A PROFILE OF DIAGNOSIS AND MANAGEMENT OF ANORECTAL FISTULAE

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CERTIFICATE

This is to certify that this dissertation entitled **"A PROFILE OF DIAGNOSIS AND MANAGEMENT OF ANORECTAL FISTULAE"** submitted by **Dr.D.SATHYA DEEPA** to The Tamil Nadu **Dr. M. G. R. Medical University**, Chennai is in partial fulfillment of the requirement for the award of **M.S (General Surgery)** and is a bonafide research work carried out by him under direct supervision and guidance.

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DECLARATION

I, **Dr. D. SATHYA DEEPA** solemnly declare that I carried out this work on **"A PROFILE OF DIAGNOSIS AND MANAGEMENT OF ANORECTAL FISTULAE"** at Department of General surgery, Government Rajaji Hospital during the period of November 2005 – August 2007.

I also declare this bonafide work or a part of this work was not submitted by me or any other for any award, degree, diploma to any university, board either in India or abroad.

This is submitted to the Tamilnadu Dr.M.G.R. Medical University, Chennai in partial fulfillment of the rules and regulation for the General Surgery Degree Examination.

Govt. Rajaji Hospital **Dr. D. SATHYA DEEPA**

Madurai.

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CONTENTS

INTRODUCTION

Anorectal fistulae are one of the most common and complex problems in anorectal surgery. The site of the disease frequently prevents the patient from seeking early and proper medical care. The chronicity of the disease associated with the nature of the symptoms, which include purulent discharge, staining of clothes, repeated abscess formation makes a healthy person to lose his confidence, and at times his ability to work. This psychosocial morbidity in a healthy person forms the other important aspect of the disease. The incomplete and inefficient treatment of this disease, frequently by non-medical people has resulted in recurrence of the disease and worse, unwanted complications. The need for per-rectal and proctoscopic examination and probing to assess the correct status of the disease so often comes in the way of proper care to the patient and acceptance of the treatment by the patient.

The last few decades has seen tremendous progress in understanding the nature of the disease, which in turn has led to better management.

The delineation of the anatomy of the rectum and anal canal and the proper understanding of the function of the physiology of continence has

helped in management of the disease. This understanding has enabled the surgeon to sacrifice the sphincters keeping the anorectal ring intact and thus eradicating the disease.

The improved techniques of surgery have contributed for the radical treatment, short convalescence and prevention of recurrence.

The methods of primary closure, primary grafting and secondary grafting has revolutionized fistula-in-ano surgery have reduced the recovery time following surgery. These methods can be adopted due to the availability of antibiotics and methods 6f gut sterilisation.

There are also newer techniques in treatment in treatment of fistula-in ano, which include injection of scierosant into the fistulous tract.

This dissertation consists of review of literature and study of cases of fistula-in-ano admitted to Govt, Rajaji Hospital – Madurai with a view to assess etiology, pathology, and treatment and follow up of patients.

This dissertation consists of two parts; Part one consists of review of literature and part two consists case reports, analysis of data collected and conclusion.

OBJECTIVES

The objectives of the study are;

1. To study the various etio-pathological factors of fistula-in-ano

To study the various modalities of treatment of fistula-in-ano and the complications associated with them.

REVIEW OF LITERATURE

EMBRYOLOGY OF RECTUM AND ANAL CANAL

In the third week of embryonic life, the embryonic disc changes over to a definite shape by the formation of the cephalus, tail and two lateral folds. As the growth proceeds the gut lengthens at first pari passu with the embryo and new portion of the hindgut can be visualized between the caudal aspect of the vitelline duct and the origin of allantois. •The hindgut caudal to the allantois dilates to form the endodermal cloaca at the fourth week and its ventral wall is the cloacal membrane. Subsequently the membrane becomes shortened by the absorption of the infra umbilical portion due to the development of the musculature of the lower part of the abdominal wall and only the perineal portion is left behind. As a result of the overgrowth of the surrounding tissue, the membrane comes to lie in the depression called the Ectodermal cloaca. The hindgut and the allantois operi into the ectodermal cloaca from the beginning and in the fifth week the Mesonephric ducts pierce its wall. By this time the ventral part of the cloaca is wider than the dorsal part, which remains very narrow, and it is into this dorsolateral corner (lateral horn) of the ventral part that the Mesonephnic ducts operi.

The mesenchyme outside the line of union of these two parts of the cloaca grows rapidly and thrusts the ectodermal epithelium and fuse. This process commences opposite the connection of the allantoic canal with the cloaca and continued caudally to forma a septum called the urorectal septum which separates the dorsal and ventral parts which later the join the rectum and the urinary bladder and urogenital sinus. The two parts of the cloaca communicate by a cloacal duct, which obliterates as. the urogenital septum reaches the cloacal membrane dividing it into anal membrane and urogenital membrane. The persistence of this duct is what results in congenital rectovaginal or recto urethral fistulae. The anal membrane sinks down below the surface and produces a depression called the proctodeum, which in reality consists of invaginated ectoderm meeting the endoderm at the anal membrane. This corresponds with the edges of the anal valves in adult life. At the ninth week the anal membrane ruptures and the hindgut communicates to the exterior. Thus the rectum, anal canal and anus develop. In the 4 and 5 weeks a small part of the hindgut projects outwards beyond the anal membrane and is usually obliterated and disappears by the end of 5^{th} week.

Recto-anal atresias occur in 1 in 5000 live births, when there is incomplete formation of hindgut, resulting in imperforate gut. Complete recto-anal atresias are much more common than true imperforation of the anal membrane. Both these conditions result in either recto-vaginal or recto-urethral fistula, through which the hindgut operis to the exterior. Sinuses may be present in children with complete obstruction from imperforate anus. Rectal reduplications are a rare cause of persistence of perianalfistula.

ANATOMY OF THE RECTAL REGION

It is essential to have a detailed knowledge of the anatomy of the ano rectal region for successful treatment of fistula in ano.

Though the anatomists of 19th and 20th century have described the anatomy of the region in great detail, the description was purely academic. This stimulated Milligan and Morgan to undertake the study and their work forms the basis for the present day anorectal surgery.

Some knowledge of sigmoid colon is essential for understanding the anatomy of the anorectal region. The sigmoid colon hangs down into the pelvis and the recto-sigmoid junction is marked by a definite flexure if the sigmoid colon is long. This flexure is known as the terminal sigmoid colon, which turns sharply downwards to fill the curvature of the sacrum to become the rectum at the level of third sacral vertebra. A sphincter at this level was described by O'Beime in 1833. Further studies failed to demonstrate the same and the consensus as of today is that, no such sphincter exists.

RECTUM: At first the rectum proceeds downwards, then downwards and forwards close to the convexity of the sacrum and coccyx for 12-15 cm and ends 2-3 cm in front and below the tip of coccyx by

turning backwards and downwards and passes through the pelvic diaphragm to become the anal canal. The curve along the sacrum and coccyx is known as the sacral flexure. The anorectal junction is opposite the apex of the prostate in male. From this level the anal canal passes downwards and backwards and this bend is termed the perineal flexure of the rectum. In addition to this anteroposterior curve, rectum has three lateral curves; the upper one is convex to the right, the middle is convex to the left and is the most prominent bulge of the three and the lower one is again convex to the right. The beginning and end of the rectum is in the midline.

The rectum is about 12 cm in length. The diameter of the rectum is 4 cm (about the same as sigmoid colon) and its lower part is dilated to form the rectal ampulla. Unlike the sigmoid colon the rectum has no sacculations, apperidices epiploicae mesentery. The tenia coli blend about 5cm above the recto sigmoid junction to form two wide muscular bands, which descend one on the anterior and the other on the posterior wall of rectum.

The rectum is covered by mesentery in the anterolateral surfaces in its upper two-thirds and only on its anterior part below that. The

peritoneum reflects on to the bladder in the male to form the recto vesical pouch. The recto uterine pouch of Douglas is formed in females by the reflection of the peritoneum onto the posterior surface of uterus This reflection is approximately 5cmfrom the anal verge in females compared to the peritoneal reflection in males which is approximately 7.5cmfrom the anal verge. The peritoneum is closely adherent to the rectum and is separated from the muscular coats by fatty tissue. This space allows for the expansion of rectum.

In the empty state the mucous membrane of the rectum in the lower part presents numerous longitudinal folds. These are temporary folds. The permanent horizontal folds, which are semi-circular, are prominent when the rectum is distended. These are made of in folding of membrane and part of the circular muscle coat of the rectum. Commonly upto three folds are found, but the numbers vary. The most proximal fold is situated near the recto-sigmoid junction either to the right or to the left. The middle fold is the largest and most consistent, situated above the ampulla, just below the peritoneal reflection and projects from the right anterior wall of rectum. In this fold the circular folds are more prominent. The lowest fold

is the most inconstant fold and lies about 2.5cm below the middle fold on the left side. Occasionally a fourth fold on the left side may be found 2.5 cm above the middle fold.

RELATIONS OF THE RECTUM: Posteriorly in the midline the rectum is related to the lower 3 sacral vertebrae, the coccyx, the median sacral vessels, the ganglion impar and branches of the rectal vessels. On both sides of the rectum and usually more on the left the following structures are found posterior to the rectum. They are: anterior rami of the lower 3 sacral and coccygei nerves, the sympathetic trunk, the lateral sacral vessels, and coccygei and levator ani muscles, The rectum is attached to the sacrum by the fibro-elastic tissues through which vessels and nerves pass. Anteriorly the relations are different in either sex. In males above the level of peritoneal reflection lies the upper part of the base of the bladder, the seminal vesicles and the contents of the rectovesical pouch. Below the level of the peritoneal reflection the rectum is related to the lower part of the base of the bladder, seminal vesicles, me efferent ducts, the terminal part of the ureters and the prostate. In the females above the peritoneal reflection it is related to the uterus, the upper part of the vagina and recto uterine pouch with its contents. Below the

level of the peritoneal reflection the rectum is related in females to the lower part of the vagina. Laterally above the peritoneal reflection it is related to the para rectal fossae and their contents, below to the pelvic sympathetic plexus, the coccygei and levator ani muscles and branches of the superior rectal vessels.

ANAL CANAL: The anal canal begins at the termination of the ampulla of the rectum. Here, the diameter of the bowel is abruptly narrowed as it passes downwards and backwards to the anus. It is about 3.8cm in length in adults and its anterior wall is slightly shorter than the posterior. In the normal subjects the anal canal is empty at the state of rest due to the sphincteric tone and the canal has the shape of an antero posterior longitudinal slit. It is of greatest importance surgically because of its role in rectal incontinence.

Behind, it is in contact with the mass of fibrous and muscular tissue termed ano-coccygeal ligament, which separates it from the tip of coccyx. In front, it is separated by the perineal body from the urethra and the bulb of the periis in males and lower end of vagina in females. Laterally, it is related to the ischio-rectal fossae where the lunate fascia gets attached, An

abscess at this level bursts into the anal canal frequently. It is covered through out the length by sphincters.

The upper half of the anal canal is lined by mucus membrane, while the lower half is covered by modified skin, the junction of the two being marked by the line of anal valves approximately 1.5cm from the anal orifice and opposite the middle or junction of the middle and lower third of internal sphincter. This level is referred to as the Dentate line or the Pectinate line.

The pectinate line marks the junction between the endodermal part of the anal canal, which develops from the cloaca, and the ectodermal part derived from the anal pit of the proctodaeum.

The lining of the anal canal is varied. The mucous membrane of the upper half of the canal is plum colored owing to the venous plexus as opposed to the lower part of the rectum, which is pink in color, and semitransparent through which the blood vessels can be seen. The mucosa above the anal valve is lined by epithelium, which is varied. It is in some cases, stratified columnar in type. In others it is mainly stratified squamous with patches of stratified columnar and in some, it combines areas of stratified squamous, stratified columnar, stratified polyhedral

cells and single layer of simple columnar cells. Below the pectinate line the mucous membrane is thrown into folds, which number between 8-14 called, Anal columns of Morgagni, which are more marked in children. Each column contains the terminal radicle of superior rectal artery and vein and these are the largest in left lateral, right posterior, and right anterior quadrants. Enlargement of these will result in the formation of internal hemorrhoids. The lower ends of these columns are joined to each other by small crescentric valve like folds of mucus membrane called the anal valves. The anal valves are deepest in the posterior wall and may lodge foreign bodies or may get infected to form abscess, which burst operi leading to fistula. The valve may be torn by hard fecal matter resulting in anal fissure, which if infected may form an abscess, which when not treated may result in a fistula. The line along which the anal valves begin is known as the pectinate line and is situated opposite the middle 3 of the internal sphincter. Sometimes small epithelial projections called anal papillae are present on the edges of the anal valves and they are considered to be remnants of the anal membrane. Johnson in 1914 suggested that the junction is situated at the lower border of Pecten.

Below the pectinate line for about 1.5cm the anal canal appears thin, smooth, pale and stretched and is known as transitional zone of pecten. It is lined by stratified epithelium, intermediate in thickness between the epithelium of the upper part and the skin of the lower part and has no sweat or sebaceous glands. During life it is bluish in color owing to the presence of internal rectal venous plexus. In contrast to the upper part of the canal where the loose connective tissue is predominant, the submucosa contains fairly dense connective tissue and thus the pecten is firmly anchored to the muscular coat. The transitional zone ends below at a narrow wavy zone called, white line of Hilton and in living this line is bluish pink in color and rarely ever recognized microscopically. It is situated at the level of the interval between the subcutaneous part of the external sphincter and the lower border of the internal sphincter. On digital palpation the anal intersphincteric groove can be felt at this site. The lower 8mm of the anal canal is lined by true skin and contains sweat and sebaceous glands. There is considerable variation in the arrangement as described above and there may be intermingling of the epithelium and the above described pattern may not be rigidly separated out from each other.

In the region of the anal sinus, the anal glands extending upwards or downwards into the submucosa and sphincters can be seen. There are 4-8 glands in the anal canal, which can be spiral or straight tubules, which may be branched and are lined by 2-3 layers of columnar or cuboidal cells and contain mucin. The ducts are lined by stratified columnar epithelium and operis into a small depression called the anal crypt. The glands are surrounded by lymphocytes in a manner resembling lymphatic follicles, which are termed as anal tonsil. The muscles in the submucous plane are thick in their vicinity. At times when the ducts are not canalized the perit up secretions form a cyst. The cyst can get infected forming an abscess, which in turn can lead to a fistula. The glands vary widely in their number and in their depth of perietration and extend even to the submucosa above the ano-rectal junction. It is known that the glands perietrate the internal sphincter extending into the longitudinal muscle layers in about. 50% of the population. No branch extends from the longitudinal layer into the external sphincter. The diameter of the gland is 3-4mm but in some it may be 0.5cm. They are lined by stratified mucus secreting columnar epithelium but sometimes they are lined by squamous epithelium,

presumably the result of metaplasia. The glands are important clinically in understanding the pathogenesis and morbid anatomy of fistula-in-ano

ANUS: The anus or the anal orifice is the lower aperture of the anal canal and is situated 4cm below and in front of the coccyx between the glutei. The skin 5 the anus is pigmented and thrown into folds, which converge towards the orifice and are continued into the lower part of the anal canal. Hairs are developed in this region only in males after puberty. A ring of large apocrine glands is found in the perineum

MUSCULATURE OF THE ANAL CANAL: The classical and lucid description of Milligan and Morgan form the foundation of modern teaching of anorectal anatomy. According to them the external sphincter consists of three parts; the subcutaneous, the superficial and the deep. The longitudinal muscle fibres of the rectal wall are prolonged downwards forming an intermuscular septum between the external and internal sphincters. This intermuscular septum divides at the lower margin of the internal sphincter into two parts:

(i) The outer one runs laterally between the subcutaneous and superficial parts of the external sphincter to become

continuous with the fascial septa separating the iscbio-rectal and the perianal spaces.

(ii) The inner one runs medially between the external and internal sphincters to the skin fixing the anal canal below the muco-cutaneous junction.

They thought that the subcutaneous part of the external sphincter forms a ring of muscle without attachment and was clearly demonstrable during clinical examination and surgical dissection. They thought part of the external sphincter was important in the causation of fissure-in-ano.

There were however, some unexplained problems in the above said description. Modern works by Eisenhower, Golligher, Leacock, Powler etc. .have corrected the concept of the anorectal of the anorectal junction in several respects.

INTERNAL ANAL SPHINCTER: At the anorectal junction the unstriped circular muscle coat below the rectum becomes considerably thickened to form the internal sphincter, It forms a striking structure in the longitudinal sections of the anal canal. Inferiorly it ends with a well-defined rounded edge, about 0.8 cm above the anal orifice and 1.25cm below the White line of Hilton. It is about 2.5- 3.5cm in length and 0.8cm

in thickness. Internal sphincter is composed of apparently separate bundles. In the upper part these bundles are arranged obliquely and their transverse axis inwards and downwards. From above downwards the obliquity becomes less and less and thus horizontal.

