"COMPARATIVE STUDY OF OUTCOME OF OPEN FISTULECTOMY VERSUS FISTULECTOMY WITH PRIMARY CLOSURE IN SINGLE LOW LEVEL ANAL FISTULA"

Submitted By

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Under the guidance of

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LIST OF ABBREVIATIONS

M	: MALE
F	: FEMALE
GS	: GOVERNMENT SERVANT
FAR	: FARMER
STU	: STUDENT
BM	: BUSSINESSMAN
HW	: HOUSWWIFE
DOA	: DATE OF ADMISSION
DOD	: DATE OF DISCHARGE
Y	: YES
NO	: NO
DM	: DIABETES MELLITUS
HTN	: HYPERTENSION
ANT	: ANTERIOR
POST	: POSTERIOR
LAB	: LABOURER
GROUP I	: FISTULECTOMY WITH PRIMARY CLOSURE
GROUP II	: OPEN FISTULECTOMY

ABSTRACT

BACKGROUND

Fistula in ano was amongst the earliest lesions to be recognized. It his generally accepted that the majority of them follow suppuration of anal glands opening in the anal crypts. Fistula-in-Ano is the most common and an intriguing problem of the Ano-rectal region in general population. Fistulectomy with primary closure in low anal fistula and its beneficial in terms of specific outcomes like short hospital stay and early recovery to work in comparison to open fistulectomy.

OBJECTIVES:

To compare the study of outcome of open fistulectomy versus fistulectomy with primary closure in low anal fistula and it's beneficial in terms of specific outcomes.

MATERIAL AND METHODS:

A prospective interventional study was done with 30 randomly selected patients assigned to the open fistulectomy & 30 for primary closure. All patient were studied clinical findings were noted and followed up for 1 year.

RESULTS:

Majority of the patients in both groups presented with discharge and swelling in perianal region. There is a significant difference between duration of "stay" of patients of open 11.46 days & closed systems 7.93 days (P value 0.0001). There is a significant difference between duration of "wound healing" of patients of open is 26.73 days & 9.79 days is closed systems (p value 0.0001). Patients who had undergone fistulectomy with primary closure had a mean VAS pain score of 3.36 while patients who had undergone open fistulectomy had a mean VAS pain score of

7.4 on the first postoperative day. Hence we followed up the patients for 1 year in low level anal fistula and we noted no recurrence in the study group.

CONCLUSIONS

The study proved that primary closure after fistulectomy showed better results in terms of patient compliance, lesser pain management, and short hospital stay in compare to open fistulectomy.

KEY WORDS: Fistula in Ano, Fistulectomy.

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INTRODUCTION

Fistula in Ano was amongst the earliest disease to be recognised. It is generally accepted that the majority of them follow suppuration of anal glands opening in the anal crypts.[1]

Fistula-in-Ano is the most common and an intriguing problem of the Ano-rectal region in general population.

Fistula-in-Ano is a preventable disease provided the perianal – perirectal suppurations are treated timely and in a corrective manner. The location of the diseased part makes the patient refrain from early consultation.

The common pathogenesis is the bursting open of an acute or inadequately treated ano-rectal abscess into the peri-anal skin.[2]

The chronicity with its annoying symptoms like soiling of the under garments, itching, repeated abscess formation, makes an otherwise healthy and active person lose their earning capacity, with lowered self-confidence.

Open fistulectomy, though considered as the standard treatment for fistula in ano, fistulectomy with primary closure has the merits of short hospital stay for patients, early wound healing, lowers costs and is a safe procedure.[3]

Though fistulectomy with primary closure was established as the better method, there is lacking evidence to support the same in recent times.

Hence in our study we intend to find out the effectiveness of the fistulectomy with primary closure, even in current time.

AIMS &OBJECTIVES OF THE STUDY

To compare the efficacy of fistulectomy with primary closure and with open fistulectomy in a single low anal fistula.

REVIEW OF LITERATURE

"Fistula" is the Latin word for a reed pipe or flute. In surgery, it implies a chronic granulating tract connecting two epithelial lined surfaces. These surfaces may be cutaneous or mucosal.[1]

This disease is as old as mankind itself. Fistula in ano management was described by Hippocrates as early as 450 BC. In 2500 B.C. the well-known ancient surgeon of India - Sushrutha has conducted operation on Fistula-in-Ano. This was known as "Salya tantra". Sushrutha traced the source of origin of fistula in ano known as "Murma" to the abscess in the perianal region. He had various instruments in his armamentarium for the surgery on fistula in ano.

Even though the details of fistula operation are not available in Egyptian medicine, the instrument which might have been used for the operations of fistula-in-ano, have been unearthed from the ruins of Pompeli. There are records to show that the operation was carried out during the middle ages.

The actual record available in the history of medicine for fistula in ano is during the 14th century. It was John Ardene, the surgeon of the late 14th century and early 15th century who conducted the operation for fistula-in-ano.

King Louis XIV had developed an anal fistula as declared officially by his court of physicians and surgeons and he was operated for the same on November 17 1686 by Charles Francois Felix by using his own instrument called "Le Bistouri ala Royale" which is a slight modification of Galen's syringotome. The king was operated successfully again on 10th December 1686 by the same surgeon. At a later stage the method of opening the fistula by cutting was replaced by a tight ligature which was passed along the tract with a strong silk or India rubber tube in order to produce necrosis of the overlying tissue.

Percival Pott (1714-88) worked in Bartholomecu's hospital and produced a paper on fistula-in-ano in 1765.

In 1779, Sir Percival Pott advocated strongly with his vast experience, that simple incision of fistula in ano and careful dressing by packing the wound was better than tight ligature.

Fredric Soloman modified this by adding another incision at the outer end of the wound in the form of "T". This is known as "Soloman's back cut" and this was designed to prevent the premature healing of the wound.

Goodsal and Miles (1900), Atwington (1901), Tuffer (1903) and Mummery (1934) contributed very much to the surgery for fistula-in-ano specifying the extent of sphincters that may be sacrificed without causing incontinence, which is a dreaded complication.

More recently the methods of primary suture and skin grafting came into existence.Hughes (1953-61) emphasized on primary or delayed primary grafting and claimed 80% success.[4]

Chassaignac in 1856 and Stephen Smith in 1879 had tried primary suturing. It was Starr[3](1953-59) who improved the technique and recorded gratifying results.

Similar studies conducted in 1996 revealed fistulectomy with primary closure is worth.[5,]

Fistulectomy with primary closure was recommended by Starr [3] (1949) of Sydney, using sulphonamides or antibiotics for bowel antisepsis, pre and postoperatively.

C.M. Shahbaz, A. Ghazanfar and A.R.Goraya carried out a prospective study in Mayo hospital, Lahore from January 1998 to December 2000 comparing fistulectomy and fistulectomy with primary repair for low fistula in

ano. They concluded that fistulectomy with primary closure is a better choice than fistulectomy alone.[6]

A.C. Dash and Prakash Agarwal [7]conducted a comparative study of surgical techniques for fistula in ano in 1997. 50 patients admitted within a span of 2.5 years were included in this study. They concluded that, as fistulectomy with primary closure had the merits of short hospital stay for patients and early wound healing, it should be the operation of choice of low anal fistula.

Toccaceli S, Minervini S et al in 1993 [8] concluded that fistulectomy with primary closure is a safe procedure indicated in the treatment of anal fistula in consideration of earlier healing and minor costs.

Prakash S, Laksmiratan V and Gajendran V [9] conducted a study on treatment of fistula in ano in 1985. One hundred and twenty cases of fistula were treated by fistulectomy with primary closure over a span of 11 years. Of the cases , 83.3% healed well in 2 weeks as compared with 4-5 weeks or more with conventional methods.

Ahmed S, Perwaiz N, Naseem R, Mahmood T. Repair of fistula in Ano[10]:Is primary closure worth in 2006. A fistulectomy and primary closure of low fistula in ano, sound healing can be achieved in over 97% of cases with amazingly early return to work.

Sushil Damor et al (2013) 8.24 days of healing took in closer group & 21.24 in open methods.[11]

In Stewart M.P. et al study, primary closure (64 patients) and open Group (73 patients), healing was faster in primary closure 7.0 days Compared to 25.1 days in open group.[8]

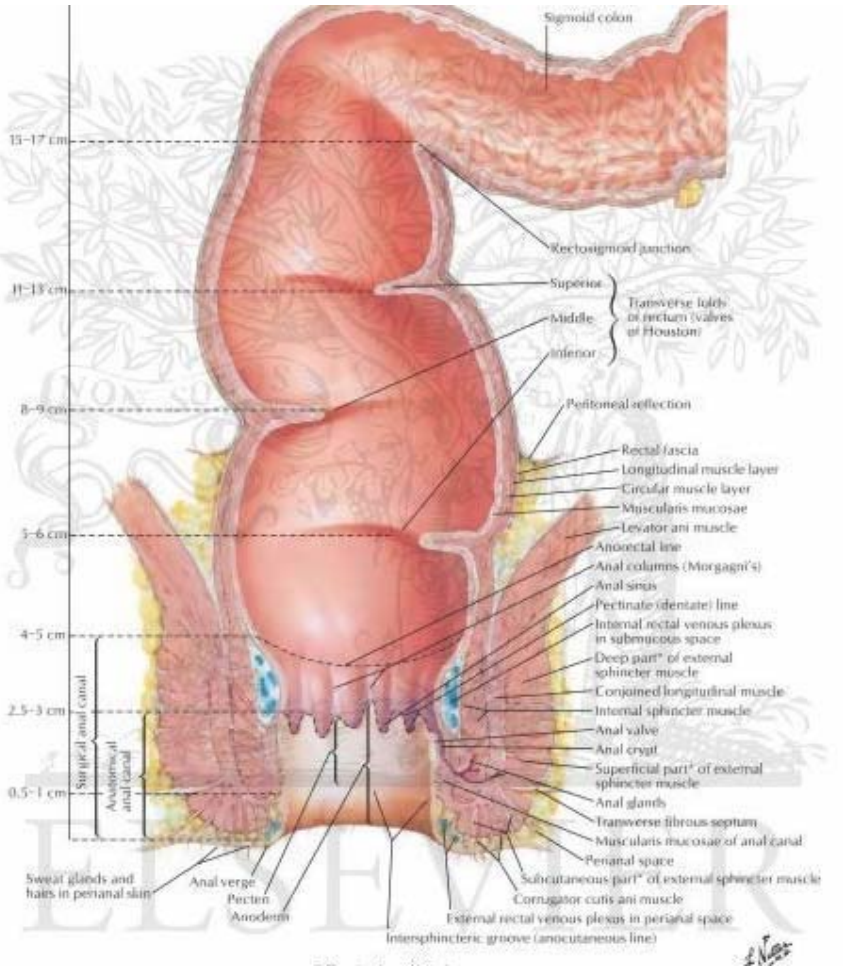


Fig 1. Anatomy of the Rectum and Anal canal

Surgical Anatomy of the Anorectal Region

A complete knowledge of the anatomy of the anorectal region is absolutely necessary to understand the surgery of fistula-in-ano

DEVELOPMENT OF RECTUM AND ANAL CANAL [12]

The hindgut is formed from the secondary yolk sac as the result of the development of the tail fold. It gives origin to the left third of transverse colon, the rectum, the upper part of the anal canal and to a considerable part of the genito-urinary system.

The part of the hindgut caudal to the allantois dilates to form a pouch termed the 'endodermal cloaca' and in its ventral wall the cloacal membrane is formed. Later the cloacal membrane comes to lie at the bottom of a shallow depression termed the 'Ectodermal cloaca'. The hindgut and allantois open into the endodermal cloaca. Its wall is pierced by mesonephric ducts in the fifth week.

After the development of urorectal septum the cloaca is divided into a dorsal segment which forms the rectum and a ventral segment which forms the urinary bladder and the urogenital sinus which are covered caudally by anal membrane and a urogenital membrane, respectively.

The lower part of the anal canal is formed from the proctodeum but it's upper part is endodermal in origin. The line of union corresponds with the edges of the anal valves in the adult.[13]

RECTUM[14]

The rectum begins from the recto sigmoid junction opposite 3rd sacral vertebra and ends 2 – 3 cms in front and below the tip of the coccyx. It turns abruptly downwards and backwards through the Levator ani muscle to become anal canal almost 4 cms from the anal verge.

It makes an angle 120° with the anus with the convexity directed anteriorly due to pull of the puborectalis muscle sling. This is called carrying angle or anorectal angle.

CURVATURES

Though the term "Rectum" means straight, the rectum is straight only in infants. The rectum fits into the hollow of the sacrum forming the sacral curvature. In infants this curvature of the rectum is not developed. The rectum also has 3 lateral curvatures with the upper and lower curvatures having convexities to the right and the middle curvature has convexity to the left.

INTERNAL STRUCTURES

Opposite the lateral convexities of the rectum the mucosa shows prominent semicircular folds called the "Valves of Houston". Two such valves are present on the left and one on the right side. The middle valve is most prominent and is called "Kohlrausch's fold". The middle third of the rectum just below the middle valve is much wider and is called the ampulla of the rectum.

PERITONIAL RELATIONS:

The adult rectum is about 18 – 20 cms long when is straight, and is divided into upper, middle and lower thirds. The upper third of the rectum has peritoneal coverings on its anterior and lateral aspects. The middle third has peritoneal covering only anteriorly while the lower third is devoid of any peritoneal covering. However

the lower third of the rectum has two fascial condensations, anteriorly the fascia of "Denonvilliers" and posteriorly the fascia of "Waldeyer".

Denonvilliers fascia separates rectum from the prostate in front and Waldeyers fascia separates it from the coccyx and last two sacral vertebrae.

These fascial layers are surgically important as they are a barrier to malignant penetration, and are valuable guides at operation.

RELATIONS

- Anteriorly the rectum is related to the bladder, ureter, prostate, seminal vesicle in males and uterus and vagina in females. Laterally it is related to the Ischiorectal fossa and levator ani muscles.
- Posteriorly, it is related to S3, S4, S5 vertebrae, median sacral vessels and mesorectum.

FASCIA AROUND RECTUM

The parietal layer of pelvic fascia is condensed laterally, attaching the rectum to the 3rd piece of the sacrum. This is called the lateral ligament of the rectum. The visceral layer of pelvic fascia investing the rectum is called the fascia propria.

ANAL CANAL[14, 15]

The anal canal (Milligan et al 1937, Gabriel 1945, Wilde 1949, Goligher et al 1955, Fowler 1957) begins where the rectal ampulla, suddenly narrows, passing down and backwards to the anus. It is about 4 cms long in adults, its anterior wall being slightly shorter than its posterior. When empty its lumen is a sagittal or triradiate longitudinal slit.

- Posteriorly: The canal is separated from the tip of the coccyx by fibro fatty and muscle tissue known as an coccygeal ligament.

- Anteriorly: It is separated by the perineal body from the membranous urethra and penile bulb or from the lower vagina. Laterally are the ischiorectal fossae and over its whole length it is surrounded by sphincters which normally keep it closed.

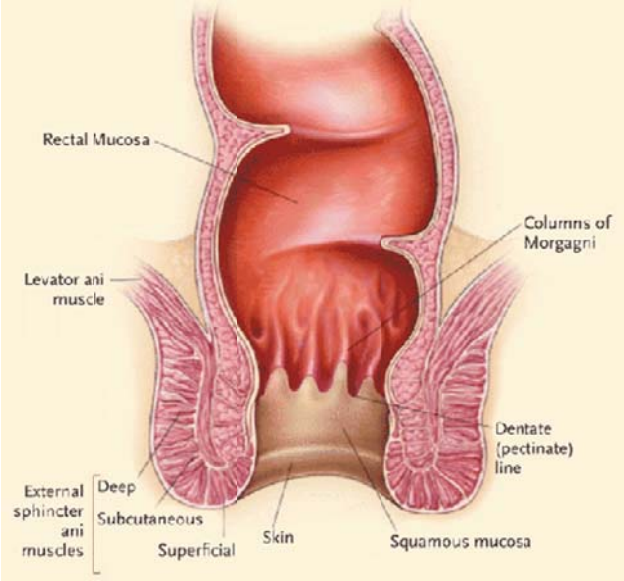


Fig 2. Lower Rectum and Anal canal

THE (MUCOUS MEMBRANE) LINING OF THE CANAL[16]

The mucosa of the lower part of the rectum is pale pink and semitransparent, the branching pattern of the superior rectal vessels being visible through it. The upper half (15mm) of the canal is also lined by mucosa, plum-red in colour due to blood in the subjacent internal rectal venous plexus.

The epithelium is variable in the upper part, it is similar to that of the rectum, consisting of simple columnar cells, some secretory and others absorptive, with numerous tubular glands or crypts. In the lower half, this gives way to non-keratinized stratified squamous epithelium, finally merging with the keratinized stratified squamous epithelium of the perianal epidermis.

In this part of the canal, there are six to ten vertical folds, the anal columns, well-marked in children but sometimes less defined in adults. Each column contains a terminal radicle of the superior rectal artery and vein, these radicles being largest in the left lateral, right posterior and right anterior quadrants of the wall of the canal. Enlargements of venous radicles in these three sites constitute primary internal hemorrhoids. The lower ends of the columns are linked by small crescentric mucous folds, and valves, above each of which is a small recess or anal sinus.

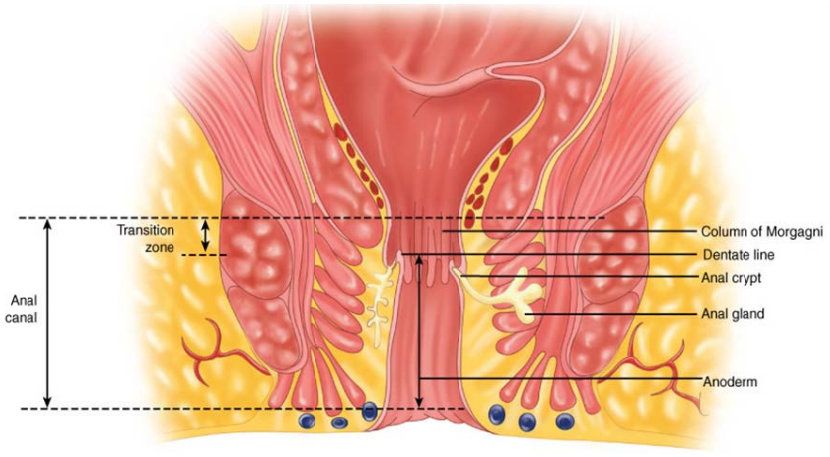


Fig 3. The lining of the anal canal

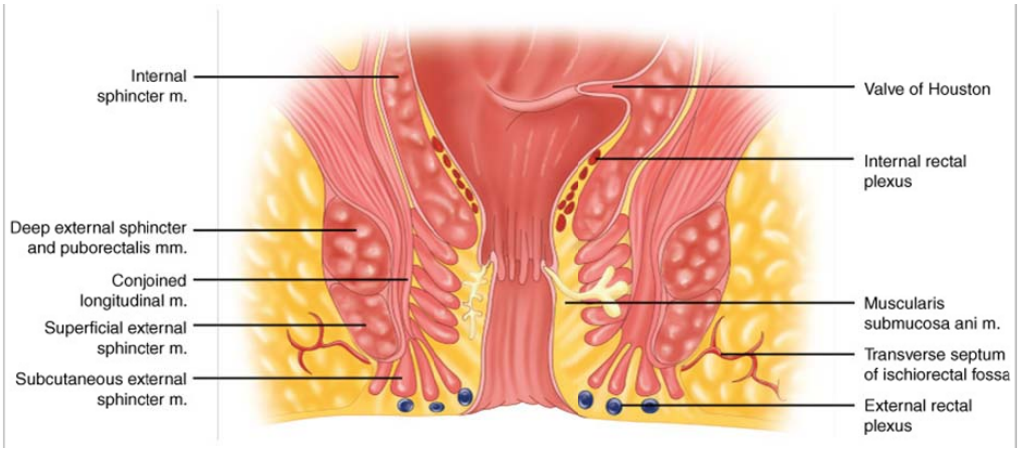


Fig 4. The distal rectum and anal canal

The anal canal extends about 15mms below the anal valves as the transitional zone, whose epithelium is non- keratinized stratified squamous epithelium.

