"COMPARATIVE STUDY OF TOPICAL DILTIAZEM SPHINCTEROTOMY AND LATERAL INTERNAL SPHINCTEROTOMY IN THE TREATMENT OF CHRONIC FISSURE-IN-ANO"

By

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DISSERTATION SUBMITTED TO SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH CENTER, KOLAR, KARNATAKA

In partial fulfillment of the requirements for the degree of

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IN

GENERAL SURGERY

Under the Guidance of

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ABSTRACT

BACKGROUND AND OBJECTIVES

Anal fissure is a painful linear ulcer in the anal canal extending from anal margin proximally towards dentate line and is most commonly seen in posterior midline, though anterior & lateral lying fissures also seen. It is one of the commonest proctalgic conditions encountered in regular practice and can be acute or chronic.

The pathogenesis of chronic anal fissure is poorly understood. Constipation and hard stools are often associated with fissure and they have been believed to initiate fissure formation.

Chronic anal fissure usually do not heal by simple conservative measures. They are most commonly treated surgically by lateral internal sphincterotomy, which lowers the resting anal pressure and heals them. But, sphincterotomy carries a significant risk of incontinence. This drawback of the surgical treatment has led to a search for alternative therapies.

Chemical sphincterotomy has been tried by using a variety of agents which include topical glyceryl trinitrate, calcium channel blockers such as nifedipine or diltiazem and botulinum toxin.

An attempt is made in this dissertation to study the comparison between surgical (Lateral Internal Sphincterotomy) and pharmacological (Topical Diltiazem Sphincterotomy) modalities of treatment of chronic fissure-in-ano.

The purpose of this study is to:

1) To study the efficacy of Topical Diltiazem Sphincterotomy for chronic fissure-in-ano.
2) To study the efficacy of Lateral Internal Sphincterotomy for chronic fissure-in-ano.
3) To compare the efficacy of Topical Diltiazem Sphincterotomy with Lateral Internal Sphincterotomy in terms of relief of symptoms, healing of fissure and complications.

MATERIALS AND METHODS

An analytical prospective study on 70 patients diagnosed with chronic fissure-in-ano was done from January 2013 and August 2014. 70 patients were included in the study who met inclusion criteria and were allotted into two groups of 35 each based on odd & even method. All odd number patients were allocated to surgical group (Lateral Internal Sphincterotomy) and all even number patients were allocated to pharmacological group (Topical Diltiazem Sphincterotomy), after a formal informed consent.

An evaluation of the two groups was done considering.

a) Relief symptoms
b) Healing of fissure
c) Post-operative complications

RESULTS

The symptoms relief, fissure healing was significantly better in Lateral Internal Sphincterotomy group when compared to the Topical Diltiazem group of patients with a low post operative complications.

CONCLUSION

Lateral Internal Sphincterotomy is found to be better treatment modality for chronic Fissure-in-Ano than Topical Diltiazem ointment, in this study. It is associated with minimal post-op complications, like haemorrhage, impaired control of flatus and post op pain. However, Topical Diltiazem ointment can be used as the initial modality of treatment in patients unwilling or unfit for Lateral Internal Sphincterotomy.

Keywords: Chronic fissure-in-ano; Lateral Internal Sphincterotomy; Topical Diltiazem Sphincterotomy

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INTRODUCTION

Anal fissure or fissure-in-ano is a common condition in surgical practice. It can be a very troubling problem because the severity of the patient discomfort and extent of disability far exceeds that which would be expected from a seemingly trivial lesion.

Definition

Fissure-in-ano is defined as a longitudinal split in the anoderm of the distal anal canal which extends from the anal verge proximally towards, but not beyond, the dentate line.[1]

Anal fissures can be acute or chronic. It may occur at any age but is usually a condition of young adults and middle aged people. Both sexes are affected equally. Its situation in the unmentionable site adds to the morbidity as the shy patients and females avoid surgical consultation.

An attempt is made in this dissertation to study the efficacy between Topical Diltiazem Sphincterotomy and Lateral Internal Sphincterotomy for the treatment of chronic fissure-in-ano.

AIM OF THE STUDY

Though fissure-in-ano is a very old entity, controversy still exists in the management**.**

The purpose of this study is to:

1. To study the efficacy of Topical Diltiazem Sphincterotomy for chronic fissure-in-ano.

2. To study the efficacy of Lateral Internal Sphincterotomy for chronic fissure-in-ano.

3. To compare the efficacy of Topical Diltiazem Sphincterotomy with Lateral Internal Sphincterotomy in terms of relief of symptoms, healing of fissure, and complications.

Selecting a method of treating this condition that can achieve optimal clinical results and the least pain and inconvenience to the patient has always posed a challenge to the surgeons. This has led to the innovation of a number of surgical and pharmacological methods that relax the anal sphincter.[2]

REVIEW OF LITERATURE

Gibbons and Read (1986) suggested that the raised sphincter pressure may cause ischemia of the anal lining and this may be responsible for the pain of anal fissure and their failure to heal. The high resting pressure recorded in patients with chronic fissure-in-ano are unlikely to be due to spasm, but probably it represent a true increase in basal sphincter tone.[3]

It is not clearly understood whether raised anal tone associated with acute anal fissure is the cause or the end result of the disease, if constipation only is the primary cause of fissure in ano.[3]

Jensen compared treatment with unprocessed bran plus warm Sitz bath and lignocaine ointment as a treatment of choice for the first episode of acute fissure in ano.[4]

Lord's anal dilatation was the earliest method of treatment of fissure-in-ano, first described in 1838. A study in 2009 by Yucel et al showed that controlled intermittent anal dilatation was as effective in providing symptomatic relief as lateral internal sphincterotomy.[5]

Sclerotherapy has been claimed to give good results in patients in whom surgery is not immediately indicated. It involves injecting 1 ml of 2% lignocaine followed by 0.05 ml of sodium tetradecyl sulphate (the sclerosing agent) into the base of the fissure to produce immediate pain relief by both anaesthesia and permanent destruction of the nerve endings. Sclerotherapy also has the added advantage as being

an OPD procedure. The authors reported that 80% of patients remained symptom free at 1 year.[6]

In 1960 Eisenhammer described lateral internal sphincterotomy. Rebeiro described subcutaneous lateral sphincterotomy and Notaras is credited for having performed the first subcutaneous lateral internal sphincterotomy.[7]

Controversy still exists regarding minor variation in technique and effectiveness between the procedures like sphincterotomy at midline or lateral and subcutaneous versus open sphincterotomy.

Bennet and Goligher studied the results of internal sphincterotomy for fissure in ano and revealed that there is no clear correlation between the occurrence of the functional defects like control of flatus, faecal staining and the amount of internal sphincter divided even upto complete division of the internal sphincter muscle.[8]

In 1984 Jensen, Lund et al compared lateral subcutaneous sphincterotomy and anal dilatation in the treatment of fissure-in-ano as an out-patient procedure and concluded that lateral subcutaneous sphincterotomy is the treatment of choice for idiopathic chronic fissure-in-ano resistant to conservative treatment.[9]

In 1970 Hoffman and Goligher evaluated lateral subcutaneous internal sphincterotomy as the treatment of anal fissure and concluded that lateral subcutaneous internal sphincterotomy has a small but definitive advantage over open posterior internal sphincterotomy and simple sphincter stretching.[10]

Khubchandani and Reed studied the sequelae of internal sphincterotomy for chronic fissure-in-ano and concluded that there is no significant difference in outcome between the procedures like lateral, bilateral or posterior midline sphincterotomy and also noted that the excision of fissure is unnecessary.[11]

Loder et al used nitric acid donors such as glyceryl trinitrate (GTN) and isosorbide dinitrate in order to induce reversible chemical sphincterotomy. Headache and recurrence was noted as a common complication of nitric acid donors.[12]

Gul, Cassetta have indicated use of botulinum toxin for the treatment of chronic idiopathic fissure-in-ano by injecting it into the internal sphincter and with no complications during follow up.[14]

A study on the different methods by Gupta PJ showed that medical manipulation of the internal sphincter should be the first line of treatment and that only if this fails or if the fissure recurs then subcutaneous lateral internal sphincterotomy should be done.[2]

Lund and Schofield did a randomized placebo controlled trial of GTN ointment in treatment of fissure in ano and concluded that topical GTN is the best first line treatment for chronic fissure-in-ano.[13]

It was reported in 2009, by Corno F et al that topical application of Glyceryl Trinitrate ointment was very effective in treating anal fissures and that it represented an alternative to the traditional first line treatment of surgical sphincterotomy.[15]

A study by Medhi et al described diltiazem to be efficacious in the treatment of chronic fissure-in-ano. Study showed that oral intake and topical applications of diltiazem reduced the anal pressure significantly.[51]

Another study said topical formulation of diltiazem is a valid alternative to GTN with similar reductions in MRP, improved healing rates and lower rates of recurrence.[52] In 2002, study by Jonas et al suggest that topical diltiazem heals GTN-resistant fissures.[53]

A prospective study in 2010 by Rather SA et al has shown subcutaneous lateral internal sphincterotomy to be curative, easy to perform and safe, making it the first line of therapy in both chronic and resistant or recurrent acute anal fissure.[16]

ANATOMY OF THE ANAL CANAL

Location and Description

The anal canal is about 1.5 inches (4 cm) long and passes downwards and backwards from the rectal ampulla to the anus. Anal canal starts at the pelvic diaphragm and ends at the anal verge. During defecation, its lateral walls are kept in opposition by the levator ani muscles and the anal sphincters.

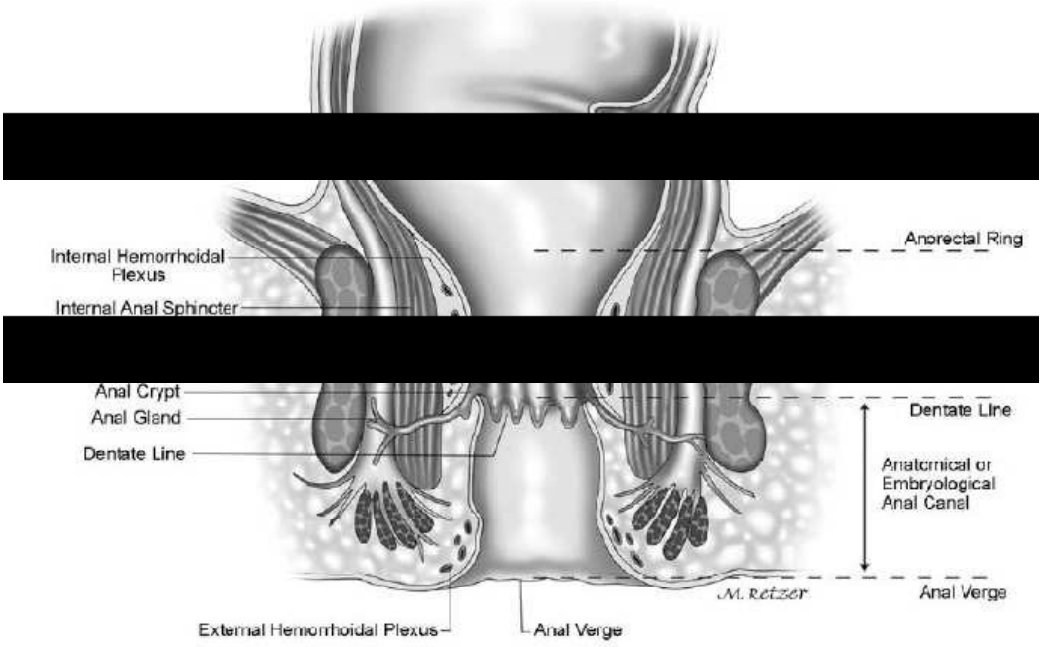


Figure 1: Location of Anal canal

Relations

Posteriorly: The anococcygeal body, which is a mass of fibrous tissue lying between the coccyx and anal canal.

Laterally: The fat-filled ischiorectal fossae.

Anteriorly: In male, perineal body, urogenital diaphragm, membranous part of the urethra, and bulb of the penis. In female, perineal body, urogenital diaphragm, and lower part of the vagina.

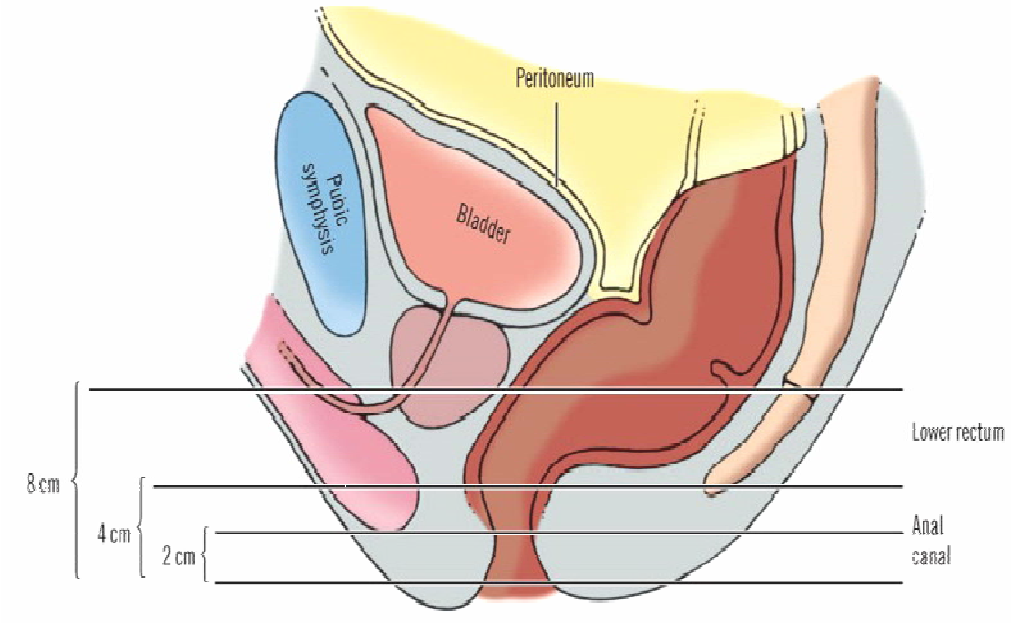


Figure 2: Relations of Anal canal

Anatomical anal canal: It is the portion of the anal canal from anal verge to the dentate line.

Surgical anal canal: It is the portion of anal canal from anal verge to the ano rectal ring.

Structure

The **Dentate line** or **pectinate line** or **the mucocutaneous junction** indicates the level where the upper half of the anal canal joins the lower half or the junction of upper mucosal and lower cutaneous part. It represents the junction of the post-allantoic gut and the proctodeum. It is located about 2 cm from the anal orifice. This junction is marked by the "line of valves" and this gives it a serrated appearance or fringe hence the name pectin (cock's comb) or dentate (with teeth).

UPPER HALF

The mucous membrane of the upper half of the anal canal is derived from hindgut endoderm. It is lined by columnar epithelium.

This mucous membrane has vertical folds called anal columns of Morgagni, which are joined together at their lower ends by small semilunar folds called anal valves (remains of proctodeal membrane).

The nerve supply is same as that for the rectal mucosa and it is derived from the autonomic hypogastric plexuses. It is sensitive only to stretch.

LOWER HALF

The mucous membrane of the lower half of the anal canal is derived from ectoderm of the proctodeum.

It is lined by stratified squamous epithelium, which gradually merges at the anus with the perianal epidermis. There are no anal columns.

The nerve supply is from the somatic inferior rectal nerve; it is thus sensitive to pain, temperature, touch, and pressure.

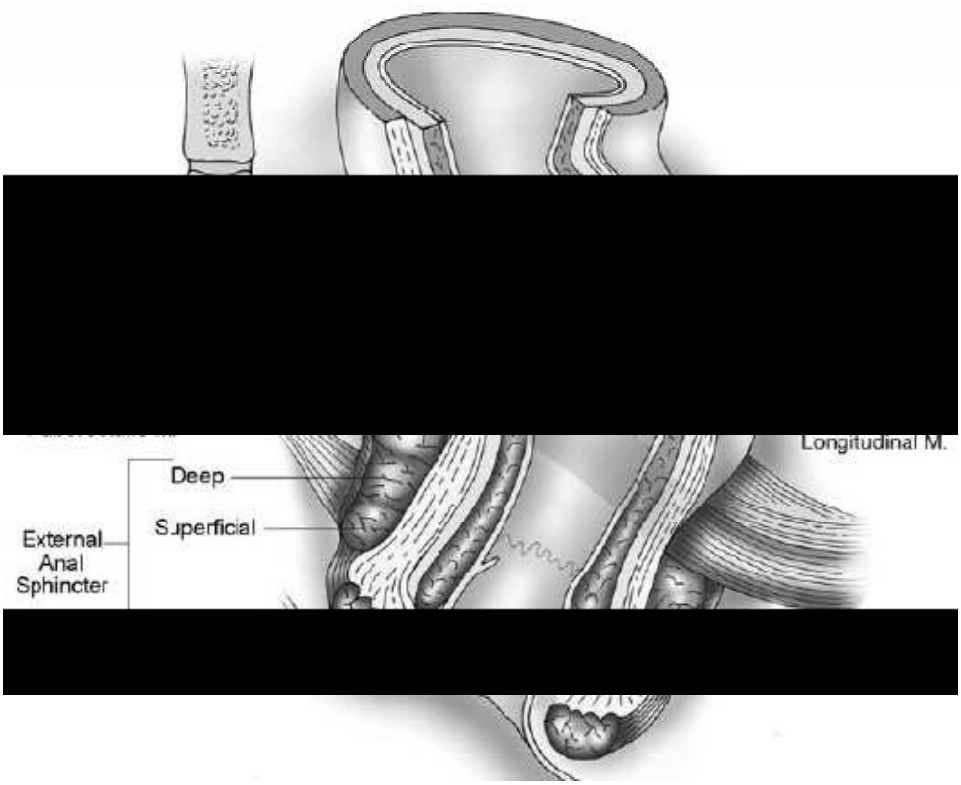


Figure 3: Muscular coat of the anal canal

Muscle Coat

As in the upper parts of the intestinal tract, muscles are divided into an outer longitudinal and an inner circular layer of smooth muscle. The longitudinal smooth muscle of the anal canal is continuous above with that of the rectum. It forms a continuous coat around the anal canal and descends in the interval between the internal and external anal sphincters. Few longitudinal fibres are attached to the mucous membrane of the anal canal, whereas others are attached to the perianal skin or pass laterally into the ischiorectal fossa.