EXTERNAL ANAL SPHINCTER: The external anal sphincter is a cylindrical muscle surrounding the anal canal and when traced upwards on the lateral sides, becomes continuous with the pubo-rectalis and pubo-coccygeus muscles. Posteriorly the cylinder is attached at the perianal skin in and close to the mid line at the lower level. At a slightly higher level, external anal sphincter runs backwards to be attached to the dorsal aspect of the coccyx to form the ano coccygeal raphe. Above that raphe there is a muscular attachment to the external sphincter, which forms a loop on the posterior part of the anal canal. Anteriorly the lower fibres of the external sphincter merges into the transverse perineal muscles by a process of decussaion at the central part of the perineum and perineal body. This feature is more marked in females. Above this level most of the peripheral fibres of the external sphincter proceed forward as pubo-rectalis, while centrally placed fibres join with the fibres of the opposite

side to encircle the anal canal completely at the level of the ano-rectal ring.

On coronal section and histological examination the external sphincter seems to extend further downward than the internal sphincter. The lower most portion curves medially to occupy a position below and lateral to the lower rounded edge of the internal sphincter. On histological examination it is seen to be one continous muscle sheet with no evidence of the division of muscle into 3 parts. But the lower most portion of the external sphincter is traversed by a fan shaped expansion of the longitudinal muscle fibres of the anal canal splitting up into 8-12 discrete bundles. It is composed of striped muscle fibres.

The two muscular tubes formed by internal and external sphincters are not fixed, but are capable of slight movement vertically inside each other. It probably occurs during defecation.

LONGITUDINAL MUSCLE FIBRES: the main layer of the longitudinal muscle fibres in the anal canal is seen to lie between the between the external and internal sphincters. This layer consists of non-striped muscle fibres with elastic tissue . Traced upwards it becomes continuous with longitudinal muscle layer of rectun

LEVATOR ANI MUSCLES: This muscle constitutes a part of the sphincter mechanism of the anal canal. They are broad thin muscles attached peripherally to the inner surfuce of the side of the pelvis and medially meets the muscle of the opposite side to form the floor of the pelvic cavity. Each muscle has 3 parts:

(i) Ilio-coccygeus: is a thin muscle, arising from the ischial spines and posterior part of the white line on Obturator fascia. The fibres run downwards, backwards and medially to be inserted to the lower two sacral vertebrae and ano-coccygeal raphe.

(ii) Pubo-coccygeus: arises from the back of the pubis and the anterior part of obturator fascia. The fibres are directed almost backwards passing along the side of the lower rectum, superior to the inner most fibres of Ilio coccygeus. It fuses with the opposite muscle to form a broad band, which passes up in front of the coccyx and is inserted into the anterior aspect of the last piece of the sacrum and the first piece of coccyx.

(iii) Pubo-rectalis: arises from the lower part of the back of the pubis, and the superior fascia of the uro-genital diaphragm. It runs backwards along the side of the ano-

rectal junction and unites with the corresponding muscle from the opposite side immediately posterior to the ano-rectal junction to form a ‘U’ shaped loop, which slings from the rectum to the pubis.

ANO-RECTAL RING: The term ano-rectal ring was coined by Milligan and Morgan. It denotes the ring of muscle surrounding the ano-rectal junction. It is formed by the upper border of the external and internal sphincters, which completely encircle the junction, and on the lateral and posterior aspects of the pubo-rectalis ring. The prominence of the ring is more posteriorly due to the angulation of the bowel at this site. Its complete division results in rectal incontinence. If the ring is preserved there will be no incontinence even when the rest of the sphincter musculature is cut.

BLOOD SUPPLY OF RECTUM AND ANAL CANAL

The arteries that supply the rectum and anal canal are:

(1) Superior rectal artery, which is the main artery, is the continuation of the inferior mesenteric artery descending to the pelvis between the layers of the sigmoid mesocolon. It divides

into two branches at the level of third sacral vertebra. These branches descend on either side of rectum. At about the middle, each branch further divide into number of branches which pierce the muscular wall and descend between the muscular wall and between the muscular and mucus coats to the level ofthe internal sphincter anastomosing with the middle and inferior rectal arteries.

(2) Middle rectal arteries- each of them arises from the anterior division of the internal iliac artery. It proceeds medially and forwards below the pelvic peritoneum, in the tissues of the lateral ligaments to reach the rectal wall. It anastomoses with the branches of the superior and inferior rectal arteries. It may be absent, duplicated or triplicated on either side.

(3) Inferior rectal arteries- arise from the internal pudendal artery as it passes above the ischial tuberosity. It pierces the wall of the pudendal canal and divides into two or three branches, which cross the ischio rectal fossa, and supplies the muscle and skin of this region. The branches anastomose with the branches of the opposite side and superior and middle rectal arteries.

(4) The median sacral artery is a small vessel, which arises from the back of the aorta just above its bifurcation. Branches pass from it to the posterior surface of the rectum.

An additional source of blood supply to the lower part of the rectum may be from branches of the internal pudendal artery that ramify in the pubo-rectalis pubo-coccygeus and transverse perineal muscles.

VEINS OF THE RECTUM AND ANAL CANAL

They are:

(i) Superior rectal vein, which commence at the internal rectal plexus of the anal canal. They pass up in the submucosa above the anal orifice, pierce the muscular coat of the rectum and unite to form a single superior rectal vein, which continues upwards as the inferior mesenteric vein.

(ii) Inferior rectal veins begin in the external plexus and drain the lower part of the anal canal. Probably the external rectal plexus has communication with the internal plexus and drains partly upward along the superior hemorroidal veins.

(iii) Middle rectal veins begin in the submucosa of the rectal ampulla and mainly drain that part of the rectal wall.

LYMPHATIC DRAINAGE OF RECTUM AND ANAL CANAL

The lymphatics follow the blood vessels and there are three main routes:

(i) Upwards through the lymphatics and lymph nodes accompanying the superior hemorroidal veins and inferior mesenteric vessel eccentrically to the aortic lymph nodes (upper half of the rectum)

(ii) Laterally along the middle hemorroidal vein on either side of the internal iliac, lymph nodes. These drain the lower half of the rectum and anal canal above the mucocutaneous junction. Some of these pierce the levator and go to the ischio-rectal fossa and from there accompany the inferior rectal vessels to the external iliac nodes.

THE NERVE SUPPLY OF THE ANAL CANAL: The internal sphincter is supplied by the autonomic nervous system. Sympathetics are derived by way of superior and inferior hypogastric plexus. The sympathetic is motor to the sphincters.

The parasympathetic supply is from the sacral outflow via the inferior hypogastric plexus. They are inhibitors to the sphincters.

The external sphincters have two sources of supply on either side from the inferior hemorroidal branches of internal pudendal and perineal branch of the fourth sacral nerve.

The levator ani muscles are supplied by the fourth sacral nerve on the pelvic surface and by the perineal branches of the pudendal nerve on the perineal surface.

The wall of the anal canal below the anal valves has a rich sensory innervation having both free intra-epithelial nerve endings and organized nerve endings. The epithelium of the anal canal below the anal valves is extremely sensitive to pain heat and cold, the afferents passing along the inferior hemorroidal nerves (somatic system). Anal canal above the anal valve has much less critical sensation and afferents pass through the parasympathetic (visceral).

PHYSIOLOGY

The act of defecation is slightly complex. Due to mass reflexes such as gastro-iliac and gastro-colic reflexes, the intestinal contents pass from ileum to the colon and downwards. The value of gastro-ileal and gastro-colic reflexes is an arguable factor.

Normally the rectum is empty. The fecal masses are driven forward by the mass movements of colon and are stored in the sigmoid colon. When the sigmoid colon distends some of the fecal matter trickles down to the rectum and the desire for defecation is initiated. This desire can be accentuated by the use of coffee, food, smoking and other stimulants. There is a voluntary reflex too, which is initiated when the abdominal pressure rises beyond 200mmHg.

The act of defecation in adult is preceded by voluntary effort like appropriate posture, straining and voluntary relaxation of external sphincter.

As a result, peristaltic movement is initiated in the colon and the internal sphincter relaxes. The peristaltic movements in the descending colon carry its contents to the pelvic colon and in turn to the rectum, which moves, down to the anus and is evacuated. Thus all the contents from the splenic flexure to the anus may be emptied at one time. The longitudinal muscles of the distal colon elevate the distal colon obliterating the recto-sigmoid flexure. Resulting in a short and straight tube. This unarguably has a mechanical advantage. Shortening of the rectum is also an important event in the act of defecation.

The reflex of defecation, under normal circumstances, can he inhibited voluntarily by suppressing the visceral reflex.

The defecation centers have been located in the hypothalamus, in the lower lumbar and upper sacral segments and in the ganglionic plexus of the gut. In spinal injuries, the intrinsic intestinal plexus will act as a center and thus preserving the reflex of defecation.

CLASSIFICATION

Anorectal fistulae are classified based on morbid anatomy.

Milligan and Morgan in 1934 have provided a very useful classification according to the position of the fistulous tract in relation to the sphincters. They are subcutaneous, submucous, anal (both high and low), ano-rectal and para-rectal. But this classification does not however emphasise the relationship of he tract to the levator muscles. Hence other types of classification came to existence.

Charles and Smith have classified the fistulae as low anal, high anal, subcutaneous, submucous, ischio-rectal and pelvi-rectal fistulae. Amitlal Som has classified them as simple and complicated. The simple fistulae are further classified as subcutaneous, submucous and anal (both high and low) fistulaes and complicated fistulae as pelvi-rectal and ano-rectal. But Farqharson has classified them as extra-sphincteric, trans-sphincteric and para-rectal flstulae and sinus.

According to Miles the fistulae can be classified as follows; subcutaneous, submucous, intermuscular and sub-sphincteric, ischio-rectal, ano-rectal and para-rectal fistulae. All these may be blind at either

of the ends or complete. Parks has given an extensive but thorough classification of fistula-in-ano.

Fistula in ano has been classified on both the vertical axis and horizontal axis. The most important being the classification of the fistulae in the vertical axis in relation to the ano-rectal ring.

In the vertical axis Goligher classified it as follows which is widely followed:

1. Perianalflstulàe: a) subcutaneous fistula

b) Low anal fistula

c) High anal fistula

2. Ano-rectal fistulae a) Pelvi-rectal fistulae

b) Ischio-reetal fistulae

3. Sub-mucous fistulae

4. Horseshoe fistulae a) single horseshoe fistulae.

b) Double horseshoe fistulae

5. Congenital fistulae a) single

b) multiple.

All these may be blind at either of the ends or complete

A classification of perianal abscesses was introduced, by Eisenhammer, which could result in fistulae. They are as follows:-

a. High inter-muscular abscess
b. Low inter-muscular fistular abscess
c. Ischio-rectal inter-muscular fistular abscess
d. Pelvi-rectal fistular abscess
e. Ischio-rectal fistular abscess
f. Muco-cutaneous fistular abscess.

The Gouger classification appears to work for all practical purposes.

PATHOLOGICAL ANATOMY The pathological anatomy of fistula-in-ano is better described by describing the course of the fistulous track in various fistula-in-ano. They may be fistulae or sinuses

1. Perianal fistulae: Milligan and Morgan showed that 90% of the fistulae arise as a result of perianal abscess. Their track may or may not perietrate the sphincter musculature but are invariably below the level of the ano-rectal ring. According to their relationships they can be classified as subcutaneous, low and high fistulae,

a. Sub-cutaneous fistulae: the track lies just deep to the perianalskin or sub-cutaneously below the pectinate line. They may be fistulae or sinuses

b. Low anal fistulae: the track here will not be above the anal crypts and usually the internal opening is at the level of the anal canal. Milligan and Morgan believed that the track does not penetrate the internal sphincter but passes through the external sphincter. This is so if the track is especially low. If it opens at the level of the anal crypts it would probably pass through the lower part of the internal sphincter as well. They may be fistulae or sinuses and they have an external opening, which extend unto the pectinate line or an internal opening.

c. High anal fistulae: The course of the track is at a higher level and is in relation to the upper part of the anal sphincters but not above the ano-rectal ring which may lie very close to the internal opening. It may be either true fistula with an internal opening in the upper part of the anal canal in which case it usually traverses the sphincter musculature very obliquely, being intra-muscular for a considerable part of its course, or a blind one with the closed end of the track reaching unto a point anywhere between the anal crypts and the ano-rectal ring.

2. ANO-RECTAL FISTULAE: These are fistulae with track extending above the level of the ano-rectal ring and thus lie opposite to both the anal canal and the lower part of the rectum. The internal opening may or may not be present. Commonly part of the track above the ano-rectal ring is closed and thus usually called cul-de-sac fistula. These fistulae either have an external opening above or may have one or two subsidiary openings into the anal canal anywhere between the level of the ano-rectal ring and anal orifice. In some circumstances there is an internal opening in the rectum, which is probably iatrogenic, due to injudicious probing of the blind fistula or faulty exploration of pelvi-rectal or high ischio-rectal abscesses.

a. **Pelvi-rectal fistulae:** A very few of them extend upwards through the muscles. If the fistula is complete, an internal opening above the sphincters into the rectum is found passing through the levator-ani. Also fistulae arising from the pelvi-rectal or supra-levator abscesses will clearly have a blind extension above the muscles without any opening into the rectum.

b. **Ischio-rectal fistulae:** Majority of them arise as a result of ischio rectal abscesses and lie below the levator ani. Because of the obliquity of the muscle, it is quite possible for the track to rise above the level of the ano-rectal ring and yet be entirely in the ischio-rectal fossa

3. SUB MUCUS FISTULAE: These are usually the blind sinuses, which lie under the anal and the rectal mucosa with an opening at the pectinate line. They are entirely internal to the sphincters. Rarely they may have an opening at the upper end as well. Some times a sub mucus fistula occurs as an upward extension of an ordinary anal fistula.

4.HORSE-SHOE FISTULA: May be single or double This is based on the horizontal disposition of the fistulae. This can be better understood by the use of Goodsall's rule: The law states that, if the external opening is behind the horizontal axis, the fistulous track bends to have a curved course terminating in an internal opening in the behind-line of the posterior opening of the anal canal; whilst those anterior to the axis run directly to the anal canal.

The curved course of the track may be unilateral or bilateral. In some cases of bilateral fistulae, the two fistulae converge to a single mid-

line internal opening and are known as single or double horse-shoe fistulae.

Not all cases of fistula-in-ano adhere strictly to the Goodsall's rule. The exceptions include posterior perianal fistulae. High posterior fistulae arising from the ischio-rectal abscesses are more liable to follow the conventional course. Though the track is on one side, there is always a tendency for extension to the opposite side through the recto-sphincteric space of Courtenay. These are called as the deep horse shoe fistulae, which is remarkably constant. It abuts the pubo-rectalis muscle as it forms a sling round the ano-rectal junction lying external to the external sphincter and below or external to the lower part of the levator-ani muscle. Fortunately in these fistulae, the internal opening is definitely below the ano-rectal ring in the posterior wall of the anal canal. At times the internal opening cannot be found and the external opening is found on either side of the anus.

The forward extension of the posterior horse-shoe ischio-rectal fistula is varied. At least the better developed of the two fistulae reaches beyond the transverse axis. Milligan and Morgan, Lloyd Davis,

Thompson have pointed that the limbs of such fistulae occasionally may extend beyond the uro-genital diaphragm.

In children below five years the internal opening is seldom found around the anterior or posterior commissure of the anal canal.

5. CONGENITAL FISTULA: may be single or multiple. It is lined by the rectal mucosa in the upper part and squamous epithelium in the lower part. It is probably the re-duplication of the hind gut. Its importance lies in the fact that the mucus secreting or colloid carcinoma arises very frequently in this fistula, as it is prone for malignancy.

Congenital fistula may arise as a remnant of medullary canal in spina bifida. Infection of a sacro-coccygeal teratoma or dermoid cyst may cause an ano-rectal fistula. Sinuses may be present in children with complete obstruction from imperforate anus.

ETIOLOGY AND PATHOGENESIS OF FISTULA-IN-ANO

Fistula-in-ano is always secondary to any of the causative factors mentioned below which include

a. Perianal abscesses and anal fissure (non-specific)
b. other rectal conditions after obstetrical or gynecological surgeries
c. Tuberculosis
d. Ulcerative colitis
e. Crohn’ s disease (regional entero-colitis)
f. Carcinoma of the rectum and anal canal
g. lympho-granuloma venereum
h. Actinomycosis of the ano-rectal region
i. perineal injuries.
j. radiation induced fistula-in-ano

1.Perianalabscess: The most common cause of fistula-in-ano is a result of inadequately treated or spontaneously ruptured ano-rectal abscess without treatment. The abscess may burst externally or internally. The

infection becomes chronic and if neglected results in a fistula. The reason for this is not well defined but the following factors are said to be causative:

i. The fatty tissue around the anus is said to have poor resistance to infection.

ii. If the abscess opens into the rectum or anus internally which is common sequelae of a neglected ano-rectal abscess there will be persistent infection of the abscess cavity from the gut organisms, which result in chronicity.

iii. The anal sphinçters may impede the drainage of the abscess cavity.

iv. Presence of a foreign body like a fish bone or egg shell might result in non-healing and persistent infection

The entry of organisms to the perianal tissue is not well established. The pelvi rectal abscess is due to diverticulitis or ulcer perforating all coats of the bowel wall. The superficial breach of mucus membrane as in fissure-in-ano will not commonly result in an abscess. Further studies reveal the following:

It was Chiari in 1878 and others in 1880 who first described the anal glands and suggested these act as the channel through which the infection is carried to perianaltissues. Parks demonstrated the glands in almost all the cases studied and made the following observations:

In children under 5 years the congenital cysts of the anal glands is the cause of perianal abscesses. In the adults the fissure-in-ano is quite common. He suggested that the inflammation from the fissure either infarcts the gland or glands or seals of the ducts and hence the glands become cystic in the intersphincteric zone. Such a cyst when infected results in an abscess. The abscess bursts into the anal canal. If the drainage is impeded, the pus travels along the longitudinal layer down to the anal verge where it bursts. This is the commonest site of fistulas in as many as 70% of the cases. Depending on the circumstances the pus may spread either above or below or into the anal canal. By this hypothesis all the directions of the course of the fistulae can be explained and the importance of this point in operative management is to be considered.

