COMPARATIVE STUDY OF PROPHYLACTIC SINGLE DOSE ANTIBIOTIC VS CONVENTIONAL FULL COURSE ANTIBIOTICS IN HERNIOPLASTY SURGERIES

M.S. DEGREE EXAMINATION

BRANCH I - GENERAL SURGERY

APRIL 2019

Department of General Surgery

MADURAI MEDICAL COLLEGE AND GOVT RAJAJI HOSPITAL

Madurai – 20

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

CHENNAI, INDIA.

CERTIFICATE

This Is To Certify That This Dissertation Titled **"**Comparative Study Of Prophylactic Single Dose Antibiotic Vs Conventional Full Course Antibiotics In Hernioplasty Surgeries**"** Submitted By **Dr.C.Prabu** To The Faculty Of General Surgery, The Tamil Nadu Dr. M.G.R. Medical University, Chennai In Partial Fulfilment Of The Requirement For The Award Of Ms Degree Branch I General Surgery, Is A Bonafide Research Work Carried Out By Him Under Our Direct Supervision And Guidance From Ooctober 2017 To September 2018.

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DECLARATION BY THE CANDIDATE

I **Dr. PRABU.C** hereby solemnly declare that this dissertation entitled **"**COMPARATIVE STUDY OF PROPHYLACTIC SINGLE DOSE ANTIBIOTIC VS CONVENTIONAL FULL COURSE ANTIBIOTICS IN HERNIOPLASTY SURGERIES**"** is a bonafide work and genuine work carried out by me. This is submitted to the TamilNadu Dr. M.G.R. Medical University, Chennai, in partial fulfilment of the regulations for the award of M.S. degree (Branch I) General Surgery.

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DATE: Dr.C.PRABU

ACKNOWLEGMENT

First I would like to give thanks to Lord God Almighty whose blessings made this study possible

At the outset, I wish to express my sincere gratitude to our Unit Chief Prof.Dr.S.Kalirathinam M.S., FMAS.,FACRSI, FIMSA., for his expert supervision and valuable suggestions.

I wish to express my whole hearted thanks to our Assistant Professors Dr.G.Sundararajan M.S.,D.L.O., Dr.Ganga .M.S.,D.PM., Dr.R.Mohan M.S., and Dr.V.Pravin Kumar M.S.,for their constant encouragement and excellent guidance.

I express my deep sense of gratitude and heartfelt thanks to Prof.Dr S.Dhamodharan Head of the Department of General Surgery, Government Rajaji Hospital and Prof Dr.D.Maruthu pandian M.S., FICS.,FAIS.,Dean Madurai Medical College for their invaluable guidance and helpful suggestions throughout my study.

Last but not least, my gratitude to all the patients who submitted themselves for this study

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- ANTI- PLAGIARISM CERTIFICATE
- ETHICAL COMMITTEE APPROVAL
- MASTER CHART

INTRODUCTION

Inguinal hernia is one of the most common surgical procedures done in elective theatres.' Hernia is a protrusion of a viscus through an abnormal opening in the walls of the cavity containing it'. About 80% of hernia occurs in groin . Inguinal hernia is the most common of all . Inguinal hernias can be congenital or acquired.

Congenital hernias usually occur when there is impedance in normal developmental process rather than an acquired weakness

This is because of patent processus vaginalis (PPV) and this explains the higher incidence of congenital hernias in preterm babies.

Acquired hernia can be direct, indirect or combination of both. There are many causes of hernia . It is mulifactorial disease process. The basic pathology in hernia is a weak abdominal wall and an excessive increase in pressure leading to henia formation.

Among the open mesh repair procedures Lichtenstein technique is the most frequently performed technique .

Lichtenstein repair for inguinal hernia is a tension free strengthening of posterior inguinal floor using polypropylene mesh also proven that recurrence of hernia is very low with mesh repair

Antimicrobial agents were once considered as magic bullets that promised to eradicate infection. Unfortunately this promise has not been fulfilled.

The use of antimicrobial agents to prevent surgical infection has become a subject of controversy and disappointment in clinical practice.

Despite advances in surgical science, infection still remains responsible for most of the post-operative morbidity and mortality.

Pre-operative preparation, excellent surgical technique, fastidious wound care and post-operative management are corner-stones of infection prophylaxis.

Antibiotics for prolonged period may be harmful to both individual and hospitals whether they are given as prophylaxis or for therapy. Routine use of antibiotics for a prolonged period after clean surgery is not justifiable.

With the fear of developing wound infection after surgery we use to administer antibiotics for a period of 7-10days even in clean and clean-contaminated cases.

This is not only expensive but also lead to hospital acquired infection and resistance to not only that particular antibiotic but also other antibiotics of the same group..

Wound infection is the foremost and by far the common complication which is faced by any operating surgeon..

In cases where open inguinal hernioplasty is perfomed the prevalance of surgical site infection has been reported to be very very low.

Most common site of infection frquently encountered in mesh repair is the Incision site .

Some of the most problematic situation encountered is the development of SSI .In case of operated hernias if a infection occurs the chance of recurrence increases many folds. This is more in case of herniorаphies.

The administration of antibiotic in clean contaminated wounds are well documented for example in cases of colorectal, GIT, as the given antibiotic has been proven to be effective in reducing infection rate.

The prophylactic antibiotic can also be given to orthopedic cases where the risk is more even if it is considered to be a clean surgery and also in cases where foreign materials are introduced in the body like prosthesis and grafts are used.

The very defenition of clean surgery states that uninfected wound In which no inflammation is seen and where the gut ,respiratory and urinary system is not entered.

All wounds by virtue are closed by rimary closure and if needed a vaccum drain is placed for appropriate drainage.

There is no documentary evidence for antibiotics in hernia surgeries for decreasing wound infection rates and has been a topic of debate since the very beginning from early 1960’s. No decrease in SSI has been documented.

Unnecesary use or inadvert use of routine conventional antibiotics may only lead to inherent problems associated with that drug

The regular use of conventional full course antibiotic in routine hernia repair can invariably lead to bacterial resistance . The duration of hospital stay, the cost incurred may pose a economic burden to the patients. Since is a common procedure performed all over the world restriccting the use of antibiotics will have greater influence on the benefits ,preventing drug resistance and reducing the toxic effects involved in the procedure

The studies which have been conducted so far did not show any clear cut advantage in using antibiotics during hernia surgery which has been discusssed in detail in literature.

AIMS AND OBJECTIVES

AIM:

To Assess The Efficacy Of Antibiotics in prevention of SSI By A Comparative Study Of Prophylactic Single Dose Antibiotic Vs Conventional Full Course Antibiotics In Hernioplasty Surgeries

OBJECTIVES:

To assess the effectiveness of prophylactic single dose antibiotic vs conventional full course antibiotics in hernioplasty surgeries by evaluating for surgical site infections

STUDY DESIGN

It is a prospective comparitive study. All patients with inguinal hernia were involved in this study. Various parameters were assessed and wound infection assesment done. The results of both case and control group studied and the efficacy determined.

PERIOD OF STUDY:

1 YEAR (october 2017 – September 2018)

COLLABORATING DEPARTMENT:

NONE

PLACE OF STUDY:

Government Rajaji Hospital,Madurai.

SELECTION OF STUDY SUBJECTS :

All patients diagnosed with inguinal hernia willing for lichtenstien hernioplasty surgery.

SAMPLE SIZE:

100 patients

DATA COLLECTION:

Data regarding history, clinical examination,laboratory values & postoperative analysis

Proforma containing patient history, clinical examination, investigations,

Informed consent forms..Injectable cephalosporins -1gm ceftriaxone , multivitamin infusion,.

METHODS:

Prospective comparitive study

ETHICAL CLEARANCE:

Approved by the Institute of Ethical Committee, Madurai Medical College.

CONSENT :

Informed and written consent from all patients

ANALYSIS:

Data analysis was done with the help of computer using SPSS 16 and Sigma Stat 3.5 version.

Using this software range, frequencies, percentages, means, standard deviations, chi square and 'p' values were calculated by One way ANOVA and Chi-square test was used to test the significance of difference between quantitative variables.

CONFLICT OF INTEREST:

None

FINANCIAL SUPPORT :

Nil from the instituition

ELIGIBILITY CRITERIA

INCLUSION CRITERIA

1)Patients With Unilateral ,Bilateral Primary Or Recurrent Hernia

2)More Than 18 Years Of Age

EXCLUSION CRITERIA

1) Patients With immunosupressed states , comorbidities like DM ,or patient on drugs like steroids,or associated with malignant disease

2)Local infection In Incision Site prior to surgeries Like Tinea Corporis

3) Complicated Hernia like those with Obstruction And hernia which are Strangulated

4)Significant Renal Impairment,Severe Hepatic Disease, Allergic To Cephalosporins

5)Pt Not Willing For Surgery

REVIEW OF LITERATURE

The management of hernia can be classified into five eras. The oldest epoch ancient era ancient Egypt to 15th century. The Egyptian Papirus of Ebers has defenitions of a hernia: swelling that comes out while coughing. Inforamtion concerning hernias in ancient times is derived from Galen. This information with small alterations was valid during Middle Ages , in the Renaissance the second era of hernia treatment started .

Hernia gained popularity mainly due to discoveries concerned with human anatomy . In spite of many important discoveries the surgical results were still below par . Astley Cooper's Introduction of anesthesia and antiseptic procedures played an important role in the beginning of modern hernia surgery. This was famously called as the era of hernia repair under tension . This period was mainly between 18^{th} and 19^{th} century .

Three rules were framed to hernia repair - antiseptic and aseptic technique . high ligation of hernia sac ,finally narrowing of deep inguinal ring'. Despite the progress the treatment results not satisfactory.

A new surgical technique was developed by bassni after which the treatment results were beginning to improve. He framed the fourth rule in hernia surgery –' reconstruction of the posterior wall of canal'.

The next milestone in inguinal hernia repair was the method described by Canadian E. Shouldice. He proposed imbrication of the transverse fascia followed by strengthening of the posterior wall by 4 layers - fasciae and aponeuroses of oblique muscles. These reduced recurrence rate to 3%. ‘The next epoch in the history of hernia surgery lasting to present days is referred to as era of tensionless hernia repair. The tension of sutured layers was reduced by incisions of the rectal abdominal muscle sheath or using of foreign materials. The turning point in hernia surgery was discovery of synthetic polymers by Carothers in 1935.

The first technique of tensionless surgery was described by Lichtenstein . ‘It is based on strengthening of the posterior wall of inguinal canal with prosthetic material. Lichtenstein published the data on 1,000 operations with Marlex mesh without any recurrence in 5 years after surgery. This formed the last rule of repair of hernia--tensionless repair.

Another method popularized by Rene Stoppa, used Dacron mesh- situated in preperitoneal space , without fixing sutures. Done in 1975, and reported recurrence rates were quite low (1.4%). The next type of repair procedure was sticking of a synthetic plug into inguinal canal.

Lichtenstein used Marlex mesh in the year 1968 which looked like rolled cigarette and used as a plug in the treatment of inguinal and femoral hernias.mesh fixation done with single sutures. The next step was introduction of a Prolene Hernia System which enabled repair of the tissue defect in three spaces: preperitoneal, above transverse fascia and inside inguinal canal.

Laproscopic treatment of groin hernias began in 20th century. Advancements later included procedures like TAPP and TEP which gained popularity due to better cosmesis and lesser hospital stay

SURGICAL ANATOMY OF INGUINAL CANAL AND ANTERIOR ABDOMINAL WALL

Inguinal Canal

The inguinal canal is an oblique passage directed inferiorly, anteriorly, and medially in the lower part of the anterior abdominal wall located above the medial portion of the inguinal ligament

It extends from a point 2 cm medial to the anterior superior iliac spine laterally to the pubic tubercle medially

The canal begins intraabdominally on the deep aspect of the abdominal wall, where the spermatic cord in males and the round ligament in females pass through the internal inguinal ring. The canal then concludes on the superficial aspect of the abdominal wall musculature at the superficial or superficial inguinal ring, this is region where the spermatic cord crosses the medial defect of the external oblique aponeurosis. In the normal situation,parietal peritoneum covers the intraabdominal portion of the spermatic cord as well as the internal ring. However, when an inguinal hernia is present, the peritoneum protrudes

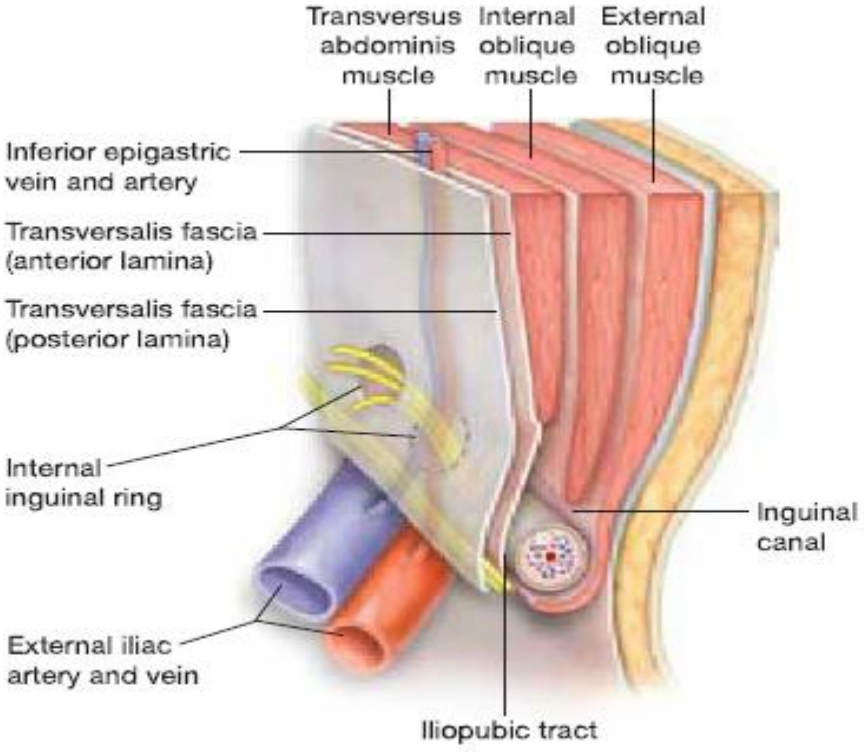
through a defect and is considered the hernia sac. It is classic to describe four walls as the boundaries of the canal: Anterior, posterior, inferior, and superior.

Anterior wall. It is formed essentially by the aponeurosis of the external oblique muscle that laterally is reinforced by the underlying muscle fibers of the internal oblique and transversus abdominis muscles.

Inferior wall. The inferior wall of the canal is a narrow groove formed by the inguinal ligament.

Superior wall. It is formed by the arched fibers of the lower edge of the internal oblique muscle and by the transversus abdominis muscle and aponeurosis.

Posterior wall. The posterior wall is formed primarily by the aponeurosis of the transversus abdominis muscle and the transversalis fascia. The transversalis layer is reinforced, inferiorly by the iliopubic tract and Cooper's ligament. The posterior wall is the most complex and important wall of the inguinal canal as defects in the layer allow hernia formation.



Spermatic Cord

The spermatic cord is a structure present in males that resembles a cord that suspends the testis within the scrotum. It begins in the preperitoneal space with the confluence at the deep inguinal ring of the ductus deferens and the testicular artery and vein that pass from the abdominal cavity through the inguinal canal down into the scrotum.