Anal Sphincters

The anal canal has a voluntary external sphincter and an involuntary internal sphincter. The internal sphincter is formed from a thickening of the smooth muscle of the circular coat at the upper end of the anal canal. The internal sphincter is enclosed by a sheath of striped muscle that forms the voluntary external sphincter and these are identified by its glistening white coloured fibres.

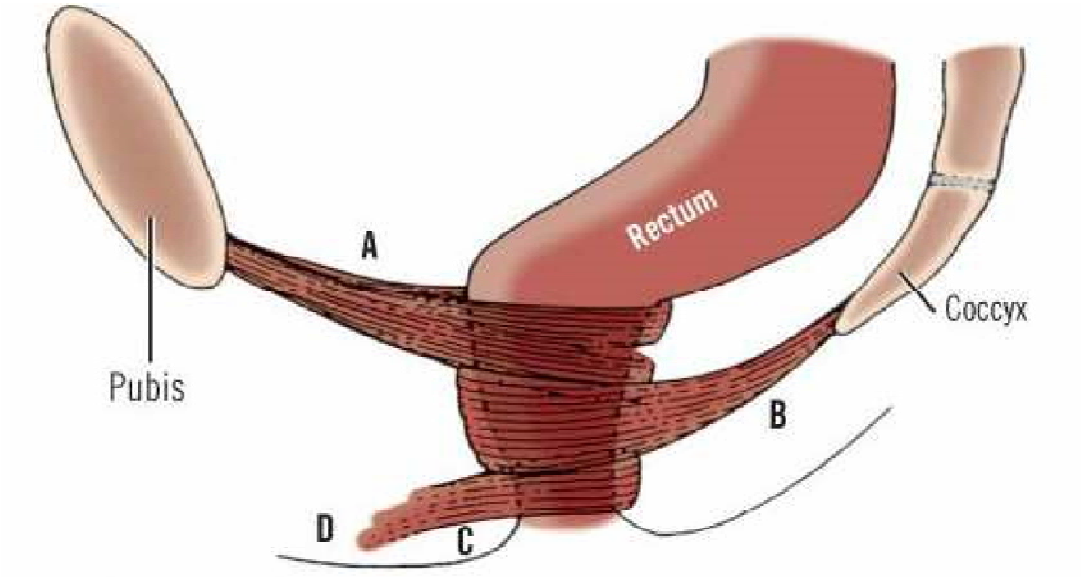


Figure 4: Sphincters of the anal canal

The external sphincter can be divided into three parts:

A deep part (A), which encircles the upper end of the anal canal and has no bony attachments.

A superficial part (B), which is attached to the coccyx behind and the perineal body in front.

A subcutaneous part (C), which encircles the lower end of the anal canal and has no bony attachments.

Puborectalis muscle

The puborectalis fibers of the two levator ani muscles blend with the deep part of the external sphincter. A sling is formed by puborectalis fibers of the two sides, which is attached in front to the pubic bones and passes around the junction of the rectum and the anal canal, pulling the two forward at an acute angle.

The internal sphincter, the deep part of the external sphincter, and the puborectalis muscles form a distinct ring at the junction of the rectum and anal canal, called the **anorectal ring**, which can be felt on per rectal examination.

Anorectal Ring

Anorectal ring of muscles is formed by the fusion of the puborectalis, deep external sphincter and the internal sphincter and it is functionally important. The anorectal ring surrounds the junction of the rectum and the anal canal. This is composed of the upper borders of the internal and external sphincters, which completely encircle the junction, posterior and lateral aspects of the strong puborectalis sling. Therefore, the ring is stronger posteriorly and laterally than anteriorly. The bowel has forward angulation which increases its markings posteriorly. Complete division of anorectal ring results in rectal incontinence. Its preservation, despite the sacrifice of the rest of all sphincter musculature avoids gross lack of control but minor degree of incontinence may result.

Blood Supply

Arteries

The arterial supply of upper half is that of the hindgut namely, the **superior rectal artery**, a branch of the inferior mesenteric artery.

The arterial supply of lower half is the **inferior rectal artery**, a branch of the Internal pudendal artery which is a branch of internal iliac artery.

Veins

The venous drainage of the upper half is mainly by the **superior rectal vein**, a tributary of the inferior mesenteric vein, and the portal vein.

The venous drainage of the lower half is by the **inferior rectal vein**, a tributary of the internal pudendal vein, which drains into the internal iliac vein.

Lymph Drainage

The lymphatic drainage from the upper half is mainly upward along the superior rectal artery to the pararectal nodes and then eventually to the inferior mesenteric nodes.

The lymphatic drainage from the lower half is to the medial group of superficial inguinal nodes along the lymphatics in the anal and perianal skin.

Nerve Supply

The mucous membrane of the upper half is sensitive to stretch and is innervated by sensory fibers that ascend through the hypogastric plexuses.

The lower half is sensitive to pain, temperature, touch, and pressure and is innervated by the inferior rectal nerves.

The involuntary internal sphincter is supplied by sympathetic fibers from the inferior hypogastric plexuses.

The voluntary external sphincter is supplied by the inferior rectal nerve, a branch of the pudendal nerve, and the perineal branch of the fourth sacral nerve.

DIGITAL PALPATION OF THE ANAL MUSCULATURE[17]

The lower edges of the internal and external sphincter are readily recognizable on digital examination of the anus in the normal living person. With a constant pressure in the postero-lateral direction, during withdrawal of the palpating finger, a distinct groove can be felt just inside the anal orifice. The upper rim of this groove is the rounded lower border of the internal sphincter. The lower rim of this groove is the upper aspect of the subcutaneous free border of the external sphincter.

On circumferential palpation, the lower edge of the internal sphincter forms a circular ring of muscle, but the lower most part of the external sphincter usually has an elliptical shape with the long axis running antero-posteriorly. It is not easy to palpate the external sphincter as the anterior and posterior attachment of the external sphincter has unequal insertion.

On asking the patient to voluntarily contract the anus, the contractions of the lower part of the external sphincter can be felt by the palpating finger. This contraction provides the tight closure of the anal verge. The lower two-third of the internal sphincter is surrounded by the external sphincter, so on digital palpation in the state of contracted external sphincter, even the internal sphincter is felt to be contracted.

Sometimes the intersphincteric groove is felt lateral to the anal verge and is seen when the internal sphincter extend further distally so that its lower edge actually reach the anal orifice or when the internal sphincter project beyond the external sphincter.

When the palpating finger is further inserted above the groove, it passes up along the smooth surface of the internal sphincter and terminates posteriorly in the sharply defined puborectalis sling and this indicates the accurate position of the anorectal ring, Although the puborectalis can be traced on to the lateral walls of the anorectal junction, anteriorly it is impossible to palpate the anorectal ring clearly.

PHYSIOLOGY OF THE ANAL CANAL

The mechanism that maintains anorectal continence and facilitates defecation are related and complex. A clear understanding of Anorectal physiology has been made possible by introduction of several newer methodologies like Anorectal manometry and Electromyography designed to quantify parameters of anorectal physiology.

Factors Maintaining Fecal Continence

The factors maintaining fecal continence are:

- Anorectal angle and co-ordinated activity of the pelvic floor musculature.
- Anal canal high pressure zone – (Anal sphincter mechanism)
- Distensibility, ‘tone’ and capacity of rectum.
- Anorectal sensory and reflex mechanisms.
- Rectal motility and evacuability.
- Anal canal motility.
- Colonic transit.
- Stool volume and Consistency.

Anal Canal High Pressure Zone

The mean length of the Anal Canal high pressure zone is 4 cm.

During anal sphincter squeeze, the canal lengthens, whereas during straining it shortens.

Resting pressure

The External and Internal anal sphincters envelop the anal canal and are responsible for maintaining resting and generating squeeze pressures.

The highest resting pressure is recorded 1-2 cm proximal to anal verge. The mean anal canal resting pressure is approximately 90 cm H_2O. Internal anal sphincter contributes about 85% of resting tone of the anal canal patients with fissure in ano resting anal pressures are found elevated and it is performed with balloon recto-sphincteric manometry.

Squeeze Pressure

Contraction of the External anal sphincter and the puborectalis muscle generates squeeze pressure and it may also be distributed unequally around the anal canal. Maximum squeeze pressure elevation lasts less than 1 minute, as the sphincter fatigues rapidly after that time.

ANORECTAL ANGLE

Anorectal angle is formed predominantly by the anteriorly directed pull of the puborectal muscle as it envelops anorectum at the level of Anorectal ring. It maintains hour to hour faecal continence. The mean angle is 102+13 degree at rest in left lateral position.

Standing changes the angle slightly; sitting widens the Angle significantly to 119+17. Valsalva manoeuvre sharpens the angle to 81+19.

It enables the anterior wall of the rectum to act as a ‘flap valve’ at the Anorectal ring. Wherever the abdominal pressure increases, the walls of the anal canal flatten as they pass through an antero-posterior slit in the pelvic diaphragm to maintain continence.

Finlay and colleagues found that, expulsion of air was achieved by a sharpening of Anorectal Angle, increase in anal canal pressure and intra rectal pressure. Conversely, expulsion of liquids was achieved by a widening to Anorectal Angle, decreasing anal canal pressure and increasing intra rectal pressure.

Rectal Anal sphincter inhibitory response (RASIR)

Whenever there is acute rectal distension, the rectal wall contracts slightly, and the proximal portion of the anal canal relaxes (Internal anal sphincter) and distal portion contracts (External anal sphincter). The role of the Rectal Anal sphincter inhibitory response is not fully understood.

Rectal Distensibility and Capacity

The rectum accommodates passively to distension – intraluminal pressure remains low, whereas intraluminal volume increases. In healthy individuals maximum tolerable volume is approximates 400 ml.

Motility of Rectum and Anal Canal

Infrequently small amplitude of contractions have been recorded in the rectum in electro-encephalic studies. The mean amplitude of these waves is about 10+3 cm in H_2O.

Three types of contractions have been observed:

1. Simple contractions of frequency 5-10 cycles / min
2. Contractions with amplitude of upto100cm H2O
3. Slow contraction of high amplitude.

The slow contractions with high amplitude are increased in case of fissure in ano. It has been demonstrated that patients with anal fissures have abnormal ‘over shoot’ contraction of their internal anal sphincter following expected relaxation due to rectal distension.

ETIOLOGY OF FISSURE-IN-ANO

The etiology of development of fissure-in-ano is largely speculative, as the exact cause of this is still unknown.

Fissures can be classified as:

1. Primary or Idiopathic anal fissure
2. Secondary anal fissure

PATHOGENESIS OF FISSURE-IN-ANO

PRIMARY (IDIOPATHIC FISSURES)

The exact cause of anal fissure and particularly the reason why the posterior midline is so frequently affected is not completely understood.

A probable explanation is that the posterior wall of the rectum curves forward from the hollow of the rectum to join the anal canal, which then turns sharply backwards. During defecation, the pressure of a hard faecal mass is mainly on the posterior anal tissues, in which event the overlying epithelium is greatly stretched resulting in trauma.[1] Trauma to the anal canal during the passage of large hard faecal matter is responsible for this condition.[18]

Constipation is one of the factors responsible for producing recurrent anal fissure as the development of recurrent fissures can be modified by increasing the fibre intake.[4] It has been shown that the action of fibre results from its water holding capacity. An important property of fruits and vegetables is that they can absorb up to

three times their weight of water. Therefore, stool bulk is increased resulting in anal dilatation and this has a beneficial effect on the fissure.[18]

Some acute fissures heal spontaneously in a week or two if the motions are kept soft and the constipation is avoided, whereas others become chronic and refuse to heal. Infection is one of the major factors for development of chronic fissure.[17]

The pain and irritation of the fissure results in spasm of the underlying internal sphincter muscle, and this fails to relax during defecation. Spasm of the anus brings the lateral edges of the fissure together so that the discharge from the crack is dammed back and healing by granulation from depth cannot take place, resulting in further tearing down of the anoderm and deepening of the fissure to form an anal ulcer. The fact that division of the internal sphincter in part or complete reduces the sphincter spasm and is followed by rapid relief of pain resulting in early healing of fissure, supports this theory.[8]

In 1908, Ball suggested that the anal fissure results from tearing down of an anal valve by hard fecal mass. This leads to a linear laceration of the anoderm extending from pectinate line to the anal orifice. He also suggested that the torn down valve becomes edematous due to repeated trauma resulting in a sentinel pile. However this explanation is not widely accepted as the anal valve is seen to be intact at the upper end of the fissure and sometimes even it is seen to be hypertrophied to form an anal papilla. Although most theories incriminate trauma of anoderm as the cause of anal fissure, it is not clear why some fissures heal and some become chronic. The

poor healing rate is attributed to simple infection. However, this is unlikely since in long standing fissures, the grade of infection is similar to that in recent ones.

With the help of Doppler laser flowmetry of the anoderm combined with anorectal manometry it is been documented that the anodermal blood flow in the posterior midline is less than other segments of the anal canal and it is suggested that the development of fissure in ano is due to the ischemic changes in the mucosal layers.[19]

Anal spasm in patients with chronic anal fissure appears to predate the fissure[3], this supports an ischemic basis for chronic fissure and implies that some people may be predisposed towards developing an anal fissure, or at risk of delayed healing once a fissure has occurred.[20]

This explains healing of anal fissure in up to 2/3rd of patients with the topical application of nitro-glycerine 0.2% to 0.5% (a nitric acid donor) and Diltiazem (calcium channel blocker) which relaxes the anal sphincter.[12, 13, 20, 21]

In addition to muscle relaxation, Glyceryl trinitrate ointment improves blood flow to the area.

SECONDARY FISSURE-IN-ANO

Secondary fissure in ano is always due to some other primary pathology of the anal canal. Surgical procedures in the anal canal like haemorrhoidectomy or leaving

open of a low fistula, where in resulting wound is situated in the midline posteriorly or anteriorly may result in secondary fissure-in-ano.[17]

Conditions like non-specific procto-colitis and Crohn's disease can give rise to anal fissures. Therefore, in suspected cases of fissure-in-ano secondary to other systemic diseases thorough investigations are to be conducted to arrive at a specific diagnosis.

PREDISPOSING FACTORS

- Inflammatory bowel disease.
- Previous anal surgery particularly haemorrhoidectomy.
- Anterior fissure develops in women due to child birth trauma.
- Persons taking laxatives or saline purgatives for a long period develop a degree of anal stenosis which may predispose to fissure formation, such patients have had only liquid motions for months or years and their anal canal has undergone some degree of contraction so that a sudden passage of a hard mass could be particularly difficult and traumatizing to it.
- Large haemorrhoids and hypertrophied anal papillae may cause fissure due to traction when these prolapse at defecation.
- Enthusiastic use of ointments for variety of anal conditions causes thinning of skin of the anal canal thus predisposing to an easy tear.
- Sometimes trauma to anal canal caused by nozzle of enema can result in fissure.
- Rarely passage of a sharp foreign body in stool may cause a fissure.

WHY FISSURE IS MORE COMMON POSTERIORLY?

Posterior midline just within the anal verge is the most common location of an anal fissure. More than 98% of fissure in males and nearly 85% in females occur in this way.