A dorsal anal fissure is a common antecedent of posterior relatively superficial fistula. The developed abscess may burst into the anal canal itself or into the skin behind the fissure resulting in a fistula. These

approximately constitute 7% of all fistulae and the internal opening is commonly found in the posterior midline.

2. **Rectal, Obstetrical or gynecological surgeries**: After hemerroidectomy or evacuation of anal hematoma the skin edges may fall together and unite to form a fistula. After perineorraphy or perineal tear during labor, anterior fistula-in-ano result. The wound gets infected resulting in abscess formation, which burst open either into the anus or into the posterior vaginal wall or into the perineal skin. Thus the recto-vaginal fistulae are the frequent consequences' Fistula-in-ano can also occur following operations for congenital disorders such as anal anastamosis after pull-through procedures for ano-rectal agenesis and Hirschprung's disease.

3. Tuberculosis: it is known for a long time that tuberculosis is sometimes the cause of fistula-in-ano. Grant in 1954 recorded 6% rate in occurrence in patients with pulmonary tuberculosis. The mode of infection is as follows:

The organisms are swallowed in the sputum and enter the perianal tissue through minute abrasions. Blood borne infection is theoretically possible. The anal glands are not commonly affected though a few cases

are reported. The tuberculous fistulae affecting the anterior and posterior commissure of the anal canal as in non-specific variety is difficult to explain. Probably the bacilli affect the glands or the lymphoid tissue, which have already been affected by the non specific organisms.

The incidence of tubercular fistula-in-ano is decreasing due to better control of the disease.

4. Ulcerative colitis is another condition that undoubtedly pre-disposes to the ano-rectal fistula as a complication of the disease. Cougher detected 57 cases of-anal and recto-vesical fistulae out of 175 cases of ulcerative colitis. The usual course of event is first an avenue for infection. In a proportion of patients this usually leads onto an abscess, which in a course of time forms a fistula. Even in mild forms of proctocolitis or proctitis the fistulas develop secondary to an abscess formation. Anal abscesses and fistulae may also be complications of segmental forms of colitis in which the rectum may found to be normal.

5. Crohn's disease: this is another cause of fistula-in-ano. In Crohn's series 17 to 31% of patients are found to have anal abscesses and fistulae. Since there is no continuity of the lesion with the fistulae, it must be assumed that the infection is conveyed along the lumen and enters the

tissue of the anal region through minute branches of the lining of the anal canal. This infection predisposes, presumably, to the formation of an abscess and a fistula and entirely non-specific.

Since granulation tissue present in the track is similar to primary lesion, it seems that some causative agent exists in the intestinal tract. It was postulated by Parks and Morson that Crohn' s disease affects the aggregated lymphoid tissue in the inter-sphincteric space.

6. Carcinoma of the rectum and anal Canal: Carcinoma of the rectum and anal canal may occasionally complicate the perianal or peri-colonic abscesses and fistulae formation. In spite of high content of bacteria in the bowel in these cases as well as ulcerated conditions, it is remarkable that they do not develop fistulae more frequently. If the growth is situated in the lower rectum and in the anal canal and such an abscess should develop it will be situated in one of the tissue spaces around the anal canal and when it ruptures will result in fistula-in-ano. The fistulae are common in colloid carcinoma whose origin is complicated. Sometimes the carcinoma is not diagnosed clinically except for the presence of the fistulous track, in which case its presence is detected only at the time of surgery.

7. LYMPHOGRANULOMA VENEREUM: It is one of the etiological factors of fistu1a-in-ano. The infection may be directly from the vagina or the rectum. The infection spreads producing proctitis and later stricture formation. These strictures are quite commonly associated with fistulae.

8. ACTINOMYCOSIS OF THE ANO-RECTAL REGION: is exceedingly rare. Its occurrence is associated with typical actinomycotic pus discharge from the fistula.

9. Perineal injuries: can be complicated by fistulas around the anal canal. The injuries can be caused by blunt trauma to the perineum, stab injuries. Blast or gunshot injuries. Occasionally ingested foreign bodies like bone can penetrate the rectum. Possibility of co-existing urethral trauma should be considered.

Penetrating injuries resulting in pelvic abscess can penetrate the pelvic diaphragm and the pus can discharge through the gluteal region resulting in an extra-sphincteric fistula.

Most of the extra-sphincteric fistulae result from over-enthusiastic drainage of an ischio-rectal abscess when the rectal wall is damaged or as a result of rectal injuries, or as a result of passage of a probe through high secondary track complicating trans-sphincteric fistulae.

10. Radiation given to the perineal region either foe genito urinary malignancies or for gastro-intestinal malignancies is known to pre-dispose for development of a recto-urethral or a teeth-vaginal fistula.

CLINICAL MANIFESTATIONS: There will be previous history of having had perianal abscess, which burst open and has been discharging intermittently or continuously since then. This history often cannot be elicited in patients with long-standing disease. Also there may be history of surgical intervention for abscess or fistulae.

The discharge may be purulent or sero-purulent. In patients with history of prior gynecological or rectal procedures or confinement in which there is injury to The perineum the patients will usually have a recto-vesical fistula, if the internal ring is situated above the ano-rectal junction.

Fistula-in-ano is usually a painless condition. Onset of pain might indicate formation of a recurrent abscess, which persists till the abscess is evacuated, either spontaneously or by intervention. The soiling of the clothes is quite an annoying symptom.

Soiling of the perianal skin, which is left in a constant wet state, leads to perianal dermatitis, pruritus and maceration of the skin.

In fistulae due to procto-colitis, Crohn's disease, actinomycosis or carcinoma of the ano-rectal region there will be additional bowel symptoms. These symptoms may be so slight that the patient may not reveal these histories unless elicited specifically. Hence, history regarding the bowel habits, passage of blood and mucus per rectum, abdominal pain and history of weight loss should be elicited with care. Smilar1y cases of tubercular fistulae may be associated with symptoms of pulmonary tuberculosis, which requires careful enquiry.

Examination consists of detailed local examination including the abdomen to rule out secondary causes.

INSPECTION: Inspection of the anal region reveals one or many external openings. Single opening is the most common. Multiple openings may also be found. At times they may be so numerous to resemble a water can. Relatively inconspicuous external openings may require gentle pressure on palpation to be revealed. In long standing cases the external opening may be situated over the summit of a little pink or a red nodule, which is due to exuberant granulation tissue. Not frequently the sinus would have temporarily healed and its position is marked by a raised papilla or a scar. The surrounding perianalskin may show a scar, which is

due to previous surgeries for fistulae or abscess. It may be red, moist and thickened due to secondary pruritus-ani, which obscures the small external openings close to the anal verge and the openings can be easily missed unless specifically looked for. A careful examination should also rule out posterior fissure-in-ano which is a common cause of posterior fistula- in-ano. The position of the openings should be recorded diagrammatically.

Palpation The next step is a careful digital palpation of the perineal region and anal canal in which pus can be expressed and will give an indication regarding the position of the track. Palpation of the indurated track is more suggestive of the location of the fistulous track. In the case of simple direct fistula (low anal and subcutaneous) the track can be palpated as a rod extending from the external opening to the anal verge. Posterior hone-shoe fistulae are not palpable due to its high position.

Palpation of the anal canal reveals the induration of an internal opening The pubo-rectalis can be felt as a thick horizontal rod on one or both sides posteriorly at or above the anal ring in presence of posterior horse-shoe fistulae. This is well appreciated if it is unilateral. It is possible to mistake the double horse-shoe fistulae for an abnormally prominent

firm pubo-rectalis sling. The internal opening is invariably detected in the midline on the posterior wall of the anal canal in posterior single or double posterior horse-shoe fistulae at or above the ano-rectal ring.

The internal opening of the anterior direct fistula will be felt as a localized patch and may or may not be present. If detected the position should be carefully determined.

In the case of sub mucus track the induration can be easily detected extending from the pectinate line normally and may extend above the ano-rectal ring. It may be low or high anal fistulae with an extension in the submucosa after penetrating the sphincters but not the mucosa. It lies above and upto the ano-rectal ring in the inter-sphincteric zone and does not indicate the presence of ano-rectal fistula. It is very difficult to differentiate with confidence between the sub-mucus and extra rectal induration, as it requires a lot of experience on the part of the examiner.

The relation between the sphincters and the ano-rectal ring has to be noted diagrammatically. Also while examining, the patient is asked to relax in order to differentiate between the double horse-shoe fistulous track and abnormally prominent puborectalis and also to assess the

amount of normal musculature that is required for normal continence mechanism

PROBING OF THE TRACK: After the fistulous track has been determined by careful palpation probing is more purposeful than without the preliminary inspection and palpation. It also minimizes the risk of creation of false passage by injudicious probing. It is an absolute necessity to exercise utmost gentleness to prevent creation of false passage.

A medium sized malleable silver probe or some form of probe with pointed director capable of being bent in the last 3cm as required is used to probe the horse shoe fistulae (Allingham's probe pointer). If the internal opening is very small then a lacrimal duct probe can be used. For simple fistulae St.Mark's hospital pattern of probe (pointed director) is sufficient.

Combined probing and digital examination will definitely help to determine the communication of the fistula to the inside. If the probing is accurate and the internal opening can be palpated by the finger in the anal canal and the probe has passed through it, the finger in the anal canal will come in contact with tip of the probe. If the fistula is incomplete the rectal or the anal wall will intervene between the finger and the probe. In such

cases further maneuvering will push the probe beyond internal opening if the fistula is complete. Care must be taken to prevent creation a false passage. The track position must be ascertained in relation to the ano-rectal junction. The direction of the probe will indicate the type of the fistula. In submucus and low anal fistulae the probe meets the long axis of the canal at right angle whereas in high anal fistulae it will be oblique and in some ano-rectal fistulae it will almost be parallel to the long axis of the canal and the tip can be palpated above the ano-rectal ring.

PROCTOSCOPY: Proctoscopy may show the internal opening, which may not have been felt by digital examination or by probing, by the escape of a bead of pus on probing and direct visualization. The optimal method of demonstrating the same will be by the use of bi-valve or tri-valve proctoscope, if available. It will also help in determination of the level of internal opening. For this the 9cm proctoscope is passed full length and is gradually withdrawn. The rectal and anal walls are carefully observed. Normally as the instrument passes down from the lower rectum below, the lumen can be seen to constrict at the ano-rectal junction. At this junction the withdrawal is stopped. If the internal opening is still visualized, it can be concluded that the internal opening is situated in the

anal canal. If it disappears from view at this juncture it can be concluded that it is above the ano-rectal junction. Proctoscopy will also reveal the state of the rectal mucosa and any evidence of procto-colitis.

SIGMOIDOSCOPY: It is advisable to inspect the terminal bowel and exclude any lesion particularly in patients above 45 years of age. A neoplasm may be detected in the rectum or the sigmoid colon, which can be the cause of the fistula. It can also detect presence of inflammatory bowel disease.

ABDOMINAL AND GENERAL CLINICAL EXAMINATION: It is routinely done prior to the local examination. It will help in localizing the manifestations of specific cause of fistulae like tuberculosis, malignancy and others.

RADIOGRAPHIC FINDINGS Injecting a radio-opaque substance into the track will help in demonstrating the extension, the number and the course of the fistulous track. X-ray of the chest reveals, sometimes the typical or healed tuberculous lesions in cases of tubercular fistula-in-ano. Sputum examination for tubercle bacilli and ESR will also help. In cases of proctocolitis barium series and barium enema will help in determination of the cause of fistula-in-ano.

Anal and rectal ultrasound as well as echo-endoscopy is known to give useful information. In anal and rectal ultrasound 7mHz and 10mHz probes are used to define

(i) Location of the internal opening

(ii) Sepsis in the inter-sphincteric plane

(iii) Sphincter defects.

MRI provides more useful information on the anatomy of the fistulous track while ultrasonography gives useful information about the sphincters.

HJSTOPATH0L0GICAL EXAMINATION: Histological examination of the fistulous track after surgery has to be routinely done. By this we can appreciate the pathogenesis of fistula-in-ano, which can include non-specific inflammation with or without foreign body giant cell reaction, features suggestive of tuberculosis, malignancy and inflammatory bowel disease.

SEQUELAE AND COMPLICATIONS: If the fistulae are not treated, the chances are very minimal that spontaneous healing occurs. If spontaneous healing occurs, the following mechanisms can explain the process;

(i) the granulation tissue in the track or the cavity may be organized into a scar tissue and lumen completely obliterated. Meanwhile the fistulous opening becomes epithelialised. The discharging sinus after rupture of the abscess closes spontaneously and remains closed. This can occur in the very new sinus. Hence these sinuses are considered discharging abscesses rather than fistula-in-ano. It is almost never seen in chronic fistulae with thick fibrous walled track especially of the complete variety.

(ii) The fistulous track may get completely epithelialised. This is commonly seen in low anal fistulae or sinuses and very short subcutaneous fistulae. In these cases squamous epithelium grows along the track from both the internal and eternal openings.

Spontaneous remission by either of these two methods should be regarded as most exceptional.

In rest of the cases the fistulae are chronic. Persistence of fistulae beyond 20 years has been reported.

In addition to the discomfort caused due to continous discharge in a case of untreated fistula, there is also a possibility of malignancy arising from the fistulous track. The malignancy can be adeno-carcinoma, colloid

carcinoma or squamous carcinoma. This change is due to chronic irritation over a long period. The possibility of malignancy is suggested by presence of a tumor mass, bloody discharge and mucin secretion.

DIAGNOSIS: Careful examination as described above will reveal the presence of the fistulous track and its relation to the sphincter musculature, which is very essential in planning surgical treatment.

DIFFERENTIAL DIAGNOSIS:

(i) Urethral fistula Fistula-in-ano should be distinguished from the urethral fistula in male when it is situated anteriorly. Passing urethral sounds and ascertaining the symptoms of urethritis can establish proper diagnosis.

In the females the anterior fistula may be communicating with the anus but it originates from the chronically inflamed Bartholin’s glands.

Anterior or low anal inter-sphincteric fistulous abscess may also involve the scrotum in males. In females, anterior high intermuscular fistulous abscess is situated deep to the caudal portion of the labia majora and if it is not treated may result in a fistula.

(ii) Pilonidal, sinus may be confused with posterior fistula-in-ano. The pilo-nidal sinus will also be in the post-anal region. It is actually

situated exactly in the midline approximately 5 cm behind the anus with single or multiple openings. Around the openings the skin enters the track with smooth edges where as in fistula-in-ano there will be exuberant granulation tissue. In addition hairs often project from the openings. Long indurated area in the rhomboid triangle is also characteristic. Cases have been reported about communication of crypto-glandular abscess communicating with an existing pilonidal sinus.

(iii) Suppurative Hidradenitis: Another disease which superficially resembles the multiple fistulae-in-ano. The subcutaneous tissue around the openings is indurated diffusely and it is nodular and the skin is purplish in color. If the opening is incised there is no track found. The incision extends into the subcutaneous tissue, which is thickened, edematous and fibrotic with very small collection of purulent material.

(iv) CONCEALED FISTULA: In most cases there will be history of discharge of pus but on examination the opening (internal or external) cannot be made out and in such cases it is advisable to enquire the patient regarding the source of the pus discharge. There will be certain amount of induration in that area. The opening may have healed temporarily. It is difficult to detect the concealed fistulous track because of scarring

(v) PRURITUS ANI: In some cases there is no fistulous track but there is severe degree of idiopathic pruritus ani. This results in oozing and soiling of the underclothes, which makes the patient to think or believe that he is suffering from fistula-in-ano. In women the vaginal discharge, at times, can be mistaken for anal discharge.

(vi) Other Causes: It is important to rule out other causes of fistula-in-ano. Detailed routine examination, rectal examination, proctoscopy Will help in noting the underlying causes such as procto-colitis, rectal lymphogranuloma, actinomycosis, or malignancies. It must be remembered that the colloid carcinoma does not arise from the rectal mucosa but from the epithelium of congenital inter-muscular fistulous track. Hence there might not be any evidence of growth in the lumen, If mucoid discharge is abundant, the patient should be examined under anesthesia to rule out malignancy. A biopsy and histopathological examination is diagnostic.

The underlying regional ileitis or segmental colitis may very easily be overlooked unless specifically looked for. In these cases the fistulae are extensive, complicated, intractable and bizarre. If this picture is present abdominal symptoms like diarrhea, passage of mucus or loss of weight

should be enquired and the lower small bowel and right colon should be evaluated to rule out malignancy.