The spermatic cord is composed of:

Three fasciae:

External spermatic fascia, formed from the investing fascia of the external oblique aponeurosis as the spermatic cord emerges from the superficial ring.

Cremasteric fascia derived from the internal oblique muscle and fascia.

Internal spermatic fascia, closely adherent to the cord structures as they pass through

the deep inguinal ring. It arises from the transversalis fascia.

Three arteries:

Testicular artery, branch of the aorta and supplies the testis.

Cremasteric artery, branch of the inferior epigastric artery.

Deferential artery, derived from the umbilical artery.

Three veins:

Pampiniform plexus and testicular vein, venous drainage from the testis. On the right

side they drain directly into the inferior vena cava and on the left side, into the left renal vein.

Cremasteric vein, drains into the inferior epigastric vein.

Deferential vein, drains into the pampiniform plexus and the vesical plexus.

3 nerves:

Genital branch of - genitofemoral nerve

ilioinguinal nerve and the Sympathetic nerves

Lymphatics, drain into the paraaortic nodes.

Round Ligament

The round ligament is composed of fibrous tissue and muscle fibers. It attaches to the superoanterior aspect of the uterus and runs via the broad ligament to the lateral pelvic wall. The round ligament crosses the external iliac vessels and enters the inguinal canal, ending by inserting into the labia majora in a fanlike fashion.

Antero-lateral Abdominal Wall

It contains almost all the abdominal organs as such, it forms a easy , semiflexible circumference of gith which extends over the entire bony prominence of the lumbar spine in the posterior aspect , inferiorly till the pelvic wall and extending superiorly upto costal region.

The lateral abdominal wall is formed by the fusion of atleast nine muscles forming aponeuroitc junctions.

The layes of the abdominal wall from above includes skin ,camper fascia , fascia of scarpa, EOA and its muscle extent, the internal oblique with its aponeurosis, transverse abdominis with its fascia , the preperitoneal fat and the peritoneal covering.

The layes continue its course into the groin where they are inserted in the inguinal canal.

The rectus abdominis muscle is the major part in the medial side.

Below the anterior superior iliac spine level the groin region forms the major component of anterolateral wall of the abdomen where there is insertion of the lateral oblique muscles which surrounds the canal on either side.

Camper's Fascia

It is a thick fascia which is present superficialy and continues with the reticular layer of the dermis.It contains moslty fat of the abdominal wall and as a result the thickness changes in each individual. This layer continues with the covering of genitalia and also the pernium. It contains the fibres of the dartos muscle. It recieves its blood supply from superficial epigastric vessels ,the circumflex iliac vessels and from tributaries of the femoral vessels.

Scarpa's Fascia

It is a sheet of areolar tissue mostly visible in the region of groin. It form a lamina just beneath the subcutaneous tissue. It has connections with the external oblique aponeurosis. In the midline it is attached to the linea alba and to symphysis pubi and contines upto dorsum of penis. It blends lateraly with the fascia lata of thigh.

External Oblique Muscle and its Aponeurotic layer

It is the superficial most layer of the aponeurotic layers. The dirction of its fibres are directed inferiorly and medialy .

It extends from posterior asspect of lower ribs mostly the 8^{th}. To the linea alba ,the pubis and iliac crest.

The medial most extension of the tendinous fibres pass just in front of the rectus abdominis muscle, forming the so called anterior layer.

The external oblique muscle continues as aponeurotic layer downwards towards the groin region and below anterior superior iliac spine there is no muscle.

The inferior fibres of the external oblique aponeurosis is folded on itself to form the inguinal ligament which forms the inferior boundary.

The aponeurotic continuation to the body of pubis and the tubercle form the external inguinal ring. The external ring is a triangular shaped opening through which the cord structures or round ligament pass through.

Inguinal Ligament

It's the lower most thickened part of the external oblique aponeurosis and suspends between the anterior superior iliac spine and the pubic tubercle. These fibres form a supporting component for the spermatic cord by forming a rounded suface above the thigh region ,.

lacunar ligament

It was first identified by Gimbernaat in the year 1794. It is a triangular shaped extension of the inguinal ligament before it gets inserted to the pubic tubercle. Its lateral end is close to the ligament of cooper. It forms the medial border of femoral canal.

External Inguinal Ring

Also called the superficial ring , it is located above superior border of pubis just lateral to the pubic tubercle. It is a triangular opening of the aponeurosis of the external oblique,

Base-pubic crest

Medial crus- aponeurosis of external oblique

Lateral crus- inguinal ligament

Medial crus is attached to rectus sheath and lateral crus to the pubic tubercle

Internal Oblique Muscle and Aponeurosis

It is the middle layer of the three flat musculoaponeurotic layers of the wall. It arises from thoracolumbar fascia and iliac crest and splays obliquely upward ,forward and medially to get attached to the inferior borders of lower three or four ribs, linea alba and pubis.

Above umblicus The aponeurosis divides to envelop the rectus abdominis and then unite in the midline to join the linea alba.. Below the level of the umbilicus, the aponeurotic layer will not split and runs in front of the recctus muscle.

The fibers of the internal oblique muscle go over the spermatic cord structures or in females around round ligament. Medially, the lower border is usually at or just slightly above the aponeurotic arch of the underlying transversus abdominis layer. Some muscle fibres form the cremaster which invest in the spermatic cord.

The internal oblique is closely attached to the underlying transversus abdominis aponeurosis. It is mainly muscular in its orgin. The insertion of internal oblique is directed towards the the linea alba and inferiorly attached to body of pubis.

Transversus Abdominis Muscle and Aponeurosis

They orginate from fascia along iliac crest, thoracolumbar fascia, fascia around the iliopsoas and lower lower sir costal cartilage. It forms the last layer of the anterior abdominal muscle layer.

The transverse abdominis arch is a curved line formed by the inferior border of the transverse abdominis. It forms a landmark for hernia surgery as it represents the superior border of direct inguinal hernia. The aponeurosis joins the internal oblique's posterior lamina which together forms the posterior rectus only above umblicus.

Below umblicus transverse abdominis forms the component of anteior rectus sheath.

Termination of aponeurotic tissue on the posterior aspect of the rectus abdominis leads to formation of the arcuate line.

The medial end of the transverse adominis gets inserted into pectin pubis and its crest to form the ligament of henle aslo called the falx inguinalis. It is closely related to the rectus sheath consisting of insertions of transverse aponeurosis. In some cases the internal oblique accompanies the fibres of transverse abdominis to form true conjoined tendon.

Conjoined Tendon

The conjoined tendon is, formed by the fusion of fibres of transverse abdominis and internal oblique and gets inserted on the pubic tubercle and superior ramus. A true conjoined tendon is a rare entity and is found only in about 3 percent of people. It is considered to be an artifact of dissection

Rectus Abdominis Muscle

The rectus abdominis is the main anchoring component of the anterior abdomen. The rectus abdominis muscle attaches to the fifth, sixth, and seventh costal cartilages and above to the xiphoid process. The attachment below includes pubic crest ,pubic symphysis and superior rami. There are tendinous insertion in the rectus muscle at various levels namely the xiphoid process , mid upper abdomen and umblicus.

The muscle is enclosed in a sheath formed by the three aponeurotic layers and divide anteriorly and posteriorly around the rectus. Above the arcuate line of douglas, the posterior sheath is formed by the internal oblique posterior fibres, aponeurosis of transverse abdominis muscle, and the transversalis fascia. Below arcuate line the posterior wall is formed only by the transversalis fascia.

Along the posterior surface of the rectus the deep inferior epigastic arteries and veins are present. Below the arcuate line these vessels are seperated from peritoneum by the fascia tansversalis only.

The two recti on either sides are seperated by linea alba. The linea alba is tendinous araea where the aponeurois of three muscles join and decussate.

Transversalis Fascia

It forms the portion of continous layer of abdominal fascia which encloses the abdominal cavity competely. The endoabdominal fascia derives its name from the overlying muscle ,in this case the transversus abdominis muscle. The transversalis fascia is continues along with lumbar, obturator , psoas, and iliac fascia. Medialy it forms a posterior covering of the lower part of rectus muscle.

The critical area of weakness in the transversalis fascia is between the transverse abdominis arch and the iliopectineal ligament where hernia are usualy formed.

The superior margin of this weakness is formed by the arch of transverse abdominis which begins laterally at iliopectineal arch and directed medialy above the deep ring and gets inserted into the rectus sheath.

Likewise the iliopubic tract and iliopectineal ligament forms a resistant lower margin which is directed towards the deep ring to the superior ramus of pubis. The integrity of transverse abdominis muscle is maintained mainly by transversalis fascia. It is also called as the floor of the inguinal canal.

lliopubic Tract

The iliopubic tract is a band of aponeurotic tissue lying within the transverse abdominis lamina that bridges across the external femoral vessels from anterior superior iliac spine and extend in the medial direction to attach to cooper's ligament. It was described by sir Alexander Thomson in the year 1836. It is the lower margin of the deep musculoaponeurotic layer which is made up of the transversus abdominis muscle and its aponeurosis and the fascia transversalis.

The iliopubic tract is overlapped by poupart's ligament laterally which lies superficial to it. But the two structures are separate and belong to seperate layers of the groin.

The inguinal ligament forms part of external oblique , the iliopubic tract is from transverse abdominis. The iliopubic tract even though is attached to the inguinal ligament ,it seperates from poupart's ligament medialy.

It forms the inferior border of the deep ring.

Along with transversalis fascia this structure crosses the femoral vessels to form the anterior margin.

Cooper's Ligament

It is also called the pectineal ligament. It is formed by the condensation of transversalis fascia to the periosteum of superior pubic ramus which is just lateral to the pubic tubercle. It is one of the thickest structure in the inguinal region and is densely adherent to the pubic ramus. It joins the iliopubic tract and the lacunar

ligament along their medial most insertions. It forms the posterior margin of femoral canal

Internal inguinal Ring

The deep or internal inguinal ring is mainly formed by aponeurosis of transversus abdominis layer. Anatomical landmark -It is located half an inch above and halfway between the pubic tubercle and the anterior superior iliac spine. Bounded by the transverse abdominis arch above and iliopubic tract below ,the fascia transversalis thickens to form an incomplete ring in the shape of inverted “V”. the open end of the “v” points lateraly and in the superior direction and supports the spermatic cord structures as they come into the inguinal canal. Inferior border of deep ring - formed by the iliopubic tract

Superior border-The transversus abdominis arch along with the superior crus of the transversalis fascia.

The crura of fascia transversalis forms the basis of shutter mechanism which operates at the internal ring. During increase in abdominal pressure ,the transverse abdominis muscle contracts which brings both crura into close approximation. This approximation of the crura and lateral sliding of the crura closes the deep or internal ring partialy which flattens the cord structures against the wall of the abdomen which provides increased protection to this area from forces which may cause hernia.

Preperitoneal Space

The preperitoneal space is the potential space between the peritoneum posteriorly and the transversalis fascia. Near the pubis, the peritoneum is separated from the transversalis fascia by the remnant of the allantois that extends from the apex of the bladder to the umbilicus. In the area of the bladder, this retropubic preperitoneal space is known as the space of Retzius. The elevation of the peritoneum in the midline by the urachus forms the median umbilical fold. Just lateral to this fold, is the medial umbilical fold, which represents the obliterated portion of the fetal umbilical artery on both sides of the urachus

Laterally, the separation of the peritoneum from the muscle layers of the abdomen is known as the space of Bogros. In other words, the space of Bogros is a lateral extension of the space of Retzius. The inferior epigastric artery runs vertically upward in the space of Bogros to enter and ramify within the rectus abdominis muscle.

Myopectineal Orifice of Fruchaud

H. Fruchaud, a French surgeon, described in 1956 an oval-shaped area in the groin protected only by the combined lamina of the aponeurosis of the transversus abdominis and the transversalis fascia where all groin hernias originate named myopectineal orifice (MPO).

The MPO is bordered:

Superiorly -by the arching fibers of the internal oblique and transversus abdominis Muscles