ANATOMICAL AND SURGICAL IMPORTANCE OF THE DENTATE (PECTINATE) LINE

It is a very important land mark.

1. It forms the embryological watershed between visceral structures above and somatic structures below the line.
2. The mucosa above the line has an autonomic nerve supply and is thus insensitive to cutting and pricking. Skin below is supplied by the inferior rectal branch of the pudendal nerve and is acutely sensitive to these stimuli.
3. The venous drainage of the mucosa is upwards into the inferior mesenteric and portal circulation. The skin below drains into the systemic venous circulation. This is relevant to the spread of malignant tumors.
4. The lymphatic drainage above the dentate line is upwards and similar to that of rectum. Below the lymph drains down and out to the inguinal lymph nodes.

The lymphatic spread of malignant tumors and infections in this area will thus differ.

5. Internal hemorrhoids develop just above this line.
6. The anal glands open into the anal sinuses above the anal valves at this level, and infection in an anal gland may lead to an anal abscess which may extend into the ischiorectal space or the peri-anal space.
7. A crack or fissure in the skin of the anal canal extending from the dentate line to the anal verge, and usually lying in the midline, is associated with local inflammation and spasm of the sphincter, causing severe pain on defecation in this sensitive area with its rich somatic nerve supply. A fissure-in-ano is sometimes caused by rupture of one of the anal valves.
8. Stimulation of nerve endings in the region of the dentate line may initiate reflex or voluntary changes in sphincter tone.

ANAL VALVES OF BALL:

These are a series of transversely placed semilunar folds linking the Columns of Morgagni. They lie along and actually constitiute the waviness of the dentate line. They are functionless remnants of the fusion of the post- allantotic gut with the proctodeum.

CRYPTS OF MORGAGNI (ANAL CRYPTS) [17]

These are situated in the lower extremities of the columns of Morgagni as small pockets. The anal glands open into the crypts mostly those situated posteriorly by a narrow duct. The duct bifurcates and the branches pass outwards to enter the internal sphincter muscle in 60% of people. Issuing from the ampulla, there are 3-6 tubular sub-branches that extend into the intramuscular connective tissue where they end blindly. Infection of an anal gland can give rise to an abscess and infection of the

anal gland is the most common cause of anorectal abscess and they may also be last site of origin of adenocarcinoma according to Dukes and Galvin.

ANAL CANAL MUSCULATURE

Internal Anal Sphincter

It is a thickened continuation of circular muscle coat of the rectum. This involuntary muscle commences where the rectum passes through the pelvic diaphragm and ends at the anal orifice, where it's lower border can be felt. The internal sphincter is 2.5cm long and 2.5 mm thick. When exposed, it is pearly white in colour. Spasm and contracture of this muscle play a major part in fissure and other anal infections. Internal anal sphincter is under control of the autonomic nervous system. It is partly muscular and partly fibrous tissue, it runs down to end as fibrous bands passing through the peri-anal fat and lower part of the external sphincter, to be attached to the skin.

External Anal Sphincter

Sphincter ani externus surrounds the whole anal canal, it is usually described as consisting of three parts, all composed of skeletal muscle. These are the subcutaneous, the superficial and the deep portions.

Subcutaneous part

The subcutaneous part is a flat band, about 15mm, broad, around the lower anal canal and lies horizontally below the lower borders of the internal sphincter and superficial part of the external sphincter. It lies beneath the skin at the anal orifice and is inferior to the Dentate line.

Superficial part

Is elliptical and superior to the subcutaneous, it is the only part attached to bone, arising from the posterior surface of the terminal coccygeal segment by the

median anococcygeal raphe. Anteriorly it surrounds the lower part of the internal sphincter and is chiefly attached to the perineal body.

Deep part:

The deep part is a thick annular band around the upper part of the internal sphincter; its deeper fibers blend inseparably with the puborectalis. Anterior to the anal canal many fibers decussate into the superficial transverse perineal muscles, especially in females. Some posterior fibers are usually attached to the ano coccygeal raphe.

The external sphincter can voluntarily contract to occlude the anus firmly.

Nerve supply is derived from the inferior rectal branch of the pudendal nerve (S2 and S3) and the perineal branch of the fourth sacral nerve.

Longitudinal Muscle

It is a continuation of the longitudinal muscle coat of the rectum intermingled with fibres from the puborectalis. Its fibres fan out through the lowest part of the external sphincter to be inserted into the true anal and perianal skin, thus connecting the corrugators cutis ani of Ellis.

Levator ani muscle

A transverse line at the level of the ischial tuberocity, divides the diamond shaped perineum into an anterior urogenital triangle and posterior anal triangle.

The levator ani muscle is the chief muscle of the anal triangle and forms the pelvic diaphragm. It consists of 3 parts namely, the pubo coccygeus, arising from the back of the pubis, the Iliococcygeus, arising from the back of the ilium and the coccygeus arising from the ischium. All groups insert into the anococcygeal body and coccyx bone. Of these the puborectalis is the most important muscle and is the inner most part of pubococcygeus muscle. It forms a sling at the anorectal junction and can be

palpated along with the sphincteric muscles at per rectal examination, as the ano rectal ring.

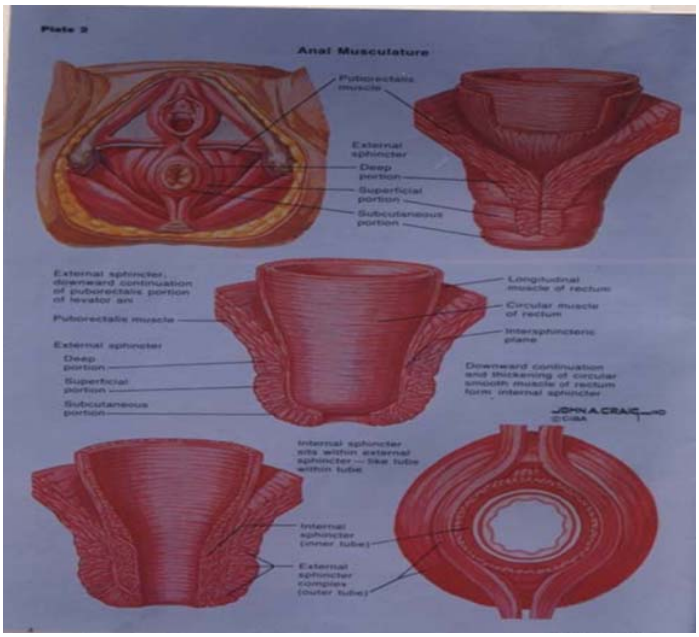


Fig 5. Anal Musculature

Ano Rectal Ring[17]

It marks the junction between the rectum and anal canal. It is formed by the fusion of puborectalis muscle, external sphincter, conjoined longitudinal muscle and internal sphincter which is palpable in the anal canal. The ring is stronger posteriorly and laterally, than anteriorly. It can be clearly felt digitally especially in its posterior and lateral aspects. Recognition of the anorectal ring is of paramount importance in the treatment of abscess and fistulae in the anal region for its complete division inevitably results in permanent rectal incontinence.

SPACES IN RELATION TO ANAL CANAL[18]

Perianal Space

It contains finely lobulated fat. Laterally it becomes continuous with the subcutaneous fat of the buttocks. Medially it may be considered as extending into the lower part of the anal canal where it is lined by modified skin probably as far

proximally as the site of Park's mucosal suspensory ligament. The space may also be said to contain the lower part of external sphincter.

Subcutaneous Space

This space lies between the internal sphincter and the mucocutaneous lining of the proximal two-thirds of the anal canal. Below, it probably extends down to the level of Park's mucosal suspensory ligament and above it becomes continuous with the sub mucous layer of the rectum. It contains internal haemorrhodial plexus and related terminal branches of the superior haemorrhoidal artery.

Pelvi Rectal or Supralevator Space:

This term is applied to the potential space between the pelvic peritoneal floor and the levator ani muscles, partly on either side in the area occupied by the loose connective tissue of the lateral ligament of the rectum and partly in front and behind the rectum. The pelvi-rectal space communicates with the Ischio rectal space through the hiatus of Schwalbe which is a gap in the attachment of the levator ani to the obturator internus fascia laterally.

Ischiorectal Fossa:

This is a wedge shaped space filled with fibrous fat lying on each side of the anal canal and lower part of the rectum. The fossae communicate with each other behind the anal canal. The fossa is pyramidal in shape. It is 5cm deep and 2.5cm wide.

Boundaries:

- Laterally: The fascia covering the obturator internus muscles and the ischial tuberosity.
- Medially: The fascia covering the levator ani muscle; the external sphincter of the anus.

- Posteriorly: Sacrotuberous ligament, on the posterior surface of which is the gluteus maximus muscle.
- Anteriorly: Urogenital diaphragm.

Under the skin is a large pad of fat filling the fossa. Here there is no deep fascia such as exists elsewhere just under the skin. The deep fascia is separated from the skin by the whole thickness of the pad of fat filling the fossa. This fascia is named the 'Fascia lunata'.

The two ischiorectal fossae communicate with each other behind the anal canal, below the levator ani and above the external sphincter by the retro sphincteric space of Courtney. Hence infection from one ischiorectal space can spread to the other, to form a horse shoe abscess or fistula. A thin transverse fascia at the level of the white line of Hilton, divides ischiorectal fossae into an ischiorectal space superiorly, forming upper 2/3, filled and the perianal space below.

FASCIA LUNATA

Relations

- Medially: It covers the fascia on the levator (anal fascia) and ends at the lower end of the levator.
- Laterally: Covers fascia on obturator internus (obturator fascia) and is attached to the ischium. The internal pudendal vessels and nerves are between these two layers which form the pudendal canal.
- Anteriorly: The fascia fuses with the urogenital diaphragm.
- Superiorly: The upper arched portion of the fascia is called the tegmentum. There is a space between this tegmentum and the apex of the fossa, which is the suprategmental space and contains fat.

THE PUDENDAL CANAL

The pudendal canal runs forwards on the lateral wall of the fossa 3-8cm above the lower border of the ischial tuberosity, leading from the lesser sciatic foramen posteriorly to the perineal membrane anteriorly. It contains the internal pudendal vessels and pudendal nerve. The artery gives the inferior rectal branch at the posterior part of the canal and the perineal branch at the anterior end

ARTERIAL SUPPLY OF RECTUM

Superior Rectal Artery

This constitutes the chief arterial supply to the rectum.It is the direct continuation of the inferior mesenteric artery. It divides into a right and left branches at the level of the third piece of the sacrum. The right branch again divides into an anterior and a posterior branch about half way down the rectum. The terminal branches run straight downwards, each in a column of Morgagni. At the level of internal sphincter this artery anastomoses with branches of middle and inferior rectal arteries.

Inferior Rectal Artery

This is a branch of internal pudendal artery. It crosses the upper part of the ischiorectal fossa. Its branches supply the anal sphincters, anal canal and the skin of the anal margin.

Middle Rectal Artery

This is a branch of internal iliac artery, which runs in close proximity to the lateral ligament of the mid rectum. This supplies the lower rectum and the upper anal canal.

Middle Sacral Artery

It is a small vessel arising form the back of the aorta just above the bifurcation. The branches of it supply the posterior surface of the rectum (anorectal junction and anal canal).

An additional source of blood supply to the lower rectum may be from branches of internal pudendal artery that ramify in the pubococcygeus and transverse perineal muscle.

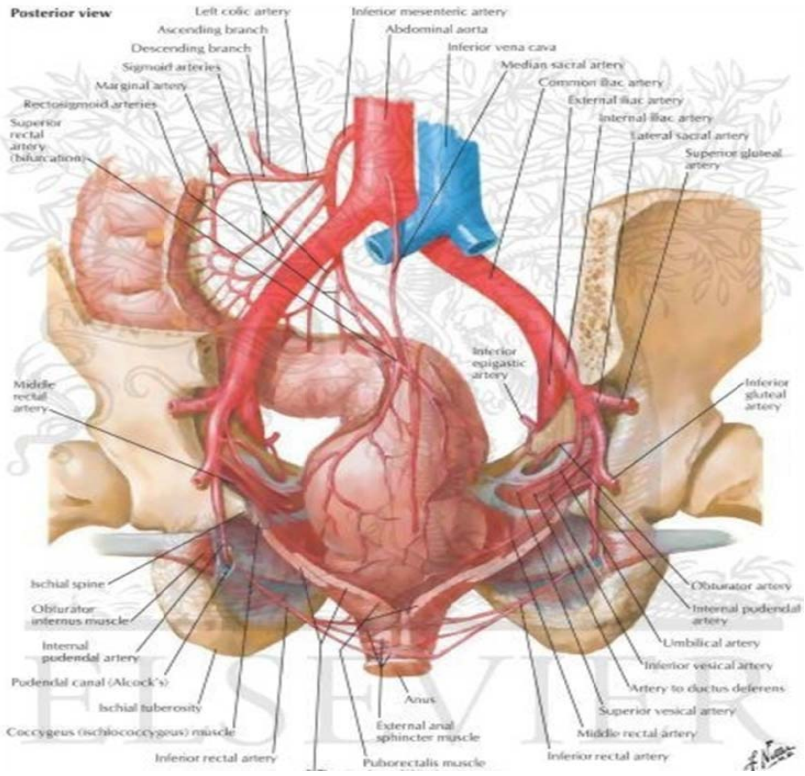


Fig 6. – Arterial Supply of Rectum and Anal Canal

VENOUS DRAINAGE OF THE RECTUM AND ANAL CANAL

Internal Rectal Venous Plexus

It lies in loose sub mucosa of the anal canal and extends from the levelof the dentate line to that of the anorectal ring. These plexus drains into about six collecting veins which are situated in the sub mucosa of the rectum. About half way up the rectum these branches pierce the rectal wall and unite outside to form superior rectal vein which is an important tributary of the portal vein. The middle rectal veins are small and drain into the internal iliac veins.

External Rectal Venous Plexus

It lies under the skin of the anal canal, below the dentate line and beneath the skin of the anal margin. These plexus communicate with the internal rectal plexus beneath the endoderm through communicating veins. The lower part of the venous plexus, drain into the internal iliac veins through the internal pudendal veins, which provide a link between portal and systemic venous system.

Lymphatic Drainage of the Rectum and the Canal:

The lymphatic of the mucocutaneous lining and that of the muscle coats intercommunicate freely. There are three main sets of lymph nodes:

1. **Superior Rectal Lymph nodes**

These nodes lie close to the superior rectal vessels. They are the para-rectal lymph nodes of Gerota which are the lymph nodes placed close to the rectal wall, in the region of ampulla, just above the levator ani muscle.

2. **Middle Rectal Lymph nodes**

These are in relation to the middle rectal vessels and lie in the lateral ligament of the rectum. From here they pass to the lymph nodes around the internal iliac vessels.

3. **Inguinal Lymph nodes**

This group drains the anus and the lower portion of the anal canal.

NERVE SUPPLY

The nerve supply of the rectum is derived from both the parts of the autonomic nervous system. The internal sphincter is supplied by the sympathetic and parasympathetic of which the former is motor and the latter is inhibitory to the sphincter. Sympathetic are derived by the way of superior and inferior hypogastric plexus and the parasympathetic is from the sacral outflow via inferior hypogastric plexus.

The external sphincter has two sources of supply on either side from the inferior haemorrhoidal branches of internal pudendal nerve and perineal branches of the fourth sacral nerve. The levator ani muscles are supplied by fourth sacral nerve on the pelvic aspects and on the perineal aspect by the perineal branches of pudendal nerves.

PHYSIOLOGY[19]

MECHANISM OF ANORECTAL CONTINENCE:

The anorectal continence is maintained by a series of mechanisms.

Primary mechanism

The puborectalis sling forming the anorectal ring, crosses the rectum anteriorly and plays the most crucial role in maintaining continence. The secondary mechanisms are the intrinsic tone in the internal sphincter ani muscle, the voluntary contraction of the external sphincter ani muscle and the compression of ischiorectal and ischio anal fat by the gluteus maximus muscle, which in turn keeps the anal canal and the rectum in a collapsed state.

The three theories of anorectal continence put forth are

1. **Pressure zone theory**

The intraluminal pressure within the rectum is less than 20mm Hg while that within the anal canal is 20 – 120 mm Hg. This difference in pressures is one mechanism for continence.

2. **Flutter valve theory**

The levator ani muscle at the anorectal junction is thought to act like a flutter valve and maintain continence.

3. **Sling theory**

The puborectalis muscle as explained above; forming a sling around the anorectal junction forms the most important mechanism of continence.

4. **Crypto glandular theory**[20]

Suppuration of the anal glands as the origin of most anorectal infections in posterior midline empty into the anal canal at level of dentate line and penetrate into surrounding sphincter to variable depth leading to fistula in ano.