Tubercular fistulae are more deceptive. Typical tubercular fistula is characterized by thin, bluish, undermined, unhealthy looking skin edges, the absence of induration, insidious onset and possibly by the stigmata of tubercular lesion elsewhere in the body. Usually typical tubercular fistulae are very rare. If the wound after fistulectomy does not heal after three weeks and if the discharge is sero-purulent, tuberculosis is suspected and evaluated for. For this reason every specimen of the track should be sent for histopathology.

TREATMENT OF NON-SPECIFIC FISTULA

There are various methods of treatment of fistula-in-ano.

As the discharge and soiling of underclothes are annoying there may be certain 8 of reactive depression. First and foremost is to reassure the patient regarding the etiology of the disease since the common belief is that the disease is contracted due to some venereal infection,

CONSERVATIVE MANAGEMENT: Based on the theoretical principle that the fistulae can heal spontaneously, various forms of conservative methods have been applied to treat fistula-in-ano, Down the

ages, attempts have been made to stimulate the track to heal by stimulating epithelialisation of the track by application of various medicaments. Various types of fluids such as silver nitrate 3-4%, bismuth paste, quinine and urethrane etc has been used. Recently fibrin glue has been injected into the fistulous track in an attempt to promote sealing of the track. The short-term results are suggestive of sealing of fistulous track and will open up new avenues in treatment of complex fistulae and high fistulae. The long-term results of these studies are still awaited. Various authorities have claimed some success. In certain cases silver nitrate has aggravated the condition by causing sloughing.

SURGICAL MANAGEMENT: It is generally accepted that surgery is the only method of treatment to. cure fistula-in-ano though recurrence and anal incontinence are well-documented complications. These complications can be minimized by proper

Knowledge of morbid anatomy of the various fistulous track, the relation of these to the sphincters and the anatomy of the rectum and anal canal. As such the treatment of fistulae needs lot of experience and caution. The successful result of operation is based on skillful technique particularly in high anal or ano-rectal fistulae. In exceptional cases excision of the

rectum is the only chance of complete cure, which is associated with the morbidity of permanent colostomy. But this is advocated only for very intractable multiple fistulae wherein the anal continence cannot be preserved and in cases where malignancy is found in the fistulous tracks.

There are three types of operations for fistula-in-ano

(i) The orthodox method of treatment: 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 of treatment came to existence.

(ii) Laying open the fistula followed by primary skin grafting (primary grafting).

(iii) Excision of the track with primary closure.

The important thing one should bear in mind is the preservation of the sphincters. It is inevitable that certain amount of sphincter musculature has to be sacrificed during the surgery. Great deal of controversy has arisen over this procedure, Formerly much of the discussion was centered on the relative importance of the sphincters. Goodsall, Miles and others have suggested that the sphincters can be divided without incontinence and later the converse theory arose. As a

matter of fact the modern experience gained regarding the internal sphincterotomy for anal fissure suggests the converse is true. According to this erroneous concept transversely running track might be above most of or all of the sphincters and yet be so low that only the external sphincter is divided during the surgery. Hence most of the internal sphincter is preserved.

It was Milligan and Morgan's great contribution to the surgery of anal fistulae, which focused the attention of the surgeons towards the detailed anatomy of this region. We know that except for the extreme lower end of the external sphincter, the two sphincters lie parallel to each other throughout their vertical position and the fistulous track requires partial severance of both the sphincters. The significant thing is the height at which the track is in relation to the sphincters. If however the ano rectal ring is divided inadvertently, total incontinence results along with complete or partial prolapse of the rectum. It is not an exaggeration to say that the modern surgical treatment of 'anal fistulae is determined by this concept of continence depending ultimately on an intact ano-rectal ring and on the absolute necessity to preserve this structure.

Hence the relation of the fistulous track to the ano-rectal ring both pre operatively a well as on the table should be determined under anesthesia. In subcutaneous, low anal and sub-mucus fistulae there is no danger of incontinence. In the case of complete ano-rectal or pelvi-rectal fistulae with an internal opening above the level of the ano-rectal ring the classical method of laying open the track is not possible.

An alternative procedure in difficult high fistulae of this type would be to use the strong braided silk which is passed through the internal opening and around the lower portion of the sphincters. The purpose of which being to stimulate a fibrous reaction which is supposed to fix the sphincters at the point where the ligature cuts through at the end of 5-6 days or it is removed by removing the sphincters when the cut ends are believed to be anchored by fibrous tissue and do not retract. But Golliger, on the contrary believes in passing the ligature under anesthesia with the finger in the rectum. The position of the internal ring is noted and by gradual traction on the ligature, extended over a number of days and the cut is completed so that the track heals from above thus avoiding incontinence.

Pre Operative care: the patient should be admitted to the hospital preferably two days prior to the surgery.

1. Bowel Preparation lower bowel may be thoroughly emptied before the operation as it considerably adds to the comfort of the patient in the post operative period. Emptying of the bowels is done by enemas and washouts rather than purgatives, which can produce distention of the bowel in the post operative period. Additionally purgative action might not be complete and the operative field might be covered with liquid feces during and after the surgery the patient is given a soap-water enema on the evening before the surgery. On the morning of the surgery the patient is given a low rectal washout using a tube and a funnel method and then siphoned back, the process of, this is repeated 3-4 times.

2. Diet: the patient is allowed a light diet with low residue for approximately two days prior to surgery.

3. Shaving the perineum: The perineum, perianal area, the lower abdomen and the back is to preferably clipped or shaved just before the surgery.

4. Anesthesia General anesthesia combined with muscle relaxants is suitable for fistulectomy. Low spinal anesthesia can also be used. By

using general anesthesia, special disadvantages like spinal headache, post-operative urinary retention and other complications of spinal anesthesia can be avoided.

5. Position of the patient Lithotomy position is best suited for fistulectomy. The patient is drawn well down to the end of the table so that the buttocks project well over the edge of the table.

The other alternative positions are the jack knife position and prone positions. The buttocks are elevated and the hips are slightly flexed using sand bags. The bleeding is said to be minimal with this position.

o. Rectal Toilet: Asepsis is not complete and some contamination is inevitable in the anal region. By free use of weak, watery anti-septic solution for swabbing purposes before and during the surgery, the contamination is probably lessened.

OPERATIVE PROCEDURES: The operative procedures for fistula-in-ano are laying open the fistula and allowing the wound to heal by granulation, or laying open the fistula followed by immediate skin grafting or excision of the tracks and primary suture of the wound.

1. Laying open the fistula and allowing the wound to heal by granulation

In this surgery the preservation of the sphincters is of utmost importance. In excising the track or opening the track certain part of the sphincter musculature is invariably divided. A great deal of controversy has risen around this fact. Formerly much of the discussion was centered on the relative importance of the two sphincters. Goodall and Miles and Allington believed that the sphincters could be divided without incontinence. Tuttle and Mummery claimed that the converse was true. Most of the fistulae pass through both the sphincters and therefore involve division of certain portion of both sphincters in the operative management. Milligan and Morgan emphasized that if the integrity of the ano-rectal ring is maintained, incontinence does not occur. The same view is held even today.

The operative managements are described below for various types of fistulae:

a) Perianal fistula: The principle is to lay open the track of the fistula or the sinus. The preliminary probing is necessary to note the internal opening or whether it is a blind fistula. A blunt pointed fistula director is passed into the anus in the case of complete fistula and in the case of blind fistula the director is advanced into the anus to complete the

track. The track is now laid open using an electro cautery throughout its length. In case of a low level fistula the fibres of the lower part of the sphincter will be seen as the sphincter is divided.

The skin edges are retracted with tissue forceps and after securing hemostasis the wound surface is inspected closely. The extent of the granulation is identified by the velvety appearance. Its recognition is important as to decide whether the entire track is opened or not. Also the false passages can be identified by their lack of granulation, After opening the entire track the granulation is scraped with a scoop till the pale tough underlying fibrous tissue is visualized. Some of the granulation tissue and part of the fibrous tissue is sent for histo pathological examination to ascertain the etiology.

Attempting excision of the fibrous tissue will result in troublesome hemorrhage. The surface of the wound should be watched for evidence of remnant of the track. Finally when no further granulation is left in the track the edges of the wound are trimmed in order to leave a shallow, concave raw area more or less pear-shaped or conical with the apex entering the anal canal. If the fistulous track is blind and the apex of the wound does not enter the anal canal, it is advantageous to enter the anal

canal by either excising a small wedge of the skin or by incising the lower fibres of the sphincter. If this is not done the fringe of the skin between the wound and the anal canal becomes edematous and painful during the post-operative days.

The wound is again inspected for hemostasis and any remnant of the track. The dressing should be applied as follows:

The flat squares of the guaze rinsed with weak anti-septic solution is to be applied with the corner tucked into the anal canal. The dressing is kept in place by using a T-bandage.

The more complicated anal or sub-cutaneous fistulae with a number of subsidiary tracks and openings require additional incisions. Sometimes there may be two tracks separately opening into the canal, the principles of treating which are the same.

b) **Ischio-rectal fistulae:** This means the high posterior or horseshoe fistulae with or without an opening into the anal canal. This is the commonest type of fistula , which is amenable to skilled surgery. There is always an external opening and it is best commenced by laying open the lateral limb on one side. From the external opening a director is passed and allowed to take the course of the track. It may proceed towards

the posterior wall of the anal canal if there is an internal opening and if there is no internal opening the director is advanced to penetrate the posterior wall of the anal canal, below the ano-rectal ring. An incision is made over the director so that it would expose the track. Sometimes the track lies deeply so that the surrounding fat has to be removed. After the identification of the track and hemostasis the wound has to be widely separated. The granulation tissue is scraped and specimen is sent for histo-pathological examination to ascertain the etiology. The fibrous band is followed laterally. The track is opened similarly and scraped. Any anterior track should be identified and laid open. If there is no internal opening in the posterior or horseshoe fistulae, a careful search with a lacrimal probe may reveal an internal opening. The ano-rectal ring should be identified before doing this. After meticulous hemostasis the wound is dressed with a large gauze soaked with a weak anti-septic solution. The dressing is kept in place by using a T-bandage.

c) Ano-rectal Fistulae: There are two types; A blind ending track (incomplete) or a fistula with an internal opening (complete)

Incomplete ano rectal Fistulae: in this the track extends above the levator-ani muscles by perforating it. This perforation has to be stretched

with a hemostat or incised with a knife. The supra-levator portion of the track is secured carefully and curetted out cautiously. The lower part of the track is dealt with similar to other type of fistulae. The external wound is enlarged by trimming the skin and sub cutaneous tissues. Provided there are no internal opening above the levator-ani and no etiology like diverticulitis or inflammatory bowel disease the prognosis is good.

Complete fistula: through perianal approach the entire track cannot be taken out and cannot be treated by orthodox method of laying open the fistula. Hence they are regarded as inoperable. These fistulae can be treated by conservative methods. One such recent method is injection of the fibrin glue into the track by passing a catheter into the track after treating the patient initially with antibiotics and allowing the track to seal. Long-term studies regarding the efficacy of the procedure are still on.

d) Pelvi-Rectal fistulae: The initial steps of the operation are similar to the ordinary high anal or ischiorectal fistulae; that is the tissues are laid open on the affected side of the anal canal. The sphincter muscles may be divided below the subsidiary opening into the anal canal but the musculature of the upper canal should bc meticulously preserved. The track leading to the high internal opening above the levator is followed

through the muscle by dividing it sufficiently to expose the opening in the rectal wall, No part of the track should be left close to the rectal wall, as this can be the source of infection and resultant recurrence. The opening in the rectal wall is then sutured with non- absorbable sutures by Lambert inversion sutures. The wound is now trimmed to leave a conical raw area. Finally the wound is packed with a guaze soaked with weak anti-septic solution.

At times the opening in the rectum gives way and the fistula recurs. But in others the sutures hold the edges long enough for it to heal so that the non- absorbable sutures will fall off later or can be removed during the dressings. The wound heals soundly and the fistula does not recur.

In very high pelvi-rectal fistula the perineal route is not of much help unless combined with the abdominal approach.

Goligher advises the preliminary defunctioning colostomy though the results of this procedure are not far superior to other methods.

e) Sub-mucus fistulae: the important thing is to make sure whether the fistula is only sub-mucus and not an extra-rectal one. Sometimes the induration of the blind extra-rectal fistula will appear as only high sub-mucus track. It is important not to confuse these two lesions, as treatment

of an ano-rectal fistula by mere incision through the rectal wall would be disastrous with the resulting incontinence.

If the fistula is sub-mucus it should be treated by laying it open into the lumen of the rectum and anal canal. A bi-valve speculum is inserted and the opening is exposed at its usual site or just above the pectinate line. The director is then passed into the opening and along the blind track and pushed through the intact mucus membrane at this point.

Sometimes the sub-mucus fistulae are the extension of some other form of fistulae and this procedure will only be part of another procedure. The other part of the surgery should be as for other fistulae,

Post-operatively this surgery may result in formation of residual pockets of pus, which would require incision later. So, the progress should bee assessed by regular digital examination.

Post-Operative Care: The outer dressing is changed twice a day leaving the inner dressing. The bowel movement may be painful. Hence, patients are advised stool softeners. If the patient has not defecated till the second post operative day in spite of stool softeners the patient may be' given a low enema. After the bowel action, the wounds in the anal region

are dressed with guaze soaked with mild anti-septic. The patient is advised Sitz bath twice daily.

In addition to the above-mentioned measures there are few precautions to be taken the initial dressings are removed on the third post-operative day. If the raw area is big the dressings might have to be removed under short general anesthesia to avoid pain. Fresh dressing is applied. These dressings are to be continued till the wound heals.

Periodic review of wounds in the theater: At times it is difficult to plug the highest point and there will be adhesions between the edges of the wound in the apex. Pus can accumulate superior to the adhesion. If the pus is found at any point this will indicate the possibility of an unopened pocket, for which a meticulous search should be made. If the edges of the wound tend to fall together, the edges have to be trimmed.

Periodic examination of the wound and rectal examination should be done in order to assess the condition of the anus. As a large fistula may heal with great amount of fibrous tissue, anal stricture may result. In order to avoid this complication daily digital dilatation has to be done till the wound heals completely. Plastic disposable dilators are available at present.

In high posterior double horseshoe fistulae both inferior hemerroidal nerves may have to be divided resulting in false incontinence. There is a high possibility of leakage of liquid fecal matter in the early post-operative days and the control of flatus may be initially imperfect. If ano-rectal ring is preserved the anal control becomes normal with regular exercises of the anal sphincters.

The process of healing might take approximately 4-5 weeks for low fistulae and 10-12 weeks for high fistulae. Hence the patient will have to be followed up on an outpatient basis.

In order to minimize the period of convalescence skin grafting may be done as the granulating surface has reached the level of the surrounding skin. The results however depend on the ability to hold the graft in place.

2. Laying open the track with primary skin grafting: this is also called as immediate thiersch grafting of anal fistula wound and was strongly advocated by Hughes in 1963. Bowel sterilization has to be done from 4-5 days before surgery to upto 4-5 days after surgery to minimize the infection and increase the chances of graft uptake. The bowel has to be binded for upto 5 to 6 post-operative day. The Thiersch grafts taken from

the medial aspect of thigh is applied over the raw area and anchored to the surrounding skin. The sutures are cut long and a pressure binding is applied over the graft. The dressings are removed on the 5 post operative day for inspection. If the graft has taken further treatment is unnecessary and the patient is discharged on the 9 or 10 post-operative day. If the graft has not taken up the wound is dressed till it heals by secondary intention. Delayed primary graft on the 3rd postoperative day is advised in cases of high anal fistulae ‘as there is copious amount of sero-sanguinous discharge which can prevent graft uptake.

This is not advised in cases of high posterior double horseshoe fistulae, as it is difficult to keep the graft in place.

3. Laying open the fistula, excision and primary closure of the wound: This method of treating the fistulae was first practiced by Chassaignac in 1856 and thereafter Stephen Smith in 1879 but was abandoned later due to poor results. In 1949 it was Starr of Sydney who improved the technique and practiced the same.

Like in case of grafting the gut has to be sterilized with suitable antibiotics. The track is laid open but the skin and fat are preserved for final closure of the wound. The extent of the track is noted and excised.

After good hemostasis, the wound is sutured tight in layers from the depth. The deep suture should be of mattress type and after closure of the subcutaneous layer the skin is approximate with mattress sutures.

This procedure gives good results with low anal fistulae but not with high anal fistulae.

Oral antibiotics should be given pre and post operatively to sterilize the gut and the sutures are removed on the 7 post-operative day.

RECTO-VAGINAL FISTULA: In high recto-vaginal fistulae, the two viscera are separated through an abdominal approach and the communication between the two is separate and closed by invaginating suture technique.

For low recto-vaginal fistulae the approach should be from perineum with a concomitant anoplasty and sphincteroplasty. If the rectal opening repair is satisfactory, it is not even necessary to deal with the vaginal end of the fistula A mid-rectal or mid-vaginal fistula is the most difficult to treat. These fistulas are commonly caused due to Crohn’s disease, malignancy, radiation and trauma. These are usually treated with simple closure or advancement flaps Use of fibrin glue for recto-vaginal fistulae is known to have poor results.