Medially - by the lateral border of the rectus muscle

Inferiorly - by Cooper's Ligament

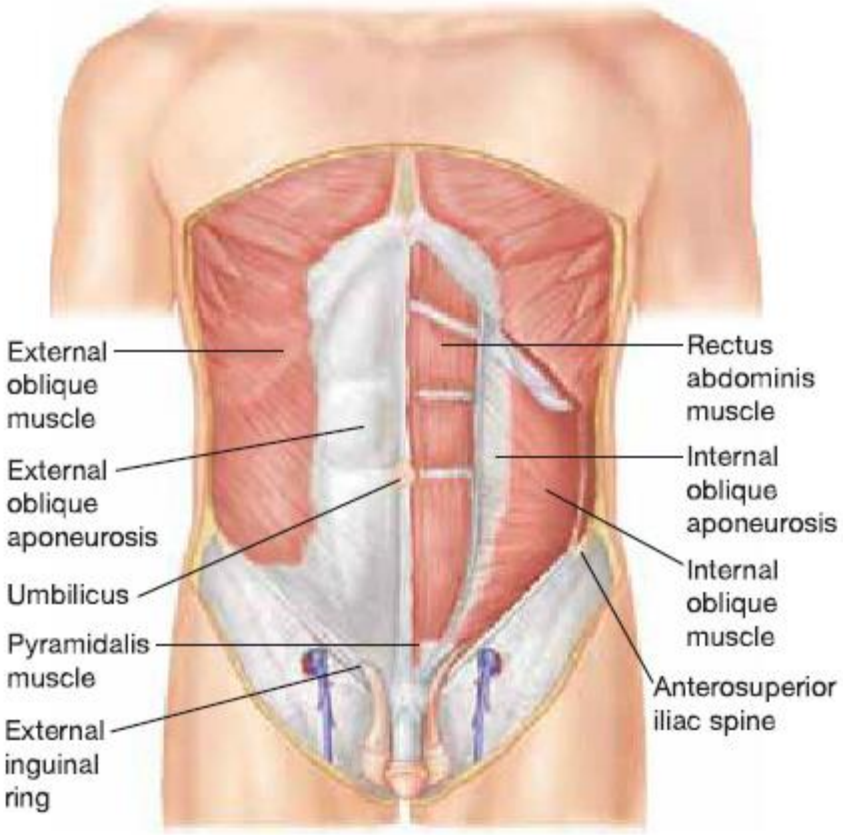
Laterally- by the iliopsoas muscle

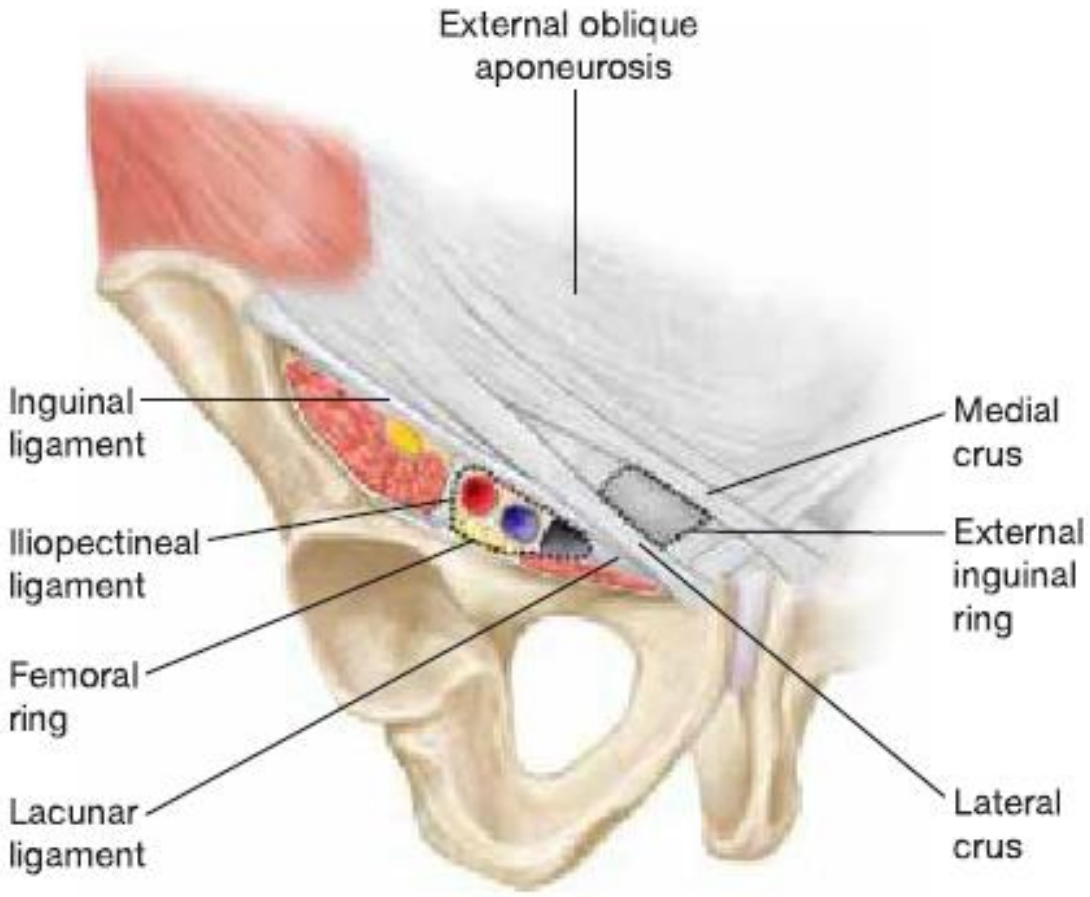
The inguinal ligament and iliopubic tract divide the MPO into two areas, both keys in the understanding of groin hernias:

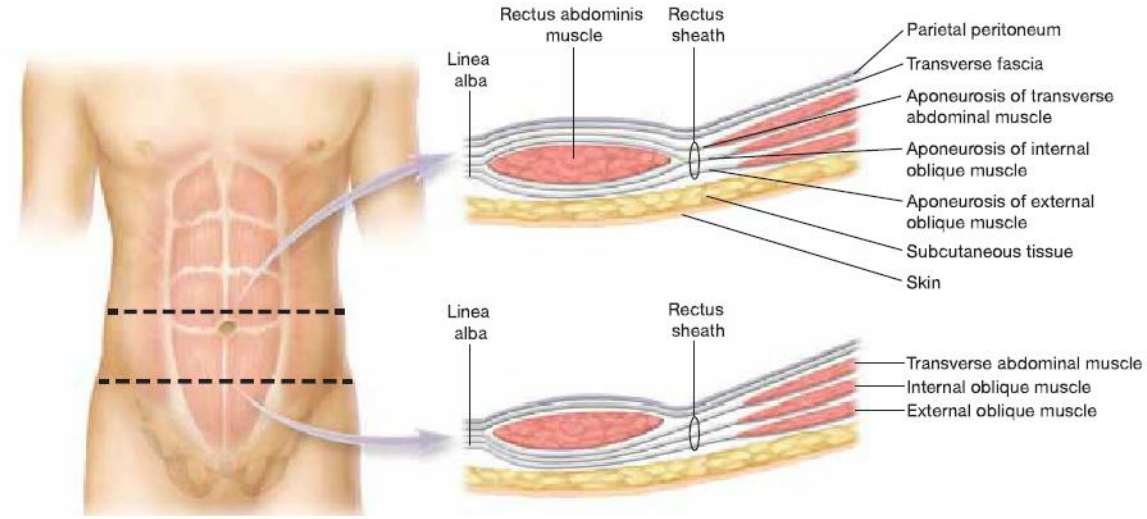
• Superior compartment containing the inguinal canal.

The inferior epigastric arteryfurther divides this compartment into:

• Hesselbach'sl triangle, medial to the inferior epigastric and weak area where direct inguinal hernias develop.


External oblique muscle
External oblique aponeurosis
Umbilicus
Pyramidalis muscle
External inguinal ring
Rectus abdominis muscle
Internal oblique aponeurosis
Internal oblique muscle
Anterosuperior iliac spine


External oblique aponeurosis
Inguinal ligament
Iliopectineal ligament
Femoral ring
Lacunar ligament
Medial crus
External inguinal ring
Lateral crus



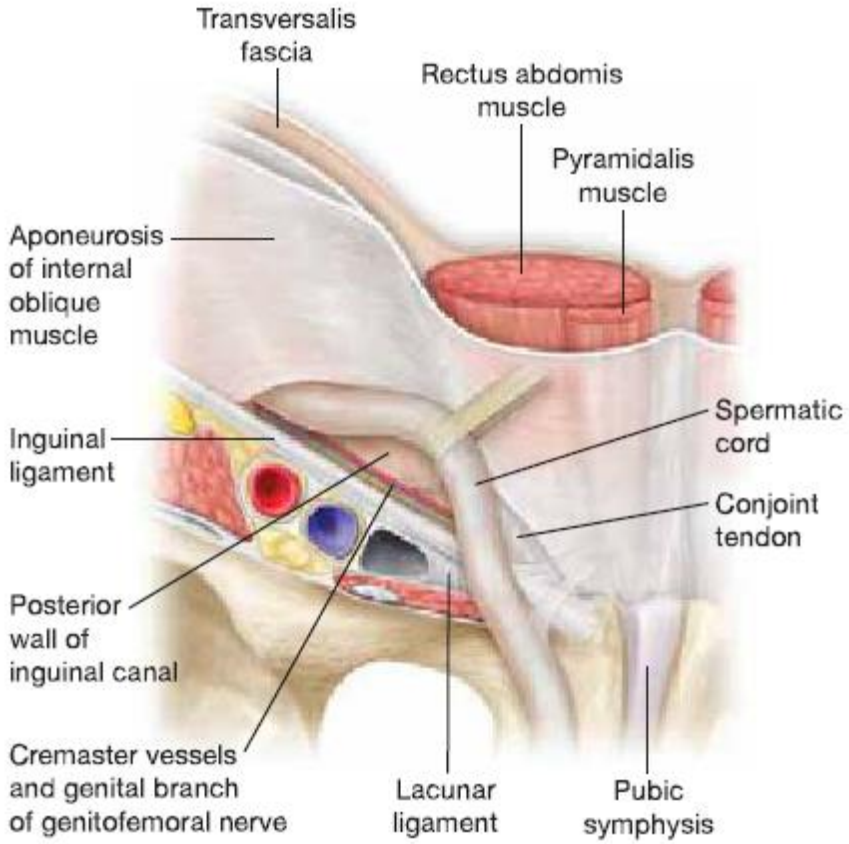


Fig - Arch of transverse abdominis

Vasculature of the Abdominal Wall and Groin Region

The blood supply of the lateral muscles of the anterior abdominal wall is primarily from the lower three or four intercostal arteries, the deep circumflex iliac artery, and the lumbar arteries.

The rectus abdominis has a complicated blood supply derived from the superior epigastric artery (a terminal branch of the internal mammary artery), the inferior epigastric artery (a branch of the external iliac artery), and the lower intercostal arteries. The superior and inferior epigastric arteries enter the rectus sheath and anastomose near the umbilicus.

The inferior epigastric artery and vein cross over the iliopubic tract at the medial aspect of the internal ring and ascend along the posterior surface of the rectus muscles, invested in a fold of peritoneum called lateral umbilical ligament

Near its takeoff the inferior epigastric artery givas off two branches, the cremasteric and the pubic. The cremasteric branch penetrates the transversalis fascia and joins the spermatic cord. The pubic branch courses in a vertical fashion inferiorly, crossing Cooper's ligament, and anastomoses with the obturator artery forming a circle the corona mortis before entering the

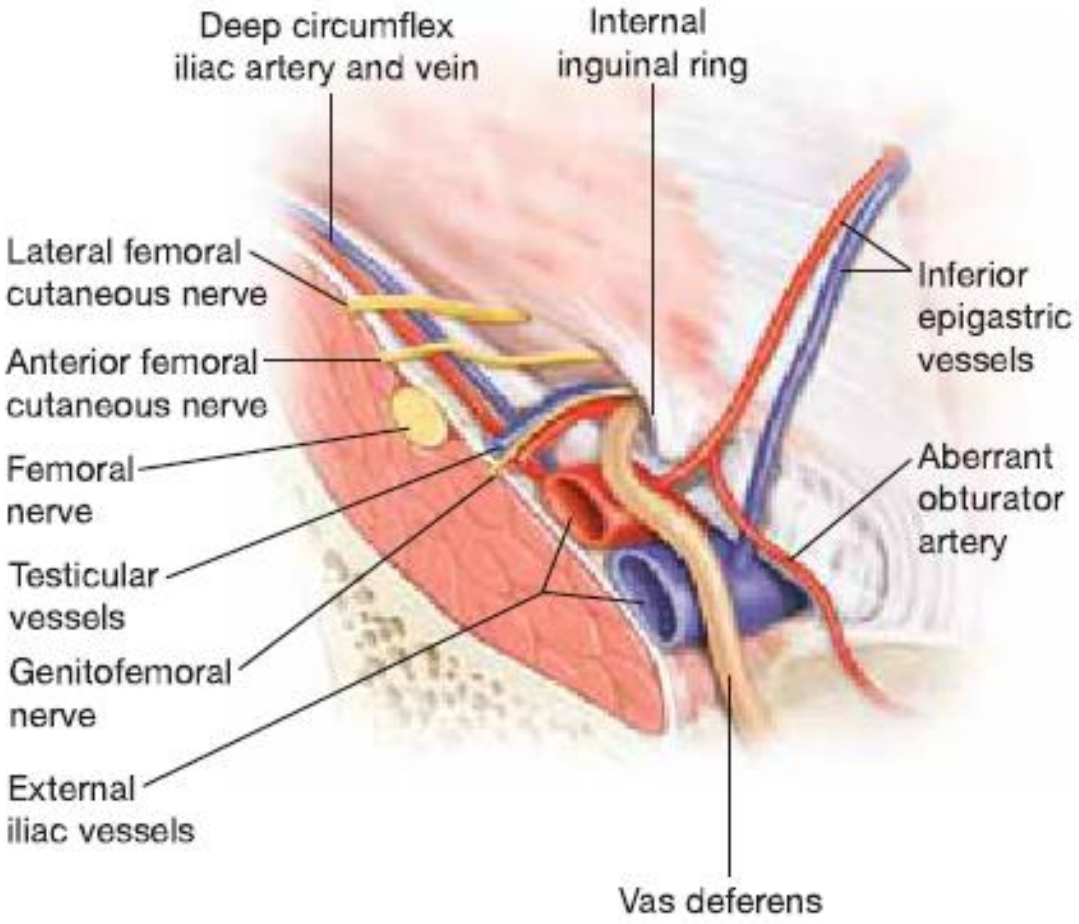
obturator foramen

Injury to the circle, usually sustained while working in the area of Cooper's ligament, may cause copious bleeding.

The testicular vessels follow the ureter into the pelvis on its lateral border, and then course along the lateral edge of the external iliac artery, cross the iliopubic tract, andjoin the spermatic cord at the lateral aspect of the internal ring.
The testicular or internal spermatic artery arises from the aorta just below the renal arteries. Anastomoses between the testicular, deferential, and cremasteric arteries supply the testicle with rich collateral circulation.

The testicular veins drain into the inferior vena cava on the right and the renal vein on the left. The deferential artery arises from the inferior vesicle artery, forming a microvascular network with the adventitia of the vas deferens.

The deferential vein drains into thepampiniform plexus and the vesical plexus. The pampiniform plexus drains into testicular veins that course with the testicular artery. The cremasteric or external spermatic artery arises from the inferior epigastric artery. The cremasteric vein drains into the inferior epigastric vein.


Deep circumflex iliac artery and vein
Internal inguinal ring
Lateral femoral cutaneous nerve
Anterior femoral cutaneous nerve
Femoral nerve
Testicular vessels
Genitofemoral nerve
External iliac vessels
Inferior epigastric vessels
Aberrant obturator artery
Vas deferens

Pathophysiology of Abdominal Wall Hernias

The most common hernias develop at sites where the abdominal wall strength to withstand the intraabdominal pressure is lower, such as the internal inguinal ring, the umbilicus, esophageal hiatus, and previous surgical entry sites. The cause of abdominal wall hernias is probably multifactorial, with one or more factors applying in any particular case.

Raised lntraabdominal Preuure

Factors that increase the pressure in the abdominal cavity, such as obesity, coughing with chronic lung disease, straining, and ascites have traditionally been considered important in the etiology of abdominal hernias; however, recent work suggests that these conditions do not cause hernias on their own but may be additional facilitating factors.

Several studies have documented strenuous physical activity as a predisposing risk factor to acquiring an inguinal hernia. Repeated physical exertion may increase intraabdominal pressure: however, whether this process occurs in combination with a patent processus vaginalis or through age-related weakness of abdominal wall musculature which is unknown.

Interestingly, several studies have noted a protective eHect of obesity.

LICHTENSTEIN HERNIOPLASTY

Indications

The Lichtenstein hernia repair is indicated for initial mild to moderate, direct or indirect inguinal as well as femoral hernias in both men and women. It can also be deployed in patients with recurrent groin hernias particularly when an alternate technique was used at the initial repair. Surgeons who choose this technique should be prepared to make the appropriate technique modifications that are based on the specific type of hernia encountered.

Patient Preparation

This technique can be performed under local, regional, or general anesthesia. One cited advantage of performing this technique in awake patients is the opportunity to ask the patient to cough and assess the repair for weakness. The arms may remain outstretched or can be tucked on the basis of the patient's body habitus and the surgeon's preference.

In routine cases, a urinary catheter is not necessary. Sufficient bladder decompression is achieved if the patient is able to urinate immediately prior to the procedure and aconsensus is reached with anesthesia that minimal amounts of intravenous fluids will be administered intraoperatively. The lower abdomen and groin are prepared consistent with the surgeon's preference. Many surgeons prefer the use of a plastic barrier draped over the skin to prevent contact of the mesh with the skin.

Unless the patient has a large intrascrotal hernia, the scrotum does not need to be draped into the operative field. The use of the plastic barrier drape makes it possible to easily include the umbilicus, the anterior superior iliac spine (ASIS), and the pubic tubercles into the operative field. A single dose of first generation cephalosporin is commonly administered for prophylaxis.