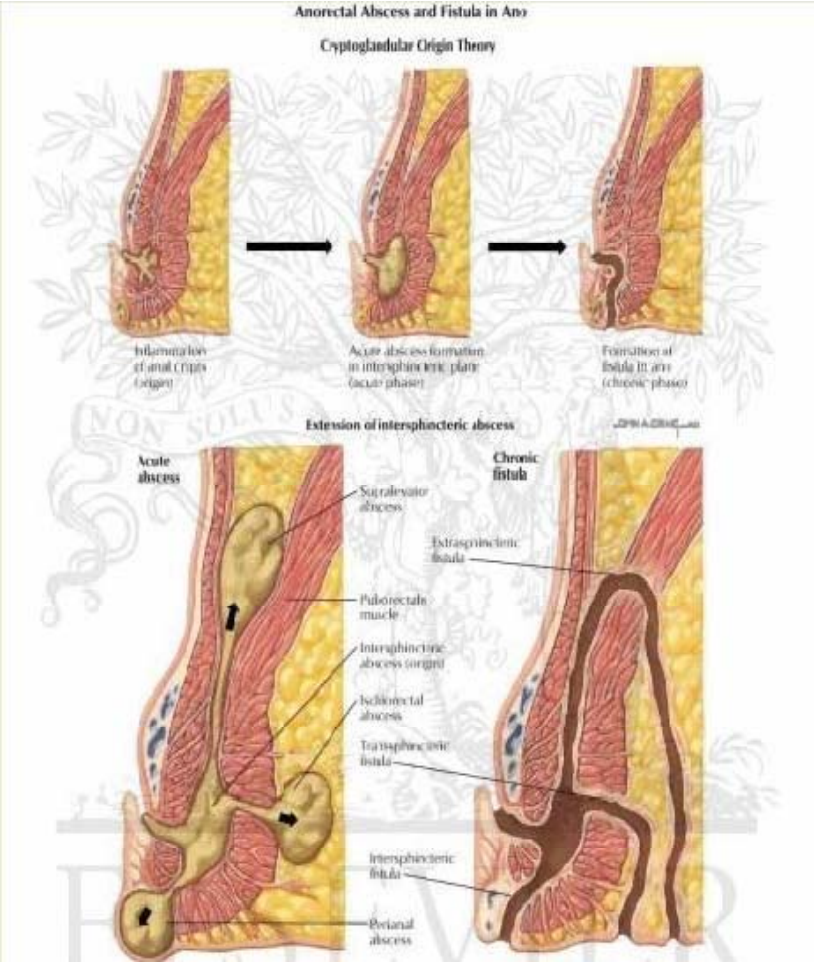


Fig. 7- Anorectal Abscess and Fistula in Ano

Crypto glandular origin Theory

AETIOLOGY AND CLASSIFICATION[1, 21]

"Fistula" is the latin word for a reed pipe or flute. In surgery, it implies a chronic granulating tract connecting two epithelial lined surfaces. These surfaces may be cutaneous or mucosal. Fistula-in-ano is a tract line by granulation tissue which opens internally in the anal canal or rectum and superficially on the skin around the anus[22].

The wall of the tract is composed of a thick tough layer of fibrous tissue which, in the intact fistula forms a fibrous tube lined on its inner aspect by a layer of granulation tissue. Its structure is seen to best advantage when the fistula is laid open at operation and the thick velvety inner coat of granulation is scraped off the white fibrous base.

C.G. Marks et al defined anal fistulas as a tract or a cavity communicating with the rectum or anal canal by an identifiable opening.

Etiology

The etiological factors to be considered here are:

1. Previous pyogenic abscess (perianal abscess).
2. Crohn's Disease (regional enterocolitis)
3. Tuberculosis.
4. Ulcerative colitis.
5. Carcinoma of the rectum and anal canal.
6. Lymphogranuloma venereum.
7. Actinomycosis of the ano-rectal region.
8. Other rectal conditions after obstetrics and gynecological operation.
9. Pelvic inflammation.

PATHOLOGY[23]

The fistulous tract has got two openings. The internal opening in the rectum or the anal canal is the primary opening and the external opening on the skin is the secondary opening. The fistulous tract is made of fibrous tissue, layered by unhealthy granulation tissue on its internal surface. Since the primary opening is communicating internally with the anal canal, the presence of fecal particles and anal micro – organisms maintains the chronicity of the fistula. Also, the high adipose content associated with relatively low vascularity in the region contributes to the chronicity. Since more than 1 gland can open into a crypt, a fistula tract may have several external openings but the internal openings is almost always single. Furthermore, presence of multiple external openings is pathognomonic of conditions like tuberculosis, inflammatory bowel disorders and sometimes LGV infections. The density of anal glands is more in the posterior part of the anal canal and this accounts for the higher incidence in the posterior half of the perianal region.

1. Previous Pyogenic Abscess

Anorectal abscess arises in the anal crypts and in the intermuscular glands. Because of the anatomical specificities of the anal canal, suppuration seldom clears spontaneously, and may persist even if drained inadequately. Thus recurrent infection is the primary cause of chronicity of fistula (Park). However for this chronicity certain hypothetical explanations have been given.

- If an internal opening into the anal canal is clearly present, as in the abscess associated with fissure or any other anorectal abscess, then repeated reinfection of cavity may occur with establishment of fistula. Sometimes foreign body like fish bone, egg shell may get lodged in the abscess cavity to maintain the chronic infective process.

- The fatty tissues around the anus have a poor resistance to infection, or that repeated retrograde infection has occurred from the external opening in the highly contaminated perianal skin.
- The anal sphincters may impede the drainage of the abscess cavity.

In children under 5 years, the congenital cyst of the anal glands is the cause of the perianal abscess. In adults the fistula-in –ano is quite common.

2. **Crohn's Disease** [24]

An important predisposing cause for anal abscesses and fistulae is Crohn's disease. In a series of 332 cases of Crohn's disease treated at the Leeds General infirmary, 16% had anorectal abscesses and 20% anal fistulae. Small intestinal primary Crohn's complication of fistula was 10%, but when the large bowel was involved, the incidence of abscess rose to 21% and fistula to 25%. When the rectum itself was implicated the figures rose to abscess 23% and fistula 35%.

Mornon and Lockhart – Mummery have pointed out, the characteristic histological appearance of Crohn's disease, with non – caseating giant cell follicles are often seen in the granulation tissue of secondary anal abscesses and fistulae studied[25].

3. **Tuberculosis**

It has long been known that anorectal abscess and fistula – in – ano may be due to a tuberculosis infection. This occurs as a well – recognized complication in patients with known pulmonary tuberculosis lesions. Granet has reported from the Sea View sanatorium of New York about 16% incidence of abscess and fistulae due to tuberculosis. The method of infection of the anal region in these cases is presumably that tubercle bacilli are swallowed in the sputum and enter the perianal tissue through minute abrasions of the lining of the anal canal.

Nowadays in developed countries the incidence of tuberculosis as aetiopathological cause has come down.

4. **Ulcerative Colitis**

Another predisposing cause for development of anorectal abscess and fistula is ulcerative colitis. In Goligher series of 465 cases of ulcerative colitis 82 patients suffered from the ano – rectal complication and 25 of them (i.e.5.48% presented with fistula –in-ano Dombel et al. Sloan et al, Jackman (1954) Highower et al (1958), Edward and Truelove (1964), Waugh et al (1964) all reported ulcerative colitis as one of the cause for the fistula-in-ano with almost same percentage as that of Goligher. Edwards and Truelove (1964) found that abscess and fistula may occur at any stage of the disease.

5. **Carcinoma of Rectum and Anal Canal**

Carcinomas of colon or rectum are occasionally complicated by the occurrence of per colonic or perirectal abscesses. If the growth lies in the lower rectum or in the anal canal and an overlying abscess develops, it will be situated in one of the tissue spaces around the anal canal, and when it ruptures it gives rise to fistula-in-ano (Dukes and Galvin, 1956). Carcinomata of the anorectal region may arise, not in the mucosa of the rectum or anal canal, but in the epithelial lining of the anal inter – muscular glands, when there may be no growth evident in the rectal or anal lumen, but may be seen in the fistulous track.

6. **Lymphogranuloma Venerum**

These are seen commonly in female. Strictures due to lymphogranuloma venereum are frequently accompanied by abscess and a fistula in the anal region.Lymphogranuloma is due to infection with a virus of psittacosis group, which is introduced into the body by sexual intercourse.

7**. Actinomycosis of the Anorectal region**

This condition is very rare, but when it occurs it is often associated with the development of the anal fistula discharging typical actinomycotic pus. The infection may occur anywhere from ileo ceacal region to the anus.

This may be primary in the rectum or may be found as a chronic anorectal abscess secondarily to the actinomycotic lesion anywhere in the alimentary tract.

8. **Previous Rectal, obstetrical or Gynecological operation**

Fistula may develop as a consequence of operation such as evacuation of the anal hematoma.

In female patient anterior fistula may be as a result of perineal tear during parturition or perineorrhaphy. Sometimes fistula – in –ano may also result due to infection or due to the injuries to the perineal region by accident

CLASSIFICATION

Fistula-in-ano has been classified on the basis of morbid anatomy.

Anal fistula are best thought of in relation to the vertical and horizontal axis to the canal. Milligan and Morgan in 1934 classified fistulae in relationship to the anal sphincter and particularly to the anal ring. They are sub mucous, low anal and high anal anoretal and pelvi rectal[15].

Charles Rob and Rodney Smith have classified the fistula as low anal, high anal, subcutaneous, sub mucous, ischiorectal and pelvi-rectal. H.R.Thompson (1962) has described the fistulae as simple and easy to treat (95%) or complex and difficult to treat (5%) [26]. It was considered as difficult when the internal opening was above the anorectal ring or when the fistulous tract was more than three- fourths of the circumference of the external sphincter.

In 1959, Steizen classifed the fistulas into 3 groups:

1. Intermuscular or intersphincteric – between the internal and external sphincter.
2. Trans – sphincteric – where the fistulous tract crosses the external sphincter into the ischiorectal fossa.
3. Extra sphincteric – the tract directly passes from the rectum through the levator ani and outside external sphincter to the skin.

A.G. Parks et al had formulated a new classification on the basis of pathogenesis and course of anal fistula [27].

The classification emphasizes the relationship of fistulae to the external sphincter.

1. Low - intersphincteric.
2. Trans-sphinteric.
3. Trans-sphincteric with high blind infralevator extension.
4. Trans-or suprasphincteric with blind supralevator extension.
5. Extra-sphincter.
6. High intersphincteric.

C.G.marks et al[28] after studying 793 patients with anal fistulae at St. mark Hospital during the period 1968 to 1973 classified the anal fistulas as follows:

1. Superficial 16%
2. Intersphincteric 54%
3. Trans – sphincter 21%
4. Supra-sphincter 3%
5. Extra – sphincter 3%
6. Multiple or Unclassified 3%

J.C.Goligher has modified the classification of Milligan and Morgan and by comparing to that of Park et al classifies the anal fistula as follows:

1. Subcutaneous fistula 5%
2. Low anal (low inter – sphincteric) fistula 75%
3. High anal (Trans – Sphincteric) fistulae 8%
4. Anorectal fistula 7%

a) Ischiorectal or intra – levator

b) Pelvirectal or supralevator.

5. Sub mucous or intramuscular

(High intersphincteric) fistula 5%

1. **Subcutaneous fistula**

In this type of fistulae the tract lies just deep to the perianal skin or cutaneous lining of the lower part of the anal canal, below the pectinate line. They may be true fistulae or sinuses.

2. **Low Anal (Low inter – sphincter) Fistula**

They may be defined as fistulae with tracks that do not extend above the level of the anal crypts, and usually open at this level into the anal canal. These fistulae usually run below the subcutaneous external sphincter, enter the inter sphincteric plane and then pass through the lower most part of the internal sphincter to open on the lining of the anal canal at the level of the pectinate line.

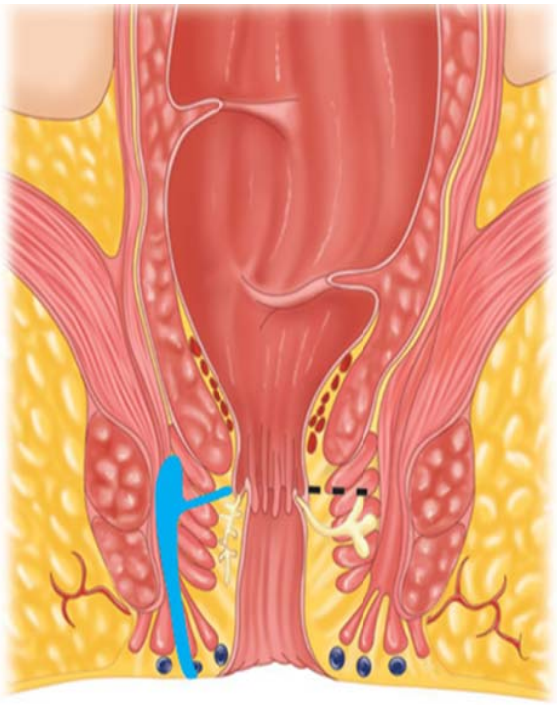


Fig. 8 Low Level Anal Fistula

3. **High Anal (Trans- sphincter) Fistula**

Here the fistulae the track rises to a higher level and is in relation to the upper parts of the anal sphincters, but does not extend above the anorectal ring, though it may reach close to it.

It may be either a true fistula, with an internal opening anywhere from the pectinate line to just below the anorectal ring but usually at the pectinate line, or a blind external fistula with the closed end of the track reaching to a point anywhere up to the anorectal ring, but usually with an additional blind side track extending through the external sphincter to end in the inter sphincteric septum at the level of the anal valves.

4. **Ano Rectal Fistulae**

It's a rare type of fistula. Tracks extend above the level of the ano – rectal ring. Sometimes there may be an internal opening in the rectum above the ring. These

fistulae either have an external opening or sometime open internally anywhere between the anorectal ring and the anal orifice.

a. **Ischiorectal or Infra – levator Anorectal fistulae**

In this variety, the fistulae most of the time, will be in the ischio – rectal fossa. Because of the obliquity of the levator ani muscle, sometime fistula track may arise above the level of anorectal ring, which is separated from the rectum by levator ani muscle. This is as a result of ischiorectal abscess.

b. **Pelvi – Rectal or Supralevator Anorectal Fistulae**

Extremely rare type of fistulae, complete with an opening to the rectum above the sphincter. In this variety the track extends through the levator ani muscle. Sometimes fistulae may be originating from a pelvirectal or supra – levator abscess and will have a blind extension above the levator ani. To sum up, it is a rare type of fistula which lies partly above the levator muscle in the pelvis. To this type another rare type 'Suprasphincteric' fistula may be included.

5. **Sub mucous or Intramuscular**

This lies between the internal and external sphincter or at a higher level between the circular and longitudinal muscle coats of the rectum as pointed out by Eisenhammer. But Milligan and Morgan said, this usually takes the form of a blind sinus extending upwards from an opening at the level of pectinate line and lie not in the sub mucosa entirely but internal to intersphincter region. Thus it is to be called as intramuscular or inter-sphincteric.

HORIZONTAL DISPOSITION

Goodsall's rule [29]

In the year 1900, Goodsall pointed out that if a imaginary transverse line was drawn across the midpoint of the anus, fistulae with their external opening posterior to this line or anterior to this line but beyond 1½ inches from the anus, have their internal opening in the midline posteriorly between the sphincters and the fistula's track is curved. When the external opening is situated in front of the transverse line, but within 1½ inches from the anus, the internal opening lies in the same radial line as the external orifice, the fistula track being straight. This is known as Goodsall's rule.

The curved track of a posterior fistula may be present on one side only, or may be bilateral, the two fistulae then converging on a single midline internal opening. These are known as single and double horseshoe fistulae may occur at different levels relative to the anus, anal canal and lower rectum. Sometimes there is possibility to come across exemption to this rule. It is said horseshoe fistula hugs the puborectalis muscle as it forms a sling round the sides and the back of the anorectal junction, lying external to the upper most part of the external sphincter and below or external to the lower most part of the levator ani muscle.

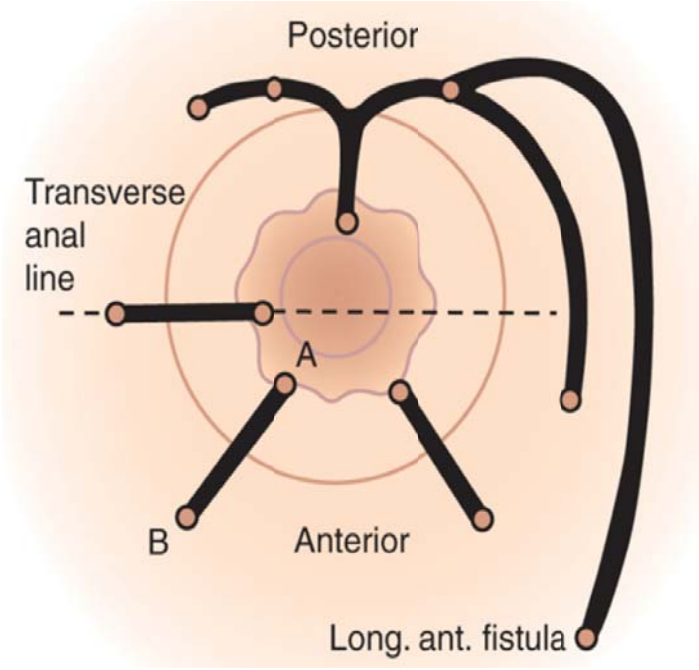


Fig 9– Goodsall's Rule

CLINICAL MANIFESTATIONS

- Commonly the principal symptom is a persistent discharge that irritates the skin in the neighborhood and causes discomfort.
- A patient with an anal fistula usually gives a history of an abscess which burst and has discharged intermittently or continuously since. Occasionally in very long-standing cases the initial acute episode may be so remote that the patient usually forgets about it. In many cases there will also be a history of one or more operations for the original abscess or the subsequent fistula. The discharge may be purulent or serous and sometimes blood stained. Soiling of the under-cloths may be another annoying complaint. Soreness and itching of the perianal skin, however, are common due to pruritis resulting from the moist, sodden condition of the skin.

Inspection[29]

- Inspection of the anal region will reveal an external opening or openings.
- In the chronic state, external opening usually can be seen as a red nodule of exuberant granulation tissue with purulent serosanguinous discharge on compression. Sometimes the opening is so small that it can be detected only when palpation around the anus expresses a few beads of pus from an otherwise inconspicuous opening and their relationship to the anal canal may reveal much more information.
- Not infrequently the sinus is temporarily healed over, though its position is marked by a raised papilla by a scar. The perianal skin may show the scars of previous operations undertaken for the fistula or some other condition. It may also be red moist and thickened from secondary pruritus ani. Thickened folds of skin may obscure small external fistulous opening.

Palpation

- Palpation of the perianal region may result in expression of pus which gives some indication regarding the position of the external opening. But more reliable as a guide to the course of the track is the detection of induration.
- In simple direct fistulas which are fairly superficial (low anal or subcutaneous) the track can generally be felt as a distinct cord of induration extending in a straight line from the external opening to the anal verge.
- Posterior horseshoe fistulae, however, are usually impalpable in the perianal region, because of their highest position relative to the anal canal.
- Palpation of the anal canal reveals the induration or an internal opening. The internal opening is invariably detected in the midline on the posterior wall of

the anal canal in posterior single or double horse-shoe fistulae at or above the ano – rectal ring.

- In sub mucous track, the induration can easily be made out, extending down the pectinate line, normally and may extend above the anorectal ring. It may be low or high anal fistulae with an extension into the sub mucosa after penetrating the sphincter.