Treatment of Tuberculous fistulae: Tuberculous fistulae are considered to treat because of the high failure of the operative management of high anal fistulae. Frequently bacterial confirmation of the etiology is lacking. It is strongly suspected that the majority of the failures have been not due to tuberculosis but due to remnant of the part of unopened track.

It has been proposed that once the pulmonary tuberculosis has been treated or ruled out, the fistulae can be treated as non-specific variety. Satisfactory healing follows if the.entire track is excised. Patients will have to be treated with the standard regimen of anti-tubercular treatment. The healing might take a long time compared to fistulae due to non-specific inflammation.

The initial management should be an accurate assessment by a chest physician of the pulmonary lesion. If the lesion is found to be active then the patient has to be treated first for pulmonary tuberculosis. If surgery is done in presence of an active pulmonary lesion then recurrence of the fistulae is common. Treatment of choice for tuberculous fistula-in-ano is anti-tubercular therapy with isoniazid, rifampicin, ethambutol and pyrazinamide.

Treatment associated with Inflammatory Bowel Disease: Any attempt at fistulectomy ignoring the etiology of inflammatory bowel disease will lead to exacerbation of the colitis. Based on the principle that the fistulae heal spontaneously with remission of the disease the primary focus should be on control of the inflammatory bowel disease. As the colitis subsides the fistulae become quiescent, but complete cure is rarely achieved. Radical surgical treatment in intractable cases includes total procto colectomy and ileal pouch.

Treatment of fistulae associated with carcinoma: the prognosis of patients with. Carcinoma either as a primary condition associated with a fistula or the carcinoma as a complication of the fistula, is Poor. Due to widespread infiltration into gluteal regions and regional lymph nodes. Treatment is the same as for a carcinoma. occasionally excision is possible by abdomino-perineal resection of the rectum with wide ablation of the surrounding tissues on the affected sides and the lymph nodes followed by adjuvant chemo and radiotherapy. This is a good palliative surgery and patients have reported to have survived beyond 3 years. In in-operable cases radiotherapy may be of value in cases of squamous cell carcinomas.

AIDS and peri anal suppurative lesions: In a patient with HIV infection or manifest AIDS who presents with perianal suppurative lesions, the focus should be on identi the cause of the suppurative lesion-crypto-glandular infection or erosion from ulcer or malignancy.

Untreated infections will rapidly progress to necrotising infection or disseminated abscesses. Hence there is no role for non-operative management.

Incision and drainage is very successful in treating the lesion. Generous incision is to be made. The purulent material drained should be sent for microbiological examination, which should include AFB staining. AIDS and Fistula-jn-ano In a patient with manifest AIDS who presents with fistula-in-ano the patient should be managed conservatively. Diarrhea due to any of the multiple causes occurring in an AIDS patient can lead to disabling incontinence jn many of these patients with fully or partially compromised sphincters. High fistulae can be managed with non-cutting setons.

HIDRADENITIS SUPPURATIVA is a chronic indolent inflammatory disease of areas of skin and sub-cutaneous tissues characterized by formation of abscesses and sinuses and due primarily to an infection of

the apocrine group of sweat glands. In perianal region this condition presents like fistula-in-ano. It was first described in English literature by Mayo clinic surgeons in 1939.

The condition is caused due to the infection of the apocrine glands but not the eccrine or the ordinary sweat glands. The apocrine glands are compound tubular glands 5mmlong, 2mm wide and 3.5mm deep. They are locate in the mammary, inguinal, genital and perineal regions. They develop from the hair follicle but do not function till puberty. They function by rupture of cell membrane and the cytoplasm is discharged as secretion.

Clinical picture: Hidradenitis occurs at puberty, in 2 and 3 decades of life in robust and healthy individuals with oily skin who have a tendency to form acne.

In the early stages it appears as small, firm sub-cutaneous nodules. They may resolve over a period of time. More commonly the adjacent nodules coalesce to form a cord like elevated band or plaque with slight suppuration. In majority of cases multiple discharging sinuses may be present. In late stages ulceration may occur.

Microscopically the skin and sub-cutaneous tissues show cellular reaction within the lumen of apocrine glands with cellular infiltration of the surrounding fissues. The gland itself may be distended with leucocytes.

Men and women are equally affected. Axilla is the commonest site of occurrence. Mammary region 8%, groin 24%, back and neck 11%, perianalregion 32% of which perineal is 1 and 25% in the axilla.

Diagnosis: the thickening of the sub-cutaneous tissue, either diffuse or nodular, and the purplish discoloration of skin, suggest sub-acute or chronic inflammation. Presence of multiple sinuses with discharge of minimal purulent secretions will confirm the diagnosis

Treatment: even though conservative management with antibiotics will control the acute infection, surgery is the treatment of choice i.e., complete excision of the lesion. Primary closure of the raw area is found to have a recurrence rate of 30%. Excision of the lesion and skin grafting is known to reduce the recurrence rate to 13%

MATERIALS AND METHODS

The materials for study of clinico-pathological aspects of fistula-in-ano were randomly selected from the casts admitted Govt Rajaji hospital , Madurai during the period of Nov 2005 Aug 2007 patients admitted were subjected to clinical examination, laboratory examination and radiological investigations. Diagnosis was confirmed and appropriate treatment was instituted.

Forty cases selected were studied as follows:

All of the cases were found to be non-specific fistulae-in-ano. No cases of fistulae as a result of inflammatory bowel disease, malignancy, tuberculosis or actinomycosis were studied as no such patients presented to the hospital during the study period.

The method of study adopted was with the aim to study the etiology, clinical picture and management.

Each patient immediately after admission was investigated as follows:

Clinical history and physical examination, both general and systemic was recorded according to the proforma prepared. Detailed examination of the local region with regards to the external opening or openings in relation to the axis was done. The extent of induration in

relation to the axis, course and its relation to the anorectum was noted. Also the behavior to the Goodsall's rule was noted. Per-rectal and proctoscopic examination was done in order to assess the track and internal opening in relation to the ano-rectum and to rule out pathology in the rectum. sigmoidoscopy was routinely done in order to rule out other pathology, which might have resulted in fistula-in-ano. Detailed abdominal examination was done to rule out other conditions which could have caused fistula-in-ano. Each patient was subjected to biochemical and hematological investigations. All the patients were subjected to radiological investigations .

Radiological examination consisted of

a) Chest x-ray

b) Fistulogram.

Laboratory examination included routine blood count and urine examination. The mode of treatment was decided based on individual cases. Operative treatment was offered to all. The six patients who refused operative therapy were offered sclerosant injection into the track.

All patients were given pre-procedure antibiotics. Bowel preparation was done by advising clear liquid diet from 2 days prior to procedure and low enema on the night before and on the day of procedure.

At the time of surgery the course of fistulous track was noted with reference to Goodsalls rule and the ano-rectal ring in order to study the morbid anatomy. If the 1c was small and low then fistulectomy primary closure of the track was attempted. fistulotomy was done for all other cases and the wound was allowed to heal by secondary intention.

The excised track and granulation tissue was sent for histopathological examination. Sclerosant injection into the fistulous track was offered only to patients with a low anal fistula and only with a: single track: Sclerosant injection was done by passing an 18 BG IV canula through the external opening and injecting the sclerosant through the IV canula after it was visualized in the internal opening by proctoscopic examination. Purse string suture was placed around the external opening after the procedure, which was removed on the 3 post-procedure day. The scierosant used was oxy-tetracycline.

The following post-procedure management was instituted all cases. The patients were kept nil orally on the procedure day. The fluid balance

was maintained by infusing intra-venous fluids. Three doses of antibiotics was given post procedure. Pain relief was provided by both NSAIDS and opioids as the individual cases warranted, On the second post-procedure day patients were started on liquid diet. All the patients were prescribed stool softeners. Patients managed by operative method had a dressing done on the 2 post-operative days. The patients were ambulated at the earliest. Patients were advised to keep the local area clean. Patients were advised sitz bath from the 2 post-operative day.

Digital examination was done from the 5 post-procedure day to prevent stricture formation and also to detect any evidence of pocket of pus or induration. Digital examination is also useful in assessing sphincter tone. Regular digital dilatation was done for two weeks to prevent stricture connation. Patients were then prescribed plastic anal dilators for self-dilatation. The time taken for wound healing in patients managed operatively was also noted. Recurrence of fistula-in-ano was watched for in the immediate post-procedure and delayed post-procedure period.

Fig1: Diagrammatic representation of Goodsall's rule which states that if the external opening is behind the horizontal axis, the fistulous track bends to have a curved course terminating in an internal opening in the mid-line of the posterior opening of the anal canal; whilst those anterior to the axis run directly to the anal canal.

Fig 2: Diagrammatic representation of the development of hind guts showing both the cloacal membrane and anal membrane. The two parts of the cloaca communicate by a cloacal duct, which obliterates as the urogenital septum reaches the cloacal membrane dividing it into anal membrane and urogenital membrane. The persistence of this duct is what results in congenital rectovaginal or recto urethral fistulae. The anal membrane sinks down below the surface and produces a depression called the proctodeum, which in reality consists of invaginated ectoderm meeting the endoderm at the anal membrane. This corresponds with the edges of the anal valves in adult life. At the ninth week the anal membrane ruptures and communicates the hindgut to the exterior. Failure of the rupture of the anal membrane results on persistence of the cloacal duct which later forms rectovaginal or recto urethral fistulae.

Fig 3: Diagrammatic depiction of the relation of the rectum to the surrounding structures

Fig 4: Diagrammatic depiction of the anal canal, laid open showing the gross structure and layers from inside to outside.

Fig 5&6: Diagrammatic depiction of low anal and trans-sphincteric fistula.

Fig 7&8 : Diagrammatic depiction of the external opening in case of a recurrent fistula and a primary case. Granulation tissue can be noted at the external opening.

Fig 9: Fistulogram depicting a complex fistula

Fig 10: Photograph depicting pus being expressed through the external opening on per-rectal examination.

RESULTS

TABLE 1

SEX INCIDENCE

Sex	Number	Percentage
Male	37	92.5
Female	03	7.5

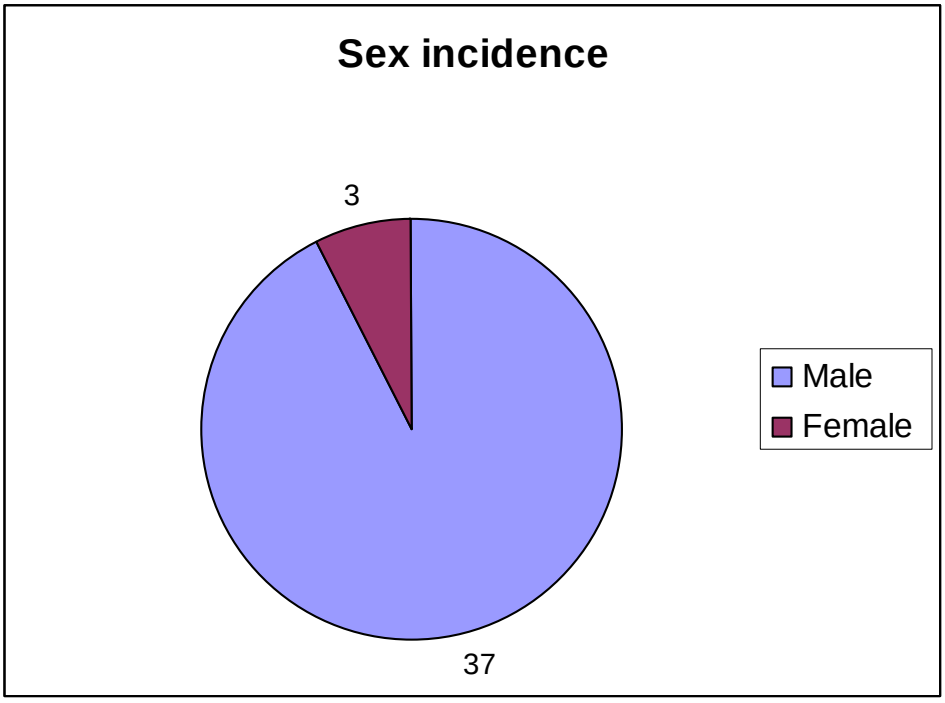


TABLE 2

AGE INCIDENCE

Age range	Number	Percentage
0-10	0	0
11-20	1	2.5
21-30	11	27.5
31-40	15	37.5
41-50	6	15
51-60	5	12.5
61-70	1	2.5
71-80	0	0
>80	1	2.5