Various hypotheses are

- The superficial external anal sphincter arises from the tip and sides of the coccyx and surrounds the anal canal leaving a weak area on the posterior wall. This causes it to tear when it is over stretched during the passage of a hard stool.
- The lower portion of this muscle is not truly circular, but rather consists of a band of muscle fibres that pass from posterior to anterior and split around the anus. The anal mucosa is, therefore, best supported laterally and is weakest posteriorly. In contrast to men, there is decreased anterior support in women accounts for the greater occurrence in this location.
- Anal crypts are more marked posteriorly and which tends to harbor subclinical infection, which causes the epithelial lining to be friable.
- Another theory that has been suggested is related to the blood supply to the area. Klosterhalfen and colleagues visualized the inferior rectal artery by means of post-mortem angiography, by manual preparations, and by histological study following vascular injection. They determined that in 85% of specimens, the posterior commissure is less well perfused than other areas of the anal canal. Hence, ischemia may be an important etiologic factor in causing anal fissure, especially in the posterior location. The blood supply, which is already tenuous, may be further

compromised by compression and contusion as the branch of the inferior rectal artery passes through the internal anal sphincter.[22]

- 10% of the women often have anterior fissure due to wider pelvises, attenuated perianal body, straighter sacro-coccyx and trauma of parturition causing old tear to break down.[23]

ACUTE AND CHRONIC FISSURES

An acute fissure is a mere ulcer, the base of which is formed by longitudinal muscle fibres and present for a period of less than 6 weeks.

The fissure is described as chronic when it becomes a well defined ulcer with the transverse fibres of internal sphincter forming the base and those fissures which is present for more than 6 weeks or which fail to heal within six weeks of straight forward dietary treatment.[20] When it becomes chronic, the deeper circular fibres of the internal sphincter are seen to form the floor of the fissure.

Combination of low grade infection and lymphatic oedema leads to development of sentinel piles.

Sometimes infection of the base of the fissure may lead to an abscess, which may rupture through the base of the fissure or through the skin nearby leaving a short subcutaneous fistula.

There is no real agreement as to what constitutes a chronic anal fissure.

A chronic fissure thus has four typical features:

(1) A boat shaped ulcer with indurated edges.

(2) Fibres of internal sphincter form the floor.

(3) A tag of skin at its lower end (sentinel piles).

(4) A rounded swelling (hypertrophied anal papilla) at its upper end.

Figure 5: A Typical Chronic Fissure in Ano

ATYPICAL FISSURES

An anal fissure situated away from the midline usually has a cause within the anal canal in the form of a fibrous polyp, large haemorrhoids or a hypertrophied anal papilla. If a cause is not found, such a fissure should immediately raise suspicion of another pathology (example – tuberculosis, syphilis, leukaemia, squamous cell carcinoma, inflammatory bowel disease especially Crohn's disease and sarcoid).

In nonspecific fissure the spasm is minimal or absent. Fissure in inflammatory bowel disease tends to be multiple, broad and situated away from the midline.

HISTOPATHOLOGY OF FISSURE IN ANO

Nothing in particular is histologically diagnostic of an anal fissure. Pathological examination of the excised lesion usually showed typical non-specific inflammatory changes. Brown and colleagues prospectively studied 18 consecutive patients who underwent internal anal sphincterotomy for chronic anal fissure and took a biopsy specimen from the base and also from the muscle before division. Histological evaluation confirmed the presence of fibrosis throughout the internal sphincter, but no such finding was identified in controls.

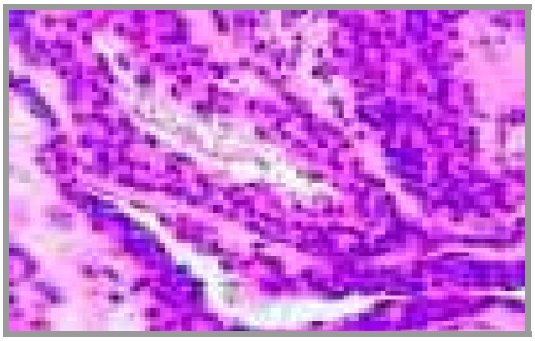


Figure 6: Histopathology of Fissure in ano

CLINICAL FEATURES

INCIDENCE

Fissure-in-ano is usually seen in young or middle aged adults, but it is also seen in other age groups like infancy, early childhood and the elderly.[1, 17]

SEX INCIDENCE

Fissure in ano is equally common in both sexes. The incidence of anterior fissure in ano is more common in women than men and the anterior fissure accounts for 10% of all fissures in females as compared to 1% in men.

SYMPTOMS

Acute fissure

Pain

Pain of tearing, cutting or burning type associated with defecation and lasting for a variable period after defecation is the symptom. The pain becomes throbbing in character and continuous when the suppuration sets in. Each act of defecation becomes agony and due to fear of pain the act of defecation may be postponed leading to constipation. Thus a vicious cycle of pain, constipation and pain is setup.

Bleeding

Bleeding is seldom more than a few drops and is bright in colour. Streaks of blood may be seen on the stool surface.

Reflex symptom of dysuria or pain radiating down the thighs is common.

Discharge and Pruritis

The anal discharge may lead to soiling of the underclothes resulting in pruritis of the perianal skin due to moisture.

Swelling

A large sentinel pile can be complained of as a lump at the anus and mimic a painful external pile.

Urinary Symptoms

Painful anal fissure causes associated spasm of the involuntary muscles controlling the urinary functions and this leads to urinary disturbances in some patients like dysuria and retention or increased frequency

Chronic Fissure

In chronic fissure, irritation, pruritus and discharge which soil the underclothing are present.

Bleeding may or may not be present.

A swollen skin tag can be felt outside the anus (sentinel piles).

EXAMINATION

ACUTE FISSURE

Inspection is the most important part in the examination of fissure in ano as a fissure can always be seen if properly examined.

Gentle lateral traction on the anal margin along with a request to bear the discomfort will show the lower end of the fissure.

Before doing a rectal examination applying a local anaesthetic ointment (5 to 10% lignocaine jelly) to the fissure is important.[17]

An acute fissure being a shallow ulcer is impalpable, though the sphincter spasm is marked. Proctoscopy is avoided in these cases and is often impossible due to intense sphincteric spasm.

The open wound is often not appreciated by the examining finger in a patient with an acute anal fissure. Because the cut is relatively superficial, there is usually no fibrosis. Palpation will usually demonstrate a spastic anal sphincter or tight anal canal and will exacerbate the patient's discomfort.

ANOSCOPY AND SIGMOIDOSCOPY

Anoscopic examination, if possible, confirms the location of the fissure. The ability to perform this examination, however, may reflect the chronicity of the problem. Ideally, proctosigmoidoscopic examination should be carried out before any

surgical procedure to establish that the rectum, at least, is not involved by inflammatory bowel disease or other pathologic entity.

CHRONIC FISSURE

In chronic fissure the presence of a sentinel piles is noted.

A hypertrophied anal papilla may be felt at the upper end of the fissure in a chronic case. Gentle proctoscopy will show the presence of associated haemorrhoids, hypertrophied papilla or a fibrous polyp.

Sigmoidoscopy is not essential for the diagnosis but must be done after acute symptoms have subsided or before surgery to rule out inflammatory bowel disease or associated pathology.

DIFFERENTIAL DIAGNOSIS

Diagnosis of fissure in ano can be made with the definitive history of pain during and after defecation, sphincter spasm and palpation with the finger at the time of digital rectal examination. But still certain conditions should be kept in mind as differential diagnosis.[17]

1. Thrombosed, prolapsed internal haemorrhoids: it is characterized by prolapsed, bluish edematous lumps seen at the anal verge.
2. Pruritis ani with superficial cracks of the anal canal: In many cases of fissure irritation of the perianal skin due to anal discharge leads to development of pruritis ani. Skin in case of primary pruritis ani shows superficial cracks extending radially from the anus, but on careful examination, absence of true anal spasm or tenderness can be noted.

3. Anal haematoma: it appears as a bluish, painful swelling at the anal verge without any crack in the cutaneous part of the anal canal.
4. Crohn's disease with anal ulceration: in this condition, fissure is much grosser than an idiopathic anal fissure and often much more extensive than ulcerative colitis. Its appearance and excision biopsy with histopathological picture helps in concluding the diagnosis.
5. Perianal abscess: there is swelling and tenderness in the perianal region. This is associated with systemic inflammatory features.
6. Internal haemorrhoids with strangulation: the severe pain with visible strangulated haemorrhoids can mimic anal fissure.
7. Squamous cell carcinoma of the anus or adenocarcinoma of the rectum invading the anal canal or anus: both of these conditions cause extreme pain on defecation but digital palpation reveals gross induration and may reveal the lowermost edge of the malignant lesion. The inguinal lymph nodes may be enlarged and hard. Biopsy confirms the diagnosis.
8. Ulcerative Colitis or Proctocolitis with associated anal fissure: septic complications are common in this condition. Usually they are extremely painful and become broad, deep and infected leading to abscess and fistula formation. They are usually multiple and usually situated away from the midline. The primary symptoms of the disease like diarrhoea and constitutional symptoms are present and high index of suspicion with the help of endoscopy and biopsy are needed to recognize this condition.
9. Syphilitic fissures: these can be either primary chancres or condylomata (secondary). A chancre soon becomes indurated at the margin and base with enlarged inguinal lymph nodes. The presence of a symmetrical lesion on the

opposite wall of the anal canal is highly suggestive of this condition. Dark ground microscopy of discharge may show spirochetes and VDRL test may be positive. Anal condylomas may occur at the anal orifice as well as in the perianal region and may be multiple. The whole anal region is usually moist, pruritic and associated with several superficial infected fissures. Secondary skin lesions and mucous patches in the mouth are usually present.

10. Tuberculous ulcers: an ulcer due to TB tends to enlarge and develop an undermined edge. Although it is difficult to differentiate from Crohn's disease a biopsy will help in arriving at the diagnosis. Polymerase chain reaction test will confirm the disease.
11. Idiopathic stenosis of the internal sphincter: it occurs in elderly patients who have become accustomed to taking aperients over many years so that the anal canal has for a long time been spared of regular dilating action of a normal solid motion. As a consequence, the internal sphincter undergoes fibrosis in a contracted state. When the contraction becomes extreme the patient finds it difficult to defecate. This condition is recognized by finding a tightly contracted internal sphincter on palpation, without any evidence of past or present fissure. If required it can be treated by internal sphincterotomy.
12. Proctalgia fugax: this disease is characterized by attacks of severe cramp like pain arising in the rectum, recurring at regular intervals and apparently unrelated to organic disease.

This is common in patients suffering from anxiety and undue stress. Pain often occurs when patient is in bed at night, usually lasts for a few minutes and disappears spontaneously.

TREATMENT

Most fissures heal spontaneously in one or two weeks with conservative line of treatment but some are resistant to any form of treatment and they go in for chronic type.

Though there may be temporary relief of symptoms, they recur frequently.

Treatment can thus be divided into:

1. Conservative
2. Medical
3. Surgical

CONSERVATIVE LINE OF MANAGEMENT

- It include dietary and life style modifications.
- Adequate fluid intake.
- Fibre rich diet. A diet should be rich in vegetables, fruits and brown rice.
- Bulk forming agents like psyllium husk and bran can be given after meals.
- Repeated anal trauma by passage of hard faeces can be avoided by laxatives such as liquid paraffin and lactulose. They are especially suitable for they tend to produce soft easily passage motions.
- Some fissures heal spontaneously in two or three weeks. These are usually superficial lesions which have been attended by a short history of pain. In contrast a chronic fissure is most resistant to any form of conservative treatment.
- Frequent passage of loose stool causes agony therefore drastic purgation must be avoided.
- Surface anaesthetic ointment (5% Xylocaine) and oral analgesics are helpful to reduce pain.

- Metronidazole and a suitable broad spectrum antibiotic will hasten recovery.
- Frequent Sitz baths with warm water are comforting and help to reduce the sphincter spasm.

MEDICAL LINE OF MANAGEMENT

It is usually a combination of conservative treatment along with **chemical sphincterotomy**.

The objectives of medical management are:

- Relief of pain.
- Complete relaxation of the internal sphincter.
- Healing of the fissure

Medical management of fissure in ano is by using an agent which produces relaxation of internal sphincter, this process is known as “Chemical Sphincterotomy”
Some of the agents used for chemical sphincterotomy are:

1. Glyceryl trinitrate
2. Calcium channel blockers- Nifidipine and Diltiazem
3. Neurotoxins
4. Botulinum toxin
5. Gonyautoxin

Newer Agents

These drugs are under trail.

- Phosphodiesterase inhibitors -Topical Sildenafil.
- L-Arginine – Precursor of NO.
- Potassium channel openers-Minoxidil.
- Angiotensin converting enzyme inhibitors–Topical Captopril
- Adrenergic antagonist –Indoramin
- Hyperbaric Oxygen.

Some of the obsolete agents and methods are:

- Cholinergic Agonist - Bethenecol cream.
- Solcoderm - 5 Fluro uracil and salicylic acid ointment.

Glyceryl trinitrate (GTN):

It is a vasodilator and smooth muscle relaxant. It releases nitric oxide which is an inhibitory neurotransmitter. The drug is used as 0.2% cream and 0.5g is applied locally to the anal canal BD or TDS for 4 to 6 weeks. When applied as a 0.2% ointment to the anal canal it produces sufficient relaxation of the sphincter to allow the fissure to heal in up to two third of patients. In addition glyceryl trinitrate being a vasodilator improves blood flow to the area and this aids healing. Unfortunately glyceryl trinitrate ointment may produce severe head ache.

Isosorbide dinitrate: As 1% ointment has also been used in past to produce chemical sphincterotomy but again it has head ache as a prominent side effect.

Calcium Channel Blockers

These are alternatives to GTN, and can be given both orally as well as topical applications.

Nifedipine and Diltiazem: are antihypertensive vasodilators and act by blocking the transport of calcium. Local application is better than oral medications. Headache, postural hypotension and perianal itching are the side effects

Diltiazem: Diltiazem (DTZ) is another calcium channel blocker that has been used as an alternative for the treatment of chronic anal fissure. Diltiazem, a non-dihydropyridine calcium-channel blocker, also effects vascular smooth muscle relaxation and dilatation. Topical 2% diltiazem reduces maximum resting pressure (MRP) by approximately 28% and this effect lasts 3–5 h after application. Side effects are minimal with diltiazem and include peri-anal dermatitis. Diltiazem given 60 mg BD in oral form or applied as 2% cream BD for 4 to 6 weeks.[52]

Nifedipine: Nifedipine is a dihydropyridine calcium-channel blocker, which inhibits calcium ion entry through voltage-sensitive areas of vascular smooth muscle and myocardium. Topical and oral formulations of nifedipine have been evaluated but not used in routine clinical practice. Nifedipine given orally as 20 mg BD or applied as 0.5% cream BD for 4 to 6 weeks.[52]

Botulinum Toxin:

Botulinum toxin A is an exotoxin produced by the bacterium Clostridium Botulinum and is a potent neurotoxin. It is a striated muscle relaxant and acts by

inhibiting acetylcholine release at the neuromuscular junction. This promotes healing of the anal fissures by causing transient paralysis of the anal sphincter.[24]

30 units of Botulinum Toxin A is injected into the internal sphincter on either side of the fissure once a month. The average healing rates of 47 to 65% have been reported.

Flatus incontinence increase in residual urine, muscle weakness, faecal soiling has been seen as local side effects.

Gonyautoxin: It's a phycotoxin produced by shellfish, has also been used in anal fissure management. In a recent report, 23 patients were injected with 100 units in the internal sphincter every 4 days. Total remission was achieved in all patients within 7-14 days. No relapses were observed during the 10 month follow-up. No side-effects were noted.

Sclerotherapy: As advocated by Antebi et al[6], sclerotherapy has also been tried for the treatment of acute fissure-in-ano as an outpatient procedure. The authors recommended that following a 1ml injection of 2% xylocaine, 0.05 ml of 3% sodium tetradecyl sulphate be injected into the base of the fissure. This leads to endothelial injury and fibrosis resulting in healing of the fissure. They also recommended that it be used in fissures which cause moderate to marked symptoms, particularly when other conservative methods have failed.

SURGICAL LINE OF MANAGEMENT

There are many methods for surgical management of fissure-in-ano, all of them are directed towards relaxation of contracted internal sphincter or correction of spasm by one way or another.[25]

The choice of operative approach to the treatment of anal fissure depends on the duration of symptoms and on the physical findings.

The aim of the surgical treatment is to modify the function of the internal sphincter so that it cannot go into spasm and to increase the diameter of the anal canal outlet so that it would offer less resistance to the passage of stools.

The surgical procedures can be classified into:

1. Sphincter stretch
2. Excision of Anal Fissure
3. Excision of anal fissure with immediate skin grafting.
4. Division of internal sphincter (INTERNAL SPHINCTEROTOMY)
    - A. Posterior Internal Sphincterotomy.
    - B. Lateral Internal Sphincterotomy
        - i. Open method
        - ii. Closed method

1. STRETCHING OF ANAL SPHINCTER

In 1829 first advocated by Recamier, it is simple and requires virtually no post op care other than daily bath.[17] It is usually done in acute fissure when there is no

response to conservative treatment. The procedure should be done under general anaesthesia with a relaxant for satisfactory results.[24]

With the patient in lithotomy position, the anus is forcibly stretched by introducing first both the index fingers and then the index and middle fingers of both hands, which maintains a steady distraction for 3 to 4 minutes. Forearms of the surgeon need to be fully pronated so as to stretch the posterior wall of the canal. This manoeuvre produces temporary paralysis of the external and internal sphincters, lasting for several days or a week and giving the fissure time to heal. Some amount of incontinence is to be expected during this period. Usually few fibres are torn in the process resulting in some extravasation of blood leading to perianal bruising and discolouration.

