to 5% at 6 months¹. That is comparable with preset study.

In one local study flatus incontinence was found in 6.6% of patients.^[98]

A study from Israel showed that no difference has been noted in continence after LIS as proved by pre and post operative anal manometry.^[105,122] Adnan Giral et al also have reported the same results.

Flatus incontinence is most probably due to loss of complete air tight closure of anal orifice as a result of defect in internal sphincter at site of sphincterotomy. As it is a clean cut, it heals slowly and tight control is gradually achieved. Hence flatus incontinence is transient; it does not require any treatment. In present study this transient flatus incontinence has been noted.

In present study no patient presented with fecal soiling of clothes. This is supported by another local study.^[96] Some other studies have also similar results regarding fecal soiling of clothes in close lateral internal sphincterotomy.

Fecal soiling can be explained by loss of tight closure of anal orifice which allows liquids like mucus to pass through it. This loss of tight closure is transient and settles in a few weeks. Therefore no fecal soiling was present at 6 weeks after sphincterotomy in present study.

In one study there was 22% soiling and 35.1% grade-I incontinence in lateral internal sphincterotomy group.^[154] This may be related to high level of sphincterotomy incision. About 80-90% of ulcers are located in the posterior midline.^[2, 14, 15]

In present study, fissure location was mostly posterior midline (88.3%). In another study, fissure was present in posterior midline in 71.4% cases.^[96] This is comparable to the traditional text book teachings about the location of the anal fissure.

In present study, anal tags were removed when found. Another local study also denotes that other rectal procedures can be combined with LIS provided the cases are carefully selected and this will give added benefit to the patient without increasing morbidity.^[96] Removal of anal tags in close lateral internal sphincterotomy did not cause any damage or added complication in present study.

There were no complications related to anesthesia. This can be explained by the fact that the procedure can be completed in very short time if surgeon is experienced and familiar with the technique.

Finally the results of present study showed higher success rate in close lateral internal sphincterotomy as far as healing was concerned. The complications were significantly low as no septic complication or recurrence was observed with out any demarcation of age and gender.

CONCLUSION AND RECOMMENDATIONS

Chronic anal fissure is a common and painful condition and most of the time easy to diagnose. Close lateral internal sphincterotomy is found to be very effective and safe procedure for the treatment of chronic anal fissure.

Close lateral internal sphincterotomy is the treatment of choice as, it has excellent success rate in terms of healing of fissure and pain relief. It has very low complication and recurrence rate so it is very cost effective in long term as well.

On the basis of this study it is recommended that chronic anal fissure, that do not respond to medically treatment should be treated with Close Lateral Internal Sphincterotomy.

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