Probing of Track

- Probing when done must be performed with a feather like touch to prevent false channels therefore it is best to avoid such probing outside the operating room. Even in the operating room with the patient under anesthesia, great care must be taken to avoid the creation of false passages into the anal canal or into the rectum.
- After a probe has been gently introduced into the track it can follow the path of a 'low' fistula towards the anus at an angle of approximately 30 degree to skin. Passage of the probe at an 80 degree angle to the skin or almost parallel to the anal canal indicates the presence of a high fistula or atleast a supralevator or ischioanal extension of a low fistula. Primary openings are successfully located by a probe in two thirds of patients. In the remainder, methylene blue dye is used.
- A malleable medium sized silver probe or some form of probe with an olive pointed director, capable of being bent in the terminal inch and a half into a straight curve as required is used to probe the horse-shoe fistula. If the internal opening is very small then a lacrimal probe is very useful. These should be used very carefully as the false passages are easily produced. For simple

straight forward fistula, St. Marks Hospital pattern of probe (pointed director) is sufficient.

Proctoscopy

- Proctoscopy may be of considerable value in cases of fistula. First of all it may show an internal opening which has not been clearly demonstrated by palpation or by the passage of a probe. This is revealed often by the escape of a bead of pus from it. Secondly proctoscope may help to distinguish between a rectal and a high anal internal opening. An 8 cm tubular proctoscope is passed full length and then, after removal of the obturator, is gradually withdrawn, the lumen being carefully observed in the process.
- When the end of the instrument passes from the lower rectum into the upper part of the canal the lumen can be seen to become constricted and then obliterated by the anorectal ring. Immediately when this occurs, the proctoscope is halted. If the internal opening of the fistula is still evident below the point of closure of the lumen it is in the anal canal but if at this stage it has disappeared from view it is above the anorectal ring in the rectum. Thirdly proctoscopy shows the state of the rectal mucosa and evidence of underlying proctocolitis.

Sigmoidoscopy

- It is used to rule out any abnormal ano-rectal pathology in the recto sigmoid or sigmoid colon, as the instrument can be passed up to 25 cm. It is desirable particularly in patients over 45 years of age. A rectal biopsy is performed if Crohn's disease is suspected.

Radiological Examinations[30]

- In the majority of patients who present with a fistula –in-ano, radiological examination is of limited value.
- Fistulography may help delineate an extra- sphinteric fistula of pelvic origin or may help patients with recurrent fistulas.
- Conventional Anal Endosonography has limited value in visualization of fistulous tracts and their internal opening. Hydrogen peroxide can be used as a contrast medium for ultrasound to improve visualization of fistulas[31].
- MRI – now Endoanal MRI is highly sensitive in the delineation of Fistula – in –ano. It provides valuable pre – operative assessment in both simple and complex fistulas[32].
- A barium enema study is indicated in patients with a history of bowel symptoms or in anyone with a recurrent fistula in ano.
- It is a good rule to have a chest film taken in every patient with an anal fistula, in order to exclude an old or recent pulmonary tuberculosis focus.
- If the lesion is discovered, its active status will then have to be determined by repeated examination of the sputum, for tubercle bacilli and ESR estimation.
- Abdominal and general clinical examination is to be done preferably prior to the rectal examination routinely.
- Lung lesions can be detected which is very important for the diagnosis of tuberculosis fistulae.

Fig. 10 – Fistulogram X-ray

Laboratory Investigation

- Routine investigation like Hb%, RBC, WBC, ESR, FBS, PPBS, blood urea, serum creatinine are essential.. Urine and stool examination are necessary in every case.
- Culture and sensitivity help to know the type of organism and its sensitivity to the antibiotics.
- Examination of sputum, ESR and other routine investigations are necessary.

Histological Examination

- Histological Examination of the fistulous tract after operation has to be routinely done. This helps to assess and appreciate the pathogenesis of fistula-in-ano and helps to exclude the other varieties like tuberculosis or mycotic or carcinomatous causes.

DIFFERENTIAL DIAGNOSIS

By examination as described, it is usually possible not only to recognize any fistula present, but also to classify it accurately according to its relationship to the sphincter musculature, which is an essential step in planning treatment. However, some other pathological conditions must be kept in mind which mimic fistula-in-ano.

Urethral Fistula

If the fistula extends forwards in a male patient, it may be necessary to consider the possibility of being a urethral fistula rather than an anal one.

In the female, an anterior fistula may originate in the anal canal and also a chronically infected Bartholin's glands. Anterior or low anal intersphincteric fistulous abscess may also involve the scrotum in the male; in the female anterior high intramuscular fistulous abscess is situated deep to the labia majora and if it is not treated, it may result in fistula.

Pilonidal Sinus

Posterior fistulae on the other hand may be confused with pilonidal sinuses, though the latter condition lies a short distance behind the anus and generally contains hairs. On examination of the posterior anal region, opening is in the midline about 5cms or behind the anus with single opening. The skin enters the opening so that opening has a smooth edge unlike that of an ordinary fistula wherein the fistula is situated at the centre of the exuberant granulation tissue.

Suppurative hydradenitis

This condition may bear a resemblance to fistula-in-ano. It is a chronic indolent inflammation of the apocrine glands which are present in the perianal region. It may be mistaken for fistula-in-ano. This occurs after purplish discoloration of the

overlying skin suggesting a sub-acute or chronically inflamed condition. This will also have numerous sinuses which seldom discharge pus.

Concealed Fistulae

In some cases though the patient has complained of discharge, no definite evidence of fistula can be discovered on examination. Occasionally, this may be due to the fact that external fistulous opening is healed and it may be difficult to decide whether the induration is due to scarring or to a concealed active fistulous track.

Idiopathic Pruritus Ani

Another cause for the complaint of a discharge in certain cases, in which no evidence of fistula is found, is a severe degree of idiopathic pruritis ani. This results in a moist oozing perianal skin and the fluid escaping from it soils the patient's under-cloths leading to the belief that he has a fistulous discharge. It is hardly necessary to point out that in female patients an alleged anal discharge may be of vaginal origin.

MANAGEMENT OF FISTULA IN ANO

The only reliable and accepted mode of treating a fistula in ano, is by surgical means.

Surgical Treatment[33]

The presence of a symptomatic fistula-in-ano is an indication for operation, for spontaneous healing of fistula-in-ano is very rare. It must be admitted however, that fistula operations have an unenviable reputation, as subsequent recurrence is not infrequent and impairment of anal continence is another unfortunate sequel. These complications can be minimized by proper knowledge of anatomy of ano-rectal region, caution, boldness, based on wide experience of the disease in its various patterns and skillful techniques particularly in high anal and anorectal fistula.

In post-operative wound management the aim is sound healing by granulation from the depths of the wound and prevention of contact and premature healing between the opposing skin and granulating wall.

So the standard method of treatment of fistula, depends on the fact that when a tract is underlying an epithelial surface, healing occurs from the epithelial edges. Epithelium spreads over the fistulous track itself. In this way the wound now becomes part of the surface incised.

Buic put forward a few principles in the surgical treatment of anal fistulae.

They are:

1. Primary opening must be found
2. The fistulous tract or tracts must be traced.
3. Structures external to the primary opening and the fistulous tunnel are converted into open ditches throughout their course.
4. Measures must be adopted during and after the operations to ensure that the cavity will heal from within outwards without development of further tracts.

Techniques of Fistulectomy[1,21,22,34]

1. Laying open the fistula and allowing the wound to heal by granulation. Since the healing of the wound takes a lot of time, the other methods came into existence, though the fundamental laying open of the track is the same.
2. Excision of the track with primary suturing.
3. Laying open the fistula followed by immediate skin grafting (primary skin grafting)

The relation of fistulous tract to the ano-rectal ring, both pre-operatives as well as on the table, should be determined under light anesthesia. In the subcutaneous, low anal and sub mucous fistulas, there is no danger of incontinence. In the case of complete anorectal or pelvirectal varieties with an internal opening above the anorectal ring, the classical orthodox method of laying open the track is not possible.

The other alternative method for difficult high fistulae of this type is to use the strong braided silk or braided stainless steel wire passed through the internal opening and round the sphincters or their remaining lower portion when the lower portion has been divided and the suture or the wire tied tightly. The object of this maneuver is to stimulate a fibrous reaction which is supposed to fix the sphincter at the point where the ligature cuts, or it is removed by dividing the sphincters when cut ends are believed to be anchored by fibrous tissue, and do not retract.

Pre-operative Preparation:

The patient should be admitted to the hospital preferably two days prior to the operation.

a) Bowel Preparations: Lower bowel must be thoroughly emptied before the operation as it considerably adds to the comfort of the patient, in post-operative treatment. Emptying of the bowel is done by enema.

b) Diet: A day or two before the operation the patient is given a light diet with low residue.

The perineal region, perineum, and the lower abdomen are shaved the evening before operation. If skin grafting is intended to be done, then the thighs should be shaved.

Anesthesia

General anesthesia combined with relevant drugs is suitable for fistulectomy. Spinal anesthesia could be used. By use of general anesthesia, spinal headache and post-operative retention of urine are slight but risk of spinal nervous lesion with resulting paralysis or permanent disturbance of bladder function can be avoided.

Position of the Patient

Lithotomy position is the best suited for fistulectomy. The patient will lie down to the edge of the table so that the buttocks will be beyond the end of the table.

Rectal Toilet

Asepsis is not complete and some contamination is inevitable in the anal region. By free use of weak, watery antiseptic solution such as Lysol or Dettol for swabbing purposes before and during the

Operative Procedure

The operative procedures for fistula-in-ano are:

- Laying open the fistula and allowing the wound to heal by granulation tissue.
- Laying open the fistula or excision of the tracks and primary suture of thewound.
- Laying open the fistula followed by immediate skin grafting.
- Laying open the fistula and allowing the wound to heal by Granulation:

This is the classic method, the track of the fistula being laid widely open and the resulting wound is allowed to heal by granulation. This operation is one of the oldest in surgery.

Perianal Fistula

The principle is to lay open the track or sinus. All the findings of pre-operative clinical examination are confirmed by further probing. If the tract is thought to be blind at its inner end, care is taken to establish the fact whether it is blind or not. Percival Pott (1779) strongly advocated that the fistula should be laid open and the wound subsequently kept open by careful packing.

Frederic Solomon's, modified the classical technique by adding to the main incision, laying open the fistulous tracks further by 'T' shaped incision. This incision became known as Solomon's "Back cut". This was designed to prevent premature healing of the outer part of the wound before the anal end had a chance to fill with granulations and become soundly epithelialized.

The Management of Sphincter Muscles and Preservation of Continence [35]

The significant thing in laying open fistulae by the classic method as Milligan and Morgan emphasized is the height at which the track lies relative to the sphincters and particularly to the anorectal ring. They claimed that provided its integrity is preserved the greater part of both sphincters may be divided without loss of continence but if the anorectal ring is inadequately divided the effect is inevitably a total loss of anal control (and usually some degree of complete or partial rectal prolapse as well)

In planning treatment, it is therefore important to define the relationship of the fistulous track to the anorectal ring, both pre-operatively and at the time of operation.

If the fistula is of the subcutaneous sub mucous or low anal variety, it's incision will clearly not endanger the anorectal ring in anyway.

If the fistula is of complete anorectal variety with an opening into the rectum above the anorectal ring, its treatment by incision would inevitably divide the ring and render the patient incontinent.

This type of fistula is to be regarded as inoperable by the classic method and calls for special operative consideration. The really perplexing cases are those with a high anal or anorectal fistula with an opening into the upper part of the anal canal; it may be extremely difficult to decide whether the internal opening is situated just below or above the anorectal ring.

(1) Detailed Technique of Laying – Open Operation

A) **Subcutaneous or low anal fistula:**

The findings on pre-operative clinical examination are confirmed by further probing, and if the tract was thought to be blind at its inner end, care is taken to establish whether it is blind or not. Sometimes a minute internal opening hitherto undetected may be demonstrated by a fine lacrimal probe passed from the external opening, or one may be found on inspecting and probing the wall of the anal canal with the aid of a bivalve speculum. Next a pointed probe director is passed along the tract into the lumen of the anal canal in a complete fistula, or so that its point projects against the skin or mucosa at the inner end in a blind fistula, possibly with the thickness of the internal sphincter intervening.

The track is now laid open throughout its length by incision on to the director, the division of the overlying tissue being finally completed by sliding the scalpel with its blade uppermost along the groove on the upper aspect of the director.

The skin edges are retracted with tissue forceps and after careful homeostasis, the wound surface is closely inspected. With its characteristic velvety covering of granulation tissue, the opened up track of the fistula is readily distinguished from the other tissues as a narrow strip running in a radical direction in the deepest part of the wound. Its recognition is useful in confirming that the director was correctly passed along the fistula and did not make a false passage in the tissue. Using a sharp scoop, the granulations are scraped off the exposed inner surface of the fistula, leaving the underlying pale tough fibrous base.

The fibrous layer is not excised but is left in the floor of the wound. It's surface should be closely examined throughout its length for any openings and these should be tested with a medium or fine lacrimal probe to determine whether they lead into subsidiary fistulous tracks. Similarly, the soft fatty tissue on either side of the track are palpated for nodules of induration that might indicate the presence of divided fistulous offshoots, and any suspicious areas thus found are examined with a fine probe for an opening leading into a track.

Finally if no further fistulous openings are discovered, the sides of the wound are trimmed with scissors, removing skin and subcutaneous fat generously in order to leave a shallow concave raw area, more or less pear shaped or conical with the apex usually entering the anal canal.

The wound is again surveyed for hemostasis and general configuration, and again palpated to make sure that no fresh areas of induration have been revealed by the process of trimming. Finally the dressing is applied; this consist of gauze rinsed out in Eusol which are arranged to cover the wound surface, the corner of one square being tucked into the anal canal to provide a dressing for the apical part of the wound.

More complicated anal or subcutaneous fistulae with numerous subsidiary tracks and openings of course require additional incisions and when these are amalgamated the effect may be to produce a much more extensive irregular wound. It is possible for a patient to have two entirely separate fistulae but this is excessively rare and it may be taken as a good working rule that all fistulous openings should be found to communicate with one another.

B) Ischiorectal fistula (High posterior horse shoe fistulae)[36]

This is the commonest type of anorectal fistulae. This is amenable to well-planned radical surgical treatment. One external opening always will be present and it is best to commence by using it to lay open the lateral limb of the horse shoe track on that side. From the external opening, a director is passed into opening and allowed to take its course. It may proceed towards the posterior wall of the anal canal and, if a definite internal opening has been identified there below the anorectal ring, it may be made to emerge through it into the canal; this part of the fistula is then laid open by incision, otherwise and usually preferably, the point of the instrument is directed forwards and made to project against and penetrate through the skin at the side of the anus and slightly in front of it. An incision is then made on to the director, releasing it and exposing part of the fistula. The granulation tissue is scraped by a sharp scoop, samples of granulation tissue should be sent for histopathological examination. The fibrous base is now followed forwards, and probing at its anterior end usually reveals prolongation of the tract.

The anterior extension is incised and the wound in relation to it appropriately trimmed to prevent overhanging skin edges and fat.

If there is no internal opening in the posterior horse-shoe fistulae a very careful search with a lacrimal probe may reveal presence of internal opening which should be laid open. Before this, the anorectal ring should be identified.

(C) Pelvirectal fistula

The track of this type of fistula is found to extend through a hole in the levator ani. This hole in the muscle should be stretched by opening the blades of a pair of artery forceps in it or, if there is too much surroundings fibrosis by incision with a scalpel. This is safely performed in a backward, lateral or forward direction, but not medially, the opening being enlarged as much as required to ensure free drainage of the supralevator portion of the track. The upper loculus should then be carefully exposed and gently curetted, portions of tissue being sent for histological section.

The lower portion of the track is dealt with, similar to the other type of fistulae. The external wound is now enlarged by wide trimming of the skin edges and fats especially posteriorly to produce deep gutter extending backward and towards the side of the coccyx.

In every high pelvi-rectal fistula the perineal route is not much help unless it is combined with the abdominal approach as in recto-vaginal fistula.

Goligher advised the preliminary left iliac defunctioning colostomy even though the results with this procedure are not far superior to other methods.

D) High intermuscular fistulae

It is important to make sure that the fistula is only sub mucous fistula.

Sometimes the induration that can be felt through the rectal wall of the blind upper end of an anorectal fistula closely mimics that of a high sub mucous or intramuscular tracts; it is important not to confuse these two lesions for treatment of an anorectal

fistula by incision through the rectal wall as it would be disastrous with incontinence as the result.

Sub mucous fistula should be treated by laying open into the lumen of the rectum and anal canal. A bivalve speculum is inserted and the opening of the fistula exposed as its usual site is just above the pectinate line. A director is then passed into the opening and along the track till its blind end forced through the intact mucous membrane at this point.

Post-operatively these sub mucous fistulae are liable to give trouble by developing a residual pocket of pus which may require further incision, so the progress after the operation should be specifically reviewed by digital or proctoscopic examination.

Post-operative care of the Wound[37]

It is difficult to estimate the importance of adequate attention to the wound during the post-operative period. Neglect of this aspect of treatment may easily result in a recurrence of a fistula despite a well performed operation.

The aim, to be constantly kept in mind during this phase, is sound healing by granulation from the depths of the wound and prevention of contact and premature healing between the opposing skin edges and granulating walls.

The outer dressing is changed twice a day leaving the inner covering gauze. The first bowel movement may be very painful.

The dressings are repeated twice a day. The bowel is kept regular and soft by administration of liquid paraffin at bed time daily.

The inner dressing is removed on the morning of the third post-operative day. Fresh dressing is applied loosely.

Periodic review of wound

Sometimes it is very difficult during the first few days to ensure the dressing has been inserted to the highest point of the wound. As a consequence, the uppermost parts of the two sides of the wound may have fallen together and may become adherent. If the pus is found at any point, it will indicate the possibility of unopened pocket there, for which a determined search should be made of the edges of the wound. Subsequently the wound has to be reviewed once a week.

Periodic examination of the wound and rectal examination should be done in order to assess the condition of the anus. As the large fistula may heal with great amount of fibrous tissue, narrowing of the anal opening (anal stricture) may result.In order to avoid complications (stenosis) regular daily anal dilatation is needed till the wound heals completely and some weeks afterwards also depending upon the case.

In the high posterior double horse-shoe fistula both inferior haemorrhoidal nerves may have to be divided resulting in false incontinence. If the anorectal ring is preserved, anal control becomes normal with the regular exercise of the anal sphincter.

Time required for complete healing

The process of healing is slow and takes about four to five weeks for low fistula[7] and up to 12 to 16 weeks for a really high double horse shoe lesion to heal. The patient can be discharged on 10th or 12th post-operative day provided the patient attends the hospital for checkup for first few dressings.

In order to minimize the period of convalescence and based on the socio economic problems of the patient, secondary skin grafting may be done as soon as the granulating surface has reached the level of the surroundings skin. The results

however are poor due to difficulty of retaining the graft in position and hence this is abandoned now.