This procedure should be avoided in patients with associated large internal piles for the fear of painful perianal oedema.[17]

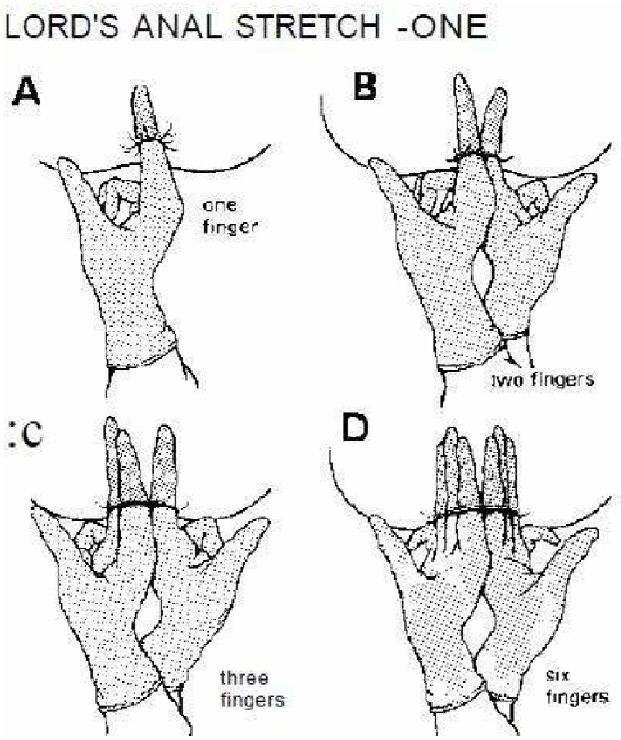


Figure 7: Demonstration of Lord's Anal Dilatation

2. EXCISION OF ANAL FISSURE

In 1948 Gabriel popularized fissurectomy, it is the excision of the fissure to remove a broad triangle of perianal skin along the lesion itself.

A triangular incision is taken, the apex of which includes the fissure and the base includes the perianal skin. The skin flap is excised. On removal of the apical portion including the anal fissure exposes the underlying lower third of the internal sphincter. The inferior border of this muscle is then either snicked or a small wedge is removed from it. The resulting wound takes about 4 to 6 weeks to heal completely.

This is an easy and reliable procedure and the results are good when procedures like stretching of the anal sphincter and the division of the edge of the sphincter are combined.

The disadvantage is that it sometimes results in keyhole deformity and there is a large external wound which takes a long time to heal.

3. EXCISION OF ANAL FISSURE WITH IMMEDIATE SKIN GRAFTING

In 1953 Hughes suggested a modification of fissurectomy to fasten healing and shorten the hospital stay. In this procedure, immediately after the fissurectomy a split thickness graft is applied to the wound which helps in early healing.[23, 26]

The main disadvantage of this procedure is that the patient must not pass tools for at least 5 to 6 days post op which is very uncomfortable for the patient and also patients may have to stay in the hospital for longer duration for the graft to take. This method is not routinely practiced now-a-days.

4. DIVISION OF INTERNAL SPHINCTER

As suggested by Eisenhammer in 1953, internal sphincterotomy is the division of the lower half of the internal sphincter through an incision in the midline of the posterior wall of the anal canal to relieve the sphincter spasm.

Morgan and Thompson in 1956 standardized this procedure with division of the internal sphincter through the floor of the fissure from the dentate line to its lower border. The incision was extended on to the perianal skin with superficial division of the subcutaneous external anal sphincter muscle to improve the drainage and healing.

A. POSTERIOR INTERNAL SPHINCTEROTOMY (Open Dorsal Internal Sphincterotomy)

This procedure can be performed under a local anaesthetic block of the inferior rectal nerves, but general anaesthesia is preferred.[27]

To expose the fissure in the posterior wall a bivalve speculum is introduced into the anal canal. An incision is made through the fissure from just above the pectinate line to 0.5 cm beyond the anal verge and gradually deepened through the internal sphincter muscle fibres. Bleeding from the raw surface is controlled. The transverse running fibres are identified which indicate the intersphincteric plane between the internal and external sphincter. The anal skin tag and fibrous polyp at the lower and upper ends respectively of the fissure are excised (if present) and the inferior edge of the external sphincter is snicked.

If there is bleeding at the end of the procedure, it is controlled by the application of a piece of adrenaline gauze to the cut surface and over this a piece of gauze soaked in tincture benzoin is applied. For anterior fissures the sphincterotomy is best performed at a separate point posteriorly or posterolaterally.

Post op, analgesics, mild aperients, Sitz bath twice a day is advised. After each bath it is advised that the anal region be covered with dry cotton wool dressing.

Post op complications include pain during defecation, recurrence, incontinence of flatus, anal discharge with resulting faecal staining of the underclothes.

The "keyhole" deformity or posterior midline furrow develops following midline posterior sphincterotomy because of scarring and epithelialization created by the separation of edges of the divided internal sphincter.[23]

A true keyhole deformity results from excision of excessive anoderm and perianal skin in the posterior midline, together with excision of a portion of sub adjacent muscle.[28]

This deformity would result in small residue of faeces to remain in the gutter which cannot be completely evacuated during defecation. This complication can be seen by gently separating the buttocks, which may appear as a key hole rather than a slit.

B. LATERAL INTERNAL SPHINCTEROTOMY

There are 2 methods of lateral internal sphincterotomy.

They are:

1. Closed method or lateral subcutaneous sphincterotomy
2. Open sphincterotomy

1. CLOSED METHOD

In 1966 Notaras introduced lateral internal sphincterotomy in order to avoid keyhole deformity resulting from posterior internal sphincterotomy and this has become the most accepted form of operative technique. The procedure avoids an open intra-anal wound, as the internal sphincter, where divided, is bridged by skin, thus avoiding the development of the keyhole deformity.[28]

A longer sphincterotomy may result in incontinence causing greater deformity of the anal canal.[29]

Operative technique and aftercare[10]

The operation is usually performed in lithotomy position under spinal or general anaesthesia. A bivalve speculum is introduced into the anal canal and rotated so that the handle lies to the patients' right. The blades are opened to expose the left lateral wall of the anal canal and making the lower margin of the internal sphincter taut and easily palpable.

Knife is introduced through the perianal skin immediately lateral to the lower edge of the intersphincteric muscle and passed vertically upwards in the intersphincteric plane till it is adjusted to lie at or just above the pectinate line. By means of delicate strokes of the blade in the direction of the anal canal, the lower half of the internal sphincter is then divided, care being taken not to penetrate the lining of the anal canal. A useful precaution to avoid such penetration is to leave a few of the innermost fibres of the muscle undivided. The knife is withdrawn and the remaining fibres ruptured with lateral pressure with the index finger. The pressure is maintained for 2 or 3 minutes to achieve haemostasis while retractor is removed from the anal canal and a pad of cotton-wool is applied and is kept in place by a firm T- bandage. If there is a large sentinel tag of skin or a fibrous polyp, it can be excised at the same time, preferably just before the sphincterotomy.[30]

A variation of this technique is to introduce the blade through the perianal skin between the internal sphincter and anoderm until it reaches a point just beyond the

dentate line and the internal sphincter is incised from medial to lateral with delicate outward strokes.[7, 23]

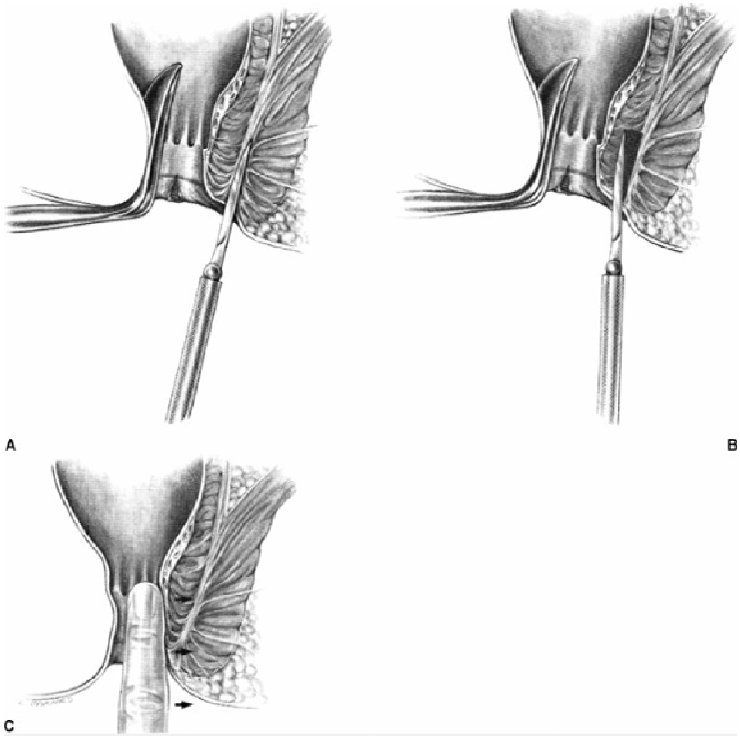


Figure 8: Lateral Internal Sphincterotomy Closed Method

A characteristic gritty sensation is felt while incising the internal sphincter. When the division of the internal sphincter is complete, the resistance to the scalpel diminishes and there is immediate release of the tension over the blades of the anal speculum. Postoperatively, analgesics and mild aperients daily Sitz bath, preferably after defecation, and dry dressings are advised.

Post-op complications include haemorrhage, sepsis leading to perianal abscess and fistula formation, ecchymosis, prolapse of internal haemorrhoids, incontinence of flatus and/or faeces.[29]

2. OPEN METHOD

In this procedure, after anaesthetizing the patient, with gentle dilatation of the anus, proctoscope is introduced. It is rotated 90 degrees to the right and radial incision is made in the anoderm just distal to the dentate line and up to 2 cm beyond the anal verge and carried across the lower border of the internal sphincter in the mid-lateral portion of the anus. Then the lower border of the internal sphincter is identified at the intersphincteric groove. Hypertrophied band of internal sphincter is freed and elevated into the incision using an artery forceps. The fibres of the internal sphincter are divided using a No. 11 surgical blade. All the fibres of the internal sphincter between the dentate line and the subcutaneous external sphincter are divided. Haemostasis is achieved with digital pressure and sutures if needed. The sphincterotomy incision is left open to heal by secondary intention. At the termination of the procedure, a small piece of gel foam coated with an anaesthetic ointment is inserted into the anal canal and perianal dressing applied.[17]

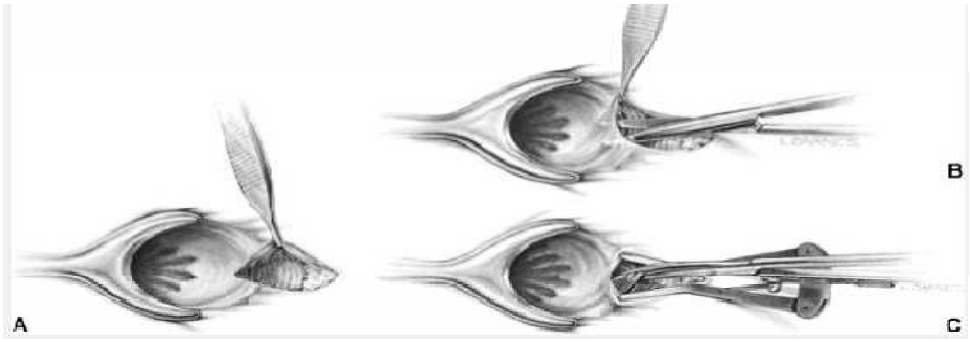


Figure 9: Lateral Internal Sphincterotomy Open Method

Open versus Closed

Walker and colleagues reviewed their experience with lateral internal anal sphincterotomy for anal fissure and stenosis in more than 300 patients. Sphincterotomy was performed by several techniques (open, closed, multiple) and under diverse circumstances, so it is difficult to interpret the results.

It is apparent, however, that complications were lowest after the closed procedure (20%) and highest for open sphincterotomy (55%). Anal fistula occurred in three patients (l%). In the entire series, 15% reported various control difficulties, and when very strict criteria for evaluation of morbidity were used, minor complications occurred in 36%.

Wiley M et al in 2004 published a series of 79 patients and concluded that there was no significant difference in outcomes with open or closed internal sphincterotomy.[31]

ISLAND ADVANCEMENT FLAPS IN THE MANAGEMENT OF ANAL FISSURES[26]

There are a few patients of chronic fissure-in-ano with recurrence or persistence of fissure despite adequate treatment including lateral subcutaneous internal sphincterotomy. These patients presenting with symptomatic fissures have weak sphincters as a result of obstetric trauma or previous perianal surgery. These patients and those who have previously undergone sphincterotomy may be at risk of incontinence following lateral internal sphincterotomy. Therefore it is better to

achieve primary healing of fissures in such patients with an advancement flap of perianal skin.

Operative technique

Under GA, patients are placed in the prone Jack-Knife position with the buttocks strapped apart. Gellipes Self retaining retractors are used to expose the anus without stretching the sphincters. The edges of the fissure are carefully excised from the underlying internal anal sphincter. The flap of buttock skin is then raised on its underlying fatty base. Adequate mobilization with sharp dissection laterally is important to ensure a broad-based flap with optimal vascularity. The flap is then advanced and sutured into the anal canal with a V-Y advancement procedure. This technique allows primary closure of the whole wound without tension and simplifies the subsequent hospital stay. Patients are put on laxatives for 2 weeks post op.

Patel S D, et al in 2011 posted a series of 50 patients who underwent such an advancement procedure and concluded that advancement is associated with a higher incidence of symptomatic relief and fissure healing and lower incidence of complications when compared with sphincterotomy and is effective at healing fissures which are refractory to sphincterotomy.[32]

RECENT ADVANCES IN THE TREATMENT OF FISSURE-IN-ANO

Sacral Nerve Stimulation

This is amongst the newest methods being tried for the treatment of chronic fissure-in-ano. Patients undergo placement of one temporary 8-electrode Octad lead for sacral nerve root stimulation. Stimulation is conducted for 20 minutes 3 times per day.

The lead is removed after 3 weeks of stimulation.

It is claimed that patients experience an immediate improvement in perineal pain after the initiation of sacral nerve stimulation. The pain relief effect lasts for 10 to 12 hours and the chronic anal fissure heals by the end of the third week of temporary sacral nerve stimulation.[33]

Patients with chronic anal fissure who choose not to pursue more invasive surgical interventions sacral nerve stimulation offers an effective alternative treatment option.[34]

MATERIALS AND METHODS

The study is conducted at R. L. Jalappa hospital & research centre and attached hospitals from January 2013 to August 2014. The patients diagnosed as having chronic fissure-in-ano are considered for this study. Chronic fissure is considered as one which has been present for more than 6 weeks, or one where previous conservative or medical treatment has failed or where the base of the ulcer is formed by the fibers of the internal sphincter or where there is a sentinel skin tag.

In this prospective analytical study 70 cases of chronic fissure-in-ano are enrolled and by odd & even method divided into odd group of 35 cases-surgical group (Lateral Internal Sphincterotomy) and even group of 35 cases-pharmacological group (Topical Diltiazem Sphincterotomy).

The primary aim of this study is to study the efficacy of Topical Diltiazem Sphincterotomy for chronic fissure-in-ano, to study the efficacy of Lateral internal sphincterotomy for chronic fissure-in-ano and to compare the efficacy of Topical Diltiazem sphincterotomy with Lateral Internal Sphincterotomy in terms of relief of symptoms, healing of fissure, and complications.

History, findings of physical examination and laboratory investigations were documented. During evaluation of the patients history, due importance was given to age, sex, bowel habits, diet, type of stools, history of previous surgical procedures of anal region and other medical problems.

In the preoperative work up, detailed examination of the anal region was done by noting the site of the fissure, condition of the fissure, presence of sentinel pile, state of anal sphincter. Patients with other conditions like fistula, abscess and inflammatory bowel disease were not included in this study.

In patients in whom digital rectal examination could not be done due to severe tenderness and anal spasm in spite of application of local anaesthetic jelly, digital rectal examination and proctoscopy were done under anaesthesia in the major operation theatre just prior to the surgery.

As a part of the general work up for surgery, patients were investigated for haemoglobin percentage, bleeding time, clotting time, fasting blood sugar, postprandial blood sugar, blood urea, serum creatinine, urine sugar, albumin, microscopy, chest x-ray, HIV, HBsAg and ECG.

Treatment was given to the patient who presented as chronic fissure-in-ano

1. Diltiazem ointment in a 2% dosage was administered to the patients. Patients were advised to first put ointment up to the 2.5 cm mark on the measuring line on the outside of the carton of the ointment and then transfer it to their fingers and apply just proximal to the anal verge over the area of the fissure. It was advised twice daily for a period of 6 weeks. Patients were followed up at 2 weekly intervals for 6 weeks.
2. Lateral Internal Sphincterotomy was performed under spinal anaesthesia. Proctoscopy was done on table and pre-operative findings reassessed. After doing these procedures, if a large associated sentinel skin tag was found it was excised.