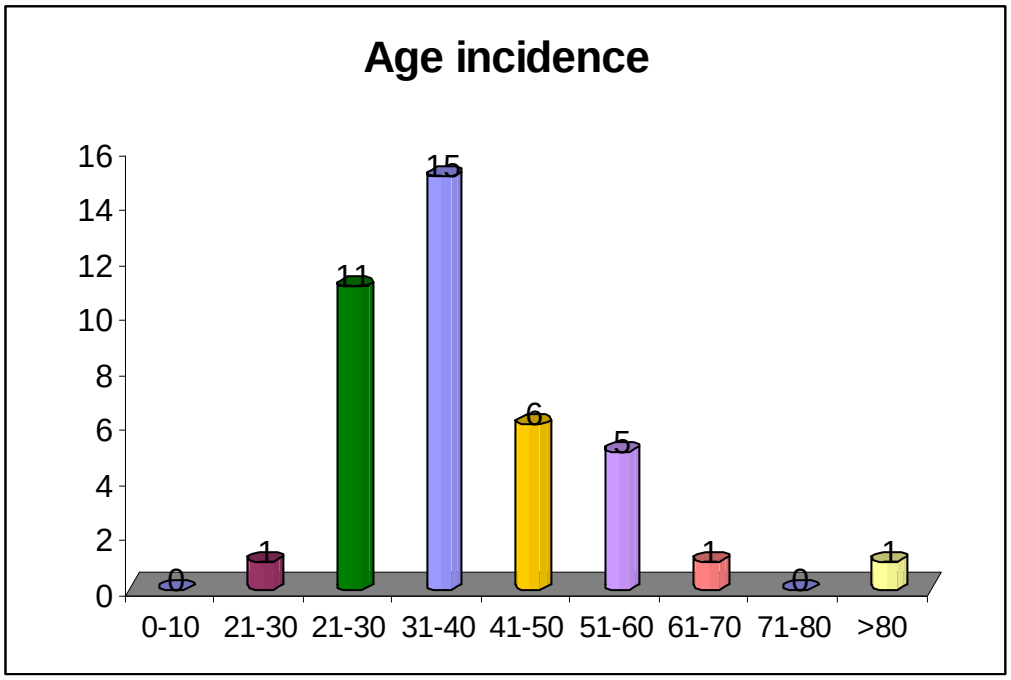


TABLE 3

CO-RELATION OF PERIANALABSCESS WITH FISTULA-IN-ANO

History of abscess present	31
No history of perianalabscess	09

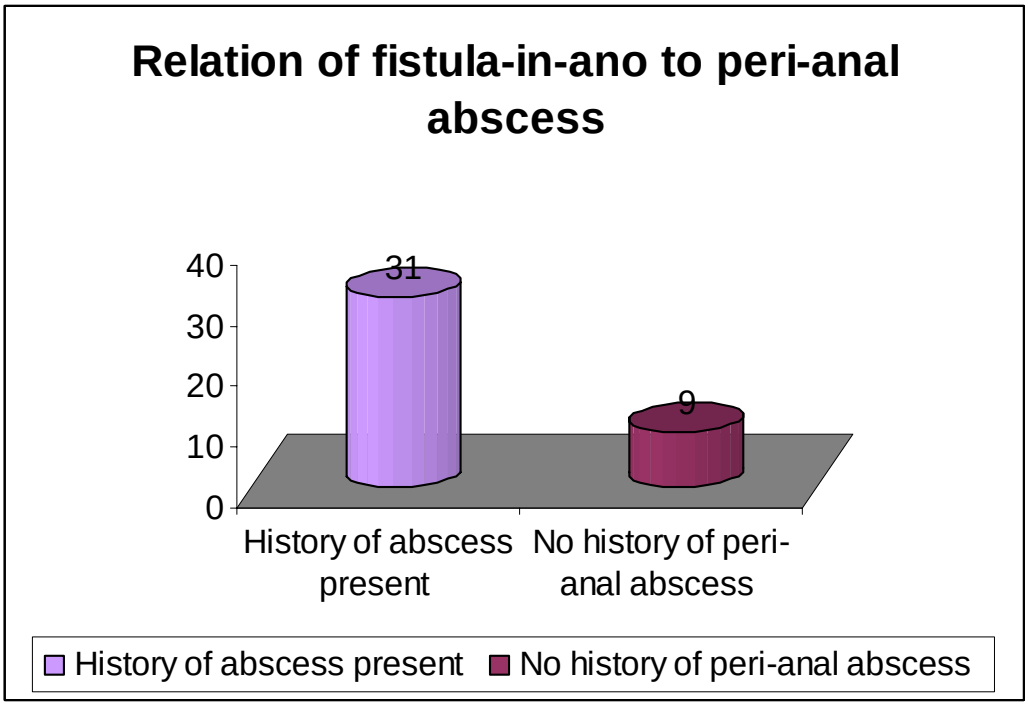


TABLE 4

RELATION OF EXTERNAL OPENING TO THE AXIS

	Number	Percentage
Anterior	24	60
Posterior	16	40

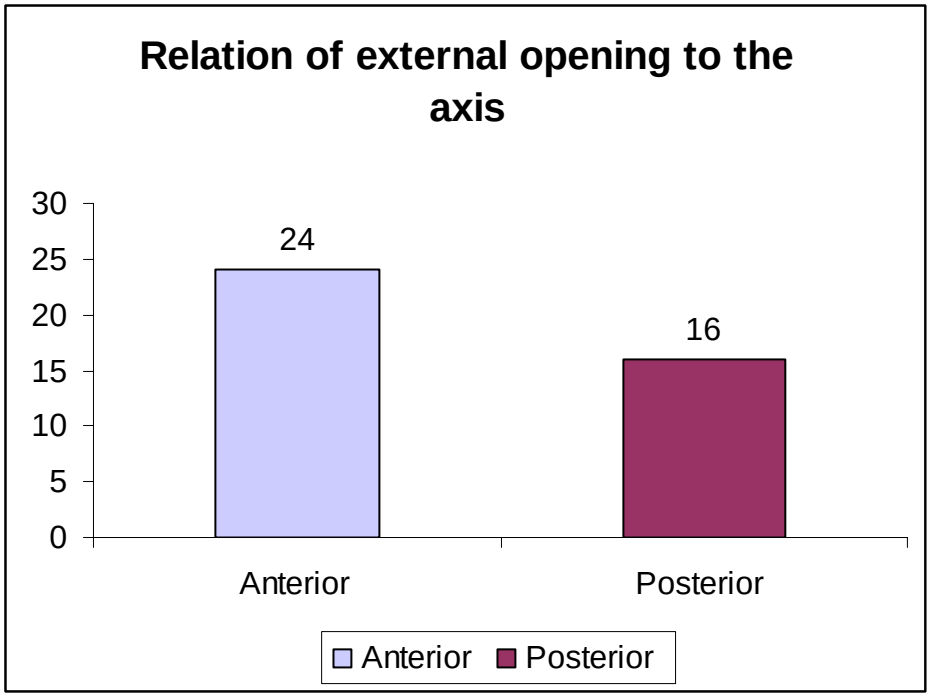


TABLE 5

INTERNAL OPENING ON PROCTOSCOPY

	Number	Percentage
Visible	23	57.5
Not visible	17	42.5

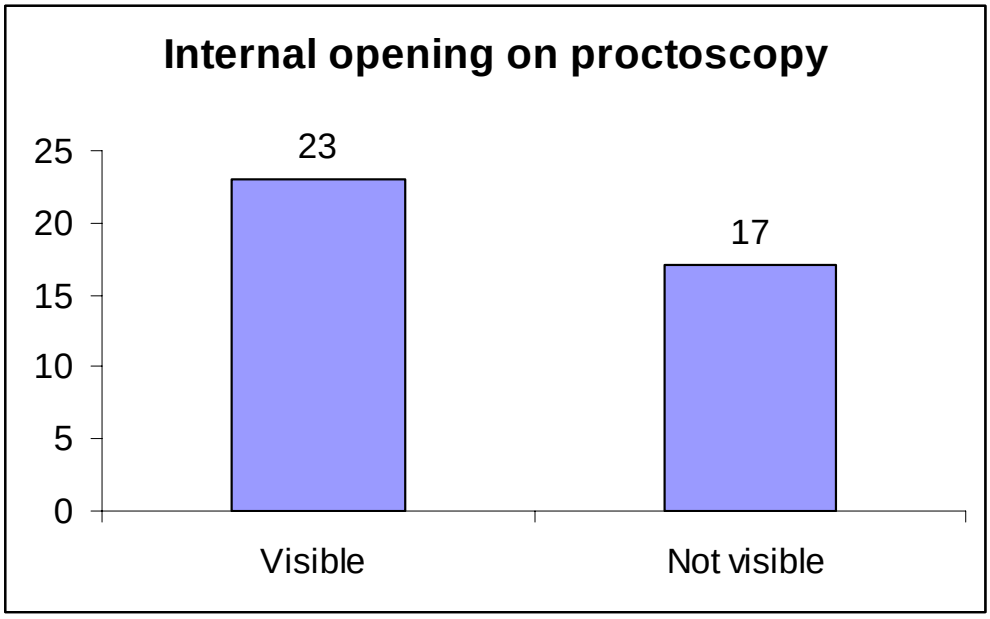


TABLE 6

RELATION OF INTERNAL OPENING TO THE ANO-RECTUM

	Number	Percentage
Low	29	72.5
High	11	27.5

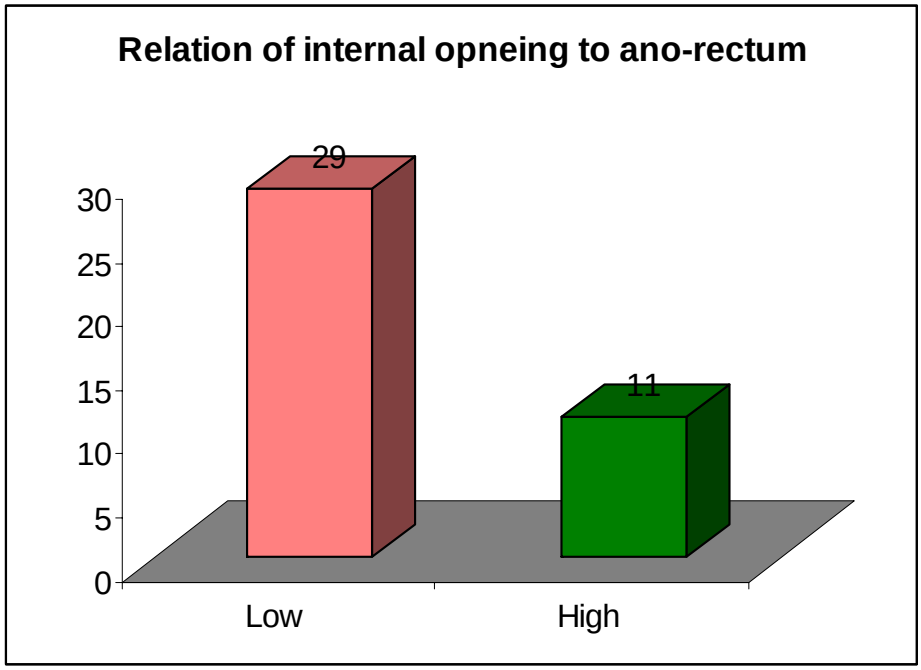


TABLE 7

RELATION OF THE TRACK TO THE ANO-RECTUM

	Number	Percentage
Low	29	72.5
High	11	27.5

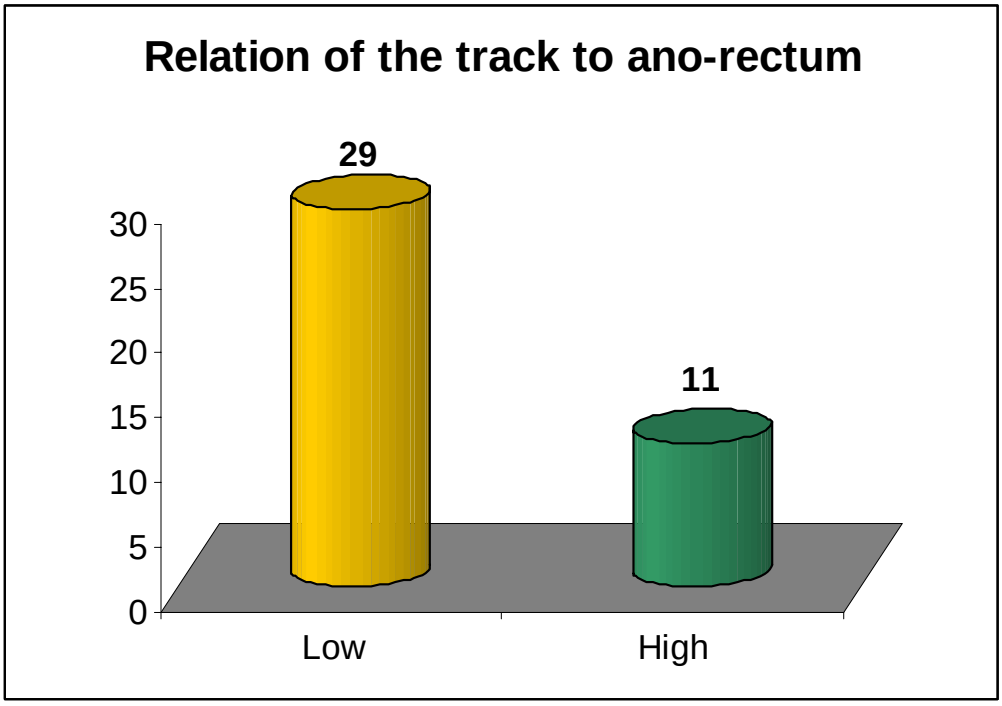


TABLE 8

SIGNS AND SYMPTOMS

Symptom / sign	Number	Percentage
Pain	28	70
Pruritus	40	100
Discharge	40	100
Ext. opening	40	100
Granulation	21	52.5
Int. Opening	23	57.5

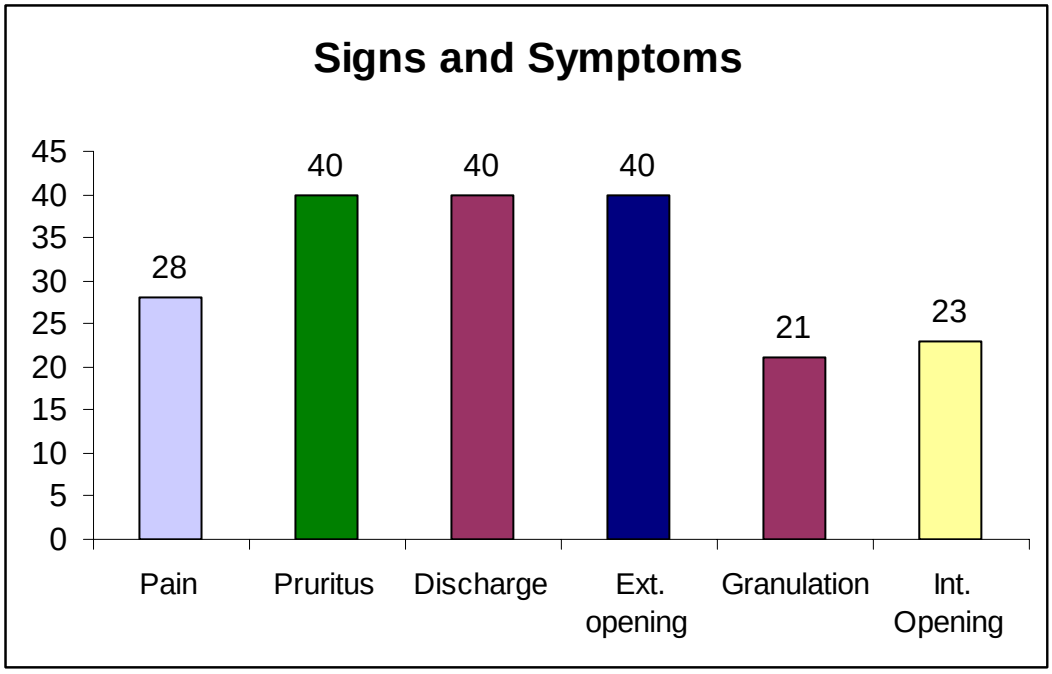


TABLE 9

TYPES OF FISTULA ON FISTULOGRAM

	Number	Percentage
Ant. Low anal	11	27.5
Post. Low anal	8	20
Low horse shoe	4	10
Blind ext fistula	4	10
Peri anal with sub mucus extension	2	5
High horse shoe	8	20
Complex fistula with high int. opening	3	7.5

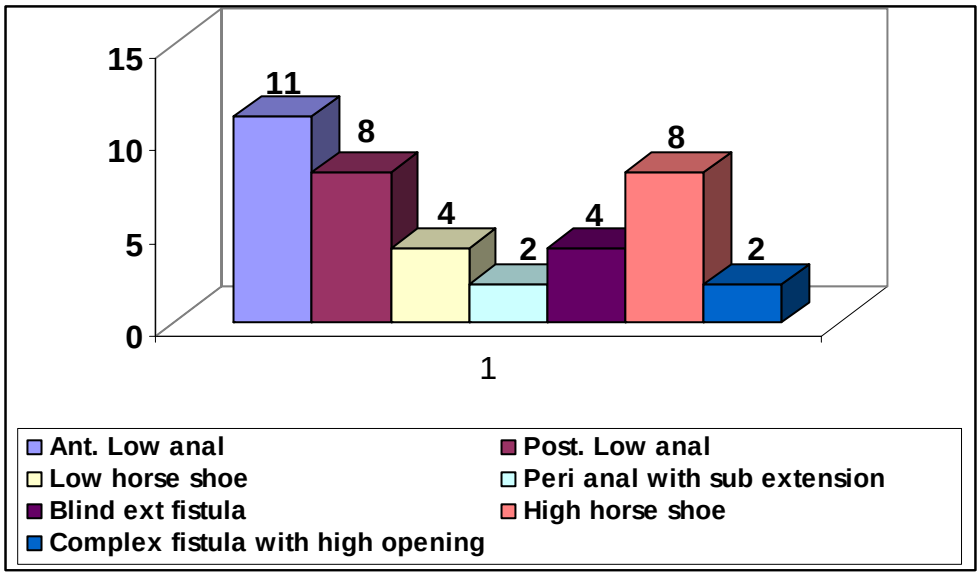


TABLE 10

MODE OF THERAPY

Mode of therapy	Number	Percentage
Surgery	34	85
Sclerosant	6	15

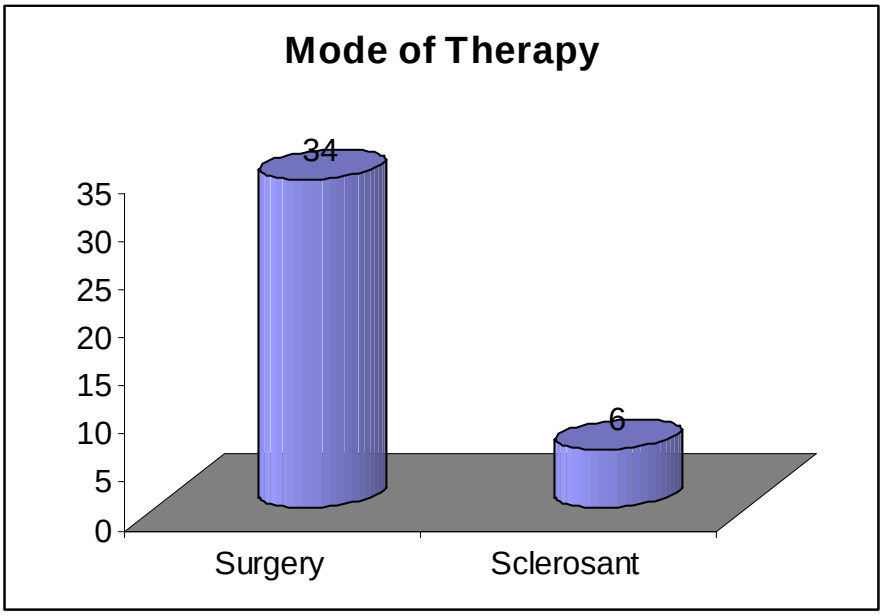


TABLE 11

TYPE OF SURGERY

	Number	Percentage
Fistulotomy	23	67.64
Fistulectomy with primary closure	11	32.36

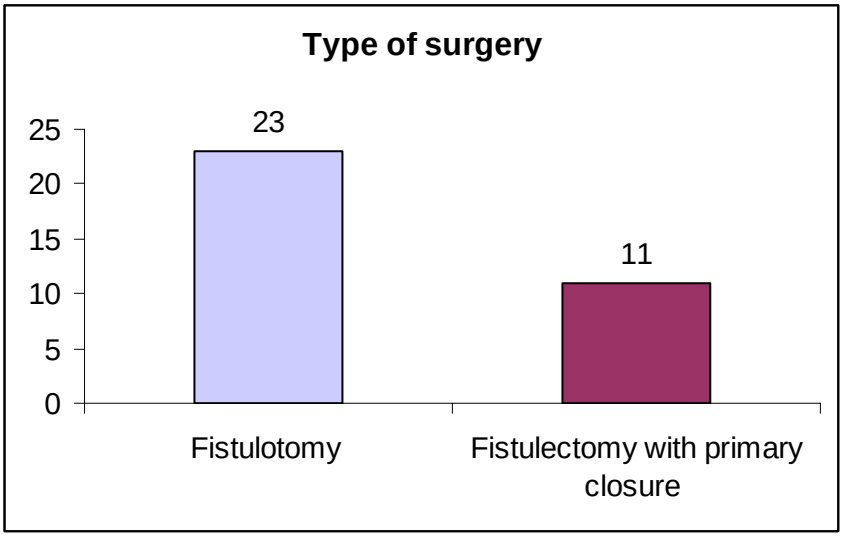


TABLE 12

HISTOPATHOLOGICAL EXAMINATION

Histopathology	Number	Percentage
Non-specific inflammation	40	100
Other pathology	0	0