(2) Fistulectomy with primary closure [1, 7,8,19]

The first operative step is to lay open the fistulous track. Skin and subcutaneous fat, however should not be excised but preserved to facilitate the final closure of the wound.

Complicated high fistulae, where tissue may have to be fairly generously removed in order to assist exploration of the tracts, are technically quite unsuitable for primary suture, as are fistulae with numerous off shoots to the main tract.

This method is most readily applied to simple direct fistulae.

To prepare the wound for suturing, it is necessary to excise the opened up fistulous tract as far as possible and leave fresh wound surfaces free from granulation or fibrous tissue.

Suturing implies the complete reconstitution of the wound from the depths using several layers of buried interrupted sutures of fine catgut as well as the surface sutures. The deepest layer consists of several mattress sutures in to the individual parts of the sphincter muscles. Subsequent layers oppose the subcutaneous fat. The surface stitches comprise of vertical mattress stitches of fine chromic catgut. In the mucosa and the skin of the part of the wound lying in the anal canal, similar stitches of vicryl is put as in the skin of the perianal region.

Goligher also practiced primary suturing by taking particular care to excise the fistula on its entirety and leave fresh supple raw surface which was then opposed by two or more layers of buried fine plan catgut sutures. Skin was opposed with Michael clip or silk sutures.

(3) **Laying open the fistula followed by immediate skin grafting** [5, 7]

This operation was strongly advocated by Hughes (1953) of Melbourne. The fistula is laid open exactly as in the classical operation and with the same precautions to saucerise the wound and avoid overhanging skin edges. Thiersch grafts taken from the medial aspect of the thigh are applied to the surface, stitched in position and firmly affixed to the wound by cotton wool pad. These grafts should be prevented from becoming floating. Firm pressure by a moulded pack is therefore essential if good apposition is to be secured.

Hughes reports were most impressive. He reported complete take in 30 cases out of 40.

Goligher reports that primary Thiersch grafting is less satisfactory. Out of his 22 cases, 100% take in 13 cases and 50 to 70% in the remaining cases.

The main drawback of immediate grafting being the operating time and trouble involved in applying & fixing the grafts & graft rejection.

Use of Seton[38, 39]

When a tract crosses the sphincter at a high level, it may be deemed safer not to divide all the muscles beneath the track. Only a portion of the muscles is cut, and a Seton is inserted. The rationale for this maneuver is threefold. First, it stimulates fibrosis adjacent to the sphincter muscle, so that when the second stage, which involves laying open the track, is completed, the sphincter will not gape. After insertion of a Seton, it is anticipated that division of the sphincter will be followed by scar formation proximal to the ligature, thus holdings the muscle fibers together, which may already have been accomplished by fibrosis of the fistulous track. Another benefit of Seton is that it allows the surgeon to better delineate the amount of muscle

beneath the fistulous track. The third advantage of using the Seton is that it acts as a drain.

Actual insertion of the Seton through the fistulous track is usually a simple matter. The internal sphincter should be divided from the level of the internal opening at the dentate line to its distal end in order to eradicate the source. The overlying skin is divided from this point to the secondary fistulous opening. A nonabsorbable suture is then threaded through the fistulous track.

Usually however the muscle is divided at a second stage 6-8 weeks later. Appropriate timing of transection of the sphincter subsequent to Seton placement is essential for sufficient fibrosis to ensure sphincter function. When a large portion of muscle is included, it might be wise to divide the remaining muscle in more than one stage. If the wound does heal well, removal of the Seton without division of the contained muscle can be considered.

Gradual pressure necrosis will severe the muscle after the Seton is tightened three or four times.

Clinical situations in which use of a seton should be considered are - high fistula, anterior fistula in women, co-existent inflammatory bowel disease (especially Crohn's disease), a marked weakened sphincter in elderly individuals, extensive scarring in individuals who have had previous operations and the presence of simultaneous fistulas.

TREATMENT OF CERTAIN SPECIAL TYPE OF FISTULA

Complete pelvirectal fistula: [Extrasphincteric Fistula with internal opening]

If the fistulous tract passing above the anorectal ring ends in an internal opening in the lower rectum, is unsuitable for treatment by an orthodox laying open operation which would render the patient incontinent. In the experience of Goligher there are five ways open to surgeon.

1**) Expectant treatment**

If the fistula is left alone, it may give the patient relatively little trouble apart from a slight continuous or intermittent discharge. Occasionally noisy escape of flatus is embarrassing. If these do not occur, the patient may continue indefinitely along expectant lines, keeping the part clean by regular baths, morning and evening and possibly wearing a dry dressing or piece of cotton wool to protect his underclothes from soiling.

2) **Establishment of a temporary colostomy**

It is hoped that the resulting defunctioning of the ano rectum would at least lessen the risk of recurrent abscess, but Williams reported some prospect of healing the fistulas, so that the colostomy may eventually be closed.

The possible curative value of a simple colostomy is something to be borne in mind in the management of these worrying cases. Here left iliac colostomy is preferred. This colostomy is to be maintained atleast for 6-12 months, before complete closure.

3) **Repair of the fistula**

When expectant treatment fails because of recurrent infection or chronic discharge or if a proximal colostomy for a prolonged period fails to heal the fistula or is unacceptable to the patient, an attempt may be made to close the internal opening,

but it can be a difficult operation. Goligher has undertaken it only 9 times - successfully in 6, unsuccessfully in 3. Sphincter muscle may be divided below the subsidiary internal opening into the anal canal, but the upper part of the musculature is preserved. The tract leading to high internal opening in the rectum proper is now followed up through the levator ani muscle; the latter is excised sufficiently to expose the hole in the rectal wall. The hole is then sutured with non-absorbable sutures. The side of the entire hole is trimmed.Gauze dressings are laid on the raw surface of the top. Post-operative management is same as in other conditions. The patient lies on the side opposite to that of the internal opening or in the prone jack-knife position.

4) **Use of a seton**

Another possibility is to use a Seton as described previously

5) **Excision of the rectum with permanent iliac colostomy.**

If recurrent sepsis and discharge persists despite a defunctioning iliac colostomy and a direct attack on the fistula has failed or been decided against, the only alternative is rectal excision. Treatment of tuberculous anal fistula

Gabriel strongly condemns the operation on superficial tuberculosis fistula and advocates conservative treatment[40].

It is clearly stated that the overall results in any large series of cases of tuberculosis fistula will be considerably influenced by the success in controlling the chest condition. The first requirement in the treatment of tuberculosis anal fistulae is an accurate assessment by the chest physician of the activity of any pulmonary tuberculosis focus present. Operative and post-operative management does not differ. If at the time of initial examination the pulmonary lesion is not made out, or the chest condition is considered to be clear, surgical treatment can be undertaken, provided there is no other focus in the hip or seminal vesicles, to account for the fistula.

6) **VAAFT (Video Assisted Anal Fistula Treatment)**

The technique is performed for the surgical treatment of complex anal fistulas and their recurrences. Key points are the correct localization of the internal fistula opening under vision, the fistula treatment from inside, and the hermetic closure of the internal opening. This technique comprises two phases: a diagnostic one and an operative one. There is no need to know the fistula classification which obviously saves time and money. Moreover, surgical wounds in the perianal region are prevented and the risk of faecal incontinence is avoided because no sphincter damages are provoked.

The advantages of the VAAFT technique are evident: no surgical wounds on the buttocks or in the perianal region are provoked, there is complete certainty in the localization of the internal fistula opening (a key point in all fistula surgical treatments), and the fistula can be completely destroyed from the inside. There is no requirement to know if the fistula is transphincteric, extrasphincteric or above sphincteric because operating from the inside no damage is caused to the anal sphincters. Therefore, no preoperative examination is necessary. The risk of postoperative faecal incontinence is excluded. Moreover, the patient doesn't need any medications and he can start working again after a few days since the VAAFT technique can be performed in day surgery.

7) **Fibrin glue for the treatment of fistulae in ano**[45]

It is a simple treatment strategy, preserves sphincter function with minimal adverse side effects. It should therefore be considered as possible first line treatment in simple fistulae but it is less likely to be successful in complex or those fistulae associated with inflammatory bowel disease. Repeat gluing is unlikely to be successful. Fistulae that have failed to heal by 3 months will need further treatment.

Anal fistula with Crohn's Disease

Treatment required for these lesions depends on the site of the underlying enteritis in the intestinal tract. If it is located in the small bowel or proximal colon, with the distal large bowel normal, the surgical attack is also two fold. First step is the excision of the diseased intestinal segment. Secondly, an appropriate 'deroofing' operation for the fistula is to be done. Often main lesion is missed and only fistula is treated, and treatment will be failure of the wound to heal or early recurrence of the condition has lead to the suspicion and eventual diagnosis of the regional ileitis.

Anal fistula with ulcerative colitis

It is said that local surgical treatment of these fistulae, by ignoring the underlying bowel condition is fragile and even dangerous as it may be followed by an exacerbation of the colitis.

Sometimes these fistulae temporarily heal as the ulcerative colitis improves to reopen again. Usually for these conditions, radical surgical treatment involving total proctocolectomy and ileostomy is required.

Anal fistula with carcinoma has got poor prognosis as a result of wide spread to the principal region, and to the inguinal lymph nodes. Occasionally however, removal is possible by means of an abdominoperineal excision of the rectum with wide ablation of the surroundings tissues on the affected side, and a subsequent block dissection of the glands of the groin. This may give a good palliative result for one or two years before recurrence takes place. In in-operable cases, super-voltage radiotherapy may be of some value, especially in cases of squamous epithelioma.

Paul Bellireau et al[41] (1983) recommends the preservation of external sphincter muscle mass in treating trans sphincteric and supra sphincteric fistulae and his studies support the attempts at sphincter preservation in fistula surgery. Carol Ann Vasilevsky

et al has conducted a retrospective study of 117 patients. These patients underwent incision and drainage of anorectal abscess. None of the patients who had intersphincter abscess developed recurrence. Of the 83 patients with perianal or ischiorectal abscess, 9(11%) developed recurrent abscess and 31(37%) developed persistent fistula –in-ano to constitute a total recurrence rate of 48%.

Han Kuypers says that the extra sphincteric anal fistulas remain a cause of concern because they may have a secondary internal opening above the pectinate line. He has treated 10 cases of extra sphinteric fistulas by two stage procedure without a diverting colostomy and had no recurrences. In this study, fistula was first laid open, then braided nylon thread was put through the extra sphincteric extension and the rectal opening and tied loosely, thus enclosing and puborectalis muscle. The deep part of the external wound heals by granulation tissue. The remaining fistulous tract drains around the Seton.

METHODOLOGY

SOURCE OF DATA

Patients admitted in the surgical wards in all the units of BLDE'U SHRI B M PATIL MEDICAL COLLEGE BIJAPUR were included in the study without bias on a serial basis. This is a randomized prospective study comprising 60 patients &(n =60) of Fistula in ano over a period from October 2011 to April 2013.

Statistical Analysis

Study period from: October 2011 to April 2013.

In case of any stastical analysis and in the presence of non-availability of prevalence and incidence rate, the sample size 30 and above is sufficient to study the significance of the difference between two performances. Using normal test (Z Test). This is because all standard stastical distribution will merge into normal distribution. Further the conclusion/inference that can be drawn using sample size more than 30 will almost remain the same as that with n=30.[43]

The statistical analysis for the present study is taken up with n=30 for each group like primary closure& open fistulectomy in single low anal fistula.

Further for effective presentation, statistical technique of presentation like table, charts, will be used.

Statistical analysis done by

- Descriptive Analysis.
- Inferential Analysis.
- Data representation done using presenting tools.
- Using software systat.

METHOD OF COLLECTION OF DATA

Inclusion Criteria: Patients with single low level fistula in ano.

Exclusion Criteria:

- Patients with high level fistula in ano
- Recurrent fistula in ano and anal fistula associated with inflammatory bowel disease
- Retro viral positive patient.
- If the patients were found to have any complicating medical conditions like Diabetes mellitus, Hypertension, Ischemic heart disease and COPD, were treated for the condition first and re assessed for fitness for surgery.

Patients were subjected to either open fistulectomy or fistulectomy with primary closure. All patients were given pre-operative prophylaxis with Inj ofloxacin & ornidazole 100ml IV. Only spinal anesthesia was administered to both the cohorts.

Open fistulectomy was done in 30 patients and fistulectomy with primary closure was done in rest of the 30 patients. Postoperatively, Inj Diclofenac 75 mg IM BD was given as analgesia for 48 hours to both the cohorts. Post operatively Inj Ofloxacin & Ornidazole IV, BD was given for 48 hours to both the cohorts.

Post operatively, the following results wereevaluated

Period of stay in hospital was compared by using the hospital records. Period of healing was compared by measuring the time taken for complete epithelialization of the operated site in open fistulectomy cases and complete wound healing in fistulectomy with primary closure.

Work load on the hospital was compared on the basis of number of days of bed occupancy, use of dressings and other medications.

Cost factor was compared on the basis of expenditure on the cost of surgical procedures, dressings, financial loss incurred due to absence from work etc.

Patients were followed up for 1 year.

Ethical clearance wasobtained from the institution for the present study.

RESULTS

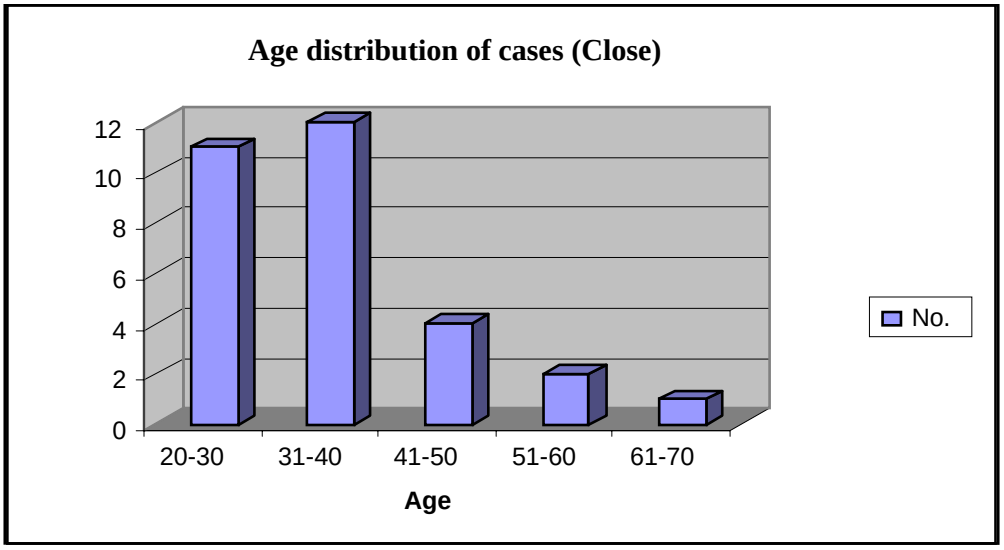
A total of 60 patients were included in the study and were divided into two equal and comparable groups. Patients subjected to fistulectomy with primary closure were classified under Group I and those who underwent open fistulectomy were classified as Group II. The patient's characteristics of the two groups were well matched as given in the table below.

AGEINCIDENCE

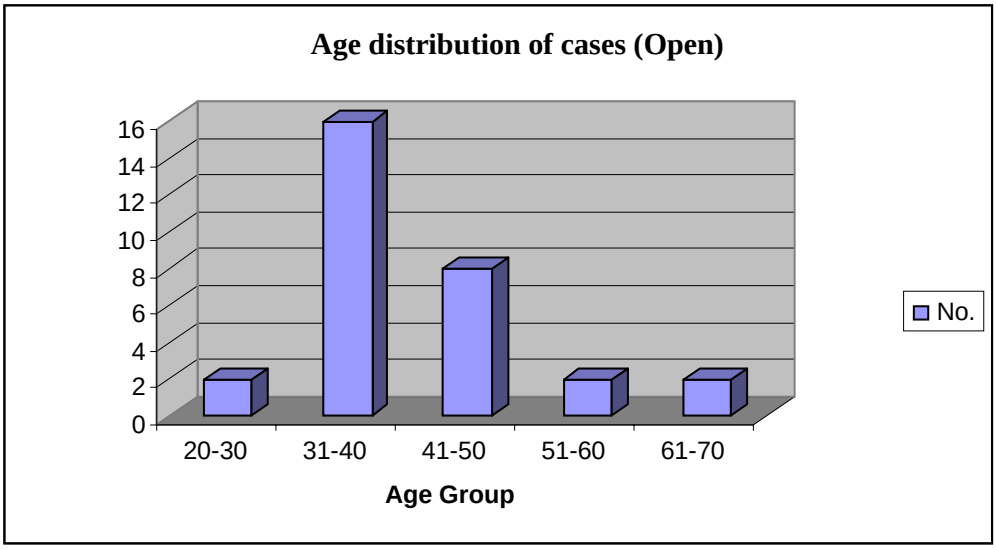
Table 1: Distribution of cases by age (Present Study).

	Group I (Close)		Group II (Open)	
Age	No.	CF %	No.	CF%
21-30	11	37.9%	2	6.6%
31-40	12	75.8%	16	60.0%
41-50	4	89.6%	8	86.65%
51-60	2	96.5%	2	93.3%
61-70	1	100%	2	100%

In our study, the incidence of fistula in ano was noticed more in 21- 40 years (76%)in Group I & Group II (60%) with an age range of 21 to 70years.