Anal pack soaked in 2% lignocaine jelly was placed into the anal canal at the end of the procedure. During immediate postoperative period, patients were monitored for complications like bleeding, soakage of dressing. Bladder catheterization was done in patients who were unable to pass urine despite having a full bladder.

Patients were allowed to take oral liquids on the same evening provided they didn't have nausea or vomiting. Postoperatively, parental antibiotics and analgesics were given to all patients till third post-op day. From then only oral medications were given. The anal pack was removed the next morning after surgery and fresh perianal dressing applied.

During the postoperative period, the relief from pain was evaluated with the help of visual analogue scale, healing of fissure, disturbances of anal continence with the help of Wexner score, which includes simple questionnaire, along with any associated complications like infection, bleeding and perianal itching or edema. Sitz bath was advised to all patients from first post-op day onwards.

In all patients, digital rectal examination was done on 4^{th} or 5^{th} postoperative day. 2 weekly follow ups were done at surgery OPD along with a detailed digital rectal examination.

The patients were advised to continue liquid paraffin syrup (Cremaffin) for 3 weeks postoperatively. All patients were followed up for up to 6 weeks. During the

follow up detailed history with respect to the relief of pain, habits, frequency of defecation and any persistence of symptoms or fissures were collected for evaluation.

Parameters included in the present study for comparison between the two groups

1. Relief of symptoms

a) Immediate

b) Delayed

c) No relief

2. Healing of fissure

a) Healed

b) Not Healed

3. Post treatment complications

a) Headache

b) Itching

c) Excoriations

d) Bleeding

e) Pain

f) Infection

g) Incontinence

PROCEDURE PHOTOS

TOPICAL DILDIAZEM

Figure 10: Topical Diltiazem Gel 2%

LATERAL INTERNAL SPHINCTEROTOMY

Figure 11: Chronic Posterior Fissure-in-Ano with Sentinel Tag

Figure 12: Glistening white fibres of undivided internal sphincter

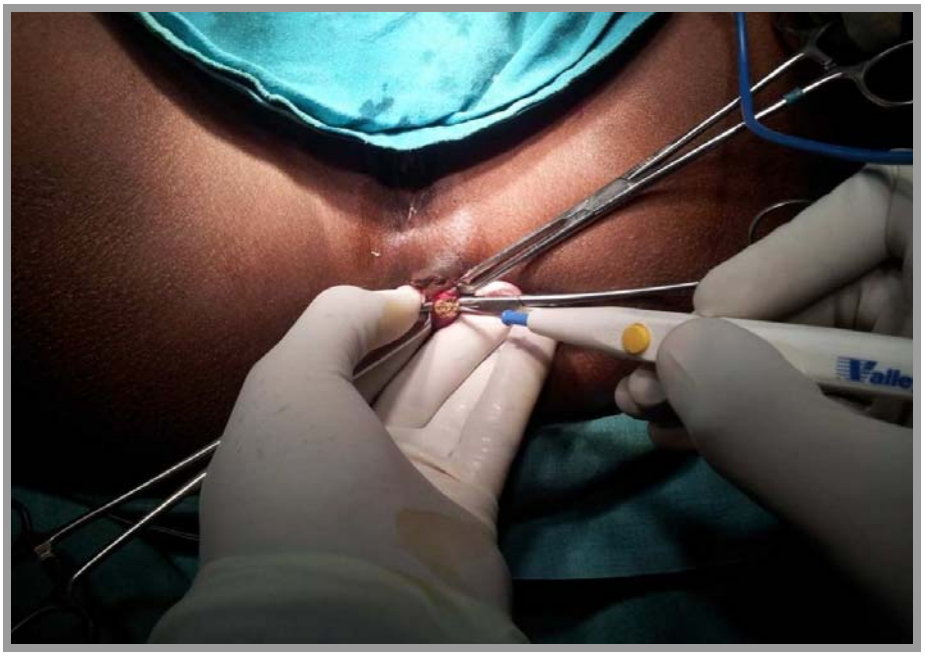


Figure 13: Internal sphincter being divided with electro-cautery

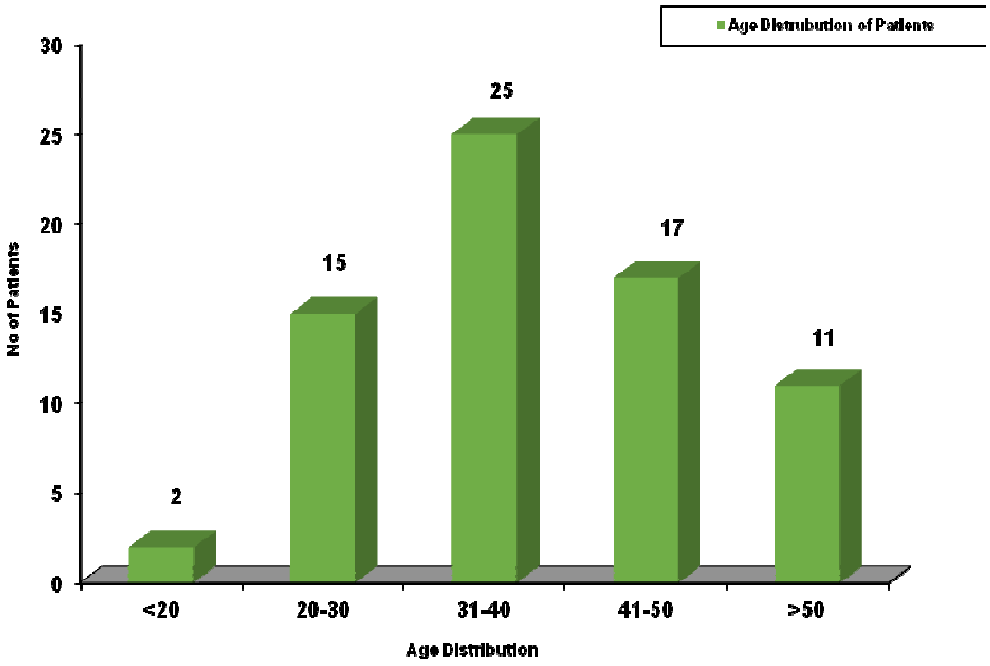
OBSERVATIONS AND RESULTS

Totally 70 cases were studied in the present series. All the cases seen at Surgery OPD or admitted and operated at R. L. Jalappa hospital & research centre and attached hospitals, kolar, during the study period with a final diagnosis of chronic fissure-in-ano were included in this study. The cases were compared keeping in mind the two modalities of treatment given.

Table 1: Distribution of patients in according to age

Age in years	No. of patients	%
<20	2	**2.9**
20-30	15	**21.4**
31-40	25	**35.7**
41-50	17	**24.3**
>50	11	**15.7**
Total	**70**	**100.0**

Mean ± SD: 39.34±11.56

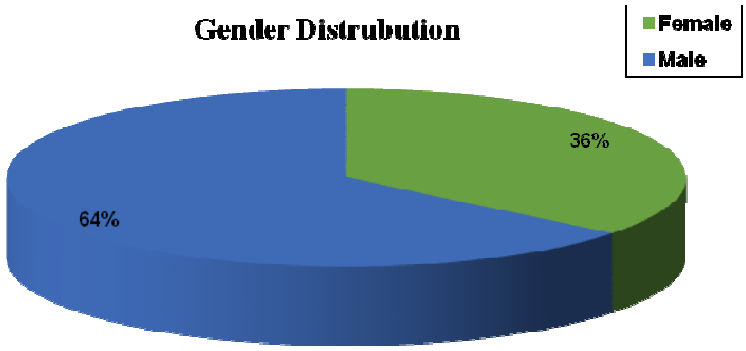


Graph 1: Age distribution of patients studied

In the present study, majority of the patients are in the age group of 31-40 years (35.7%), followed by the age group of 41-50 years (24.3%). The mean age of presentation was 39.34 years with standard deviation of 11.56. The youngest patient in the study is a 19 year old female and the eldest patient is 78 year old male.

Table 2: Distribution of patients according to Gender

Gender	No. of patients	%
Female	25	**35.7**
Male	45	**64.3**
Total	**70**	**100.0**

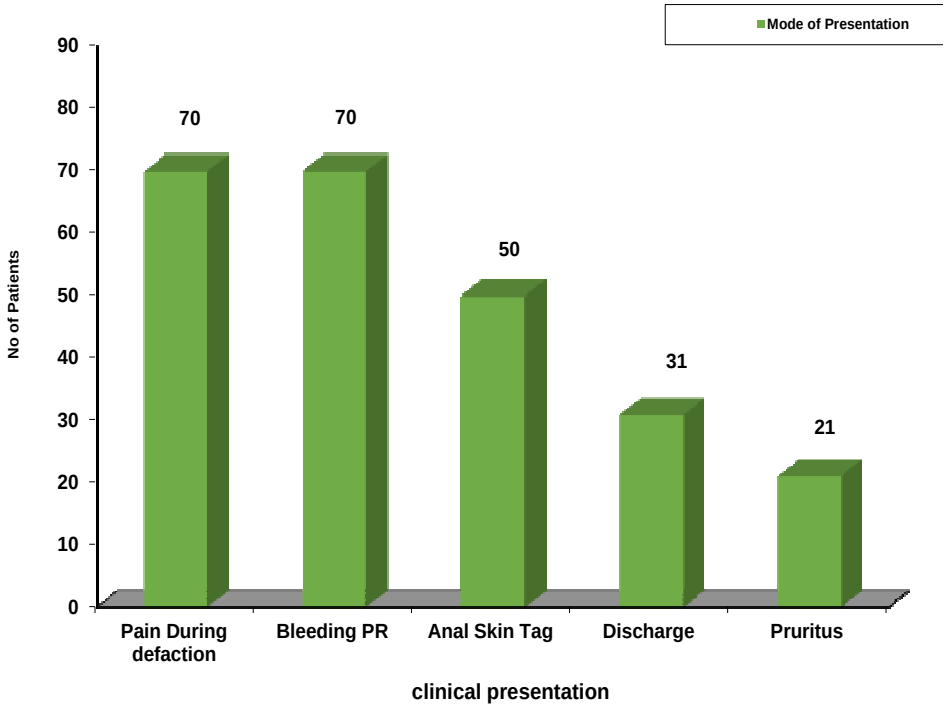


Graph 2: Gender distribution of patients studied

In the present study, the total number of male patients are 45 (64.3%) and that of females are 25 (35.7%). The male to female ratio in the present study is 1.8:1. So Male patients had higher incidence at 64.3%.

Table 3: Distribution of patients according to mode of presentation

Mode of presentation	No. of patients (n=70)	%
Pain during defecation	70	**100.0**
Bleeding PR	70	**100.0**
Anal skin tag	50	**71.42**
Discharge	31	**44.3**
Pruritus	21	**30.0**

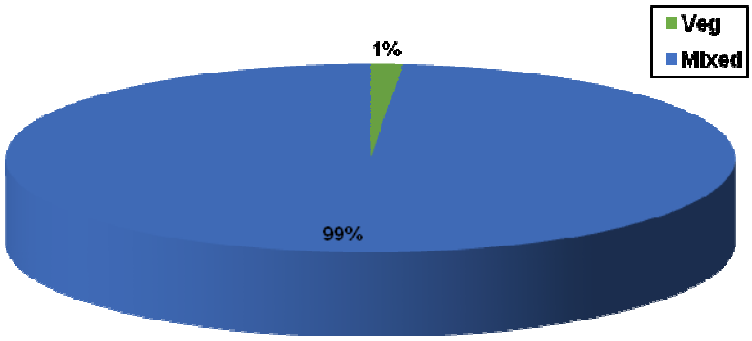


Graph 3: Clinical symptoms of patients studied

In this study, Out of the 70 patients with chronic fissure-in-ano, all 70 patients (100%) had pain during defecation and all 70 patients (100%) had bleeding per rectum, making these two as the most common presenting complaint in chronic fissure, 50 patients (71.42%) had anal skin tag, 31 patients (44.3%) had discharge and 21 patients (30.0%) had pruritus per ano.

Table 4: Distribution of patients according to Diet pattern

Diet pattern	No. of patients	%
Mixed	69	**98.6**
Veg	1	**1.4**
Total	**70**	**100.0**

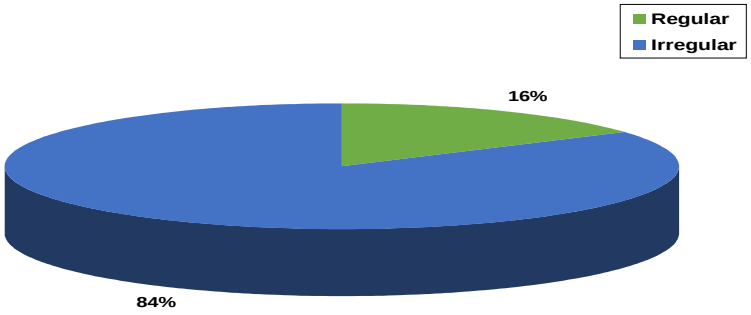


Graph 4: Distribution of patients according to Diet Pattern

In the present study reveals that most of the patients are having mixed dietary habits. 69 (98.9%) out of 70 patients are having mixed dietary pattern and only 1 (1.4%) patient is having vegetarian diet.

Table 5: Distribution of patients according to Bowel Habits

Bowel Habits	No. of patients	%
Regular	11	**15.7**
Irregular	59	**84.3**
Total	**70**	**100.0**

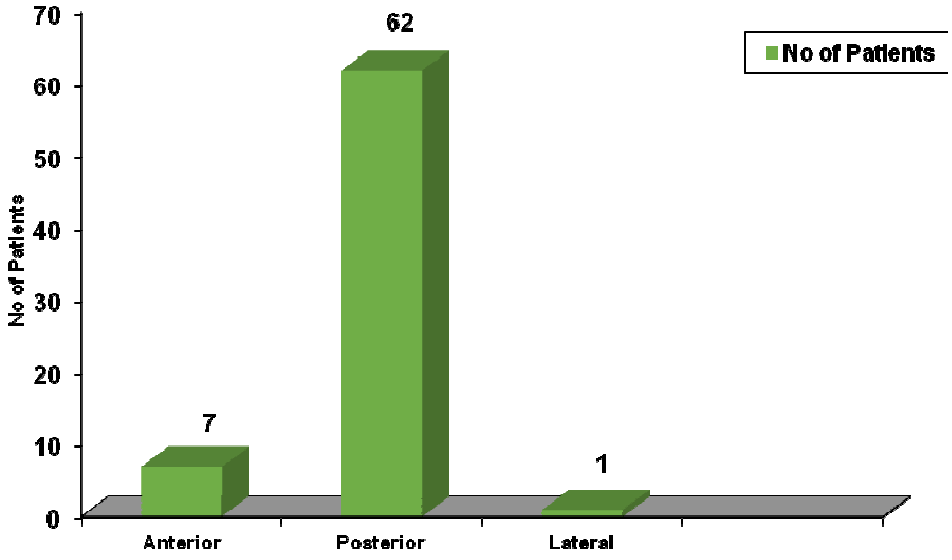


Graph 5: Distribution of Bowel Habits pattern

In the present study large number of patients have irregular bowel habits. 59 (84.3%) patients have irregular bowel habits, whereas 11 (15.7%) patients have regular bowel habit.