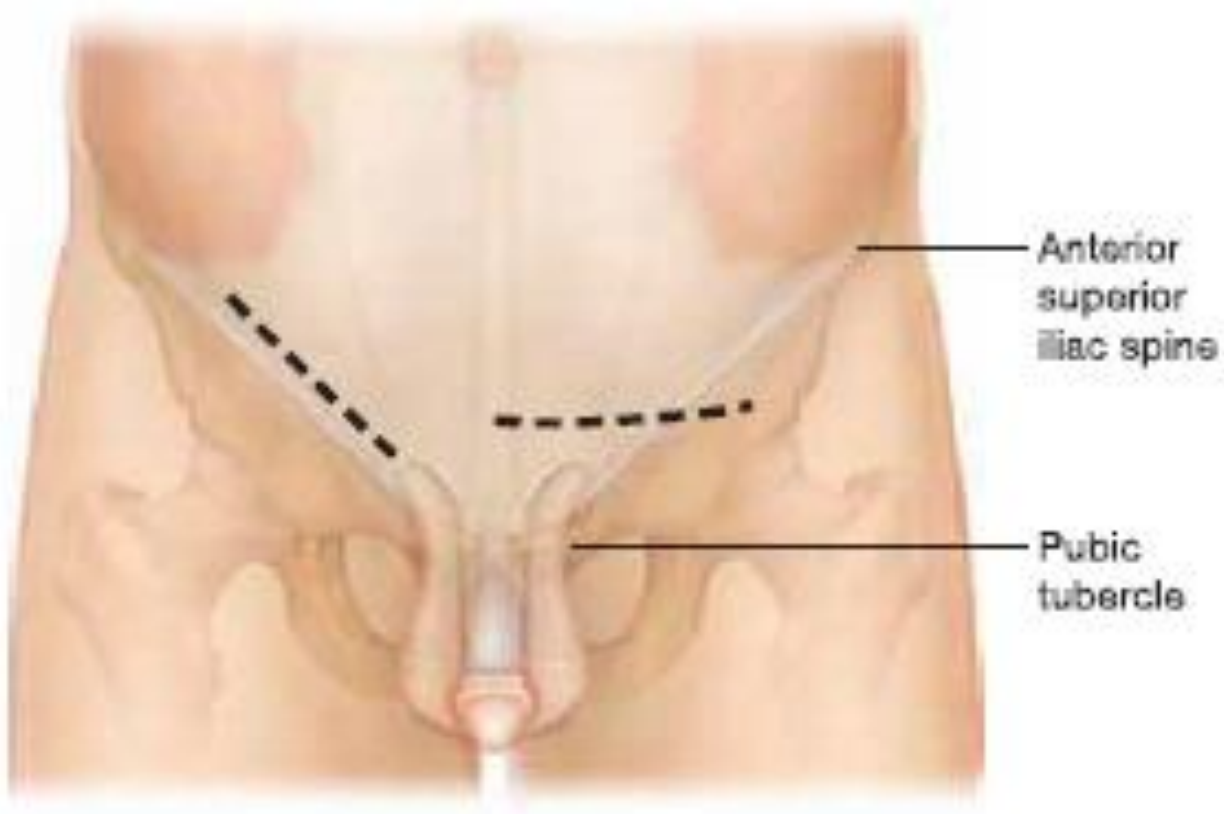
Incision

For most patients, a properly placed incision need not be much larger than 5 cm. There are two basic incision types for this procedure, transverse or oblique

Transverse incisions have the advantage of being made in the lines of Langer which imparts a theoretical cosmetic advantage. The oblique incision is essentially made over the distance from the internal to the external ring which in theory allows for the smallest length of incision needed.

The oblique incision is prepared by marking a line from the *ASIS* to the pubic tubercle. A 5 to *7* em incision is then made parallel 1 em cephalad to the previously marked line which begins medially 2 em lateral to the pubic tubercle and continued for the selected distance.

Given the general laxity of the skin in this region it can easily be shifted in order to visualize all of the required structures to be dissected. Once the skin is incised, the incision is carried down to the extamal oblique fascia sharply or by cautery. It is common to encounter a subcutaneous vein requiring ligation in the lateral aspect of the wound. The external oblique should be exposed from the external ring 10 em laterally and at least 5 em in width. This will facilitate closure at the and of the case.


Anterior
superior
iliac spine
Pubic
tubercle

Dissection

The true dissection commences at opening the external oblique fascia in line with its fibers. After identifying the pubic tubercle the surgeon or assistant can place their finger into the external ring just under the external oblique fascia. The fascia is then opened medially to laterally with electrocautery using the surgeon's finger to protect the underlying structures.

Alternatively, one blade of the Metzenbaum scissors is placed under the external oblique aponeurosis and the scissors are "pushed" in the direction of the fibers opening the layer.

This guarantees that the external ring will be completely opened which is a requirement for adequate exposure. The external oblique should be open for at least 10 cm which will allow for complete exposure of the internal ring as well as a few centimeters laterally. Cephalad and caudad flaps of the external oblique aponeurosis are developed from the pubic tubercle for the entire length of the incision.

The cephalad extent of the dissection should expose the conjoined tendon and rectus sheath. The caudad flap dissection should be continued until the inguinal ligament (Poupart) is clearly demonstrated.

Self-retaining retractors are used to maintain the exposure. At this point the course of the ilioinguinal nerve should be discerned.

At this point either the nerve is carefully mobilized and retracted behind the cephalad flap of the external oblique aponeurosis or some surgeons prefer to resect the nerve and allow the proximal end to retract into the internal oblique muscle fiber.

The second option is more commonly employed in older patients. Not all patients experienced numbness when this resection maneuver is performed because of overlapping innervation.

If the nerve is resected, neuroma is possible, inguinodynia is avoided.

The spermatic cord is then mobilized. It is elevated off the pubic tubercle in its entirety along with its cremasteric fibers. A drain is then secured around it.

The spermatic cord must be carefully elevated from 2 cm distal to the pubic tubercle all the way to the internal ring. There are often cremasteric fibers that are lateral and medial to the spermatic cord that require division in order to achieve full mobilization.

Moderate to large direct hernias may present as a structure adherent to the undersurface of the spermatic cord.

These hernias are easily separated and diagnosed by elevating
the spermatic cord anteriorly and sweeping the direct hernia posteriorly without violating the plane of the cremasteric muscle. The spermatic cord is then mobilized laterally.

The anterior and medial portion of the cremasteric envelope of the spermatic cord is opened for 3 to 4 em in the line of its fibers. The hernia sac associated with an indirect hernia is located in this portion of the spermatic cord. If a peritoneal sac is identified, it is mobilized by retracting a hernia sac cephalad and laterally while mobilizing the spermatic cord structures medially .

The process is likened to opening a book. With the spine of the book. centered in the internal ring. This process should be continued until the vas deferens and cord vessels are seen entering into the internal ring and completely separated from the peritoneal sac.

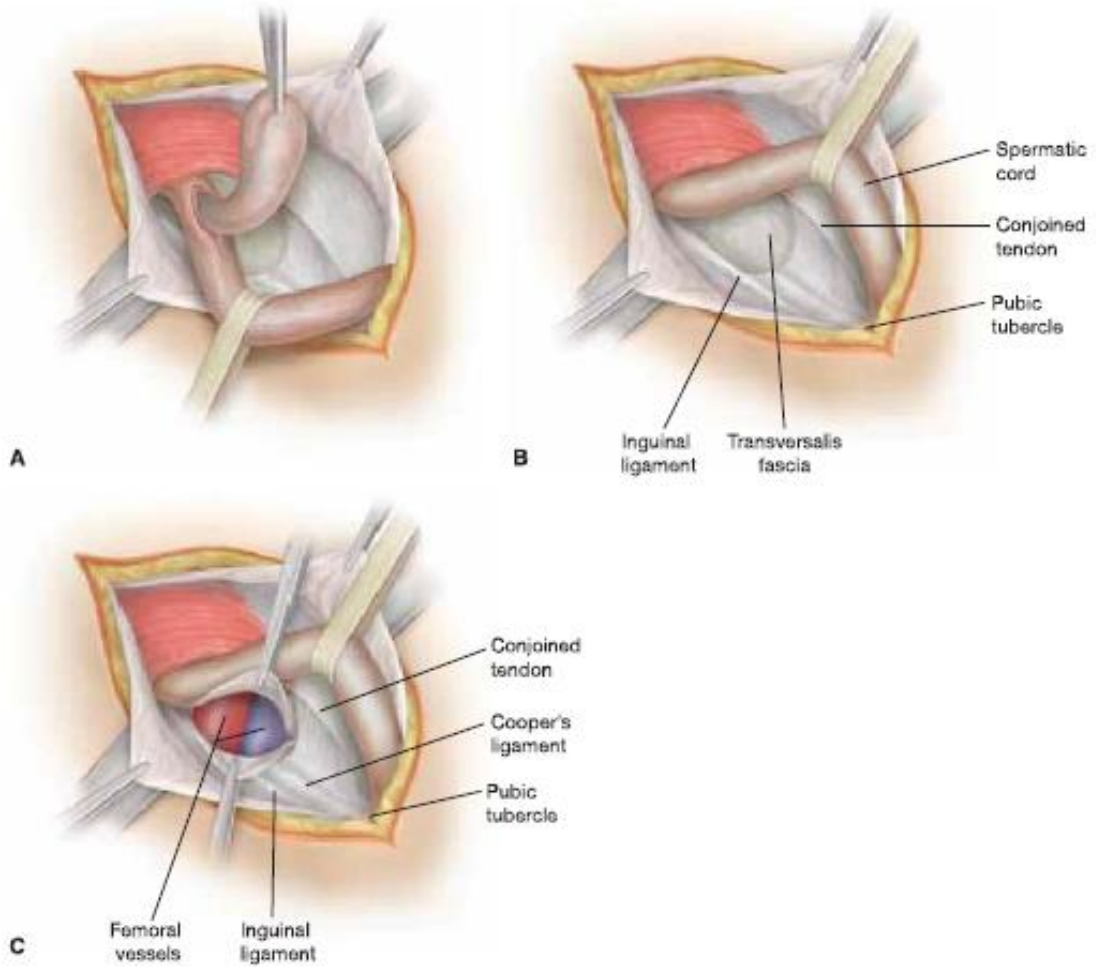
Lipomata of the spermatic cord are mobilized in a similar fashion. Once these structures are mobilized, they are either ligated and excised or mobilized back into the retroperitoneum.

After the completion of the exploration of the spermatic cord, the fioor of the inguinal canal is assessed by examining the transversalis fascia. If the integrity of the fioor of the inguinal canal is intact, then the transversalis fascia does not need to be opened unless a femoral hernia is suspected .

These suspicions can be confirmed by examining the region outside of the extemal oblique just medial to the femoral vein and palpitating for any suspicious masses suggesting femoral hernia.

If either a direct hernia or femoral hernia exists, then the transversalis fascia should be opened in its medial portion near the pubic tubercle at its juncture with the inguinal ligament By doing so, Cooper's ligament in the femoral canal can be exposed .

Femoral hemias are then reduced and Cooper's ligament is cleared off from the femoral vein to the pubic tubercle with care to avoid injury to the rectal vein which can run parallel to Cooper's ligament. The ligament is identified as a firm but slightly spongy structure lying over the pubic ramus.


A
B
Spermatic cord
Conjoined tendon
Pubic tubercle
Inguinal ligament
Transversalis fascia
C
Conjoined tendon
Cooper's ligament
Pubic tubercle
Femoral vessels
Inguinal ligament

SURGICAL SITE INFECTIONS

Even though surgeons are known to have adequate knowledge with infections since the starting , the underlying practices for treatment of infections came into lime light only after discovery of' germ theory'. The theory of antisepsis also helped

Many discoveries in the late 18th played role in learning about the pathology and physiology behind the disease process.

Germ theory was given by the famous scientist of era , louis pasteur . He demonstrated that diseases are caused by specific microbes. He deviced methods of sterilisation.

Organisms namely staph aureus ,streptococcus were discovered by- lister. Late 18th century saw experiments by many renowned scientists like Robert koch .He identified organisms causing disese like TB , dysentry, vibrio cholerae During this study on influenza virus, in 1918, he noticed a' zone of inhibition' around *Penicillium notatum* colony which grew profusely on a plate with *Staphylococcus*. In the year 1928 he made the discovery of penicillin.

This led to the growth of effective antimicrobial agents against infectious organisms . They were routinely used as *prophylaxis against postoperative wound which got infected*. The discovery of microflora of GIT, skin,respiratory system, alimentary tract helped surgeons to upsurge their information on organisms which they will come across in operative procedures.

With many clinical studies and observations made by renowned veteran surgeons, Frank Meleny et al and William Altemier et al, the fact that aerobes and anaerobes Combine or synergise to become the source of serious infections (soft tissue lesions & intra-abdominal sepsis) existence came into limelight. So the concept that held that inhabitant organisms were not pathogenic to human beings was vanished as these organisms by lagre have the potential to cause serious surgical site infections when entered into sterile cavity during surgical procedure.
Over the few last years , new concepts and ideas of polymicrobial existence of surgical site infections were propagated. Aspirates from the peritoneal cavity fluid of hospitalised persons with perforated hollow viscus or impending perforation of appendix or a gangrenous inflammed appendix showed
the presence of both aerobes and anaerobic microorganisms.

Trials were being held to know the effective means of microorganisms source control to categorise and treat the infections caused and antimicrobial
agents were given with the aim of targetting both disease causing pathogens and normal commensals.
William osler, a leading american medical profesional made studies to note that patients even died because of inflammatory response by the host to the organism. These studies provided a good insight of host inflammatory response to infection.these were mainly due to activation of different pathways in respone to infective foci. This helped to form many new therapies .

These new methods of treatment were mainly aimed at targetting the modified inflammatory response. Increased response by the host tissue plays an important role in causing end organ failure and multiple organ dysfunction.

So the main obstacle for the treating surgeon is to minimise infection and as a result prevent multi organ failure.

SURGICAL SITE INFECTIONS

DEFINITIONS:

This Term, 'Surgical Wound Infection Task Force' (SWITF) Was Earlier Used To Ascribe -Surgical Site Infections.

The Term 'SURGICAL WOUND'–Was Later Replaced By 'SURGICAL SITE INFECTION'. This Term Was Later Formulated By CDC Group In The Year 1992.

CDC Definitions For Surgical Site Infection Surveillance Is Given Below

SUPERFICIAL INCISIONAL SURGICAL SITE INFECTION

'Infection occurs within 30 days after the operation and infection involves only skin and subcutaneous tissue of the incision and at least one of the following:

1. Purulent drainage with or without laboratory confirmation, from the superficial incision

2. Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision

3. At least one of the following signs or symptoms of infection: pain or tenderness, localised swelling, redness, or heat and superficial incision is deliberately opened by surgeon, unless incision is culture-negative

4. Diagnosis of superficial incisional SSI made by a surgeon or attending physician

DEEP INCISIONAL SURGICAL SITE INFECTION

Infection occurs within 30 days after the operation if no implant is left in place or within one year if implant is in place and the infection appears to be related to the operation and infection involves deep soft tissue (e.g. fascia, muscle) of the incision and at least one of the following:

Purulent drainage from the deep incision but not from the organ/space component of the surgical site

A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever (>38°C), localised pain or tenderness, unless incision is culture-negative

An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination

Diagnosis of deep incisional SSI made by a surgeon or attending physician

ORGAN/SPACE SURGICAL SITE INFECTION

Infection occurs within 30 days after the operation if no implant is left in place or within one year if implant is in place and the infection appears to be related to the operation and infection involves any part of the anatomy (e.g., organs and spaces) other than the incision which was opened or manipulated during an operation and at least one of the following:

Purulent drainage from a drain that is placed through a stab wound into the organ/space

Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space

An abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination

Diagnosis of organ/space SSI made by a surgeon or attending physician.'