Graph 1



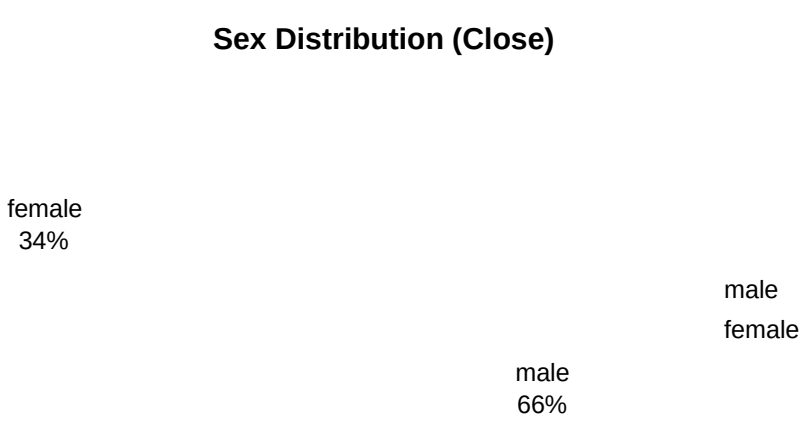
Graph 2

Sex incidence

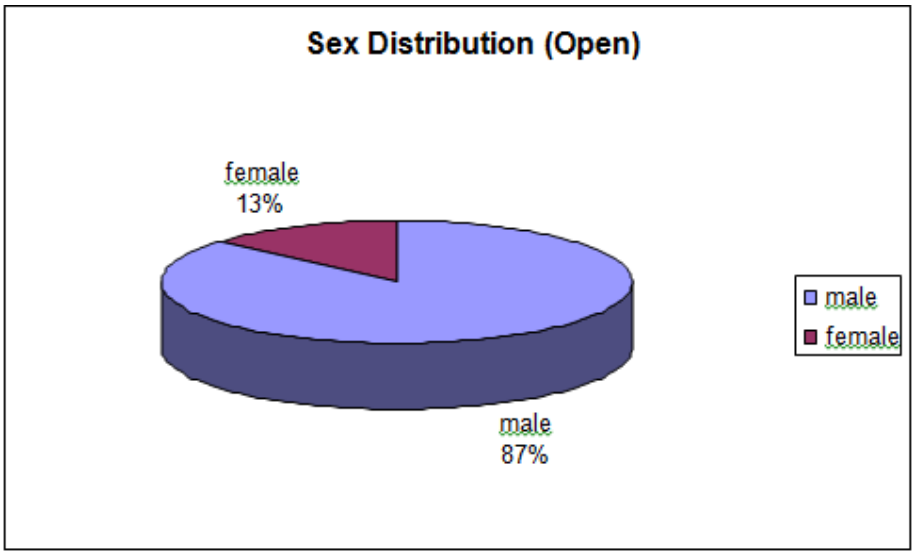
Table 2: Distribution of Male& Female under “close” and “open”

Sex	Group I (Close)		Group II (Open)	
	No.	%	No.	%
Male	19	65.5%	26	86.6%
Female	10	34.5%	04	13.3%
Total	29	100%	30	100%

In our study the distribution of cases in Group I, Male were 65.5% & Female were 34.5% in comparison to Group II, Male were 86.6% & Female were 13.3%.



Graph 3



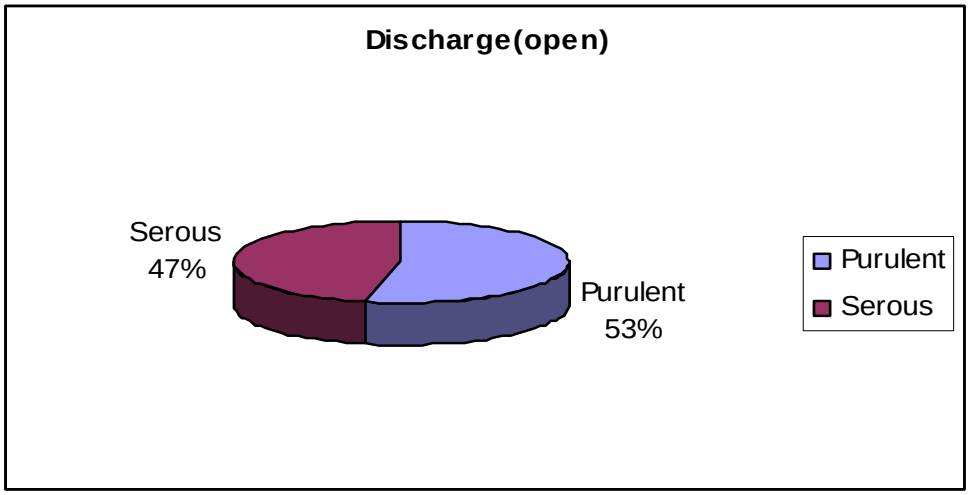
Graph 4

TYPE OF DISCHARGE FROM EXTERNAL OPENING

Table 3: Discharge (Presentation toHospital)

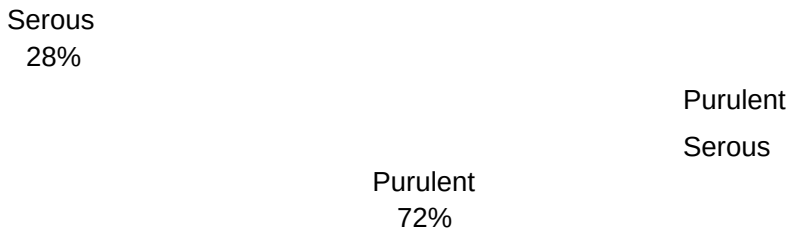
	Group I (Close)		Group II (Open)	
	No	%	No	%
Purulent	22	72.4%	16	53.3%
Serous	08	27.6%	14	46.7%

In our study, 72.4% of patients had purulent discharge, 27.6% had serous discharge in Group I while compared to Group II 53.3% had purulent & 46.7% had serous discharge.



Graph 5

Discharge (Close)



Graph 6

TYPE OF FISTULA

External Opening

External opening was noted in all the patients in our study.

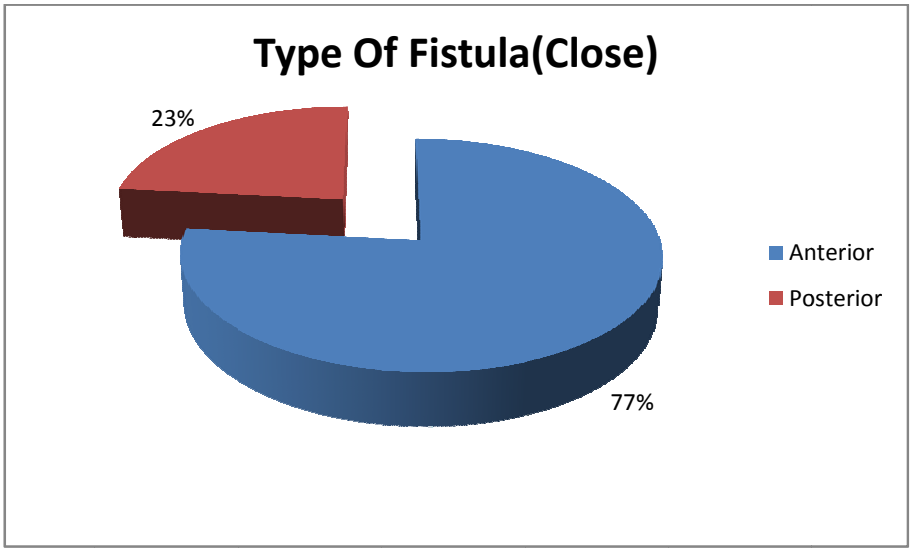
Internal Opening

Per rectal and proctoscopic examination showed the presence of internal opening in all the cases studied.

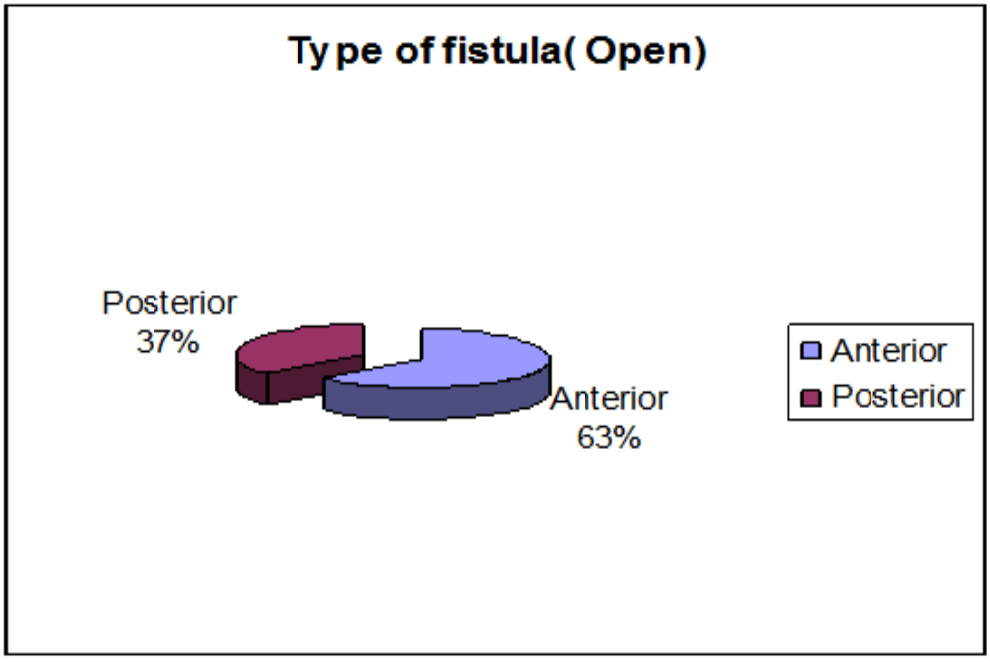
Table 4:Type of fistula

	Group I (Close)		Group II (Open)	
	No	%	No	%
Anterior	23	76.6%	19	63.3%
Posterior	7	23.3%	11	36.6%

In our study , anterior type of fistula was more common in both Group I (76.6%) & Group II (63.3%)compared to posterior type of fistula noted in Group I (23.3%)& Group II (36.6%) .



Graph 7



Graph 8

COMPLICATIONS IN THE IMMEDIATE

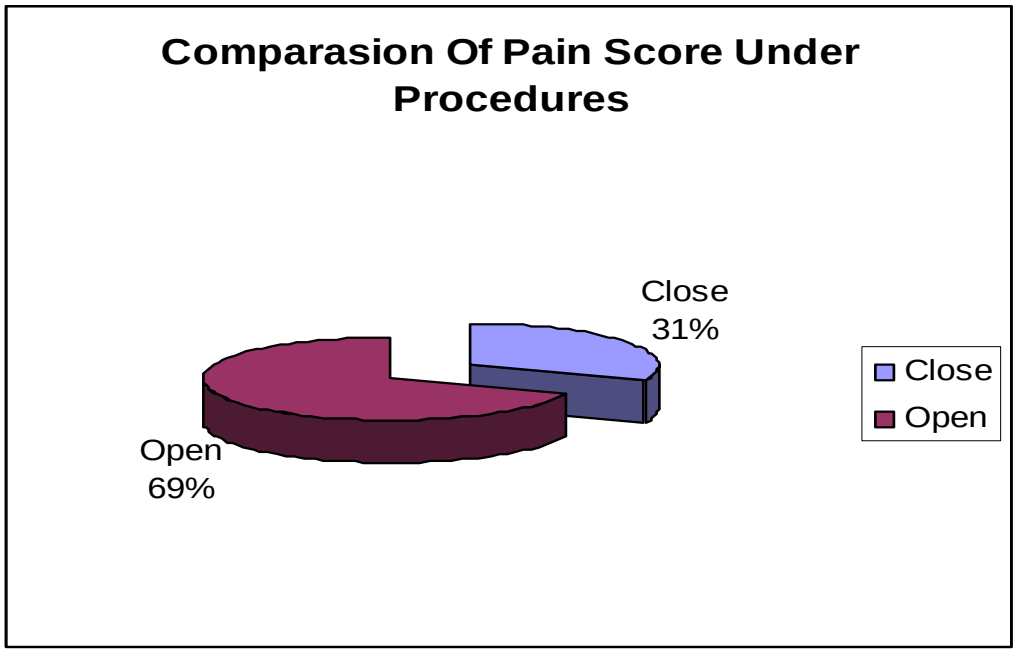
POST-OPERATIVE PERIOD

Pain

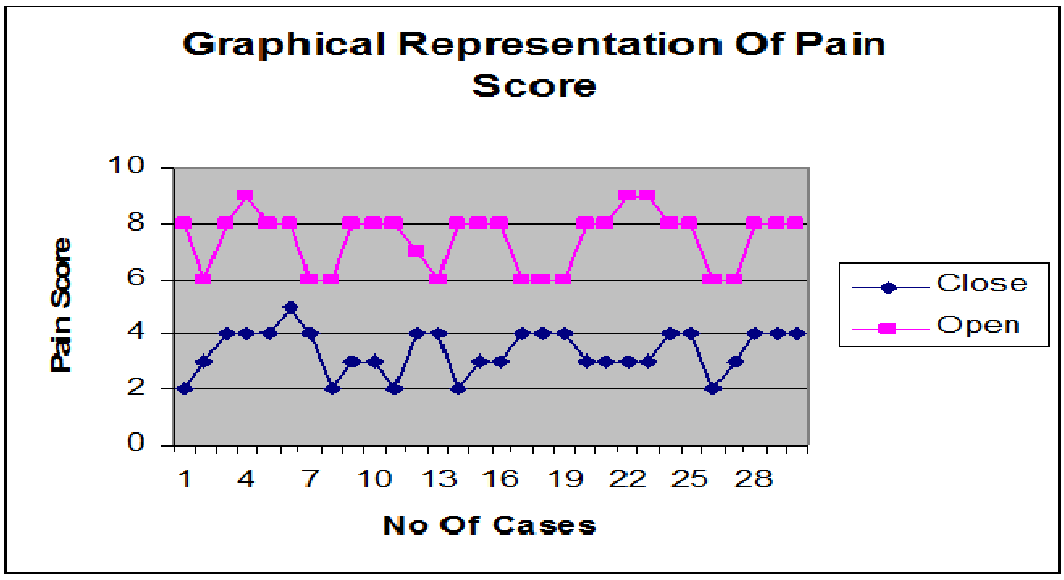
Pain score on a scale of 1 – 10; 1 being no pain and 10 being maximum bearable pain was considered by evaluating the patient using a visual analog scale.

Table 5 – Pain Score on first post-operative day

Measures	Group I (Close)	Group II (Open)	Z -Value	P – Value
Mean	3.36	7.4	16.86	0.0001
SD	0.80	1.04		
MAX	5	9		
MIN	2	6		



Graph 9



Graph 10

In the present series, patients who had undergone fistulectomy with primary closure had a mean VAS pain score of 3.36 while patients who had undergone open fistulectomy had a mean VAS pain score of 7.4 on the first postoperative day.

The pain score observed between Group I & Group II in fistula in ano showed a significant p value. (P value 0.0001). This suggests that pain is less in fistulectomy with primary closure compared to open fistulectomy.

WOUND HEALING TIME

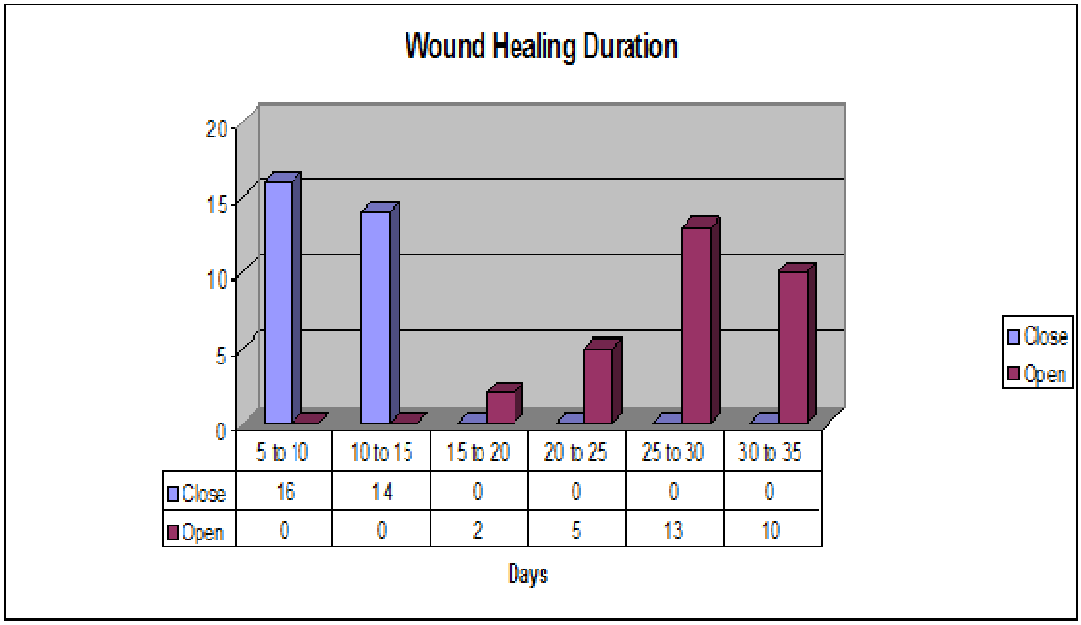
Table 6(a): Wound healing in present study Group I (Close Method)

Type Of Fistula	<1 Weeks	1-2 Weeks	2-3 Weeks
Low Level Fistula	0%	90%	10%

Table 6(b): Wound healing in present study Group II (Open Method)

Type Of Fistula	1-2 Weeks	2-4 Weeks	4-6 Weeks
Low Level Fistula	0%	60%	40%

Showing Wound Healing In Duration



Graph 11

Table 6 (c): Comparison of Wound healing days under Group Iand Group II.

Days	Cases under Close	Cumulative frequency	%	Cases under Open	Cumulative frequency	%
8	4	4	13.8%	--	--	--
9	12	16	55.8%	--	--	--
10	8	24	79.3%	--	--	--
11	1	25	82.7%	--	--	--
12	2	27	89.6%	--	--	--
13	3	30	100%	--	--	--
--	--	--	--	--	--	--
18	--	--	--	2	2	6.6%
20	--	--	--	3	5	16.6%
22	--	--	--	2	7	23.3%
25	--	--	--	2	9	30.0%
26	--	--	--	3	12	40.0%
27	--	--	--	2	14	46.0%
28	--	--	--	4	18	60.0%
29	--	--	--	2	20	66.6%
30	--	--	--	2	22	73.3%
32	--	--	--	2	24	80.0%
33	--	--	--	3	27	90.0%
34	--	--	--	3	30	100%
Total	30	--	--	30	--	--

Table 6 (d): Test of significance between wound healing duration of closed and open.

	Group I (Close)	Group II (Open)	Z-Value	P-Value
	Mean+/-SD	Mean+/-SD	17.16	0.0001
Duration of Stay in Days	9.79+/-1.49	26.73+/-5.11		

Table 6 (e): Test For AssociationBetween Wound Healing Duration And Mode Of Operation.

Duration	Group I (Close)	Group II (Open)	Odds Ratio	P Value
5 to 10	15	1	29.0	0.001
Above 10	15	29		

Conclusion

We noted in our study, that the healing time was considerably less in the Group I patients which healed by 8-10days while in Group II patients, it took about 3-6 weeks for complete healing.