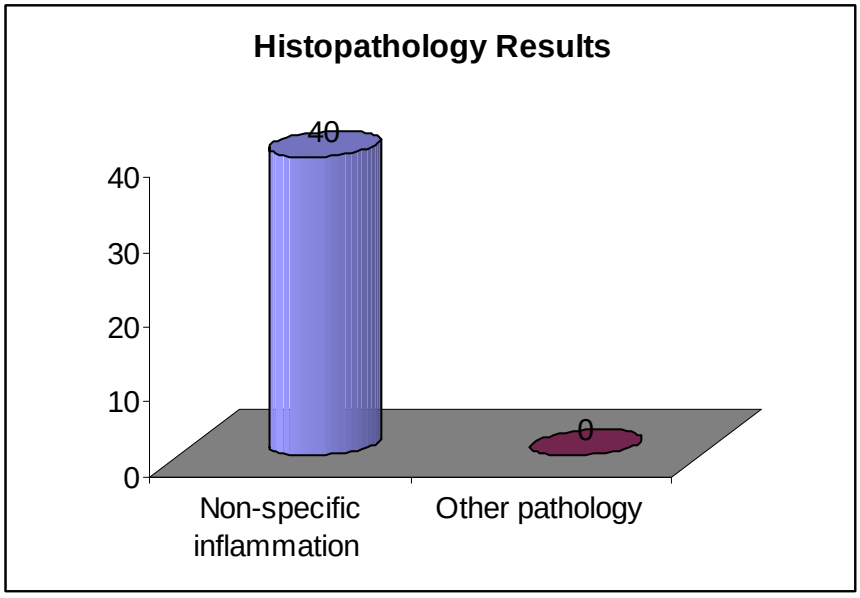


TABLE 13

FOLLOW-UP AT THE END OF 6 MONTHS OF SURGERY

	Number	Percentage
Asymptomatic	31	91.18
Recurrence	3	8.82

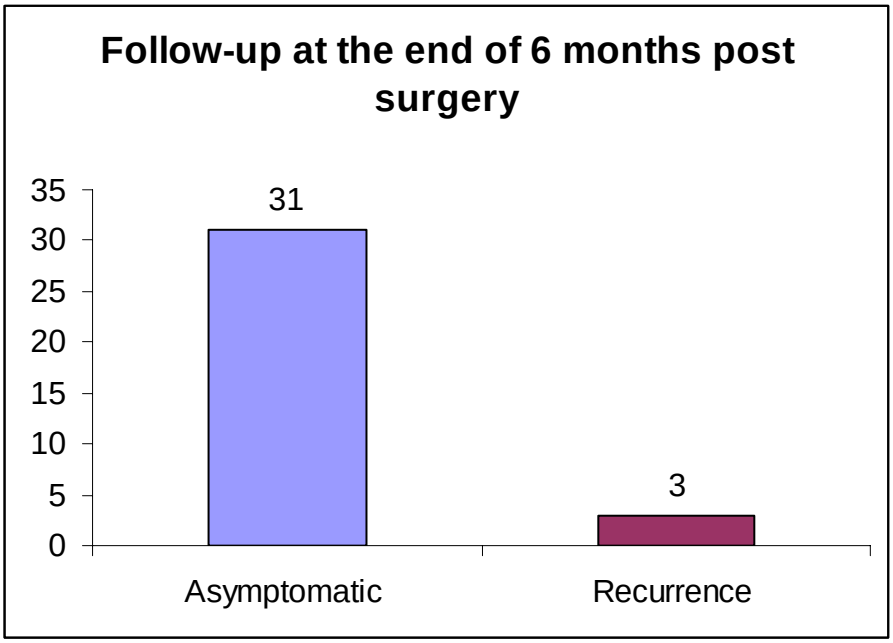


TABLE 14

TYPE OF FISTULA IN RECURRENT CASES

Complex high fistulae	3
Others	0

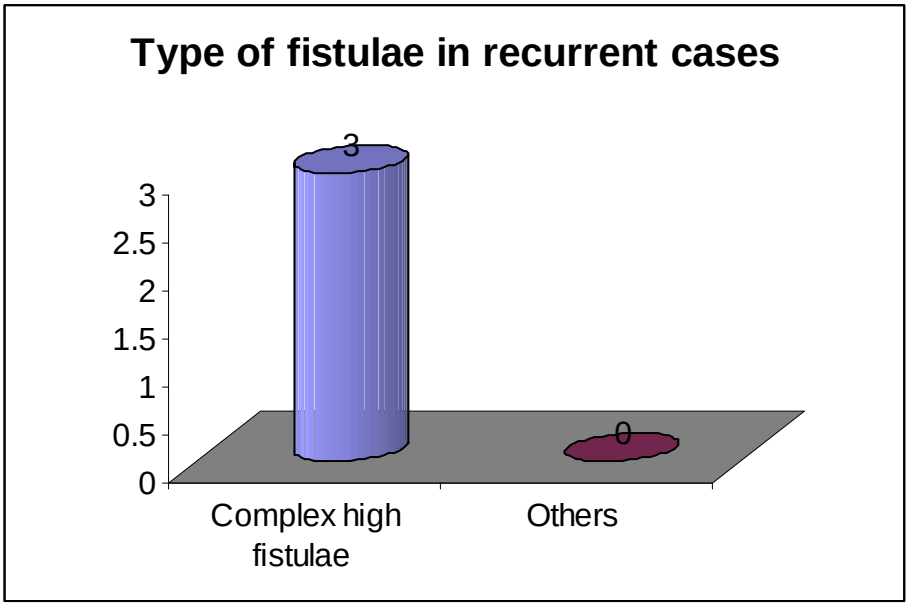
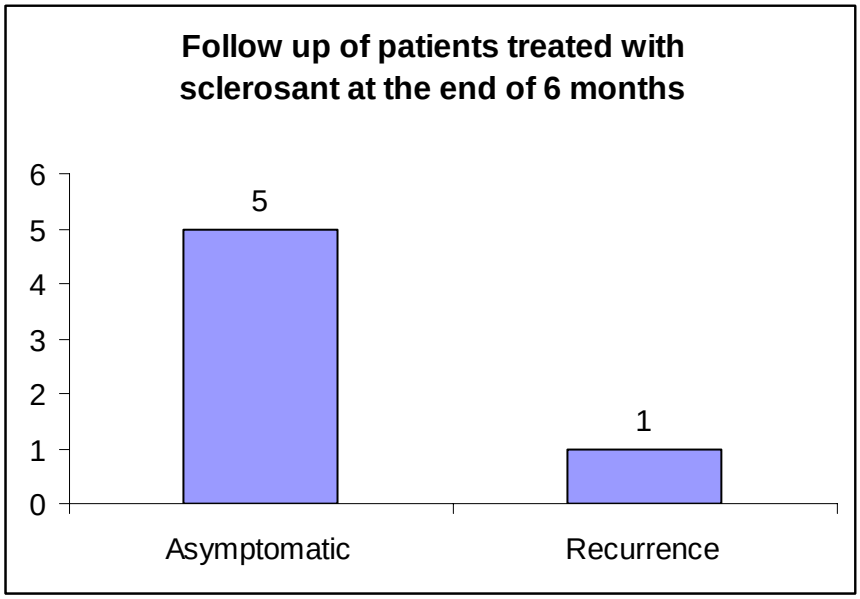


TABLE 15

FOLLOW UP PATIENTS TREATED WITH SCLEROSANT AT THE END OF 6 MONTHS

Follow-up	Number	Percentage
Asymptomatic	5	83.33
Recurrence	1	16.66



ANALYSIS AND DISCUSSION

The incidence of fistula in ano and the etiological factors are studied from The patients admitted to Govt Rajaji Hospital , Madurai and the data regarding the signs, symptoms, laboratory and radiological investigations are analyzed from the forty cases studied here.

Forty cases of fistula-in-ano were admitted to the hospital between, Nov 2005 Aug 2007 six of these patients who refused surgery were offered scierosant injection into the fistulous track. Only patient with a single track and low fistula-in ano were selected for sclerosant injection as this method was being newly tried in our study.

The surgical procedure adopted for the other patients was fistulotomy for high fistulae and fistulac with multiple tracks followed by secondary healing. Fistulectomy was done for patients with a low and a single track

The cause of the fistula-in-ano could be conclusively decided by histopathological examination post-operatively. In this series all the cases were found to be secondary to non-specific inflammation.

1) Table 1: In our study 92.5% of the patients were males and only 7.5% were females. The male to female ratio was approximately 9:1.
2) Table 2: Incidence in various age groups is shown in table 2. Approximately 65% of the cases occurred between the age groups of2l-40.
3) Table 3: Approximately 80% of the patients gave a history of perianal abscess which either spontaneously ruptured or for which no medical attention was sought.
4) Table 4: 60% of the fistulae were anterior fistulae. 40% were found to be posterior fistulae-in-ano.
5) Table 6&7: 73% of the fistulae were found to be low fistulae. 27.5% of the fistulae were found to be high fistulae.
6) Table 8: All the patients gave history of pruritus, discharge and at least one external opening was found in all. 70% of the patients presented with pain, which could be attributed to active infection. Internal opening was visualized only in about 60% of the patients. The analysis of the data in this series suggests that the main

symptoms and signs were pain, discharge, pruritus, and presence of external and internal opening.

7) Table 9: Radiological investigations: Chest x-ray was done in all patients and was found to be normal. Fistulogram was done in all patients. The most common types of fistulae found were anterior low anal and posterior low anal. Four patients had blind ending external track or sinuses. Two patients had complex fistulae with high internal opening.
8) Table 10: All patients were given the option of surgery. Six patients with low fistula-in-ano who refused surgery were given the option of sclerosant injection after informed consent.
9) Table II of the 34 patients who underwent surgery, 23 of the patients underwent fistulotomy The other 11 patients underwent fistulectomy with primary closure. These patients were found to have short and single low track.
10) Table 12: histopathological examination of the specimen of the track of all patients was reported as non-specific inflammation.
11) Table 13: Patients were followed till upto 6 months post-procedure. Out of the 34 patients who underwent surgery three

patients were noted to have recurrence. Two of the three patients were noted to have complex fistula-in-ano with high internal opening pre-operatively. All the three patients who had a recurrence had fistulotomy as the procedure in the first instance.

12) Table 14: Investigations done further on the patients with recurrent fistulae confirmed that the fistulae were high complex fistulae.

13) Table 15: patients treated with sclerosant injection into the track also were followed upto 6 months; one patient was noted to have recurrence at the end of six months. Other patients were asymptomatic at the end of six months.

SUMMARY AND CONCLUSIONS

1. A review of 34 operated cases and 6 cases treated by sclerosant injection has been presented here
2. Low anal (anterior ad posterior) is the commonest type of fistulae seen in the series
3. The commonest predisposing factor appears to be a pyogenic perianal abscess which has not been treated or not been adequately treated
4. There is a greater incidence in males upto a ration of 9%
5. The commonest age group affected is between 20-40 years
6. Discharge , pruritus and pain are the most common presenting complaints
7. Clinical digital examination and probing is of utmost importance in diagnosing the type of fistula in relation to the anal canal.
8. Various varieties of fistula in ano like perianal, low anal, complex, horseshoe and others could be demonstrated by radiology studies.
9. Patients who underwent surgery had spinal anesthesia.

10. Of the patients treated by surgical means, patients whose wound was primarily closed had a shorter healing time.
11. Primary closure of wound was attempted only in patients with low fistula in ano and sort single track.
12. Regular dressings of the wound was done. The wound healed in majority of the cases between 3-4 weeks. Primary suturing of the wound significantly shortened healing time.
13. There was no incidence of recurrence of fistula in cases of fistulectomy and primary closure done in patients with low fistula and single track.
14. Transient incontinence noted in upto 25% of the patients managed surgically which could be attributed to post-operative edema and transient low tone of the sphincters.
15. The same complication was not seen in patients treated with sclerosant injection.
16. Though fistula-in-ano per se does not appear to carry any mortality, the morbidity can be minimized by proper diagnosis regarding the type of fistula and by good knowledge of ano-rectal anatomy.

17. Sclerosant injection for management of fistula-in-ano appears to carry good results though further studies regarding the biological basis of action and long-term efficacy still has to be investigated.
18. Many a case of fistula-in-ano could have been prevented by the proper treatment of perineal and para-rectal suppurative lesions.

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PROFORMA

Name: Age: Sex: I.P. Number:

Address:

Date of Admission: Surgery Unit:

Date of Surgery

Date of discharge

Presenting symptom and duration:

Previous history of peri-anal abscess- fever- diarrhea-

Prolonged labor in females in the recent past- perineal surgeries-

History of tuberculosis / HIV exposure

History of present illness

1. Discharge: duration- nature:

   Periodicity – continuous/intermittent

   Relation to defecation

2. Swelling: Number: Duration:

   Associated with pain- Site-

   Associated with discharge

3. Pain Duration- Nature-

   Relation to defecation

4. Pruritus

5. Bowel habits: habitual constipation-

Nature of stools

Diarrhea

Alternating constipation and diarrhea

6. Micturition

& other symptoms

Family history of tuberculosis

Inflammatory bowel disease

Colo-rectal malignancies

Personality history: habits- cleanliness- occupation-

CLINICAL EXAMINATION

1. General examination

a. Build- b. Nutritional status-

2. Cardiovascular system: Pulse- Blood pressure-

Cardia-

3. Respiratory system

4. Abdominal Examination:

5. Local examination: Peri-anal-skin Fissure-

External opening: Number Operative scar

Granulation tissue- Relation to the axis-

Discharge from the opening on pressure

Induration: Extent- Course-

Relation to the anao-rectal ring-

Relation to the axis-

Relation to the anal canal

Internal opening-Relation to the ano-rectal ring

Palpable growth in the ano-rectum

Condition of the anal sphincters

Inguinal lymph nodes

Swelling in the perineum

Condition of the prostate

Condition of the pelvic bones

6. Proctoscopy: Condition of the mucus membrane-

Internal opening- Visible growth-

Discharge- Ulcer- Strictures-

Other associated conditions-

7. Probing of the track: course of the track-

Internal opening and its relation to the ano-rectal ring-

8. Sigmoidoscopy: mucus membrane- ulcer-

growth- discharge-

INVESTIGATIONS: Blood: Hb-

WBC Count-Total and differential count

Urine for sugar, protein and microscopy

Chest X-ray

Fistulogram

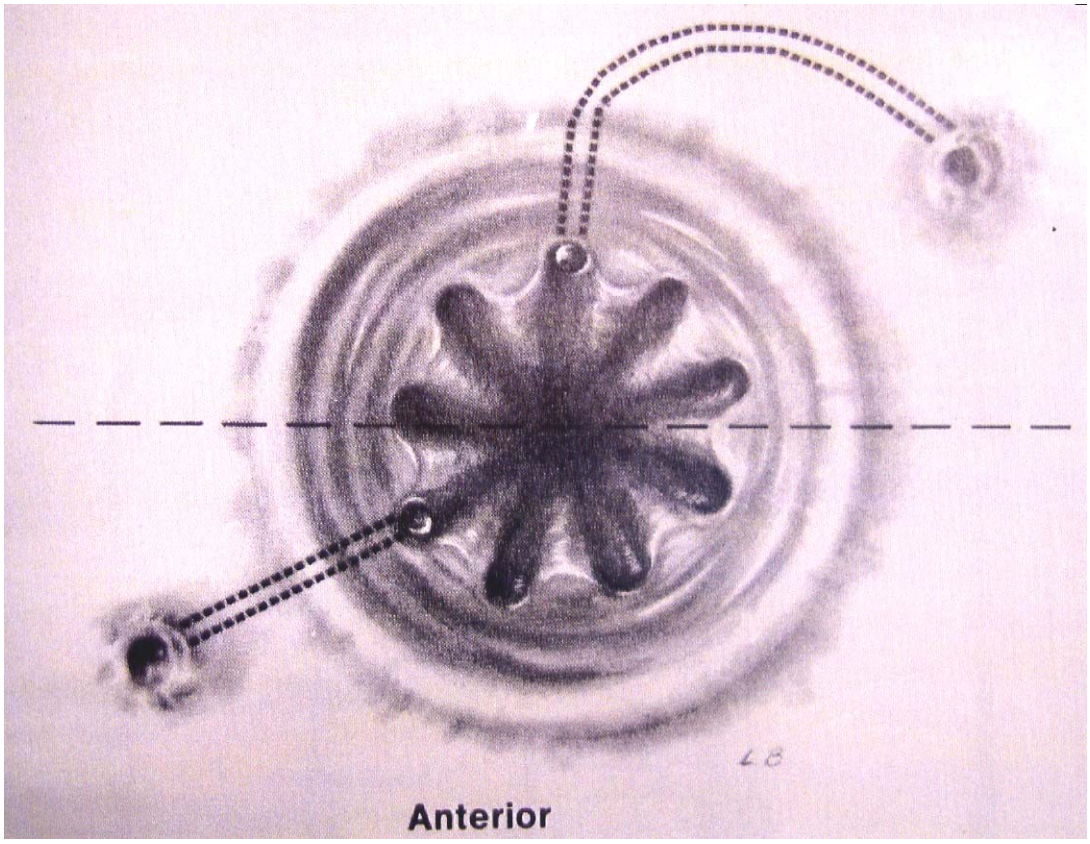
Biopsy of the fistulous track

Diagnosis

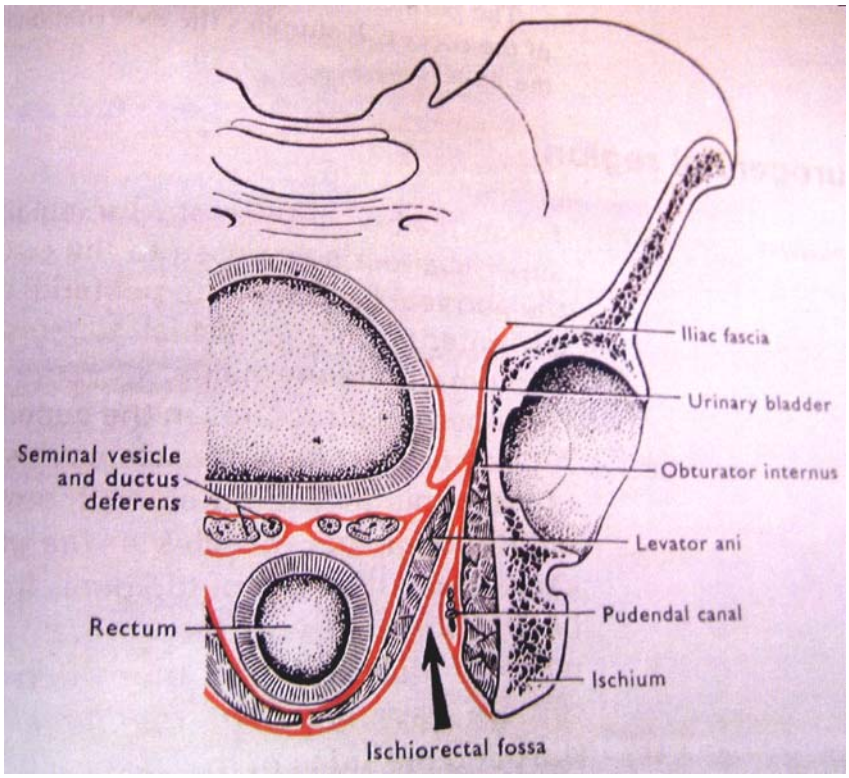
Treatment

Follow-up

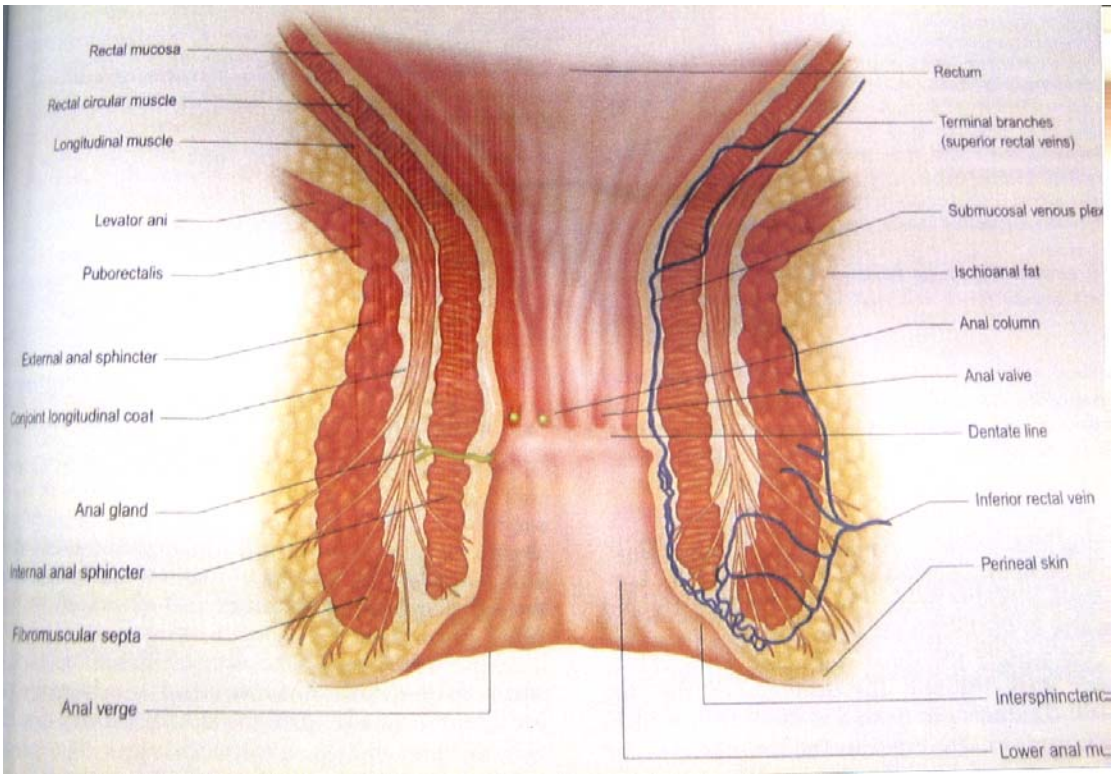
GOODSALLS RULE



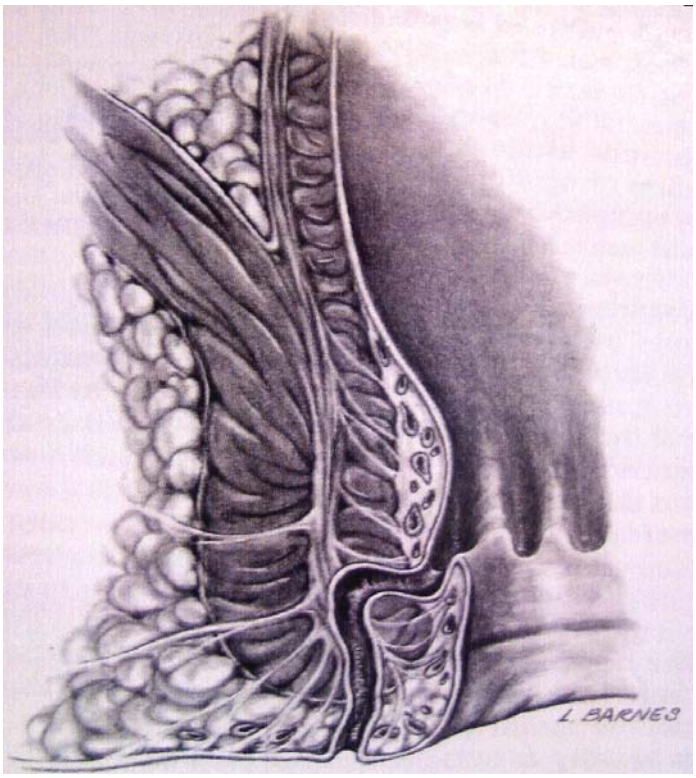
RELATION OF RECTUM


Iliac fascia
Urinary bladder
Seminal vesicle
and ductus
deferens
Obturator internus
Levator ani
Rectum
Pudendal canal
Ischium
Ischiorectal fossa

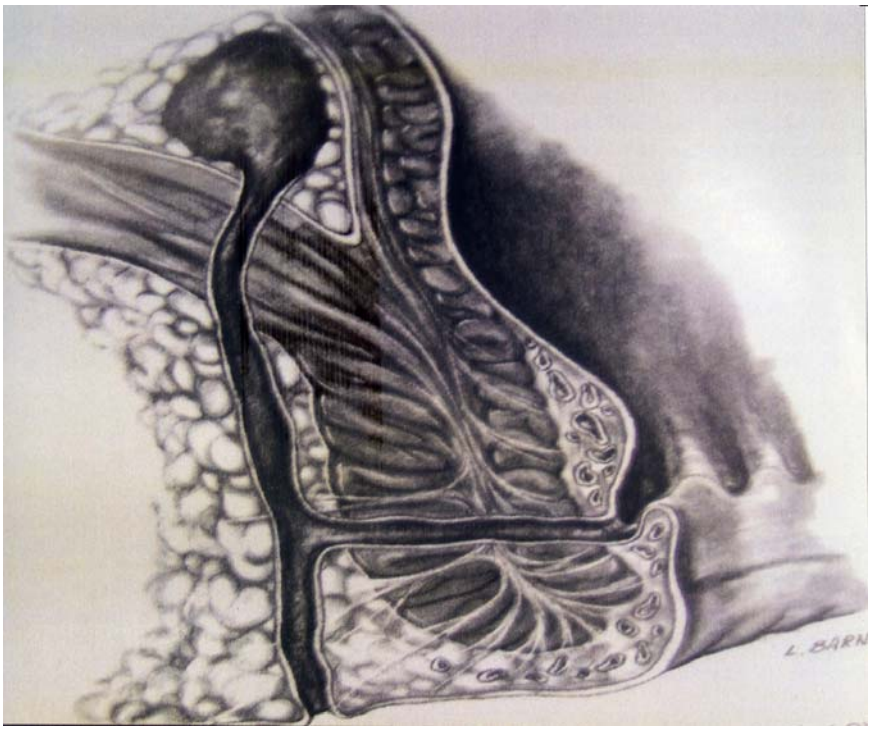
ANAL CANAL



LOW ANAL FISTULA



TRANSPHINCTERIC FISTULA



EXTERNAL OPENINGS OF FISTULA

FISTULOGRAM

PERRECTAL EXAMINATION

MASTER CHART

Sl. No.	Name	Age	Sex	IP No.	D.O.S.	Pain	Pruritus	Discharge	H/o Abscess	Constipation	Previous Surgery	Previous history of TB	GPE	RS	Peri anal skin	Number of external opening	Granulation	Relation to axis	Discharge	Relation of internal opening to ano-rectum	Relation of induration to ano-rectum	Growth on PR	Internal opening on proctooscopy	Track on probing	Treatment
1	Rajan	26	M	814456	25/03/06	+	+	+	+				N	N	Macerated	1	+	Ant	+	Low	Low		Visible	Low	Fistulectomy
2	Shankar	35	M	800305	21/11/06		+	+	+	+			N	N	Macerated	1		Ant	+	Low	Low			Low	Fistulectomy
3	Ramar	84	M	800666	1/12/2006	+	+	+		+			N	N		2	+	Post	+	Low	Low			Low	Fistulotomy
4	Mallan	52	M	807739	24/03/06	+	+	+	+				N	N	Macerated	1		Post		High	High			High	Fistulotomy
5	Muthiah	25	M	783347	3/1/2006	+	+	+	+		+		N	N	Macerated	1	+	Ant		High	High			High	Fistulotomy
6	Munusamy	62	M	797341	23/09/06		+	+	+				N	N		2		Post	+	Low	Low			Low	Fistulotomy
7	Krishnaswamy	35	M	797408	21/09/06		+	+	+	+			N	N		1		Ant	+	Low	Low		Visible	Low	Sclerosant
8	Shiva	25	M	798125	3/10/2006	+	+	+	+				N	N	Macerated	2	+	Ant		Low	Low		Visible	Low	Fistulotomy
9	Krishnamoorthy	57	M	798813	21/10/06	+	+	+	+				N	N		1	+	Ant	+	Low	Low			Low	Fistulectomy
10	Venkatesh	32	M	798233	26/10/06	+	+	+	+				N	N	Macerated	1		Post	+	Low	Low		Visible	Low	Sclerosant
11	Meenakshi	43	F	798941	25/10/06		+	+	+				N	N	Macerated	2	+	Post	+	Low	Low		Visible	Low	Fistulotomy
12	Chandrasekar	40	M	799807	9/11/2006	+	+	+	+	+			N	N	Macerated	1		Post		High	High		Visible	High	Fistulotomy
13	Joseph	26	M	802088	22/12/06	+	+	+	+				N	N		1	+	Ant		High	High		Visible	High	Fistulotomy
14	Murthy	26	M	786801	7/3/2006	+	+	+	+				N	N		2		Post	+	Low	Low		Visible	Low	Fistulotomy
15	Andithevar	60	M	787699	6/4/2006	+	+	+	+				N	N		1		Ant	+	Low	Low			Low	Fistulectomy

Sl. No.	Name	Age	Sex	IP No.	D.O.S.	Pain	Pruritus	Discharge	H/o Abscess	Constipation	Previous Surgery	Previous history of TB	GPE	RS	Peri anal skin	Number of external opening	Granulation	Relation to axis	Discharge	Relation of internal opening to ano-rectum	Relation of induration to ano-rectum	Growth on PR	Internal opening on proctooscopy	Track on probing	Treatment
16	Palani	40	M	787490	30/03/06		+	+	+				N	N	Macerated	3	+	Post	+	Low	Low			Low	Fistulectomy
17	Mookan	48	M	779411	15/10/06		+	+	+	+			N	N	Macerated	1	+	Ant	+	Low	Low		Visible	Low	Fistulectomy
18	Munisamy	35	M	781068	19/11/06	+	+	+	+				N	N	Macerated	1		Ant	+	Low	Low		Visible	Low	Sclerosant
19	Syed	40	M	781674	8/12/2006	+	+	+	+				N	N	Macerated	2	+	Post		Low	Low		Visible	Low	Fistulotomy
20	Nagappan	35	M	780435	4/11/2006		+	+	+				N	N	Macerated	1		Post		High	High		Visible	High	Fistulotomy
21	Ganeshan	27	M	787181	30/03/2006		+	+	+				N	N	Macerated	1	+	Ant	+	High	High			High	Fistulotomy
22	Uthaman	48	M	792672	23/06/2006		+	+	+	+			N	N	Macerated	1		Post	+	Low	Low		Visible	Low	Sclerosant
23	Wahidpasha	24	M	802771	5/1/2006	+	+	+	+				N	N		1		Ant		Low	Low			Low	Fistulectomy
24	Annadurai	36	M	805635	1/3/2006	+	+	+	+		+		N	N		2	+	Ant	+	Low	Low			Low	Fistulotomy
25	Prema	20	F	805959	9/3/2006	+	+	+	+				N	N		1	+	Ant	+	Low	Low		Visible	Low	Fistulectomy
26	Ravi	45	M	805985	9/3/2006	+	+	+	+				N	N		1		Ant	+	Low	Low			Low	Fistulectomy
27	Palani	40	M	804988	27/02/2006	+	+	+	+	+		+	N	N	Macerated	2	+	Post		Low	Low			Low	Fistulotomy
28	Sathyaraj	35	M	789313	3/3/2006	+	+	+	+				N	N	Macerated	1		Post		High	High		Visible	High	Fistulotomy
29	Selvam	45	M	792436	23/05/2006	+	+	+	+				N	N	Macerated	1	+	Ant	+	High	High			High	Fistulotomy
30	Siva	32	M	796320	20/08/2006	+	+	+	+				N	N	Macerated	2		Post	+	Low	Low		Visible	Low	Fistulotomy
31	Makesh	28	M	798635	3/10/2006		+	+	+				N	N		1		Ant		Low	Low		Visible	Low	Sclerosant

Sl. No.	Name	Age	Sex	IP No.	D.O.S.	Pain	Pruritus	Discharge	H/o Abscess	Constipation	Previous Surgery	Previous history of TB	GPE	RS	Peri anal skin	Number of external opening	Granulation	Relation to axis	Discharge	Relation of internal opening to ano-rectum	Relation of induration to ano-rectum	Growth on PR	Internal opening on proctooscopy	Track on probing	Treatment
32	Uma	23	F	783547	13/01/2006		+	+	+	+			N	N		2	+	Ant		Low	Low		Visible	Low	Fistulectomy
33	Govindhan	45	M	781775	4/3/2007	+	+	+	+				N	N		1	+	Ant	+	Low	Low			Low	Fistulotomy
34	Nallappan	45	M	801468	4/5/2007	+	+	+	+		+		N	N		4		Ant	+	High	High			High	Fistulotomy
35	Narayanan	56	M	797459	23/5/2007	+	+	+	+				N	N	Macerated	2	+	Post	+	Low	Low			Low	Fistulectomy
36	Muthiah	60	M	786789	8/4/2007	+	+	+	+				N	N	Macerated	1		Post		High	High			High	Fistulotomy
37	Jegathish	32	M	784367	12/5/2007	+	+	+	+	+		+	N	N	Macerated	1	+	Ant		High	High		Visible	High	Fistulotomy
38	Maqbooljan	28	F	803547	27/01/2006	+	+	+	+				N	N		2		Post	+	Low	Low			Low	Sclerosant
39	Krishnan	38	M	792367	25/05/2006	+	+	+	+				N	N	Macerated	1		Ant	+	Low	Low		Visible	Low	Fistulectomy
40	Rangan	30	M	783980	24/10/2006	+	+	+	+				N	N	Macerated	1	+	Ant		Low	Low		Visible	Low	Sclerosant

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