SOUTHAMPTON SCORING SYSTEM

Southampton scoring system

Grade	Appearance
0	Normal healing
I Normal healing with mild bruising or erythema:	
A	Some bruising
B	Considerable bruising
C	Mild erythema
II Erythema plus other signs of inflammation:	
A	At one point
B	Around sutures
C	Along wound
D	Around wound
III Clear or haemoserous discharge:	
A	At one point only (<2cm)
B	Along wound (>2cm)
C	Large volume
D	Prolonged (>3 days)
Major complication IV Pus:	
A	At one point only (<2cm)
B	Along wound (>2cm)
V Deep or severe wound infection with or without tissue breakdown; haematoma requiring aspiration	

The wound grading system used was simplified for the use of analysis.
By using the worst wound score recorded and information about any treatment instituted either in hospital or the community, wounds were regarded in four categories:
(A) normal healing;
(B) minor complication;
(C) wound infection-wounds graded IV or V or wounds treated with antibiotics after discharge from hospital, irrespective of the wound grading given to them by the nurse; and
(D) major haematoma-wound or scrotal haematomas requiring aspiration or evacuation.

ASEPSIS WOUND SCORE

ASEPSIS wound score

	Proportion of wound affected					
Wound characteristic	0	<20	20-39	40-59	60-79	>80
Serous exudate	0	1	2	3	4	5
Erythema	0	1	2	3	4	5
Purulent exudate	0	2	4	6	8	10
Separation of deep tissues	0	2	4	6	8	10

Points are scored for daily wound inspection.

Criterion	Points
Additional treatment:	
Antibiotics	10
Drainage of pus under local anaesthesia	5
Debridement of wound (general anaesthesia)	10
Serous discharge*	daily 0-5
Erythema*	daily 0-5
Purulent exudate*	daily 0-10
Separation of deep tissues*	daily 0-10
Isolation of bacteria	10
Stay as inpatient prolonged over 14 days	5

* Given score only on five of seven days. Highest weekly score used

Category of infection: total score 0-10 = satisfactory healing;
11-20 = disturbance of healing; 20-30 = minor wound infection;
31-40 = moderate wound infection; >40 = severe wound infection.

A CASE OF BILATERAL HENIA OPERATED WITH SSI GRADE 2C IN THE RIGHT SIDE AND GRADE 1C IN THE LEFT SIDE AS PER SOUTHAMPTON GRADING.

PATIENT WITH SEROUS DISCHARGE AT ONE POINT ONLY IN THE MEDIAL SIDE OF INCISION SITE.

SOUTHAMPTON GRADE 3A

A CASE OF UNILATERAL HERNIA WITH NORMAL HEALING .

GRADE 0

MECHANISM OF PREOPERATIVE ANTIBIOTICS

Antibiotics preoperatively diffuse into the peripheral compartment and wound fluid This saturated drugs namely the antimicrobials kill and thus preventing the invasion of bacteria and bacterial duplication.

GOALS OF PRESCRIBED ANTIBIOTIC THERAPY

To maintain the maximum serum concentration of drug namely the agent and also in the tissues which is greater than the MIC (minimal inhibitory concentration) by atleast 5-8 times for not less than three fourths of the duration for the surgery.

'MIC – The minimum concentration of antibiotic to kill 99% of organisms.'

Use the full prescribed doses of selected antibiotic in the deciding period (The vulnerable period mainly during surgery)

'CHOICE OF ANTIBIOTIC

1. Maintain effective antibiotic level throughout the procedure
2. Less adverse effects
3. Less interference with anaesthetic drugs
4. Cost effective
5. Broad spectrum to pathogens

6. Less interference with host defense’

Antibiotics commonly used in the prophylaxis are flucloxacillin ,methicilin, ampicillin and amoxycillin, mezlozilin, cephalosporins,aminoglycosides, vancomycin, imidazoles,carbepenem

THE ROUTE OF PROPHYLAXIS

The route of drug prophylaxis will depend on the wound contamination. The preference of the operating surgeon and the proven durability and reliability of the drug care. Both topical administation and parenteral route of administration have shown increased benefit in decreasing wound infections when properly given and administered.

Pharmacokinetic profile: For optimum action the antibiotic has to be present at the site of infection in sufficient concentration for an adequate length of time. This depends on their pharmacokinetic characteristics. Most antibiotics are given at 2 to 4 half-life intervals—thus attaining therapeutic concentrations only intermittently. For many organisms, aminoglycosides, fluoroquinolones and metronidazole produce ‘concentration-dependent inhibition’, i.e. inhibitory effect depends on the ratio of peak concentration to the MIC. The same daily dose of gentamicin produces better action when given as a single dose than if it is divided into
2–3 portions. On the other hand, β-lactams, glycopeptides and macrolides produce ‘timedependent inhibition’, i.e. antimicrobial actiondepends on the length of time the concentration remains above the MIC; division of daily doseimproves the effect. However, the doses should be so spaced that the surviving organisms again

start multiplying and a cidal action is exerted. Penetration to the site of infection also depends on the pharmacokinetic properties of the drug. A drug which penetrates better and attains higher concentration at the site of infection is likely to be more effective. The fluoroquinolones have excellent tissue penetration—attain high concentrations in soft tissues, lungs, prostate, joints, etc. Ciprofloxacin and rifampin have very good intracellular penetration. Cefuroxime, ceftriaxone, chloramphenicol, ciprofloxacin attain high CSF concentration.

Commonly used antimicrobials drugs for surgical prophylaxis

Oral (single dose given 1 hour before procedure)

1. Amoxicillin 2 g (50 mg/kg)

2. Cephalexin 2 g (50 mg/kg)

3. Cefadroxil 2 g (50 mg/kg)

For patients allergic to penicillin

1. Clindamycin 600 mg (20 mg/kg)

2. Azithromycin 500 mg (15 mg/kg

3. Clarithromycin 500 mg (15 mg/kg

Parenteral (single injection just before procedure)

1. Ampicillin 2 g (50 mg/kg) i.m./i.v.

2. Cefazolin 1 g (25 mg/kg) i.v.

3. Vancomycin 1 g (20 mg/kg) i.v. (in MRSA prevalentareas and/or penicillin allergic patients).

4. Clindamycin 600 mg (20 mg/kg) i.v. (for penicillin allergic patients).

5. Cefuroxime 1.5 g (30 mg/kg) i.v.+ Metronidazole 0.5 g (10 mg/kg) i.v.

6. Gentamicin 160 mg (3 mg/kg) i.v.+ Metronidazole 0.5 g (10 mg/kg) i.v.

TIMING

Most reliable timing was achieved with parentral administration by the Anesthetist or the operating surgeon just prior to induction of anesthetic agent or half an hour prior to the incision

FOR PROLONGED PROCEDURES

Antibiotics repeated every 4 hrs for prolonged surgery

Antibiotics should be continued for 1-2 days postoperatively in

clean contaminated wound

For dirty contaminated wounds, antibiotics should be continued for 5-7days.

TOPICAL ANTIBIOTIC PROPHYLAXIS

Topical instilation consists of application of antibiotic in the surface of the wound opening each plane of the tissue and at regular intervals during the entire surgery duration.

They are of some use only when it is constantly present on the surface of the wound so that it has some effect on the infective organisms.

Eg., Topical Sulphazalizine on open wounds.

Topical- Aminoglycoside

In day to day routine use the first generation cephalosporin is an excellent choice

Aminoglycosides are also routinely used . Main disadvantage of these drugs is

a) Systemic drug absorption can cause toxicity

b) Anaerobes will not be killed even in high dose of concentrations

COMPLICATIONS

The most dreaded complications are *anaphylaxis or drug reaction* and *death.*

Its routinely associated with the b-lactam drugs.

including the cephalosporins, carbapenem, pencillin and monobactam

Vancomycin also cause red man syndrome

Cephalosporins can rarely lead to hypoprothrombinemia and disorder of bleeding. Stretomycin can cause nephrotoxicity and hepatotoxicity.

Prophylactic antibiotic treatment

The usage of empirical antibiotics- before the surgery to prevent any complications arising due to infections.

Procedure-Specific Recommendations for Prophylaxis

PROCEDURE	*LIKELY ORGANISMS*	*RECOMMENDED ANTIBIOTIC**	*ADULT DOSE†*
Cutaneous	*Staphylococcus aureus, Staphylococcus epidermidis*	No uniform recommendation	
Head and neck	*S. aureus*, streptococci	Cefazolin (Ancef, Kefzol)	1 to 2 g intravenously
Neurosurgery	*S. aureus, S. epidermidis*	Cefazolin	1 to 2 g intravenously
Thoracic	*S. aureus, S. epidermidis*	Cefazolin	1 to 2 g intravenously
Cardiac	*S. aureus, S. epidermidis*	Cefazolin‖	1 to 2 g intravenously
Abdominal			
Gastroduodenal	Gram-positive cocci, enteric gram-negative bacilli	High risk: cefazolin	1 to 2 g intravenously
Colorectal	Enteric gram-negative bacilli, anaerobes	Oral: neomycin (Neosporin) and erythromycin base	1 g orally (3 doses)#
		Parenteral: cefotetan (Cefotan) or cefoxitin (Mefoxin)	1 to 2 g intravenously

PROCEDURE	*LIKELY ORGANISMS*	*RECOMMENDED ANTIBIOTIC**	*ADULT DOSE†*
Appendectomy	Enteric gram-negative bacilli, anaerobes	Cefotetan or cefoxitin	1 to 2 g intravenously
Biliary	Enteric gram-negative bacilli	High risk: cefazolin	1 to 2 g intravenously
Gynecologic and obstetric	Enteric gram-negative bacilli, group B streptococcus, anaerobes	Cefazolin**	1 to 2 g intravenously
Urologic	*S. aureus*, enteric gram-negative bacilli	Cefazolin††	1 to 2 g intravenously
Orthopedic	*S. aureus, S. epidermidis*	Cefazolin	1 to 2 g intravenously
Noncardiac vascular	*S. aureus*, *S. epidermidis*, enteric gram-negative bacilli	Cefazolin	1 to 2 g intravenously
Breast and hernia	*S. aureus, S. epidermidis*	High risk: cephalosporins	1 to 2 g intravenously

CEPHALOSPORINS

These are a group of semisynthetic antibiotics derived from ‘cephalosporin-C’ obtained from a fungus *Cephalosporium*. They are chemically related to penicillins; the nucleus consists of a β-lactam ring fused to a dihydrothiazine ring,(7-aminocephalosporanic acid). By addition of different side chains at position 7 of β-lactam ring (altering spectrum of activity) and at position 3 of dihydrothiazine ring (affecting pharmacokinetics), a large number of semisynthetic compounds

have been produced. These have been conventionally divided into 4 generations. This division has a chronological sequence of development, but more importantly, takes into consideration the overall antibacterial spectrum as well as potency.

Ceftriaxone The distinguishing feature of this cephalosporin is its longer duration of action (t½ 8 hr), permitting once, or at the most twice daily dosing. Penetration into CSF is good and elimination occurs equally in urine and bile.
Ceftriaxone has shown high efficacy in a wide range of serious infections including bacterial meningitis (especially in children), multiresistant typhoid fever, complicated urinary tract infections, abdominal sepsis and septicaemias

Therapeutic- antibiotic treatment

This refer to the use of drugs which will decrease the growth or multiplication of micro-organisms, it also involves its eradication . Thus, it helps in decreasing infection caused due to a pathogen , but also in reducing the impact of organisms which will colonise the git or normal skin flora.

Principles behind prophylaxis of drugs

• The use of the antibiotic agent which is likely to cause the probable infection

• On any day select the full dose of desired antibiotic.

• Administer the chosen drug prophylactically

• If TIME of operation extended for more than 4 hrs, another dose of the given antibiotic.

• Post op antibiotic are the given when risk of infection is increased.

"The consensus is that a single dose of antibiotic immediately before an operation is enough and that there are dangers not only to hospital but also to the patients in prolonged course of prophylactic antibiotics. Resistance to antibiotics is related closely to the prolificity with which antibiotics are prescribed"

Single dose prophylaxis

STRACHAN coworkers gave the idea of single dose antibiotic prophylaxis. They were the people who proposed a single dose of broad - spectrum antibiotic prior to surgery without using it after the procedure.

single dose vs no antibiotic trial:

many studies were conducted notable of which is a comparative study where comparison was done between single dose of preop antibiotic –a second generation cephalosporin against five days post operatively. The rate of SSI was about 5% and the other control group was around 8%

One single dose vs multiple doses of the same drug trial

Patients who underwent colonic surgery received single dose of prophylactic antibiotic against multiple doses of the antibiotic. This study was done in about five hundred patients which was conducted in single dose group , infection rate was about 5% . The reamining patients who received multiple dose of antibiotic the rate of infection was about 7%

Risk associated with antibiotic prophylaxis-

Any patient who develop the following symptoms like bronchospasm ,hypotension, edema in the larynx , utricaria or pruritic rash are potential candidates for anaphylaxis.So the least drug to cause anaphylaxis is preferred for propylaxis like o beta-lactams.

If the pt is allergic to beta lactams other options can be selected based on the source of infection and the likely organism expected. Patient safety is considered foermost.

Prophylactic antibiotics

• Patients who received antibiotics preoperatively had comparitivelydeveloped lesser infection rates compared to the patients who received post operatively. As Far as these problems are concerned a rational has been developed to give drugs to the undamaged tissue even before contamination occurs.

CDC GUIDELINES 2017 FOR PROPHLAXIS BASED ON CATEGORIES

Recommendations were categorized using the following standard system that reflects the level of supporting evidence or regulations:

- Category IA: A strong recommendation supported by high to moderate–quality evidence suggesting net clinical benefits or harms.
- Category IB: A strong recommendation supported by low-quality evidence suggesting net clinical benefits or harms or an accepted practice (eg, aseptic technique) supported by low to very low–quality evidence.
- Category IC: A strong recommendation required by state or federal regulation.
- Category II: A weak recommendation supported by any quality evidence suggesting a trade-off between clinical benefits and harms.
- No recommendation/unresolved issue: An issue for which there is low to very low–quality evidence with uncertain trade-offs between the benefits and harms or no published evidence on outcomes deemed critical to weighing the risks and benefits of a given intervention.

Parenteral Antimicrobial Prophylaxis

Administer preoperative antimicrobial agents only when indicated based on published clinical practice guidelines and timed such that a bactericidal

concentration of the agents is established in the serum and tissues when the incision is made. (Category IB–strong recommendation; accepted practice.)

No further refinement of timing can be made for preoperative antimicrobial agents based on clinical outcomes. (No recommendation/unresolved issue.)

Administer the appropriate parenteral prophylactic antimicrobial agents before skin incision in all cesarean section procedures. (Category IA–strong recommendation; high-quality evidence.)

In clean and clean-contaminated procedures, do not administer additional prophylactic antimicrobial agent doses after the surgical incision is closed in the operating room, even in the presence of a drain. (Category IA–strong recommendation; high-quality evidence.)