The evaluation of duration of "wound healing" in patients of Close& Open Methods showed a significant P value.(P Value 0.0001)

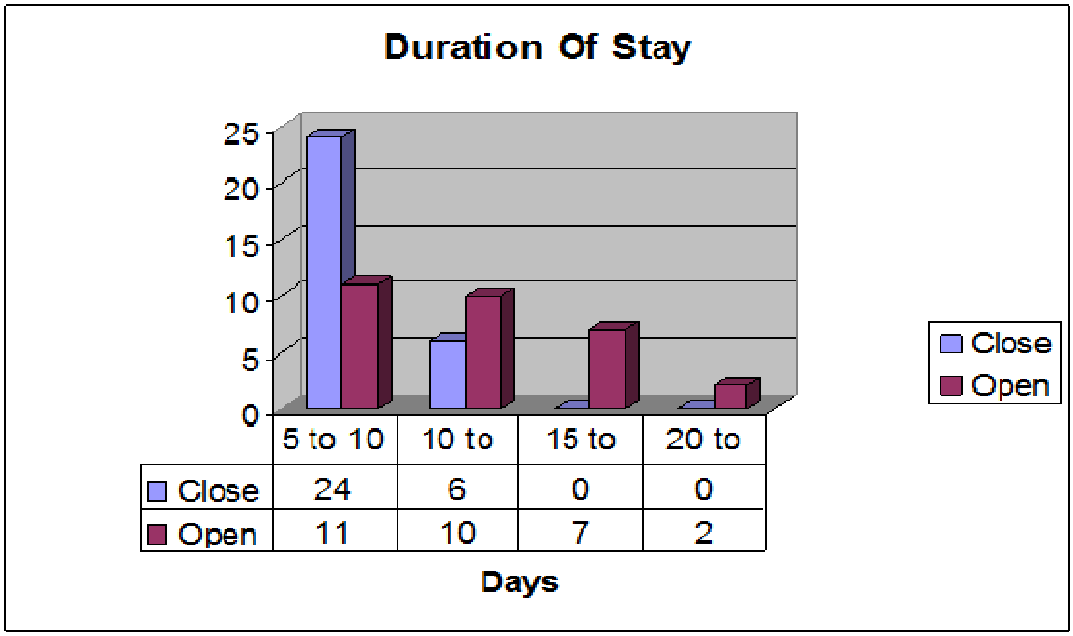
A significant association was also noted between wound healing & mode of operation.

HOSPITAL STAY

Table 7 (a) Comparison of days of hospital stays under Close& Open Methods

Days of stay	Cases Under Primary Close	Cumulative frequency	%	Cases under open system	Cumulative frequency	%
5	3	3	10.3%	-	-	-
6	7	10	31.0%	-	-	-
7	8	18	58.6%	2	2	6.6%
8	4	22	72.4%	3	5	16.6%
9	2	24	79.3%	6	11	36.6%
10	0	24	79.3%	3	14	46.6%
11	2	26	86.2%	3	17	56.6%
12	1	27	89.6%	1	18	60.0%
13	3	30	100%	1	19	63.3%
14	0	-		2	21	70.0%
15	0	-		2	23	76.6%
16	0	-		3	26	86.6%
17	0	-		2	28	93.3%
18	0	-		0	28	93.3%
19	0	-		2	30	100%
Total	30			30		

Showing Hospital Stay in Close& Open Methods.



Graph 12

Table7 (b): Test of significance between duration of stay in hospital under closeand open methods.

	Group I (Close)	Group II (Open)	Z-Value	P-Value
	Mean+/-SD	Mean+/-SD		
Duration of Stay in Days	7.93+/-2.46	11.46+/-3.42	4.538	0.0001

Table 7(c): Test for Association between Hospital Stay and Mode of Operation

Duration	Group I (Close)	Group II (Open)	Odds Ratio	P Value
5 to 10	24	11	6.90	0.01
Above 10	6	19		

The duration of Hospital Stay following the open fistulectomy was more even for a low level fistula(11.46 days) in comparison to closer method (7.93 days) .

A statistically significant P value was obtained considering duration of "Hospital Stay" of patients among Close& Open Methods.(P value 0.0001)

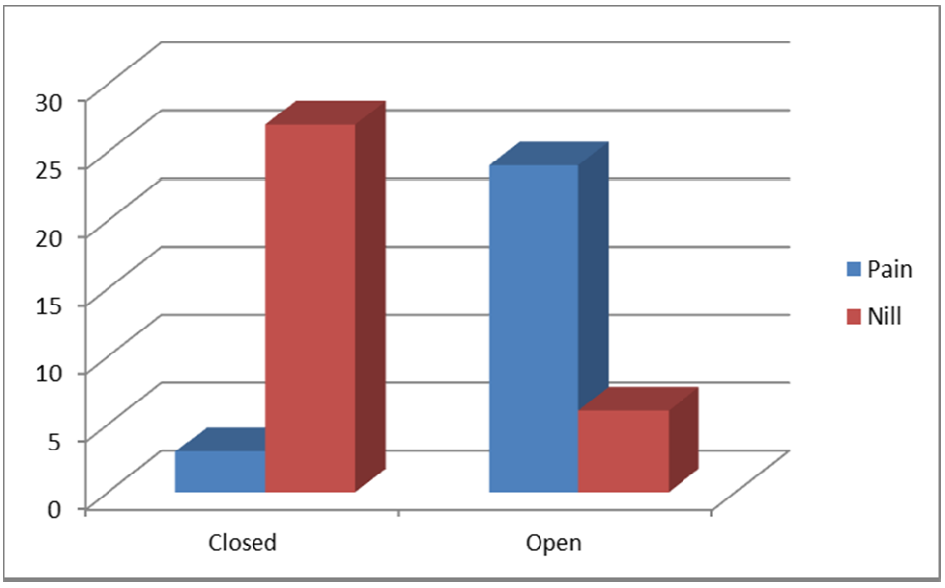
Association was also noted between Hospital Stay & Mode of operation.

POST – OPERATIVE COMPLICATIONS.

Table 8:Present series

	Group I (Close)		Group II (Open)		Test statistics	
	Number	%	Number	%	Z-Value	P-Value
Pain	03	10.4%	24	80%	7.60	0.0001
Nil	27	89.6%	06	20%	7.069	0.0001

Complications associated with Close& Open methods.



Graph 13

In our present study,Group I had less pain (10.4%) in comparison to Group II (80%).

We noted a significant P value for pain between fistulectomy of primary closer& open fistulectomy. (P value 0.0001)

In the present series as only low level fistulae was selected, the anorectal ring was not damaged during surgery, hence rectal incontinence was not a sequel.

In our study, we followed up the patient of low level anal fistula & we noted no recurrence in the study group.

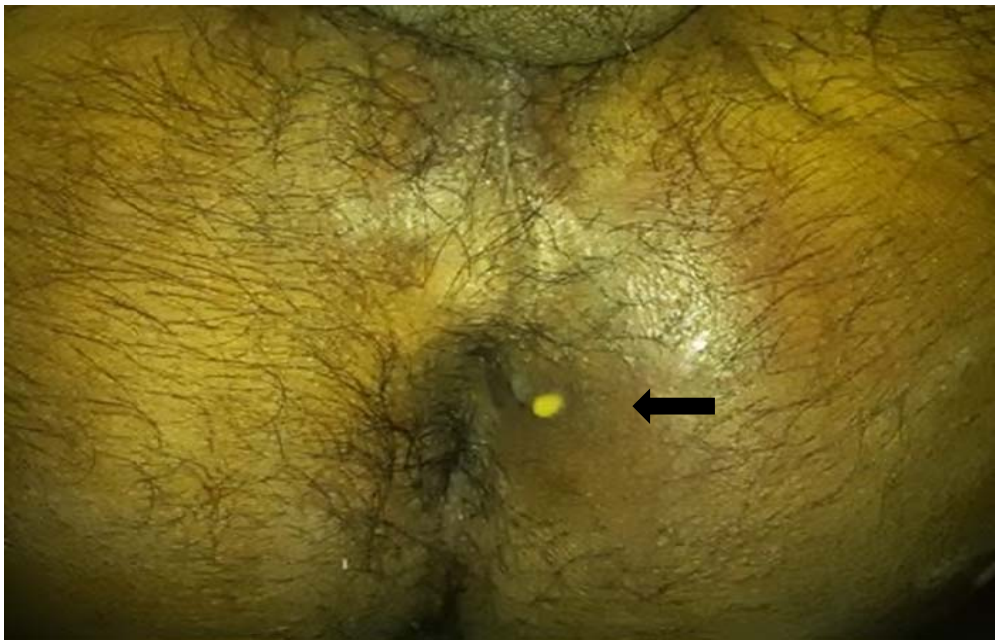


Fig. 1 – External opening of low anal Fistula

Fig 2: Injecting Dye into the Fistulous Track

Fig. 3 – Probing of the tract

Fig. 4 – Dissection of the Fistulous Tract

Fig 5 -Dissection of fistulous Tract

Fig.6– Laying open of the Fistulous Tract

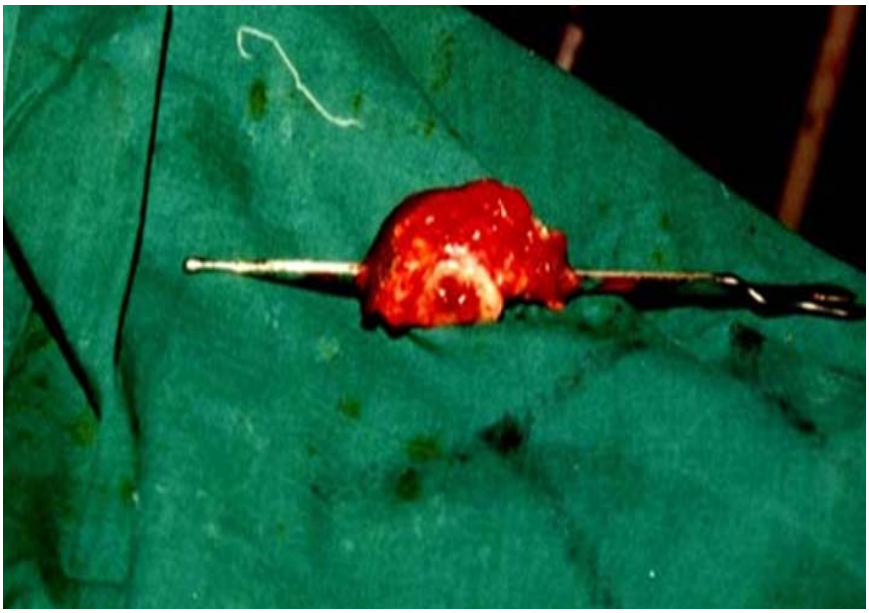


Fig 7 – Post operative specimen of Fistulous Tract

Fig 8 - Fistulectomy with Primary Closure

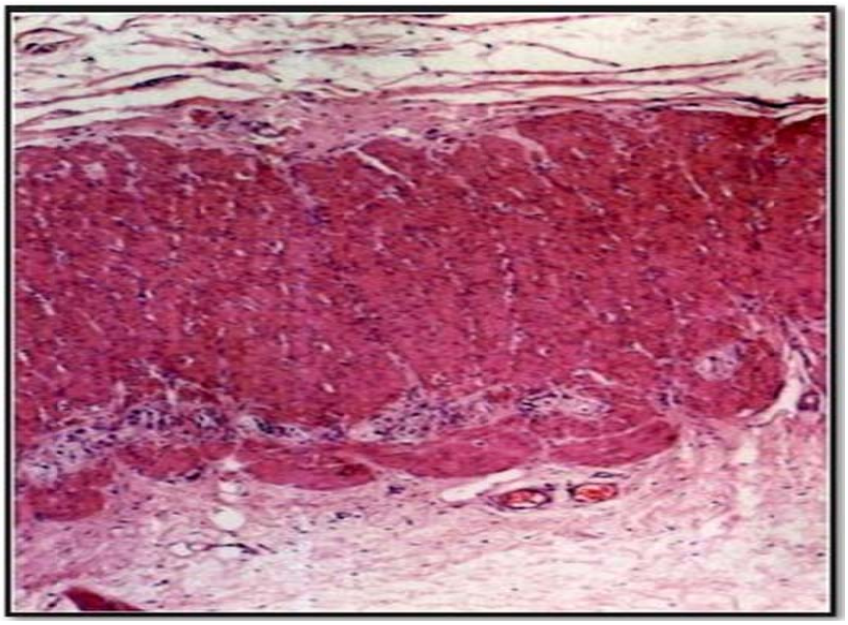


Fig 9 – HPR OF Fistula in ano

DISCUSSION

In our study, the incidence of fistula in ano was noticed in the commonest age group of 21- 40 years among 76%in Group I &60% in Group II . The highest age was 70 years and the lowest age was 21 years in our study.

Our results were comparable to the reports of Sushil Damor et al , who also noted the incidence of fistula was more in 21-40 yrs of age, with 64% patients in Group I and 60% in Group II in this age group.[11] Similar observations were also noted by Chaudhry Muhammad shahbaz et al study,with a peak incidence at 21-40 years .[6]

In our study, majority of patient were male,65.5% in Group I &86.6% in Group II. Sushil Damodar et al noted , 32% male in open method &48% males in primary closure.The observations were in accordance to those made in our study.

In our study, the duration of hospital stay in Group I was 7.93 days & Group II was 11.46 days as compared to Stewart MP et al [8], who reported 4 days in Group I &14.1 days in Group II . Prakash S et al [9], reported mean hospital stay was 5.2 days .Sushil damor et al[11], reported mean hospital stay as 5.1 days in Group I and Group II as 12.88 days. The difference observed in our study could be due to the difference in the hospital guidelines for admission and discharge at each institute.

In our study,the duration of wound healing treated under Group I was 9.79 days & Group II was 26.73 days as compared to sushil damor et al [11] was 8.24 days in Group I &21.24 in Group II .In Stewart M.P. et al [8] studies, Group I was 7 days &Group II was 25.1 days.In Prakash S et al [9]studies, wound healed in 2 weeks with Group I as compared to 4-5 weeks in Group II.

In our study pain score in Group I was 3.36 & Group II was 7.4 on first post-operative day as compared to Sushil Damor et al [11] , who reported a pain score in Group I as 4.124 & Group II as 5.8.

In our study Anterior type of fistula (70%) was more common & Posterior type of fistula was (30%) which was in accordance to the observations made by previously reported studies.

Postoperative pain score evaluation showed, pain was more in Group II (80 %) in comparison to Group I (10.4%). In the present series as only low level fistulae were selected, the anorectal ring was not damaged during surgery. Hence incontinence was not a sequel.

In our study 73% of patients had purulent discharge, 27% has serous discharge in Group I,compared to Group II, 53% had purulent & 47% had serous discharge.

Goligher et al (1967) [1] reported 84% of his patients had purulent discharge, 10% had blood mixed discharge, 6% had serous discharge, it co-insides in our study.

Success rate of fistulectomy - primary closure and laying open technique:

Table 9: Success Rate of Fistulectomy (open & close methods)

Starr Series	Goligher Series	Sushil Damor series	Poon Chi-Ming series	Present Series
100%	60%	100%	84%	100 %

In our study, cases treated for low level anal fistula showed 100 % result in securing successful & uneventful outcome following fistulectomy with primary closure.

Starr of Sydney,treated low level fistula in ano by primary suturing under antibiotic cover before and after operation and claimed almost 100% result in securing successful and uneventful outcome.

In Poon Chi-Ming et al, study (135 patients), there was recurrence in 13.3% of patients operated by fistulectomy.

Goligher performed fistulectomy with primary closure on 20 cases of low anal fistulae, 12 secured uneventful and sound healing but in the remaining 8 cases sepsis occurred, necessitating re-opening and re-fashioning of the wound, which was followed by satisfactory healing by granulation.

In Goligher study, convalescence period was one week for primary closure when compared to 4-5 weeks by classical methods.

In observations in our study showed a high success rate for fistulectomy with primary closure as reported by previous other studies.

Follow – up

Most of the patients came for follow up for 1 year.

SUMMARY

- In this study, 60 cases of low anal fistulae were selected for comparative study. 30 cases were treated by Group I (Close) and 30 cases were treated by Group II (Open).
- Pain is less in fistulectomy with primary closure in comparison to open group with VAS score being 3:7
- Among the cases studied the commonest etiology was pyogenic abscess (non – specific) which ruptured spontaneously or was treated inadequately.
- The high incidence of cases was in the age group between 21- 40 years.
- The incidence was more among males, the ratio being 4:1
- Among the study anterior fistula was the most common presentation.
- The common presenting features were swelling, pain and discharge from the external opening. The physical findings were tenderness, induration of external opening around anus.
- In cases treated by group I, the healing occurred quickly, within a period of 8 - 10 days.
- In the cases treated by group II – excision of fistula tract and laying open of the wound and allowing healing by secondary intention from depth, the wound healing time was 3-6 weeks.
- Hence fistulectomy with primary closure was preferred choice & better method in treatment for single low anal fistula.

CONCLUSION

- In the present series, patients who had undergone fistulectomy with primary close had a mean VAS pain score of 3.36 while patients who had undergone open fistulectomy had a mean VAS pain score of 7.4 on the first postoperative day.
- In cases treated by group I, the period of hospital stay was 7-13 days on average and the healing occurred quickly, within a period of 8 -13days (mean – 9days).
- In the cases treated by group II period of hospital stay was 12 days on average and excision of fistula track and laying open of the wound and allowing healing by secondary intention, the wound healing time was average 26-34 days.
- Because of long time taken to heal, number of hospital visits for dressings were more and more antibiotics were prescribed. Hence expenditure was more for patients and work burden increased for doctors and hospital staff. More working days were lost by the patients.
- From this study we can conclude fistulectomy with primary closure is ideal for low anal fistula. This saves number of days required for wound healing, hospital stay and results in less expenditure for patients, saves the number of working days lost.

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ANNEXURE I

ETHICAL COMMITEE

Ethical Committee BIJAPUR-586103 Dist Watd 27/2011 Date 21-10-11

B.L.D.E.UNIVERSITY'S

SHRI.B.M.PATIL MEDICAL COLLEGE, BIJAPUR-586 103

INSTITUTIONAL ETHICAL COMMITTEE

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this college met on 20-10-2011 *at* 10-30am *to scrutinize the Synopsis/Research projects of postgraduate/undergraduate student/Faculty members of this college from Ethical Clearance point of view. After scrutiny the following original/corrected & revised version synopsis of the Thesis/Research project has been accorded Ethical Clearance.*

Title Comparative study of outcome of open fistule - etomy versus fistulectomy with primary closure in single low level anal fistula.

Name of P.G./U.G. student/Faculty member Dr. Vikram Nagathan Dept of Surgery

Name of Guide/Co-investigator Dr. M.B. Patil Prof of Surgery

DR.M.S.BIRADAR,
CHAIRMAN
INSTITUTIONAL ETHICAL COMMITTEE
BLDEU'S, SHRI.B.M.PATIL
MEDICAL COLLEGE, BIJAPUR.
Chairman
Ethical Committee
BLDE A'S Shri. B.M. Patil
Medical College
Bijapur-586103

Following documents were placed before E.C. for Scrutinization
1) Copy of Synopsis/Research project.
2) Copy of informed consent form
3) Any other relevant documents.

ANNEXURE II

SAMPLE INFORMED CONSENT FORM

B.L.D.E.U's SHRI B.M. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE, BIJAPUR – 586103, KARNATAKA.

TITLE OF THE PROJECT

COMPARATIVE STUDY OF OUTCOME OF OPEN FISTULECTOMY VERSUS FISTULECTOMY WITH PRIMARY CLOSURE IN SINGLE LOW LEVEL ANAL FISTULA.

PRINCIPAL INVESTEGATOR: Dr. VIKRAM NAGATHAN

PG GUIDE: Dr. M.B.Patil M.S.