Table 6: Distribution of patients according to Site of fissure

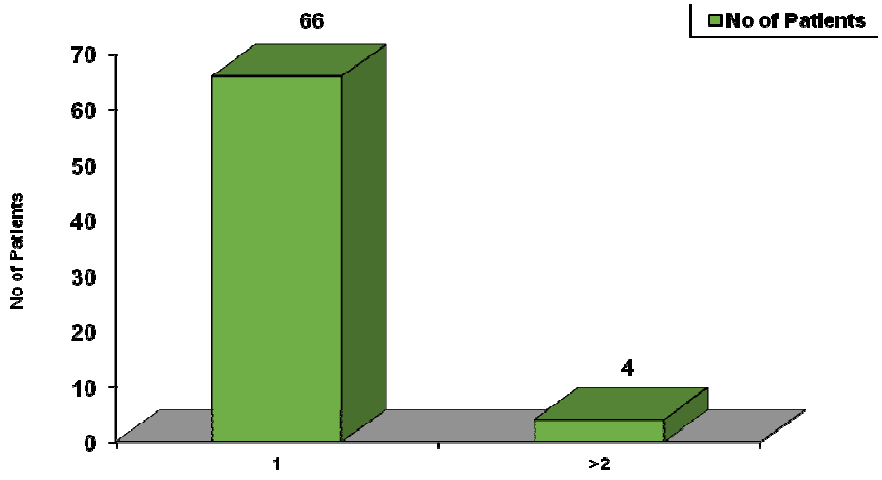
Site of fissure	No. of patients	%
Anterior	7	**10.0**
Posterior	62	**88.6**
Lateral	1	**1.4**
Total	**70**	**100.0**



Graph 6: Distribution of patients according to Site of fissure

Table 7: Distribution of patients according to Number of fissure

Number of fissure	No. of patients	%
1	66	**94.3**
≥2	4	**5.7**
Total	**70**	**100.0**

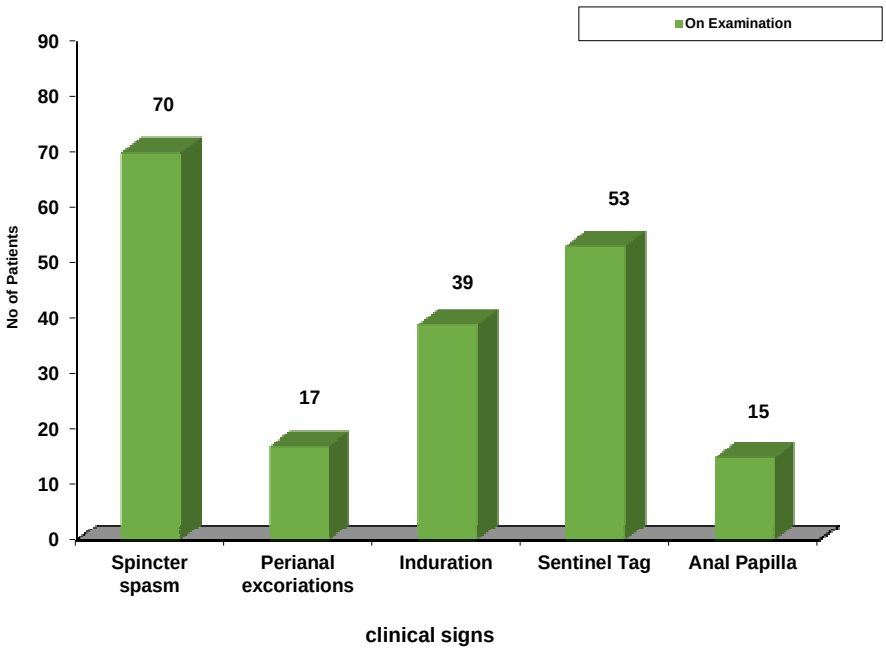


Graph 7: Distribution of patients according to Number of fissure

In the present study, posterior fissure is the most common site among the patients studied. 62 (88.6%) patients had only posterior anal fissure, 7 (10%) patients had anterior fissure and 1 (1.4%) patient had fissure in the lateral aspect. Among 7 patients with anterior fissure, 4 patients had associated posterior fissure too. Overall 66 patients had posterior fissure, making it the predominant site among the patients studied.

Table 8: Distribution of patients according to clinical signs on examination

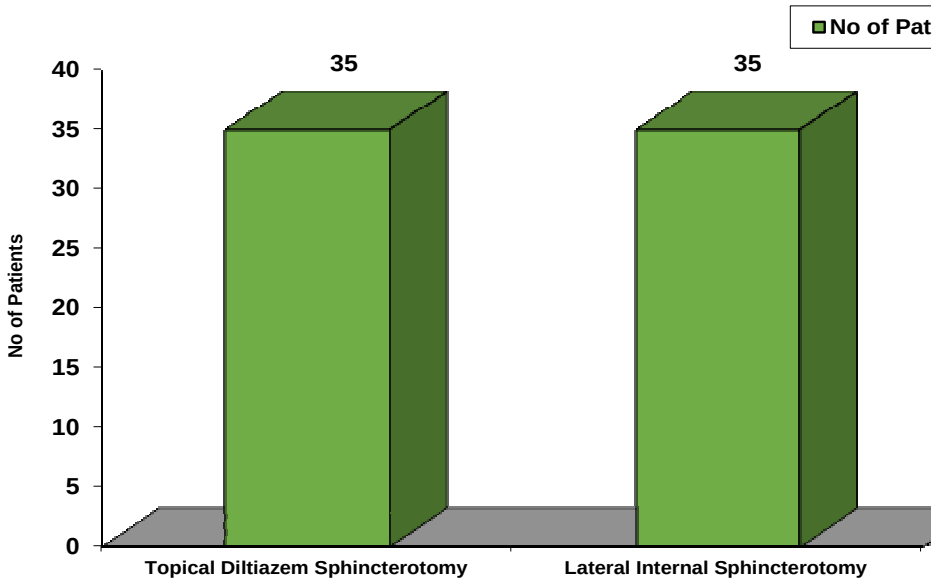
On examination	No. of patients	%
Sphincter spasm	70	**100**
Perianal excoriations	17	**24.2**
Induration	39	**44.2**
Sentinel tag	53	**75.7**
Anal papilla	15	**21.4**
Discharge	20	**37.1**



Graph 8: Distribution of patients according to clinical signs

Table 9: Distribution of patients according to Treatment given

Treatment Given	No. of patients	%
Pharmacological- Group P (Topical Diltiazem Sphincterotomy)	35	50.0
Surgical- Group S (Lateral Internal Sphincterotomy)	35	50.0
Total	70	100.0

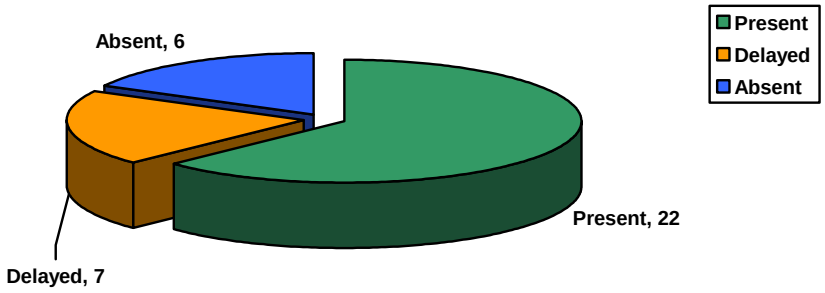


Graph 9: Distribution of patients according to Treatment group

In this study two groups of 35 patients each were allotted, Topical Diltiazem group/Pharmacological group (group P) consisting of 35 patients and Lateral Internal Sphincterotomy group/Surgical group (group S) consisting of 35 patients. These groups were selected according to odd and even method.

Table 10: Distribution of patients according to Relief of Symptoms in Topical Diltiazem group

Relief of symptoms	No. of patients (N=35)	%
Present	22	**62.85**
Delayed	7	**20.0**
Absent	6	**17.1**
Total	**35**	**100.0**



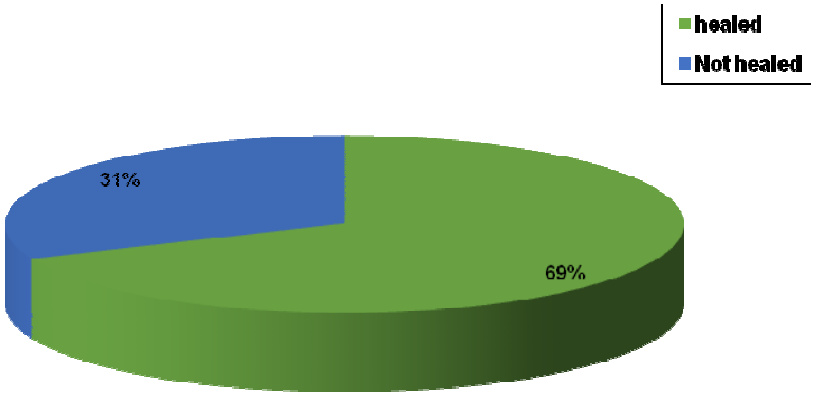
Graph 10: Distribution of patients according to Relief of Symptoms in Topical Diltiazem group

If patients continued to have symptoms after 2 week of completion of treatment it was considered as delayed relief and persistence of symptoms even after 6 weeks were considered as failure or absence of symptoms relief.

In this study, out of 35 patients 22 (62.85%) of them had early relief of symptoms, 7 (20.0%) of them had delayed relief of symptoms. 6 (17.1%) patients didn't have improvement in symptoms even after 6 weeks.

Table 11: Distribution of patients according to Healing of fissure in Topical Diltiazem group

Healing of fissure	2 weeks	4 weeks	6 weeks	%
Healed	0	10	24	**68.7**
Not healed	35	25	11	**31.4**
Total	**35**	**35**	**35**	**100.0**

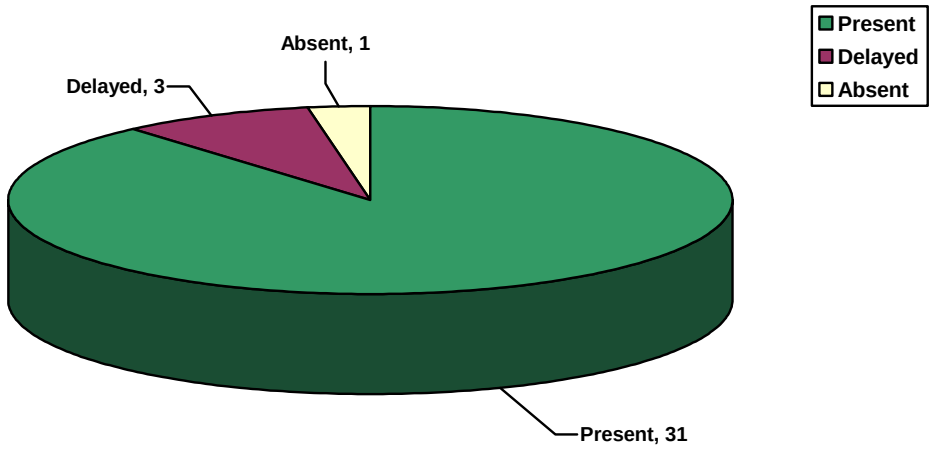


Graph 11: Distribution of patients according to Healing of fissure in Topical Diltiazem group

In the present study, 24 (68.7%) patients out of 35 in Topical Diltiazem application group had complete fissure healing, whereas in 11 (31.4%) patient's fissure didn't heal even after completion of 6 weeks. But the time duration required among healed group was more, as there were no cases of healed fissure after 2 weeks of treatment.

Table 12: Distribution of patients according to Relief of Symptoms in Lateral Internal Sphincterotomy group

Relief of symptoms	No. of patients (N=35)	%
Present	31	**88.57**
Delayed	3	**8.57**
Absent	1	**2.85**
Total	**35**	**100.0**

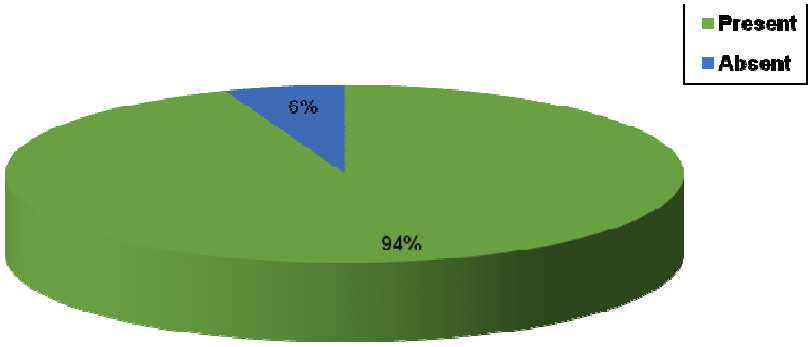


Graph 12: Distribution of patients according to Relief of Symptoms in Lateral Internal Sphincterotomy group

31 (88.57%) out of 35 patients had early relief of symptoms, 3 (8.57%) of them had delayed relief of symptoms. 1 (2.85%) of the patient didn't have improvement in Symptoms even after 6 weeks.

Table 13: Distribution of patients according to Healing of fissure in Lateral Internal Sphincterotomy group

Healing of fissure	2 weeks	4weeks	6 weeks	%
Healed	22	31	33	**94.28**
Not healed	13	4	2	**5.71**
Total	**35**	**35**	**35**	**100**



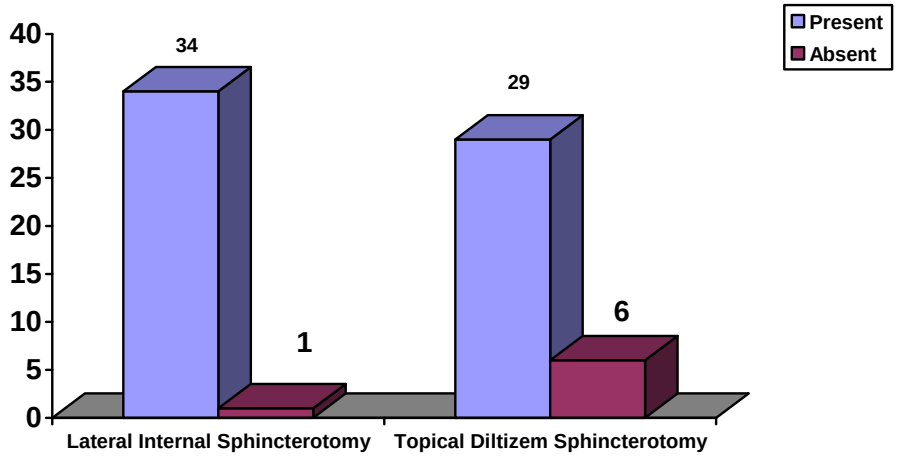
Graph 13: Distribution of patients according to Healing of fissure in Lateral Internal Sphincterotomy group

In the present study, 33 (92.28%) out of 35 patients in Lateral Internal Sphincterotomy group had complete fissure healing, whereas in 2 (5.71%) patients fissure not healed even after completion of 6 weeks. Time duration required for most of the patients among healed group was less than 2 weeks, whereas only 2 patients required full 6 weeks.

Table 14: Comparison of relief of symptoms in both treatment modalities

Relief of Symptoms	Lateral Internal Sphincterotomy		Topical Diltiazem Sphincterotomy	
	n=35		n=35	
	No. of Patients	Percentage	No. of Patients	Percentage
Present	34	97.14	29	82.8
Absent	1	2.85	6	17.1
Total	**35**	**100.00**	**35**	**100.00**

X^2=3.968, df=1, p=0.04**

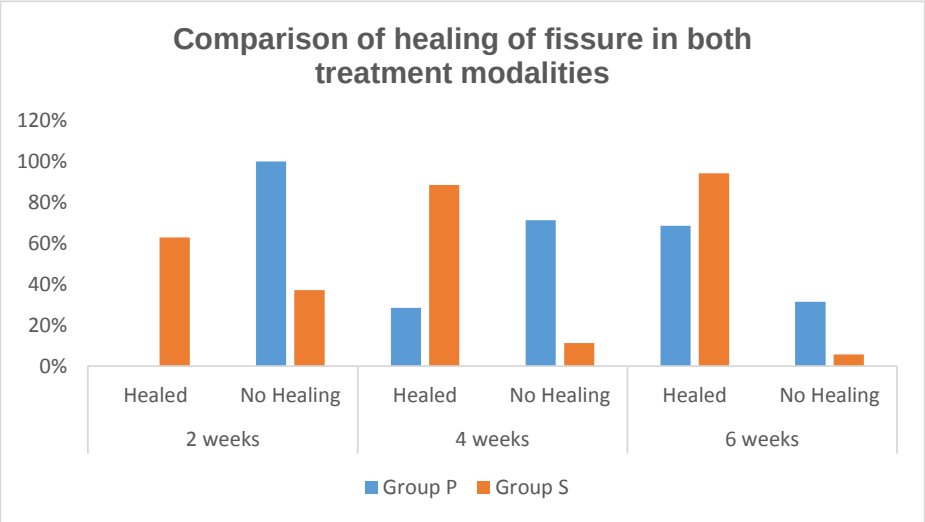


Graph 14: Comparison of relief of symptoms in both treatment modalities

On comparing relief of symptoms in the 2 modalities of treatment for chronic fissure-in-ano, it was observed that symptom relief was 82.8% with topical application of Diltiazem ointment and 97.14% with Lateral Internal Sphincterotomy patients. This observation was statistically significant, i.e. Relief of symptoms was better in Lateral Internal Sphincterotomy group.