GUIDELINES FOR RECOMMENDATIONS ON SURGICAL ANTIBIOTIC PROPHYLAXIS AND RELATED TIME OF ADMINISTRATION BASED ON VARIOUS STUDIES

SHEA/ IDSA 2014 -Administer only when indicated, within 1 hour before incision with superior efficiency between 0 and 30 minutes prior to incision compared with administration between 30 and 60 minutes

NICE -2013-Single dose of antibiotic intravenously on starting anaesthesia. Prophylaxis should be given earlier for operations in which a tourniquet is used, that is, after rather than before tourniquet inflation.

ASHSP -2013 Administration of the first dose of the antimicrobial beginning within 60 minutes before surgical incision is recommended. Administration of vancomycin and fluoroquinolones should begin within 120 minutes before surgical incision because of the prolonged infusion times required for these drugs

The Royal College of Physicians of Ireland (2012) -At induction (within 60 minutes prior to incision surgery). If a tourniquet is to be applied, a 15-minute period is required between the end of antibiotic administration and tourniquet application. Single dose, except if blood loss (>1.5 L in adults or 25 mL/kg in children) and prolonged surgical procedures (4 hours)

UK High impact intervention care bundle (2011)-Appropriate antibiotics administered within 60 minutes prior to incision and only repeated if there is excessive blood loss, a prolonged surgical procedure or during prosthetic surgery

GUIDELINES FOR STOPPING ANTIBIOTIC PROPHYLAXIS.

SHEA/IDSA (2014) Stop agent within 24 hours after the procedure for all procedures

American Society of Health-System Pharmacists - Discontinue antibiotic prophylaxis within 24 hours after surgery

NICE (2008) - Consider giving a single dose of antibiotic prophylaxis intravenously on starting anaesthesia

The Royal College of Physicians of Ireland (2012) -With the exception of a small number of surgical indications (see below), the duration of surgical prophylaxis should be a single dose. Duration of prophylaxis involving more than a single dose, but not for more than 24 hours: open reduction and internal fixation of compound mandibular fractures, orthognathic surgery, complex septorhinoplasty (including grafts), head and neck surgery. Duration for more than 24 hours, but not for more than 48 hours: open heart surgery

) UK High impact intervention bundle (2011)- Appropriate antibiotics were administered within 60 minutes prior to incision and only repeated if there was excessive blood loss, a prolonged operation or during prosthetic surgery.

MECHANISM of PREOPERATIVE ANTIBIOTICS

The drug given in the preoperative period will diffuse into the peripheral compartment and also wound exudate. This leads to saturation of the drug which destroys and also helps in preventing the incoming bacteria and multiplication of bacteria.

‘Goals Of Antibiotic Therapy

1. To maintain the maximum concentration of agent in the serum and also the tissues which is more than the MIC (minimal inhibitory concentration) by 3-4 times for not less than three quarters of time during surgery.

MIC – The minimum concentration of antibiotic to kill 99% of organisms.

2. Use full doses of chosen antibiotic in the DECISIVE period (The vulnerable period during surgery)’

THE main ingredient to sucessful propylaxis

The prophylactic administration should be used only for intraoperative administation.

A single perioperative dose or if needed continuous administration if topical antibiotic is chosen.

A shorter duration is more preferred. Prophylactic antibiotics can never be said as an excuse for faulty techniques.

MATERIALS AND METHODS

AIM:

To Assess The Efficacy Of Antibiotics in the prevention of SSI By A Comparative Study Of Prophylactic Single Dose Antibiotic Vs Conventional Full Course Antibiotics In Hernioplasty Surgeries

OBJECTIVES:

To assess the effectiveness of prophylactic single dose antibiotic vs conventional full course antibiotics in hernioplasty surgeries by evaluating for surgical site infections

ELIGIBILITY CRITERIA

INCLUSION CRITERIA

1)Patients with unilateral ,bilateral primary or recurrent hernia

2)more than 18 years of age

EXCLUSION CRITERIA

1) Patients With immunosupressed states , comorbidities like DM ,or patient on drugs like steroids,or associated with malignant disease

2)Local infection In Incision Site prior to surgeries Like Tinea Corporis

3) Complicated Hernia like those with Obstruction And hernia which are Strangulated

4)Significant Renal Impairment,Severe Hepatic Disease, Allergic To Cephalosporins

5)Pt Not Willing For Surgery

MATERIALS USED:

1. Proforma containing patient history, clinical examination, investigations,

2. Informed consent forms.

3.injectable cephalosporins -1gm ceftriaxone , multivitamin infusion,.

METHODOLOGY

Patients with primary , recurrent unilateral or bilateral inguinal hernia > 18 years of age are assessed for hernioplasty. The groin of the posted person is prepared by adequate trimming or clipping without causing any abrasions of the groin hair the previous night. Then the area marked for incision and surgery is properly cleaned with betadine scrub for atleast 10 mins before the surgery. After anesthetizing the patient, the trial medication was given.single dose antibiotic given in one group of patients while other group received multivitamin injection. Then the incision site was painted at least four times with 5% betadine solution for 3 -5 mins. A open Lichtenstein hernia repair as per the guidelines for surgery is performed as described by Lichtenstein Hernia Institute . A macroporous polypropylene mesh was sutured in place with monofilament polypropylene (prolene). Type of anaesthesia and skin closure not standardized.. If the procedure exceeded two hours of time then the patients were excluded from the study. Patients who didn't receive single dose of antibiotic intraoperatively were started on full course of antibiotics – injection ceftriaxone for 5 days. Patients are first clinicaly evaluated on fourth post operative day for any infection. Then patients are seeen and reviewed after duartion of two weeks and four weeks. Thorough wound inspection is done to rule out any arising surgical site infection. Wound infection was defined by the guidelines stated by the' Centers for Disease Control and prevention' . In case if the patient who is on single dose antibiotic developed SSI, he is initially managed with sterile

dressing alone along with reassuarance. In case of no reponse if required even one or two suture are removed to drain out the discharge if any. If there is no apparent response or progression of infection noted, antibiotics are started. . All the collected data are recruited using a predesigned proforma.

PROFORMA

NAME DOA-

AGE DOD-

SEX DOS-

OCCUPATION

PRESENTING COMPLAINTS:

SWELLING IN GROIN

DURATION

ONSET

PRECIPITATING /RELIEVING FACTORS

SWELLING – REDUCIBLE
IRREDUCIBLE

VOMITING YES NO

FEVER YES NO

ABDOMEN PAIN YES NO

ABDOMEN DISTENSION YES
NO

CONSTIPATION YES NO

MICTURITION DIFFICULTY YES NO

PAST HISTORY

HISTORY OF PREVIOUS SURGERIES YES
NO

IF YES ,DETAILS

HT,DM ,BA,TB,SEIZURES YES
NO

PERSONAL HISTORY

SMOKER/ALCOHOLIC

HISTORY OF COLLAGEN TISSUE DISORDER

GENERAL EXAMINATION

CONSCIOUS	DROWSY	
ORIENTED	NOT ORIENTED	
PALLOR	YES	NO
CYANOSIS	YES	NO
ICTERIC	YES	NO
LYMPHADENOPATHY	YES	NO

BP PR TEMP-

CVS- RS-

CNS-

GCS- P/A- BS-
PRESENT/SLUGISH/ABSENT

GUARDING

RIGIDITY

TENDERNESS

PALPABLE MASS

LOCAL EXAMINATION

SITE-

SHAPE-

SURFACE-

EXTENT-

SKIN OVER SWELLING-

COUGH IMPULSE

EXTERNAL GENITALIA

OPPOSITE SIDE GROIN-

PALPATION

TENDERNESS	YES	NO
CONSISTENCY		
REDUCIBILITY	YES	NO
COUGH IMPULSE	YES	NO
DEEP RING OCCLUSION TEST	IMPULSE--PRESENT	ABSENT
INVAGINATION TEST		
ZIEMANN TECHNIQUE		

DIAGNOSIS—

GILBERT TYPE-

NYHUS TYPE-

OPERATIVE NOTES ATTACHED

TYPE Of ANTIBIOTIC USED

CONDITION ON POD4

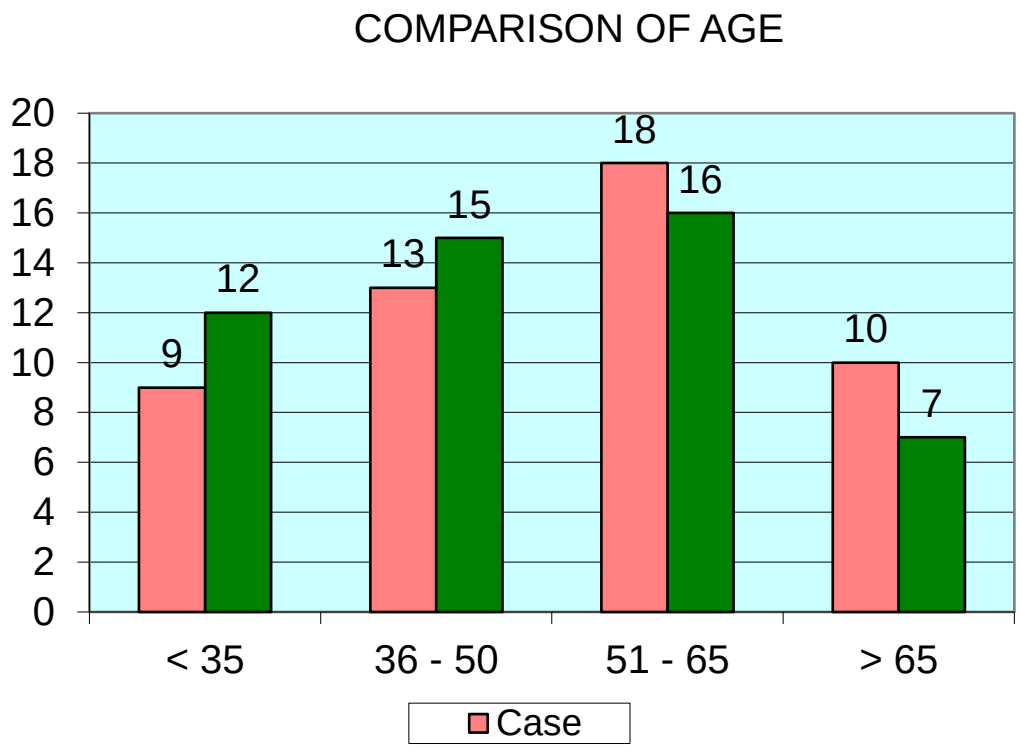
CONDITION ON 2ND WEEK

CONDITION ON 4TH WEEK

OBSERVATION AND RESULTS

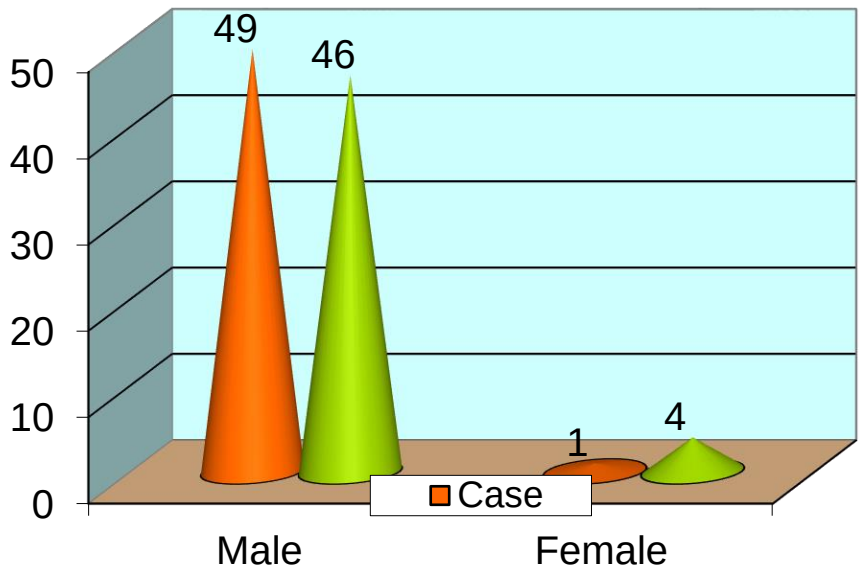
OBSERVATION AND RESULTS

Age in years	Case	Control
< 35	9	12
36 - 50	13	15
51 - 65	18	16
> 65	10	7
Total	50	50
Mean	52.16	47.96