PURPOSE OF RESEARCH

I have been informed that this study will analyse the Comparative Study of open fistulectomy versus fistulectomy with primary closure in single low anal fistula.

I have been explained about the reason for doing this study and selecting me/my ward as a subject for this study. I have also been given free choice for either being included or not in the study.

PROCEDURE

1) **Open fistulectomy**

Pre-operative cleaning enema are necessary, when the patient has been anaesthetised and placed in lithotomy position .Using bidigital palpation of perineal tissue will often reveal a cord like induration representing the track which will lead the intraanal finger towards the proximal opening, it is better to endeavour to find internal opening via proctoscope. If internal opening cannot be seen insertions of probe retrograde into anal crypt. Injection of dilute methylene blue or preferably dilute hydrogen peroxide solution to the fistula opening site to know the track. A probe is passed with the help of knife the fistula track is excised from the perianal region till the inner opening in the anal canal and allowed to heal by secondary intention.

2) **Excision of the track with primary suturing**

The first operative step is to excise the fistulous track. Skin and subcutaneous fat, however should not be excised but preserved to facilitate the final closure of the wound.

In complicated high fistulae, where the tissue has to be generously removed in order to explore the tract, that are technically quite unsuitable for primary closure, This method is most readily applied to simple direct fistulae. To prepare the wound for closure, it is necessary to excise the opened up fistulous tract as far as possible and leave fresh wound surfaces free from granulation or fibrous tissue.

Closure includes the complete reconstitution of the wound from the depth using several layers of buried interrupted sutures with fine vicryl as well as the surface sutures. The deepest layer consists the sphincter muscles which are sutured by mattress suture. Subsequent layers oppose the subcutaneous fat. The surface stitches

comprises of vertical mattress stitches with fine vicryl. In the mucosa and the skin of the part of the wound lying in the anal canal, similar stitches of vicryl/ chromic catgut is put as in the skin of the perianal region.

RISKS AND DISCOMFORTS

I understand that I/my ward may experience some recurrence for primary closure in single low anal fistula, there may be pain at the operated site, there may be leak from the wound, anal incontinence and I understand that necessary measures will be taken to reduce these complications as and when they arise.

BENEFITS

I understand that my/my wards participation in this study will help to analyse the effectiveness

CONFIDENTIALITY

I understand that medical information produced by this study will become a part of this Hospital records and will be subjected to the confidentiality and privacy regulation of this hospital. Information of a sensitive, personal nature will not be a part of the medical records, but will be stored in the investigator's research file and identified only by a code number. The code key connecting name to numbers will be kept in a separate secure location.

If the data are used for publication in the medical literature or for teaching purpose, no names will be used and other identifiers such as photographs and audio or video tapes will be used only with my special written permission. I understand that I may see the photograph and videotapes and hear audiotapes before giving this permission.

REQUEST FOR MORE INFORMATION

I understand that I may ask more questions about the study at any time. Dr. Vikram Nagathan is available to answer my questions or concerns. I understand that I will be informed of any significant new findings discovered during the course of this study, which might influence my continued participation.

If during this study, or later, I wish to discuss my participation in or concerns regarding this study with a person not directly involved, I am aware that the social worker of the hospital is available to talk with me. And that a copy of this consent form will be given to me for careful reading.

REFUSAL OR WITHDRAWL OF PARTICIPATION

I understand that my participation is voluntary and I may refuse to participate or may withdraw consent and discontinue participation in the study at any time without prejudice to my present or future care at this hospital.

I also understand that Dr. Vikram Nagathan will terminate my participation in this study at any time after he has explained the reasons for doing so and has helped arrange for my continued care by my own physician or therapist, if this is appropriate.

INJURY STATEMENT

I understand that in the unlikely event of injury to me/my ward, resulting directly to my participation in this study, if such injury were reported promptly, then medical treatment would be available to me, but no further compensation will be provided.

I understand that by my agreement to participate in this study, I am not waiving any of my legal rights.

I have explained to _____ the purpose of this research, the procedures required and the possible risks and benefits, to the best of my ability in patient's own language.

Date: Dr. M.B. Patil (Guide) Dr. Vikram Nagathan (Investigator)

STUDY SUBJECT CONSENT STATEMENT

I confirm that Dr. Vikram Nagathan has explained to me the purpose of this research, the study procedure that I will undergo and the possible discomforts and benefits that I may experience, in my own language.

I have been explained all the above in detail in my own language and I understand the same. Therefore I agree to give my consent to participate as a subject in this research project.

_____ _____

(Participant) (Date)

_____ _____

(Witness to above signature) (Date)

ANNEXURE III

PROFORMA

FISTULA – IN –ANO

Name I.P.No

Age DOA

Sex: DOD

Address:

CHIEF COMPLAINTS

Discharge Duration

Swelling Duration

Number

Pain Present / Absent

Fever Present / Absent

H/O PRESENT ILLNESS

a. Discharge 1. Duration

2. Nature

3. Periodicity

b. Swelling 1. Number

2. Duration

3. Associated with discharge or not

4. Site

c. Pain Present / Absent

d. Fever Present / Absent

e. Pruritus Present / Absent

f. Bowel Habit Regular / Irregular / Painful

5. PAST HISTORY

H / o swelling in anal region: Burst open / surgically treated

H / o T.B.

H/o Diabetes

H/o Exposure to S.T.D

H/o of rectal malignancy

6. Personal and Family History

No. of Children

Smoker / Non – Smoker

Alcoholic / Non – Alcoholic

Nature of work

Veg. Or Non – veg. or Mixed

Bladder function – Normal / Altered

Sleep – Normal / Disturbed

7. GENERAL PHYSICAL EXAMINATION

GENERAL SURVEY

Built:	Obese	Moderate	Poor
Nourishment	Good	Moderate	Poor
Lymphadenopathy	General	Local	Non - significant

8. OTHERS SYSTEMS

Cardiovascular system

Per Abdomen

Respiratory system

9. LOCAL EXAMINATION

Inspection

a. Perianal skin – any operated scar Present / Absent

b. Fissures Present/ Absent

c. External openings Number

Position

Any exuberant granulation tissue Present or Absent

Palpation

a. Tenderness Present / Absent

b. Thickening of the wall of the fistula Present / Absent

c. Mobility to deeper structures Present / Absent

d. Any swelling in neighbouring region Present / Absent

e. Induration Present / Absent

Relation to anorectal ring – In relation to transverse axis

f. Examination with probe

Direction Curved or Straight

Depth

Presence of Foreign body Present / Absent

Tip of the probe enters into bony cavity / hollow viscus.

Any discharge after withdrawal of probe Present / Absent

PROCTOSCOPY

SIGMOIDOSCOPY

INVESTIGATIONS

Blood : Hb% TLC.

DLC. Urine: Alb

B.T. Random Blood Sugar

C.T. Micro E.S.R.

B.U(Blood Urea)

S.C.(serum creatinine)

ECG in all leads

X – ray of the Chest

Examination of discharge – Culture and sensitivity

Any opaque foreign body

Histopathology report of excised track

Fistulogram

Surgical Treatment

a. Pre – operative Preparation

b. Operative Treatment

c. Anaesthesia

d. Operative notes

Post- operative progress: Any complications during immediate post-

Operative period

FOLLOW UP

SUMMARY

MASTER CHART OPEN FISTULECTOMY GROUP

SR NO	NAME	IP NO	AGE	SEX	OCCUPATION	DOA	DOD	SWELLING (MONTHS)	DISCHARGE (MONTHS)	PAIN(Y/N)	PRURITIS (Y/N)	DM/HTN	HOSPITAL STAY (DAYS)	WOUND HEALING (DAYS)	TYPE OF FISTULA ANT/POST	COMPLICATION	DISCHARGE	Pain Score
1	SOMALING	12692	65	M	FAR	6/23/2011	7/1/2011	12	8	Y	Y	DM	8	20	ANTERIOR	PAIN &DISCHARGE	PURULENT	8
2	SHRESHAIL	12885	36	M	FAR	6/26/2011	7/5/2011	12	12	Y	Y	NIL	10	20	POSTERIOR	PAIN &DISCHARGE	PURULENT	6
3	RAMU	27218	43	M	GS	12/29/2011	1/8/2012	4	4	Y	Y	NIL	11	22	POSTERIOR	PAIN &DISCHARGE	SEROUS	8
4	GUNDAPPA	14997	40	M	GS	8/4/2011	8/16/2011	3	3	Y	N	DM	13	28	POSTERIOR	PAIN	PURULENT	9
5	MOHAMMED ALI	22135	41	M	FAR	10/17/2011	10/25/2011	4	4	Y	Y	NIL	9	28	ANTERIOR	PAIN	PURULENT	8
6	MEGHA	26123	35	F	FAR	12/8/2011	12/15/2011	6	6	Y	Y	NIL	8	32	POSTERIOR	PAIN	SEROUS	8
7	AMAR	26677	50	M	FAR	12/22/2011	12/30/2011	4	3	Y	Y	NIL	9	32	POSTERIOR	PAIN &DISCHARGE	PURULENT	6
8	KASHIRAYA	4428	31	M	GS	2/23/2012	30-2-12	12	12	Y	Y	NIL	8	26	ANTERIOR	PAIN	SEROUS	6
9	NAGRAYA	12642	25	M	GS	6/7/2012	6/15/2012	12	10	Y	Y	NIL	9	28	ANTERIOR	NILL	PURULENT	8
10	SUNITHA	10329	31	F	HW	3/15/2012	3/26/2012	7	6	Y	Y	NIL	12	35	POSTERIOR	NILL	PURULENT	8
11	SHIVANAND	13594	38	M	FAR	6/25/2012	7/10/2012	12	12	Y	Y	NIL	16	30	POSTERIOR	PAIN &DISCHARGE	PURULENT	8
12	LATEEF	19420	35	M	FAR	8/30/2012	9/10/2012	9	9	Y	Y	DM	11	34	ANTERIOR	PAIN	PURULENT	7
13	VISHWANATH	24835	60	M	FAR	11/1/2012	11/10/2012	8	8	Y	N	NIL	10	33	POSTERIOR	PAIN &DISCHARGE	SEROUS	6
14	SUNIL	29255	36	M	GS	12/27/2012	1/14/2013	4	4	Y	Y	NIL	19	27	ANTERIOR	PAIN &DISCHARGE	PURULENT	8
15	MADIWALLAPPA	30529	65	M	FAR	12/27/2012	1/10/2013	6	6	Y	N	DM	15	34	POSTERIOR	PAIN &DISCHARGE	SEROUS	8
16	RAMU	14458	42	M	GS	8/4/2011	8/15/2011	12	12	Y	Y	NIL	12	27	POSTERIOR	NILL	PURULENT	8
17	GADDEPPA	2497	40	M	GS	1/31/2012	2/7/2012	8	7	Y	N	NIL	8	29	POSTERIOR	NILL	PURULENT	6
18	HANUMANTH	11003	35	M	FAR	5/18/2012	5/24/2012	8	6	Y	N	NIL	7	33	POSTERIOR	NILL	SEROUS	6
19	BHIMASHI	3148	60	M	FAR	2/7/2012	2/20/2012	5	4	Y	Y	NIL	14	18	ANTERIOR	PAIN &DISCHARGE	PURULENT	6
20	PARASAPPA	5863	28	M	LAB	3/13/2012	3/28/2012	8	8	Y	N	NIL	16	20	POSTERIOR	PAIN	SEROUS	8
21	N M TUPPAD	5817	40	M	LAB	3/12/2012	3/25/2012	4	3	Y	Y	DM	14	18	ANTERIOR	PAIN	SEROUS	8
22	RESHMA	23620	36	F	HW	11/21/2011	12/6/2011	6	6	Y	N	NIL	16	18	POSTERIOR	PAIN & DISCHARGE	PURULENT	9
23	JATEPPA	21535	39	M	GS	10/11/2011	10/20/2011	10	8	Y	Y	DM	10	28	ANTERIOR	PAIN &DISCHARGE	PURULENT	9
24	BHIMANGOUDA	6004	45	M	FAR	3/4/2013	3/12/2013	12	12	Y	N	NIL	9	25	ANTERIOR	PAIN	SEROUS	8
25	MOHAMMED ALI	22135	50	M	GS	11/24/2011	11/30/2011	12	12	Y	Y	NIL	7	30	ANTERIOR	PAIN	PURULENT	8
26	BASAVARAJ	23561	45	M	FAR	11/20/2011	11/30/2011	7	7	Y	N	DM	11	22	POSTERIOR	PAIN	SEROUS	6
27	SUNIL	29284	48	M	GS	12/13/2012	12/21/2012	6	6	Y	Y	NIL	9	25	POSTERIOR	NILL	PURULENT	6
28	KALLAWWA	25530	39	F	HW	11/8/2012	11/24/2012	4	4	Y	N	NIL	17	28	POSTERIOR	PAIN	PURULENT	8
29	RAJESH	25526	40	M	GS	11/8/2012	11/24/2012	8	8	Y	N	NIL	17	26	POSTERIOR	PAIN	SEROUS	8
30	SHARANU	12148	33	M	GS	6/16/2011	6/24/2011	2	2	Y	Y	NIL	9	26	POSTERIOR	NILL	PURULENT	8

MASTER CHART OF FISTULECTOMY WITH PRIMARY CLOSURE GROUP

Sr No	Name	IP NO	AGE	SEX	OCCUPATION	DOA	DOD	SWELLING (MONTHS)	DISCHARGE (MONTHS)	PAIN Y/N	PRURITIS(Y/N)	DM/HTN	HOSPITAL STAY (DAYS)	WOUND HEALING (DAYS)	TYPE OF FISTULA(ANT/ POST)	COMPLICATION	DISCHARGE	Pain Score
1	SHIVAMURTHY	15150	40	M	GS	6/3/2013	6/11/2013	2	3	Y	N	NIL	9	8	POSTERIOR	NIL	PURULENT	2
2	KUMAR	14653	30	M	FAR	5/29/2013	6/4/2013	2	2	Y	N	NIL	7	9	POSTERIOR	NIL	PURULENT	3
3	PUNDALIK T	24936	36	M	FAR	6/14/2012	6/20/2012	6	6	Y	Y	NIL	7	9	ANTERIOR	NIL	SEROUS	4
4	BHIMAPPA	11814	32	M	GS	5/28/2012	6/7/2012	5	4	Y	Y	DM	11	10	ANTERIOR	NIL	PURULENT	4
5	SURESH	24936	44	M	FAR	12/1/2011	12/8/2011	8	8	Y	Y	DM	8	10	POSTERIOR	NIL	SEROUS	4
6	GANESH	2533	30	M	GS	1/28/2013	2/9/2013	6	6	Y	Y	NIL	13	13	ANTERIOR	NIL	PURULENT	5
7	MAHADEVI	1915	43	F	FAR	1/21/2013	2/1/2013	4	4	Y	N	NIL	12	12	POSTERIOR	NIL	PURULENT	4
8	SOUMYA	1263	30	F	FAR	1/14/2013	1/22/2013	4	3	Y	N	DM	9	12	ANTERIOR	PAIN	PURULENT	2
9	GURU	5879	40	M	FAR	3/3/2013	3/15/2013	2	2	Y	N	NIL	13	13	POSTERIOR	NIL	PURULENT	3
10	MAHANADA	10062	39	F	GS	4/9/2013	4/15/2013	3	4	Y	N	NIL	7	9	POSTERIOR	PAIN	SEROUS	3
11	MAHADEVI	9801	25	F	STU	4/8/2013	4/15/2013	4	4	Y	N	NIL	8	10	POSTERIOR	NIL	PURULENT	2
12	PAVITHRA	8618	35	F	FAR	4/11/2013	4/18/2013	3	8	Y	N	NIL	8	10	POSTERIOR	PAIN	PURULENT	4
13	RAKESH	8611	35	M	BM	4/11/2013	4/17/2013	1	4	Y	N	NIL	7	9	POSTERIOR	NIL	PURULENT	4
14	RATANABAI	9954	42	F	FAR	4/9/2013	4/15/2013	4	8	Y	Y	NIL	7	9	POSTERIOR	NIL	PURULENT	2
15	BHIMRAJ	30594	55	M	GS	12/28/2012	1/9/2013	7	8	Y	Y	DM	13	13	POSTERIOR	NIL	PURULENT	3
16	INDIRA	7033	38	F	FAR	3/20/2013	3/26/2013	4	8	Y	Y	NIL	7	9	POSTERIOR	NIL	PURULENT	3
17	VASARAJ	4760	40	M	FAR	2/28/2013	3/4/2013	2	6	Y	Y	NIL	5	8	POSTERIOR	NIL	PURULENT	4
18	VIMALABAI	9255	50	F	FAR	4/3/2013	4/7/2013	4	7	Y	Y	NIL	5	8	POSTERIOR	NIL	PURULENT	4
19	BASAPPA	3370	30	M	BM	2/6/2013	2/11/2013	1	2	Y	N	NIL	6	8	POSTERIOR	NIL	SEROUS	4
20	BASAVARAJ	3145	28	M	FAR	2/3/2013	2/8/2013	4	4	Y	Y	NIL	6	9	POSTERIOR	NIL	PURULENT	3
21	SUREKHA	2905	22	F	FAR	2/2/2013	2/12/2013	4	6	Y	N	NIL	11	11	POSTERIOR	NIL	PURULENT	3
22	ASHA	4880	60	F	HW	3/21/2013	3/26/2013	4	6	Y	Y	DM	6	9	ANTERIOR	NIL	SEROUS	3
23	BABUGOUDA	6332	28	M	GS	3/7/2013	3/12/2013	8	8	Y	Y	NIL	6	9	POSTERIOR	NIL	PURULENT	3
24	GOPALGOUDA	15389	68	M	FAR	7/13/2012	7/19/2012	1	1	Y	Y	NIL	7	10	POSTERIOR	NIL	SEROUS	4
25	RUDRAYYA	18640	32	M	FAR	9/5/2011	9/10/2011	4	4	Y	Y	NIL	6	9	ANTERIOR	NIL	PURULENT	4
26	NEELAKANTH	18649	30	M	FAR	9/5/2011	9/12/2011	7	6	Y	Y	DM	7	9	POSTERIOR	NIL	PURULENT	2
27	NADAGERAPPA	12730	25	M	GS	6/9/2012	6/14/2012	1	1	Y	Y	NIL	6	9	ANTERIOR	NIL	SEROUS	3
28	RAMAPPA	3368	40	M	FAR	2/6/2013	2/13/2013	7	7	Y	Y	NIL	8	10	POSTERIOR	NIL	PURULENT	4
29	RAKESH	6019	28	M	BM	3/15/2012	3/19/2012	3	6	Y	N	NIL	5	10	POSTERIOR	NIL	PURULENT	4
30	PIREJI	21699	28	M	FAR	8/7/2013	8/15/2013	4	4	Y	N	NIL	9	10	POSTERIOR	NIL	SEROUS	4