Table 15: Comparison of healing of fissure in both treatment modalities

	2 weeks		4 weeks		6 weeks		Total
	Healed	No Healing	Healed	No Healing	Healed	No Healing	
Group P	0 (0%)	35 (100%)	10 (28.57%)	25 (71.42%)	24 (68.57%)	11 (31.42%)	35
Group S	22 (62.8%)	13 (37.14%)	31 (88.57%)	4 (11.42%)	33 (94.28%)	2 (5.71%)	35
X^2, df P value	$X^{2=}$32.08, df=1 p<0.0001**		$X^{2=}$25.96, df=1 P<0.0001**		$X^{2=}$19.21, df=1 P<0.0001**		



Graph 15: Comparison of healing of fissure in both treatment modalities

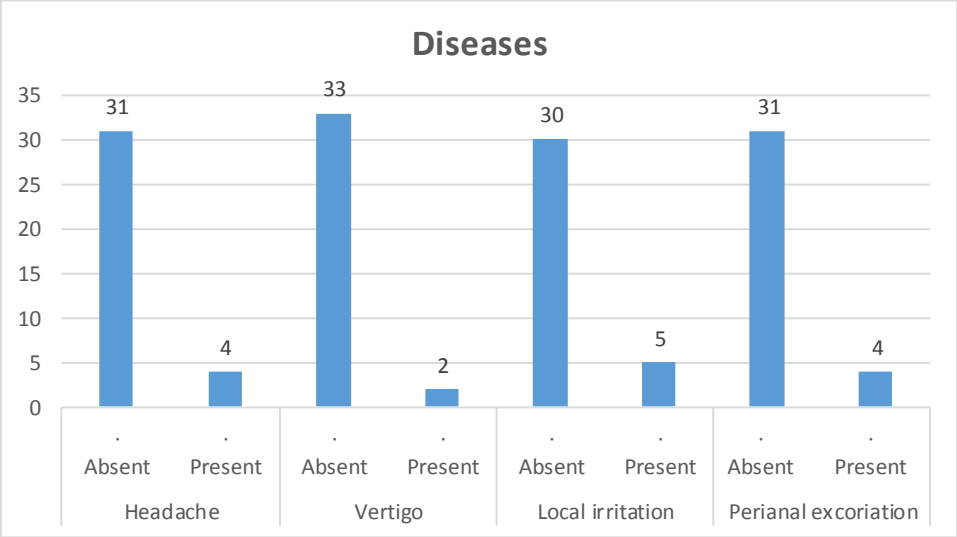
On comparing healing of fissure in the 2 modalities of treatment for chronic fissure-in-ano, it was observed that healing of fissure was complete in 24 (68.7%) patients of Topical Diltiazem group and 33 (94.28%) patients of Lateral Internal Sphincterotomy group. Time taken for fissure healing in Topical Diltiazem group is long in comparison to Lateral Internal Sphincterotomy group. 22 (62.8%) patient out of 35 in Lateral Internal Sphincterotomy group had fissure healing within 2 weeks,

whereas none of the patient in Topical Diltiazem group had fissure healing during first 2 weeks.

This observation of difference in healing between the two procedures was statistically significant at 2 weeks, 4 weeks, and 6 weeks interval, i.e. Healing was better in Lateral Internal Sphincterotomy group at all the intervals compared to Topical Diltiazem group.

Table 16: Distribution of patients according to post-operative complications in Topical Diltiazem group

	No. of patients (n=35)	**%**
Headache		
• Absent	31	**88.57**
• Present	4	**11.42**
Vertigo		
• Absent	33	**94.28**
• Present	2	**5.71**
Local irritation		
• Absent	30	**85.71**
• Present	5	**14.28**
Perianal excoriation		
• Absent	31	**88.57**
• Present	4	**11.42**

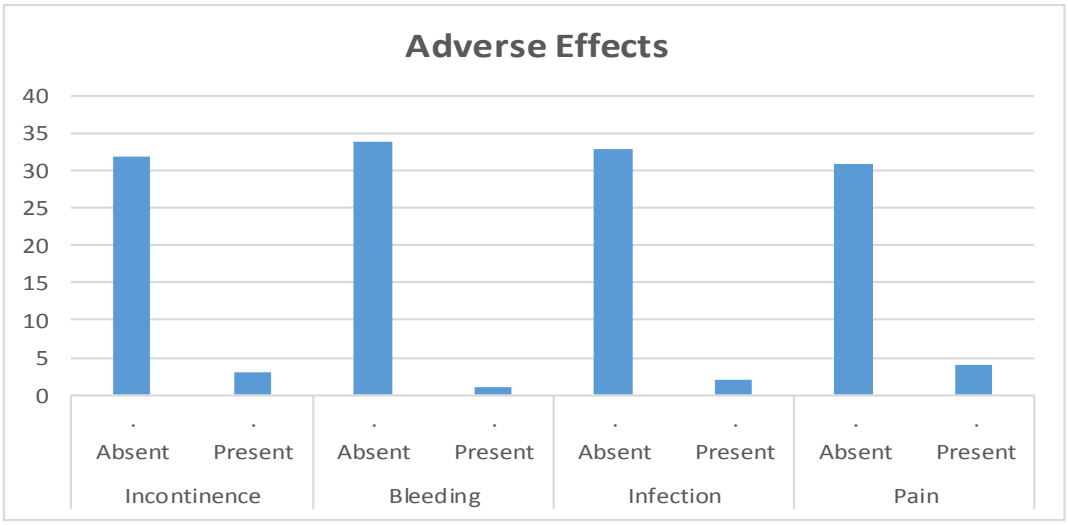


Graph 16: Distribution of patients according to post operative complications in Topical Diltiazem group

In the present study, 4 (11.42%) out of 35 patients had headache after application of ointment. In 2 of the 4 patients, headache persisted beyond 4 weeks with low compliance and eventually had to stop topical ointment. 2 patients (5.71%) had vertigo, 5 patients (14.2%) had local irritation and 4 patients (11.42%) had perianal excoriations, these patients compliance was poor with the Topical Diltiazem ointment.

Table 17: Distribution of patients according to post-operative complications in Lateral Internal Sphincterotomy group

	No. of patients (n=35)	%
Incontinence		
• Absent	32	**91.42**
• Present	3	**8.57**
Bleeding		
• Absent	34	**97.14**
• Present	1	**2.85**
Infection		
• Absent	33	**94.28**
• Present	2	**5.71**
Pain		
• Absent	31	**88.57**
• Present	4	**11.42**



Graph 17: Distribution of patients according to post operative complications in Lateral Internal Sphincterotomy group

In the present study, 3 (8.57%) out of 35 patients had incontinence after Lateral Internal Sphincterotomy. Incontinence was for flatus but it was temporary in nature, resolved in 3-4 weeks. 1 patient (2.85%) had persistent bleeding during defecation even after 6 weeks, 3 cases had bleeding beyond 2 weeks but eventually resolved. 2 patients (5.71%) had wound infection but was cured after completion of coarse of antibiotic. 4 patients (11.42%) had persistent pain even after adequate analgesics.

DISCUSSION

Fissure-in-ano, a common disease of the anal canal, basically consists of a crack in the squamous lined part of the anal canal and is remarkably constant in its situation, posterior midline, with a few exceptions. It starts as an acute tear in the anoderm probably due to over stretching from passage of a large or hard stool.

The angulation of the anal canal and the elliptical shape of the superficial portion of the external sphincter leave the posterior midline segment of the internal sphincter relatively unsupported and this leaves the posterior midline more prone for fissure formation. Recent studies have indicated that the posterior midline region of the anal canal has a relatively reduced blood supply. With reduced or minimal nutrition, healing of any injury is delayed, which explains the development of chronic fissures.

Constant hypertonicity in the sphincter muscles will compress the blood vessels supplying the anoderm and leads to the development of ischemic ulcers. These ischemic ulcers refuse to heal with adequate conservative treatment unless the sphincter muscle is relaxed.

In the present study, male/female ratio is 1.8:1, consisting of 45 male and 25 female patients. Peak incidence for development of fissure-in-ano was the fourth decade of life.

In the present study, pain and bleeding during defecation were the commonest complaint in patients with chronic fissure-in-ano (100%). The presenting complaints documented in the study by Khubchandani and Reed[11] were pain (23.5%), bleeding (76.2%), pruritis ani (34.9%) and an anal lump (24.3%) and burning sensation in the anal region (33%).

In the present study, all 70 patients (100%) complained of constipation. In the study by Jensen et al[4] in 1967, 67% of patients complained of constipation.

In the present study, 98.6% of patients were consuming mixed diet consisting of both vegetarian and non-vegetarian food and 1.4% were purely vegetarian.

Treatment: 70 cases of chronic fissure-in-ano were divided into Topical Diltiazem sphincterotomy and Lateral Internal sphincterotomy groups of 35 patients each. The comparison of results between this study and previous studies is done in the tables that follow.

Table 18: Topical Diltiazem Sphincterotomy for Chronic Fissure-in-ano in comparison with previous studies (In percentage)

Results		**Present study**	**Knight *et al* [54]**	**Jonas *et al* [55]**	**Carapeti *EA* [41]**
Number of patients (n)		**35**	71	39	30
Healing of fissure	Complete	**68.7**	89.4	49	67
	Persistent	**31.4**	11.8	51	33
Headache		**11.42**	1.40	0	2.82
Perianal itching		**14.28**	1.40	10	4.7

Table 19: Lateral Internal Sphincterotomy for Chronic Fissure-in-ano in comparison with Previous studies (in percentage)

Results		Present study	Liratezepoulos N48	Sanchez Romero A[49]	Syed SA[50]
Number of patients (n)		35	246	120	112
Relief of pain	Immediate	88.57	98	100	100
	Delayed	11.43	2	0	0
Healing of fissure	Complete	94.28	97.50	100	99
	Persistent	5.71	2.50	0	1
Haemorrhage		2.85	0.80	2.50	1.70
Disturbances of anal continence	Soiling of undergarments	0	0	5	1.70
	Incontinence to flatus	8.57	7.02	7.50	2.60
	Incontinence to faeces	0	0	0	0

LIMITATIONS OF THE PRESENT STUDY:

Postoperative follow up period is for 6 weeks and therefore delayed recurrences could not be studied.

Majority of the patients were from faraway places and usually consulted local doctors for minor surgical problems. Hence minor post-operative complications could have been missed in follow up period.

The patients were far villagers with improper follow up, especially after 4 weeks, hence in few patients the follow-up was done by telephonic communication.

ADVANTAGES OF THE PRESENT STUDY:

Present study group consists of patients only with fissure-in-ano. Since the patients with associated anal conditions are not considered in the study, it gives the correct picture of post treatment evaluation.

Post treatment results can be compared accurately as both modalities of treatment are compared with equal number of patients spread over a near homogenous and uniform demography.

As the cases are divided into surgical and non-surgical treatment modalities, it clearly highlights the two extreme mode of treatment for same condition and its efficacy.

SUMMARY

In this prospective study 70 cases of chronic fissure-in-ano divided into 35 cases of Topical Diltiazem Group and 35 cases of Lateral Internal Sphincterotomy Group, were treated on OPD basis or admitted and operated as inpatients depending on the treatment modality assigned.

Pain during defecation and bleeding per rectum are the most common presenting symptom followed by sentinel skin tag and anal discharge. This is often associated with difficulty in passing stools and history of constipation, which could be explained as the reason or the end result of fissure in ano.

The commonest age group affected is the fourth decade. Male sex group had more incidence than female sex groups.

Commonest site of fissure was the posterior midline in both male and female patients.

All the cases treated were of primary fissure-in-ano and no secondary cases were included. Cases associated with conditions like fistula, abscesses and inflammatory disease were not considered in the study.

Lateral Internal Sphincterotomy has the best treatment efficacy and minimal post-op complications. Haemorrhage, impaired control of flatus and post-operative pain were seen in few patients which were transient in nature.

Relief of symptoms and healing of fissure was seen in significant percentage of patients treated with Topical Diltiazem Sphincterotomy, but less in comparison to Lateral Internal Sphincterotomy group. Time required for fissure healing was more in Topical Diltiazem group. Headache and perianal itching were the complications associated with Topical Diltiazem group.

CONCLUSION

Lateral Internal Sphincterotomy is found to be better treatment modality for chronic Fissure-in-Ano than Topical Diltiazem ointment, in this study. It is associated with minimal post-op complications, like haemorrhage, impaired control of flatus and post op pain. However, Topical Diltiazem ointment can be used as the initial modality of treatment in patients unwilling or unfit for Lateral Internal Sphincterotomy.

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ANNEXURES

PROFORMA

Name:

Address:

Age/sex:

O.P No:

I.P No:

D.O.A:

D.O.O:

D.O.D:

D.O.E:

CHIEF COMPLAINTS:

1. Pain	:	Duration:
2. Bleeding per rectum	:Present/ Absent	Duration:
3. Anal lump	:Present/ Absent	Duration:
3. Passing blood and mucus	: Present/ Absent	Duration:
4. Constipation	: Present/ Absent	Duration:
5. Pruritis	:Present/ Absent	Duration:

HISTORY OF PRESENTING ILLNESS:

1. Pain : Duration

   Relation to defecation : Before/ After

   Character of pain :

2. Discharge : Present/ Absent Duration:

   Nature : Bloody/ Mucous

3. Bleeding per rectum : Present/ Absent

   Relation to defecation : Before ( )

   During ( )

   After ( )

   Type of bleeding : Linear streak ( )

   Droplet ( )

   Spurting ( )

4. Pruritis : Present/ Absent

5. Bowel habits : Regular/ Irregular

   Habitual constipation : Present/ Absent

   Nature of stools : Hard ( ) Soft ( ) Semisolid ( )

   Strain factor : Yes/ No

PAST HISTORY:

1. Anal fissure and treatment : Yes/ No
2. Underwent surgery for fissure earlier? : Yes/ No
3. Perianal abscess : Present/ Absent
4. Tuberculosis : Present/ Absent
5. Crohn's disease : Present/ Absent
6. Ulcerative colitis : Present/ Absent

FAMILY HISTORY:

1. History of Tuberculosis : Present/Absent
2. History of Ulcerative colitis : Present/Absent
3. History of Crohn's disease : Present/Absent
4. History of Colorectal malignancies : Present/Absent

PERSONAL HISTORY:

1. Diet : High fibre diet/Low fibre diet
2. Intake of fluid : Adequate/ Inadequate
   (2-4 litres)/ (1-2 litres)
3. Alcoholic : Yes/No
4. Bowel habits : Regular/ Irregular

GENERAL PHYSICAL EXAMINATION:

1. Nourishment : Good/ Poor
2. Anemia : Present/ Absent
3. Jaundice/ Cyanosis/ Clubbing/ Edema:
4. Vitals:
    a. PR :
    b. BP :
    c. RR :
    d. Temperature :
5. Weight : ( ) kg

LOCAL EXAMINATION:

A. Per rectal examination

1. Position of the patient: Left lateral position/ Lithotomy position
2. Inspection: Perianal excoriation : Present/ Absent

    Sphincter spasm : Present/ Absent

    Site of fissure : Anterior/ Posterior/ Lateral

    Number of fissure : ( )

    Sentinel pile : Present/ Absent

    Nature of discharge from ulcer: Purulent ( )

    Muco-purulent ( )

    Blood stained ( )
3. Palpation: Fissure : Indurated/ Non- indurated

    Tenderness: Present/ Absent

B. Bi-digital examination

1. Patient tolerating rectal examination: Yes/ No
2. State of anal sphincter
    a. External sphincter spasm: Present/ Absent
    b. Internal sphincter spasm : Present/ Absent
3. Tenderness : Present/ Absent

SYSTEMIC EXAMINATION: Inspection/ Palpation/ Percussion/ Auscultation.

1. Respiratory System:

2. Per Abdomen:

3. Cardiovascular System:

4. Central Nervous System:

INVESTIGATIONS:

1. Complete blood examination
2. Urine examination
3. Bleeding time, Clotting time
4. ECG
5. Chest x-ray

PROVISIONAL DIAGNOSIS:

FINAL DIAGNOSIS:

TREATMENT:

Medical line of management/ Surgical line of management:

I. Medical line of management:

1. 2% Diltiazem gel for local application
2. High fiber diet
3. Plenty of oral fluids
4. Laxatives
5. Sitz bath

2^{nd}week 4^{th}week 6^{th}week

Adverse effects:

Headache : present/ Absent

Local irritation : Present/ Absent

Vertigo : Present/ Absent

Perianal excoriation: Present/ Absent

II. Surgical line of management:

PROCEDURE :

ANAESTHESIA :

OPERATIVE NOTES :

	2nd week	4th week	6th week

Adverse effects:

Bleed per rectum : Present/ Absent

Infection : Present/ Absent

Pain : Present/ Absent

Incontinence : Present/ Absent

EVALUATION OF PAIN:

This is done by using Visual Analogue Scale (VAS).

1 2 3 4 6 7 8 9

0{----------5----------}10

No Pain Worst pain

0 - 3 MILD PAIN

3 - 7 MODERATE PAIN

8 - 10 SEVERE PAIN

EVALUATION OF INCONTINENCE:

This is done by using a simple questionnaire (Wexner score).

Type of incontinence	*Never*	*Rarely*	*Sometimes*	*Usually*	*Always*
Solid	0	1	2	3	4
Liquid	0	1	2	3	4
Gas	0	1	2	3	4
Wears pad	0	1	2	3	4
Lifestyle alteration	0	1	2	3	4

Never- 0; *Rarely*- <1/month; *Sometimes*- <1/week, >1/month; *Usually*- <1/day, >1/week; *Always*->1/day.

0 - Perfect continence

1-7 -Good continence

8-14 -Moderate incontinence

15-20 -Severe incontinence

OUTCOME OF THE TREATMENT:

Method: 2% Diltiazem gel topical application

IMPROVEMENT OF SYMPTOMS HEALING FOLLOW-UP MISSED

2nd week

4th week

6th week

Method: Lateral Internal Sphincterotomy

IMPROVEMENT OF SYMPTOMS	HEALING	FOLLOW-UP MISSED
2nd week		
4th week		
6th week		

INFORMED CONSENT

I, _____ have been told about the study in a language that I understand (_____). I have been told that this is for a dissertation procedure, that my participation is voluntary and I he/she reserve the full right to withdraw from the study at my own initiative at any time, without having to give any reason, and that decision to participate or withdraw from the study at any stage will not prejudice my/his/her, rights and welfare. Confidentiality will be maintained and only be shared for academic purposes.