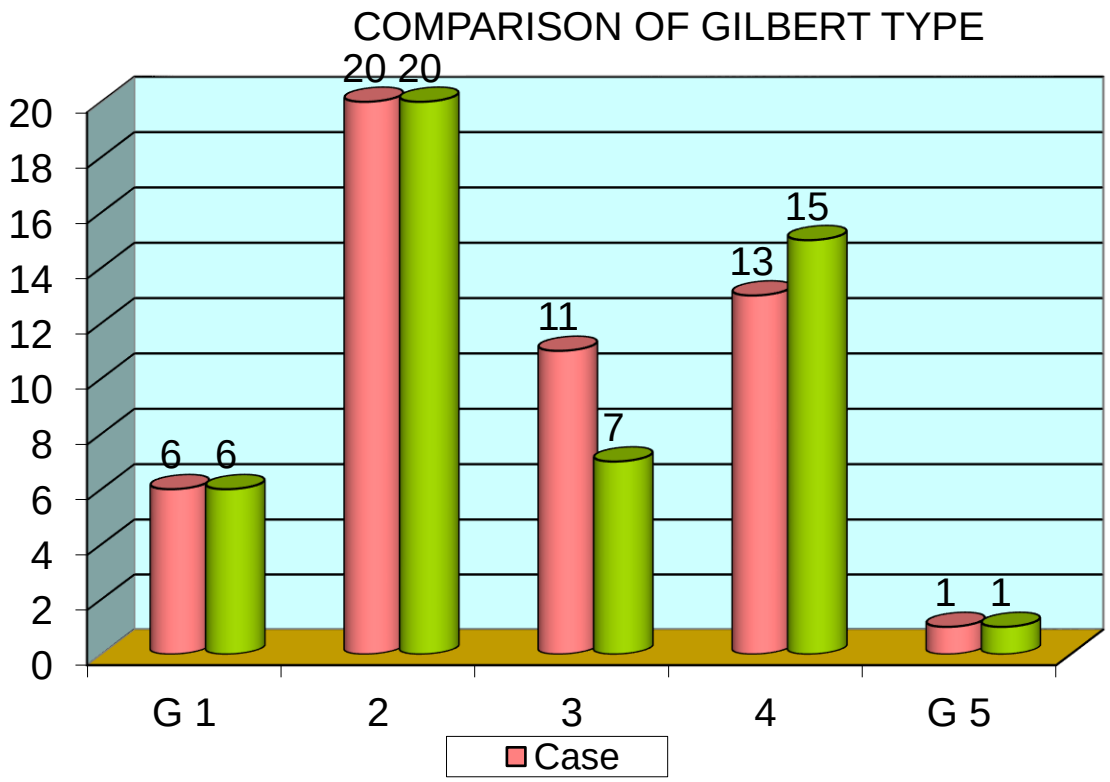


Gender	Case	Control
Male	49	46
Female	1	4
Total	50	50

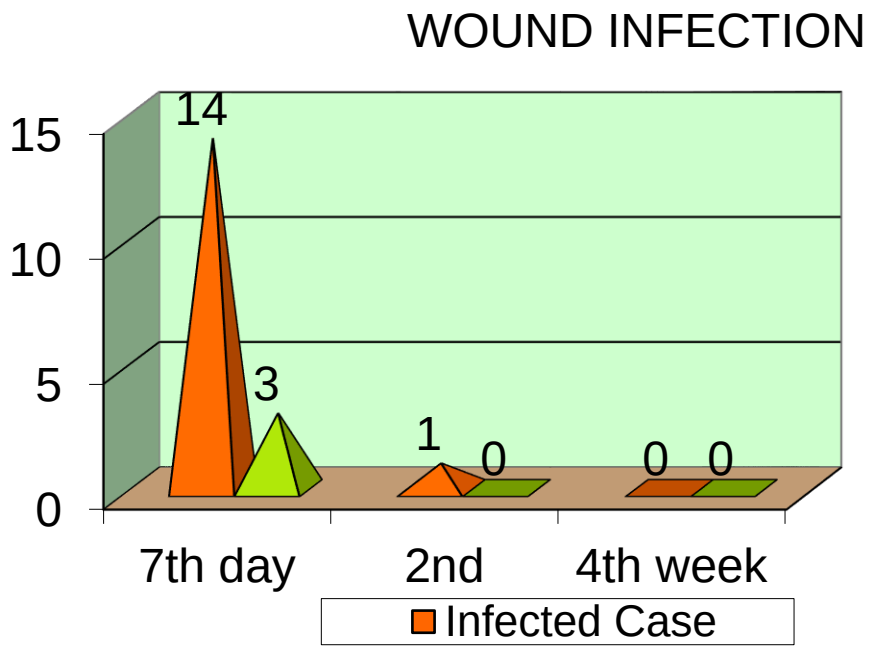
GENDER DISTRIBUTION



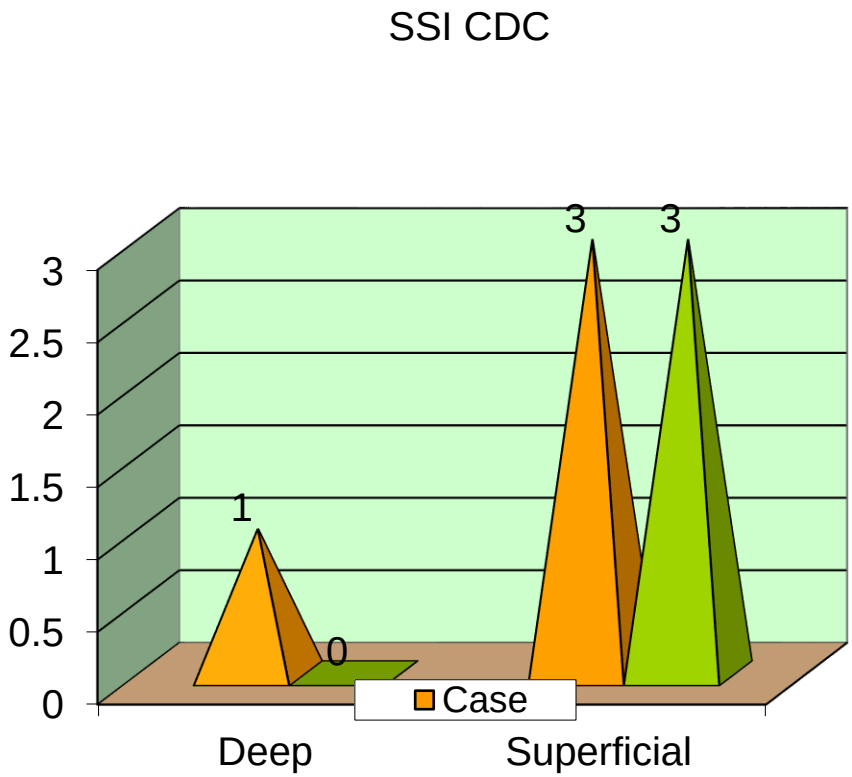
Gilbert type	Case	Control
G 1	6	6
2	20	20
3	11	7
4	13	15
G 5	1	1



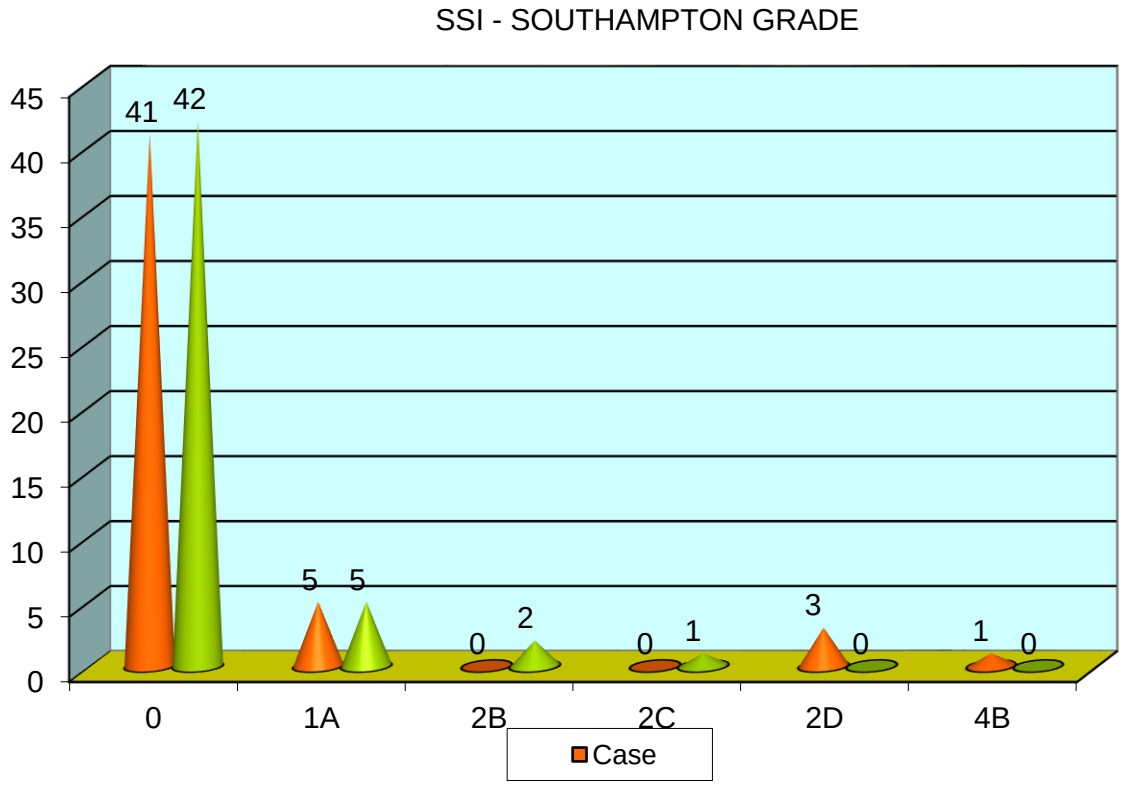
Wound infection	Infected	
	Case	Control
7th day	14	3
2nd week	1	0
4th week	0	0



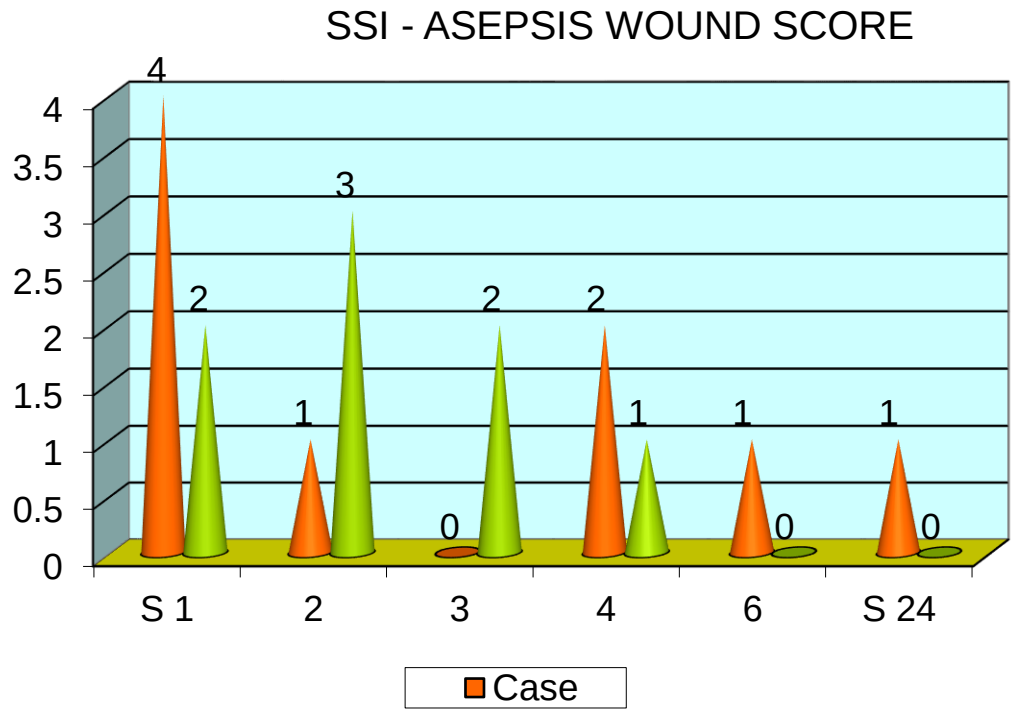
SSI CDC	Case	Control
Deep	1	0
Superficial	3	3
p value	0.875	Not sig



SSI- SOUTHAMPTON GRADE	Case	Control
0	41	42
1A	5	5
2B	0	2
2C	0	1
2D	3	0
4B	1	0
p value	0.976	Not sig

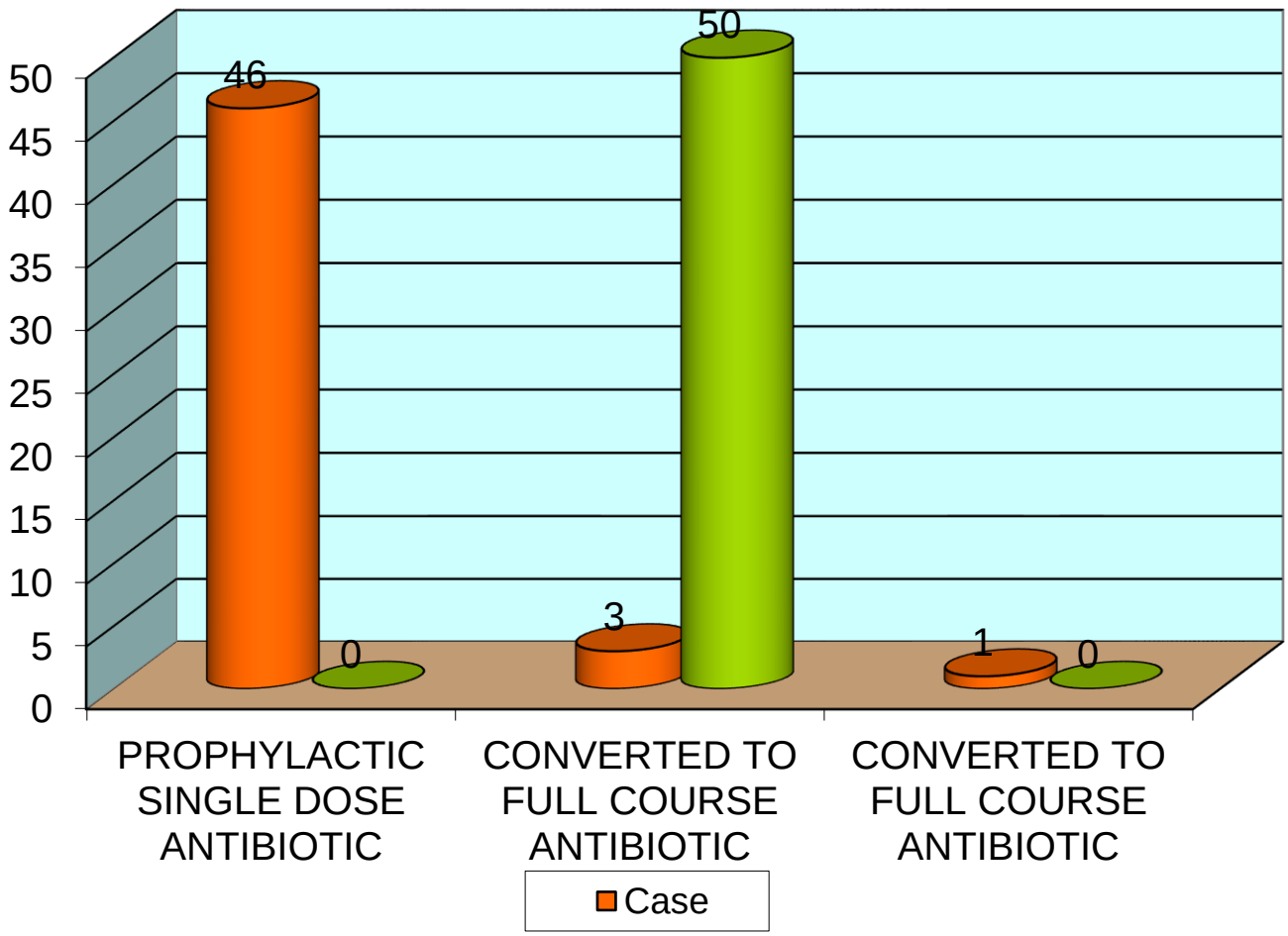


SSI- ASEPSIS WOUND SCORE	Case	Control
S 1	4	2
2	1	3
3	0	2
4	2	1
6	1	0
S 24	1	0
p value	0.287	Not sig

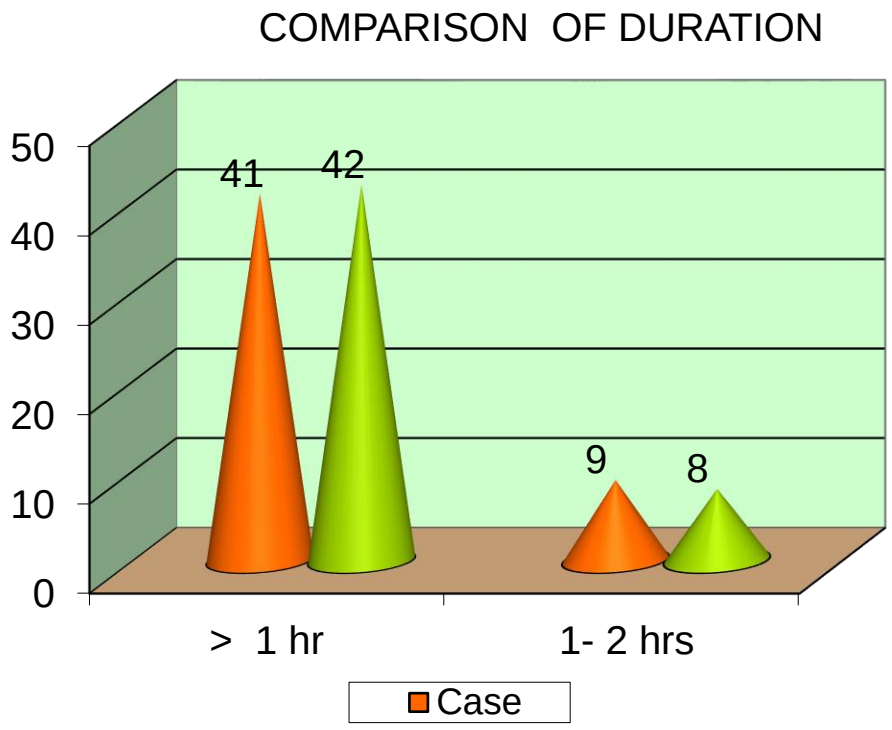


Antibiotic given	Case	Control
PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	46	0
CONVERTED TO FULL COURSE ANTIBIOTIC	3	50
CONVERTED TO FULL COURSE ANTIBIOTIC	1	0
p value	<0.001	Significant

COMPARISON ANTIBIOTIC GIVEN



Duration	Case	Control
> 1 hr	41	42
1- 2 hrs	9	8
Total	50	50
p value	1.00	Not sig



DISCUSSION

SURGERIES performed in elective theatres are usualy clean surgeries. We usualy follow a sterile technique and other areas of contamination are usualy not entered like the GIT , respiratory system and urinary system. The operating room ,the atmosphere and sterility of instruments ,surgeons effort to maintain asepsis also play an imortant role in preventing surgical site infection apart from risk factor associated with patients and operating team.