I hereby give consent to participate in the above study. I am also aware that I can withdraw this consent at any later date, if I wish to. This consent form being signed voluntarily indicates agreement to participate in the study, until I decide otherwise.

I have signed this consent form, before my participation in this study.

Signature of the subject:

Date:

Place:

I, Dr. Anupam choudhary, Post graduate student in Department of General Surgery conducting a dissertation work for award of MS degree in General Surgery.

The study topic is "*Comparative Study of Topical Diltiazem Sphincterotomy and Lateral Internal Sphincterotomy in the Treatment of Chronic Fissure-in-ano"*

I hereby state that the study procedures were explained in detail and all questions were fully and clearly answered to the above mentioned participant /his/her relative.

Investigators signature:

Date:

Place:

KEY TO MASTER CHART

M	**Male**
F	**Female**
DOA/DOE	**Date of Admission/ Date of Examination**
DOP	**Date of Procedure**
DOD	**Date of Discharge**
P	**Present**
A	**Absent**
M	**Mixed**
V	**Vegetarian**
R	**Regular**
I	**Irregular**
POS	**Posterior**
ANT	**Anterior**
LAT	**Lateral**
PHR	**Pharmacological**
SURG	**Surgical**
H	**Healed**
NH	**Not Healed**

MASTER CHART

SL. NO	NAME	AGE	SEX	IP NO	DOA/DOE	DOP	DOD	PAIN DURING DEFECATION	BLEEDING PR	ANAL LUMP	DISCHARGE	PRURITUS	DIET	BOWEL HABITS	SITE OF FISSURE	NUMBER OF FISSURE	SPHINCTER SPASM	PERIANAL EXCORIATIONS	INDURATION	SENTINEL TAG	ANAL PAPILLA	DISCHARGE	TREATMENT GIVEN	HEADACHE	VERTIGO	LOCAL IRRITATION	PERIANAL EXCORIANTIONS	RELIEF OF SYMPTOMS	HEALING OF FISSURE	INCONTINANCE	BLEEDING	INFECTION	PAIN
1	SRIRAMA REDDY	40	M	875220	14-01-13	15-01-13	19-01-13	P	P	P	P	P	M	I	pos	1	P	A	P	P	A	A	surg	-	-	-	-	P	H	A	A	A	A
2	PRASANNA KUMAR G V	34	M	898253	14-01-13	-	-	P	P	P	A	A	M	R	pos	1	P	A	P	P	A	A	phr	A	A	A	A	P	H	-	-	-	-
3	VISHWANATH	40	M	758-S	20-01-13	21-01-13	26-01-13	P	P	P	A	A	M	R	pos	1	P	P	P	P	P	P	surg	-	-	-	-	P	H	A	A	A	P
4	SRINIVAS REDDY	35	M	38316-S	21-01-13	-	-	P	P	A	P	A	M	R	pos	1	P	A	A	P	A	A	phr	A	A	P	P	P	H	-	-	-	-
5	VENKATESHAMMA	33	F	221-S	21-01-13	23-01-13	27-01-13	P	P	P	P	P	M	I	pos	1	P	P	A	P	A	P	surg	-	-	-	-	P	H	A	P	A	A
6	RAMACHANDRAPPA	43	M	885174	24-01-13	-	-	P	P	P	P	A	M	I	pos	1	P	A	P	P	A	A	phr	A	A	A	A	P	H	-	-	-	-
7	ESHWARAPPA	48	M	881402	1/2/2013	5/2/2013	8/2/2013	P	P	P	A	A	M	I	pos	1	P	P	P	P	P	P	surg	-	-	-	-	P	H	P	A	A	A
8	SHANKAR M V	36	M	885948	16-02-13			P	P	P	A	A	M	R	pos	1	P	A	A	P	A	A	phr	A	A	A	A	P	H	-	-	-	-
9	SAMPANGIRAMAIAH	38	M	870200	21-02-13	25-02-13	28-02-13	P	P	P	A	A	M	I	pos	1	P	A	A	P	A	A	surg	-	-	-	-	P	H	A	A	A	A
10	MUBEENA BEGHAM	20	F	892860	23-02-13	-	-	P	P	P	A	P	M	R	pos	1	P	P	P	P	A	P	phr	P	P	A	A	A	NH	-	-	-	-
11	VENKATALAKSHMAMMA	25	F	2054-S	25-02-13	27-02-13	2/3/2013	P	P	A	A	A	M	I	pos	1	P	A	A	P	P	P	surg	-	-	-	-	P	H	A	A	A	A
12	SHANTHAMMA	39	F	892852	1/3/2013	-	-	P	P	A	P	A	M	I	pos	1	P	A	A	A	A	A	phr	A	A	A	A	P	NH	-	-	-	-
13	MAHABUPH PASHA	45	M	2213-S	2/3/2013	4/3/2013	9/3/2013	P	P	P	P	A	M	I	pos/ant	2	P	A	P	P	A	A	surg	-	-	-	-	P	H	A	A	A	A
14	KRISHNAPPA	65	M	994289	8/3/2013	-	-	P	P	A	A	A	M	I	pos	1	P	A	A	A	A	A	phr	A	A	A	A	P	H	-	-	-	-
15	RASAMMA	45	F	2456-S	9/3/2013	11/3/2013	16-03-13	P	P	A	A	A	M	R	pos	1	P	P	P	P	P	P	surg	-	-	-	-	P	H	A	A	A	A
16	JAYARAMAPPA	57	M	884310	2/4/2013	-	-	P	P	P	A	P	V	R	pos	1	P	A	P	P	A	A	phr	A	A	A	A	P	NH	-	-	-	
17	CHINAPPA	57	M	913257	30-05-13	4/6/2013	12/6/2013	P	P	A	P	P	M	I	pos	1	P	P	A	A	P	P	surg	-	-	-	-	P	H	A	A	A	A
18	SURESH SHETTY	45	M	912548	31-05-13	-	-	P	P	P	A	M	I	pos	1	P	A	P	P	A	A	A	phr	A	A	A	A	P	H	-	-	-	-
19	NAGAVENI	33	F	916699	6/6/2013	12/6/2013	15-06-13	P	P	P	P	P	M	I	pos	1	P	A	A	P	A	A	surg	-	-	-	-	P	H	A	A	A	A
20	PRAKASH	42	M	919448	14-06-13	-	-	P	P	P	A	A	M	R	pos	1	P	A	P	P	A	P	phr	A	A	P	P	P	NH	-	-	-	-
21	NARAYANAPPA	38	M	6821-S	17-06-13	20-06-13	24-06-13	P	P	P	A	P	M	I	pos	1	P	A	A	P	A	A	surg	-	-	-	-	P	H	A	A	A	A
22	GANESH	38	M	921336	21-06-13	-	26-06-13	P	P	P	P	P	M	R	pos	1	P	A	P	P	A	A	phr	A	A	A	A	P	H	-	-	-	-
23	MAHADEVAPPA	48	M	921262	21-06-13	25-06-13	28-06-13	P	P	P	A	A	M	I	pos	1	P	A	P	P	P	A	surg	-	-	-	-	P	H	A	A	A	A
24	SATISH S	32	M	900422	29-06-13	-	-	P	P	P	A	A	M	I	pos	1	P	A	P	P	A	A	phr	A	A	A	A	P	H	-	-	-	-
25	ARCHANA	28	F	7472-S	1/7/2013	3/7/2013	7/7/2013	P	P	P	P	P	M	I	pos	1	P	P	A	P	A	P	surg	-	-	-	-	P	H	A	A	A	A
26	MANI	34	M	927843	4/7/2013	-	-	P	P	A	A	A	M	I	pos	1	P	A	A	A	A	A	phr	A	A	P	P	P	NH	-	-	-	-
27	DEVANANDA	30	M	7697-S	6/7/2013	8/7/2013	12/7/2013	P	P	P	P	A	M	I	ant	1	P	P	A	P	A	P	surg	-	-	-	-	P	H	A	A	A	A
28	GOPAL	55	M	904819	8/7/2013	-	-	P	P	P	P	A	M	R	pos	1	P	P	A	P	A	P	phr	A	A	A	A	P	NH	-	-	-	-
29	SULLAPPA	48	M	4249-S	10/7/2013	11/7/2013	15-07-13	P	P	P	P	A	M	I	pos	1	P	A	P	P	P	A	surg	-	-	-	-	P	H	A	A	A	A
30	RAJALAKSHMI	54	F	894800	25-07-13	-	-	P	P	P	A	A	M	I	pos	1	P	A	A	P	A	A	phr	A	A	A	A	P	H	-	-	-	-
31	CHANDRAMMA	27	F	935145	9/8/2013	13-08-13	16-08-13	P	P	P	P	P	M	R	pos	1	P	P	P	P	A	P	surg	-	-	-	-	P	H	A	A	A	A

MASTER CHART

32	KRISHNAMURTHY	38	M	887259	10/8/2013	-	-	P	P	A	A	A	M	I	lat	1	P	A	A	A	A	A	phr	A	A	A	A	P	H	-	-	-	-
33	NARAYAN SWAMY	45	M	9139-S	10/8/2013	12/8/2013	16-08-13	P	P	P	P	A	M	I	pos/ant	2	P	A	P	P	P	A	surg	-	-	-	-	P	H	-	P	P	P
34	NANJUNDAPPA K	78	M	932282	31-08-13	-	-	P	P	P	P	P	M	I	pos	1	P	A	P	P	A	A	phr	P	A	A	A	P	NH	-	-	-	-
35	ASHOK	30	M	941725	31-08-13	3/9/2013	6/9/2013	P	P	A	A	A	M	I	pos	1	P	A	A	A	A	A	surg	-	-	-	-	P	H	A	A	A	A
36	VENKATESH SHETTY	45	M	922064	1/9/2013	-	-	P	P	P	P	A	M	I	pos	1	P	A	A	P	A	A	phr	A	A	A	A	P	H	-	-	-	-
37	ESWAR REDDY	30	M	9861-S	3/9/2013	4/9/2013	6/9/2013	P	P	P	P	P	M	I	pos	1	P	A	P	P	A	P	surg	-	-	-	-	P	H	A	A	A	A
38	GNANA REDDY	52	M	931187	26-09-13	-	-	P	P	A	A	A	M	I	pos	1	P	A	P	A	A	A	phr	A	A	A	A	P	H	-	-	-	-
39	RAGHAVENDRA	26	M	971643	20-12-13	24-12-13	27-12-13	P	P	P	A	A	M	I	pos	1	P	A	P	P	P	A	surg	-	-	-	-	P	H	A	A	A	A
40	NAGHABHUSHAN	33	M	977761	3/1/2014	-	-	P	P	P	P	P	M	I	pos/ant	2	P	A	A	P	A	A	phr	A	A	A	A	P	H	-	-	-	-
41	PARVEEN	28	F	987904	5/2/2014	7/2/2014	10/2/2014	P	P	A	P	P	M	I	pos	1	P	P	A	A	P	P	surg	-	-	-	-	P	H	A	A	A	A
42	RAMADEVI	42	F	720080	14-02-14	-	-	P	P	P	A	A	M	I	pos	1	P	A	P	P	A	A	phr	A	A	A	A	P	H	-	-	-	-
47	SURESH KUMAR	40	M	990303	15-02-14	17-02-14	22-02-14	P	P	P	P	A	M	I	pos	1	P	A	A	P	A	A	surg	-	-	-	-	P	H	A	A	A	A
44	ANITHA	28	F	965960	19-02-14	-	-	P	P	P	A	A	M	I	pos	1	P	A	P	P	A	A	phr	A	P	A	A	P	H	-	-	-	-
43	BASAMMA	65	F	981717	19-02-14	3/3/2014	19-03-14	P	P	P	P	A	M	I	pos	1	P	P	P	P	A	P	surg	-	-	-	-	A	NH	P	A	A	A
46	PILLAPPA	18	M	994220	19-02-14	-	-	P	P	A	P	P	M	I	pos	1	P	A	A	A	A	A	phr	A	A	P	A	P	H	-	-	-	-
49	SUJATHA	29	F	992619	20-02-14	24-02-14	1/3/2014	P	P	P	P	A	M	I	pos/ant	2	P	A	P	P	A	A	surg	-	-	-	-	P	H	A	A	A	A
48	RAVINDRANATH GOWDA	42	M	958077	20-02-14	-	-	P	P	A	P	P	M	I	pos	1	P	A	A	A	A	A	phr	A	A	A	A	P	H	-	-	-	-
45	JAYAMMA	38	F	994988	21-02-14	12/3/2014	23-03-14	P	P	P	A	A	M	I	pos	1	P	A	P	P	A	A	surg	-	-	-	-	P	H	A	P	A	P
50	SRINIVAS	35	M	943988	1/3/2014	-	-	P	P	P	A	A	M	I	pos	1	P	A	A	P	A	A	phr	P	A	A	A	P	NH	-	-	-	-
53	SRINIVAS BM	28	M	996063	1/3/2014	3/3/2014	18-03-14	P	P	P	A	A	M	I	pos	1	P	A	P	P	P	A	surg	-	-	-	-	P	H	A	A	P	P
52	NAGAMANI	31	F	1005352	4/3/2014	-	-	P	P	P	P	A	M	I	pos	1	P	A	P	P	A	A	phr	A	A	A	A	P	H	-	-	-	-
55	LAKSHMI DEVI	40	F	996534	6/3/2014	10/3/2014	18-03-14	P	P	P	P	P	M	I	pos	1	P	P	P	P	A	P	surg	-	-	-	-	P	H	A	A	A	A
54	NETHRAVATHI	35	F	33178	15-03-14	-	-	P	P	A	A	A	M	I	pos	1	P	P	A	A	A	P	phr	A	A	A	A	A	NH	-	-	-	-
57	RATHNAMMA	35	F	955145	19-03-14	24-3-14	2/4/2014	P	P	A	A	A	M	I	pos	1	P	A	P	A	A	A	surg	-	-	-	-	P	H	A	A	A	A
56	MANJUNATH	37	M	994212	21-03-14	-	-	P	P	P	A	A	M	I	pos	1	P	A	P	P	P	A	phr	A	A	A	A	A	NH	-	-	-	-
51	SUDHAMANI	52	F	1005131	28-03-14	15-04-14	24-04-14	P	P	P	A	P	M	I	pos	1	P	A	A	P	P	A	surg	-	-	-	-	P	H	A	A	A	A
58	PRASANNA	22	M	1002935	28-03-14	-	25-03-14	P	P	P	A	A	M	I	pos	1	P	P	P	P	A	P	phr	A	A	A	A	P	H	-	-	-	-
59	ARUN KANTH	25	M	975856	2/4/2014	3/4/2014	5/4/2014	P	P	P	A	A	M	I	pos	1	P	A	P	P	A	A	surg	-	-	-	-	P	H	A	A	A	A
60	GULLNAZ BEGAM	50	F	1008424	3/4/2014	-	8/4/2014	P	P	A	A	A	M	I	pos	1	P	A	A	A	A	A	phr	A	A	A	A	P	H	-	-	-	-
61	VARALAKSHMAMMA	35	F	1002066	3/4/2014	7/4/2014	12/4/2014	P	P	A	A	A	M	I	pos	1	P	P	P	A	A	P	surg	-	-	-	-	P	H	A	A	A	A
62	HARISH KUMAR CS	32	M	997637	24-04-14	-	-	P	P	P	P	P	M	I	pos	1	P	A	P	P	A	A	phr	A	A	A	A	A	NH	-	-	-	-
63	RAVANAMMA D	45	F	2580	5/5/2014	7/5/2014	15-05-14	P	P	A	P	A	M	I	ant	1	P	A	A	A	A	A	surg	-	-	-	-	P	H	A	A	A	A
64	VENKATESH M	44	M	28441	2/7/2014	-	-	P	P	P	A	A	M	I	pos	1	P	A	P	P	P	A	phr	P	A	A	A	A	H	-	-	-	-
65	MD FIYAZ	28	M	26966	9/7/2014	11/7/2014	16-07-14	P	P	A	A	A	M	I	pos	1	P	A	A	A	A	A	surg	-	-	-	-	P	H	A	A	A	A
66	DIVYA PADMINI	19	F	988543	10/7/2014	-	-	P	P	P	A	P	M	I	ant	1	P	A	P	P	A	A	phr	A	A	A	A	A	H	-	-	-	-
67	MUNIVENKATARAVANAPPA	60	M	25434	11/7/2014	15-07-14	25-07-14	P	P	P	P	P	M	I	pos	1	P	P	A	P	A	P	surg	-	-	-	-	P	H	A	A	A	A
68	PARIMALA	45	F	27828	11/7/2014	-	23-07-14	P	P	A	A	A	M	I	pos	1	P	A	A	A	A	A	phr	A	A	A	A	P	H	-	-	-	-
69	VASANTH PATEL	52	M	30429	18-07-14	22-07-14	30-07-14	P	P	P	A	A	M	I	pos	1	P	A	P	P	P	A	surg	-	-	-	-	P	H	A	A	A	A
70	GOWRAPPA	45	M	33098	25-07-14	-	29-07-14	P	P	P	A	A	M	I	pos	1	P	A	P	P	A	A	phr	A	A	P	P	P	H	-	-	-	-