The operating surgeon should not have the liberty of prescribing antibiotics due to faulty techniques as it is never a substitue for clean aseptic environment. In clean surgeries the source of infection in case of wound sepsis is usualy from exogenous source like the nostril or oral cavity of surgeons or skin of patient.

In this study factors which may hinder our study like hypertension, , immunocompromised state, diabetes mellitus other co-morbities,

, hypersensitivity to any drugs have been strictly

excluded. As far as literatures are concerned the infection rate in clean surgeries is low as 1.5% . The studies pertaining to hernia show even lower percentage of infection. This study was done to assess the usefulness and effectivity of prophylactic antibiotic compared to conventional antibiotics. Study results of 100 patients studied with no loss to follow up revealed the following findings. Out of the 50 patients who were posted for prophylactic antibiotic 14 developed signs of SSI within days, one developed during the 2nd week. In control group 3 developed SSI

within days. The overall p value was 0.357 which was not significant. As per CDC guideliness of the case group 1 had deep and 3 had superficial infection which was not significant compared to control group with p value of 0.85.SSI grading as per southampton grade was insignificant with p value of 0.976 . The asepsis wound score was less than 6 in both groups except one case in case group with scor of 24. The overall p value was 0.287 for asepsis wound score. Out of the 50 case group 4 were converted to conventional antibiotics . Duration was not a factor in this study as prolonged surgeries did not lead to failure of prophylactic antibiotics.

According to a similar study performed in our hospital taking into account all elective clean surgeries , the rate of
infection in the study group i.e., the patients who received a
prophylactic antibiotic was 6%. In the group who never received an antibiotic prophylactically, twele percent developed an infection. No patient developed organ or space SSI

But as per Plait et al, conducted a study to evaluate the role of perioperative prophylaxis in clean surgeries, he found a absolute decrease in the risk of surgical site infection to about 40%. However in this study, the allocated sample size (n = 1000) was larger than this study. These trials help in identifing the regimens for specific SSI. Successful drug regimens are those which are available at low cost for the patient , has a longer half life and has specific activity against organisms which are usualy found in routine SSI. The best agent for prophylaxis varies according to

the tye os surgery. In this study ceftriaxone was used as prophylactic antibiotic to combat the likely source of infection

The second factor to be considered is the cost of the drug used. The misuse os drugs in inpatient as well as over the counter drugs leads to economic burden due to increased cost per patient. It can also cause newer infections and emergence of drug resistance in the community. Study by T. Boonchan et al, C. Wilasrusmee et al and A. Thakkinstian et aldone in 2016 was a Network meta-analysis of antibiotic prophylaxis for prevention of surgical-site infection after groin hernia surgery which stated that beta lactam antibiotics were most effective SSI prophylaxis for groin hernia repair. In 2003, a Cochrane meta-analysis showed that
antibiotic prophylaxis in inguinal hernia repair procedures
could neither be unequivocally recommended nor rejected

A Multicenter Double-Blind Randomized Controlled Trial done by Theo J. Aufenacker, MD et al , Dirk van Geldere et al on The Role of Antibiotic Prophylaxis in Prevention of Wound Infection After Lichtenstein Open Mesh Repair of Primary Inguinal Hernia revealed a A small percentage 1.7 % of wound infection after Lichtenstein open mesh hernia repair and there was no statistical difference between the antibiotic prophylaxis or placebo group. A similar randomised clinical study conducted by N Vinoth et al, CRM Karthikeyan et al on the Role of antibiotic prophylaxis in open inguinal hernioplasty revealed that out of the sixty patients under study 5 developed SSI which was 8.3 percent of which 3

were in case group and 2 in control. They developed only superficial SSI with ODD'S ratio of 0.6429 which was statisticaly insignificant

A operating surgeon should weigh the potential risk and also the advantages of giving an antibiotic after a particular procedure especially after a clean and uncontaminated surgery when chances of SSI is very low. Any improvement in quality of medical treatment can be attained by proper use of antibiotic which will be effective in preventing and controlling infection. The drug regimens should be optimised depending on the surgical procedure as it becomes burden on the economy.

According to the results of this study whish evaluated the role of prophylactic antibiotics vs conventional full course of antibiotics in hernia repair the rate of surgical site infection in the group which received prophylactic antibiotic (study group) was 4 out of 50 accounting to 8% and the one who received the conventional dose was 3 out of 50 -6% according to CDC guidelines of wound infection. This difference in the rate of infection is not significant statistically as the p value was 0.875 (>0.05) obtained by the test of significance (chi square test).

CONCLUSION

Thus we come to a conclusion that for a clean surgery of hernia repair , the use of conventional antibiotics does not cause a significant reduction in the rate of surgical site infection. Also in literature, it is nowhere established that conventional antibiotics for clean surgeries in general surgery reduce the infection rate as in clean contaminated and contaminated surgeries where its role is extensively studied and its reduction in rate of surgical site infection is strongly established. As this study involved only a smaller group of patients from a sinlge institution the effect of operating room and the surgeon leading to bias could not be evaluated. Thus to conclude, according to this study performed even though it proves beyond doubt that prophylactic antibiotic during intraoperative period is no inferior to conventional antibiotics with a non significant p value , a larger study population with longer duration of study in multiple setups is needed to substantiate the outcome which states that conventional antibiotics has no added benefit in preventing Surgical site infection in hernia surgeries.

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ஆராய்ச்சிதகவல்அறிக்கை

மதுரை அரசு இராசாசி மருத்துவமனையில் வரும் நோயாளிக்குள் குடலிறக்கம் ஏற்பட்டு உள்ளவர்களுக்கு ஒரு ஆராய்ச்சி இங்கு நடைபெற்றுவருகிறது. நீங்களும் இந்த ஆராய்ச்சியில் பங்கேற்க விரும்பிகிறோம் .உங்களை சில சிறப்பு பரிசோதனைக்கு உட்படுத்தி அதன் தகவல்களை

ஆராய்வோம். அதனால் தங்களது நோயின் ஆய்வரிகையோ அல்லது சிகிச்சையோ பாதிப்பு ஏற்படாது என்பதை தெரிவித்து கொள்கிறேன் .முடிவுகளைவெளியிடும்போது அல்லது ஆராய்ச்சியின்போதோ தங்களது பெயரோ அல்லது அடையாளங்களோ வெளியிடமாட்டோம் என்பதை தெரிவித்து கொள்கிறோம்.இந்த ஆராய்ச்சியில் பங்கேற்பது தங்களுடைய விருப்பத்தின் பேரில்தான் நடக்கும். . மேலும் நீங்கள் எந்நேரமும் இந்த ஆராய்ச்சியில் இருந்து பின்வாங்கலாம் என்பதையும் தெரிவித்துகொள்கிறோம்.

இந்த சிறப்பு பரிசோதனை முடிவுகளை ஆராய்ச்சியின்போது அல்லது ஆராய்ச்சியின் முடிவின்பொது தங்களுக்கு அறிவிப்போம் என்பதையும் தெரிவித்து கொள்கிறோம்.

ஆராய்ச்சியாளரின் கையொப்பம் பங்கேற்பாளர் கையொப்பம்

URKUND

Urkund Analysis Result

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Submitted By:	dr.prabutry@gmail.com
Significance:	5 %

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28.09.2017 Thesis typing.docx (D30912879)
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MADURAI MEDICAL COLLEGE
MADURAI, TAMILNADU, INDIA -625 020
(Affiliated to The Tamilnadu Dr.MGR Medical University, Chennai, Tamil Nadu)

ETHICS COMMITTEE CERTIFICATE

Name of the Candidate	:	Dr.Prabu C
Course	:	PG in MS., General Surgery
Period of Study	:	2016-2019
College	:	MADURAI MEDICAL COLLEGE
Research Topic	:	Comparative study of prophylactic single dose antibiotic vs conventional full course antibiotics in hernioplasty surgeries
Ethical Committee as on	:	23.01.2018

The Ethics Committee, Madurai Medical College has decided to inform that your Research proposal is accepted.

Member Secretary

Chairman
Prof Dr V Nagaraajan
M.D., MNAMS, D.M., Dsc.,(Neuro), Dsc (Hon)
CHAIRMAN
IEC - Madurai Medical College
Madurai

Dean & Convenor
DEAN
Madurai Medical College
Madurai-20

10 APR 2018

CERTIFICATE – II

This is to certify that this dissertation work titled “COMPARATIVE STUDY OF PROPHYLACTIC SINGLE DOSE ANTIBIOTIC VS CONVENTIONAL FULL COURSE ANTIBIOTICS IN HERNIOPLASTY SURGERIES” of the candidate Dr.PRABU.C with registration Number 221611117 for the award of in the branch of M.S. degree General Surgery (Branch I) April 2019. I personally verified the urkund.com website for the purpose of plagiarism Check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows percentage of plagiarism in the dissertation.

Guide & Supervisor sign with Seal.

NAME	age	IP NO	sex	HERNIA SIDE	GILBERT TYPE	wound			SSI -CDC	SSI - SOUTHAMPTON GRADE	SSI -ASEPSIS WOUND SCORE	ANTIBIOTIC GIVEN	DURATION OF SURGERY
						7TH DAY	2 WEEKS	4 WEEKS					
SARAVANAN	28	3584	M	R		2 N	N	N			0	0 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
VASANTHAKUMAR	56	94234	M	R		3 N	N	N			0	0 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
PALANI	21	101752	M	R		2 N	N	N			0	0 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
SEKAR	27	101907	M	L		2 N	N	N			0	0 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
VEERABHADIRAN	69	101949	M	R		2 N	N	N			0	0 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
CHITHAMBARAM	34	103620	M	R		3 N	N	N			0	0 FULL COURSE ANTIBIOTICS POSTOP	1-2 HRS
PANCHAVARNAM	45	4596	F	L		2 N	N	N			0	0 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
PICHAIMUTHU	71	70327	M	R		2 N	N	N		1A		2 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
SABARAGIRI	15	1080251	M	L		4 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
AADHIMOOLAM	60	62648	M	R		4 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
MARUTHAN	31	66663	M	L		4 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
KONDAL RAJ	64	80825	M	L		3 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
SARASWATHI	68	38361	F	R		4 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
GOPAL	61	61183	M	B/L	LEFT-2 ,RIGHT-4	N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	1-2 HR
PAWANRAJ	51	80848	M	R		1 N	N	N		1A		2 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
PICHAIMUTHU	40	96344	F	R		4 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
SENTHILKUMAR	41	76017	M	R		1 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
VARADHARAJAN	65	5506	M	L		2 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
GANAPATHY	51	5839	M	R		2 N	N	N		1A		1 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
NAGARAJAN	67	4120	M	L		3 INFECTED	N	N	SUPERFICIAL	2C		4 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
ANDIVEL	41	65629	M	R		3 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	1-2 HRS
JOSEPH RAJ	49	72474	M	L		4 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
KARUPUSAMY	56	95460	M	L		5 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
PERIYASAMY	52	61362	M	B/L	L-3, R-2	N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	1-2 HRS
SANTHANAM	53	7447	M	B/L	L-2,R-2	N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
RAVI	29	62649	M	R		1 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
SIVAKUMAR	46	3905	M	B/L	L-4,R-4	N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	1-2 HRS
KARUPPU	44	64188	M	R		3 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
ALAGAN	61	78491	M	R		2 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
MOHAN	30	41162	M	R		2 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	1-2 HRS
PANDI	67	2974	M	R		2 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
KANDHASAMY	50	933290	M	R		4 INFECTED	N	N	SUERFICIAL	2B		3 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
TAMILVENI	43	68876	F	R		4 N	N	N		1A		1 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
KARTHIGAI MANI	31	1673	M	L		2 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
RAMASAMY	65	61082	M	B/L	L-2,R-2	N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	1-2 HRS
KUMAR	43	43627	M	R		4 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
DHANDAPANI	70	75911	M	R		2 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
SEENIVASAN	68	68220	M	R		1 N	N	N		1A		2 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
ESWARAN	62	68878	M	R		2 N	N	N			0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR

JAYARAJ	63	54876	M	B/L	L-4,R-4	N	N	N		0	FULL COURSE ANTIBIOTICS POSTOP	1-2 HRS
ALAGAR	48	4361	M	R		4 N	N	N		0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
MUTHUKRISHNAN	51	60803	M	R		2 N	N	N		0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
VADIVEL	55	60909	M	R		2 N	N	N		0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
MOOKAN	42	68902	M	R		1 N	N	N		0	FULL COURSE ANTIBIOTICS POSTOP	> 1 HR
KARUPPAIYA	73	71865	M	L		4 N	N	N		0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
ULAGANATHAN	59	60799	M	R		4 N	N	N		0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
RAMAR	52	60812	M	R		2 N	N	N		0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
PANDI	63	68237	M	L		4 N	N	N		0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR
SHANKAR	20	1620	M	R		3 INFECTED	N	N	SUPERFICIAL	2B	3 FULL COURSE ANTIBIOTICS POSTOP	>1 HR
MUTHUKRISHNAN	80	69715	M	L		2 N	N	N		0	FULL COURSE ANTIBIOTICS POSTOP	>1 HR

MASTER CHART FOR CASE GROUP

						WOUND							
NAME	ip no	age	sex	side	gilbert type	7th day	2nd week	4th week	SSI-CDC	SSI- SOUTHAMPTON GRADE	SSI- ASEPSIS WOUND SCORE	ANTIBIOTIC GIVEN	DURATION
KANNAN	57809	27	M	L		1 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
SELVAM	3776	55	M	L		2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	1-2 HRS
MOHAN	41162	29	M	L		2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
KANNAN	62671	46	M	R		3 N	N	N		1A	2	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
KARUPPAIYA	45612	55	M	R		4 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
SHEBAGAM	64221	70	M	L		4 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
MARIYADOSS	56352	41	M	R		4 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
BALAMURUGAN	51984	36	M	L		3 INFECTED	INFECTED	N	DEEP	4B	24	**CONVERTED TO HIGHER FULL COURSE ANTIBIOTIC**	1-2 HRS
VISWANATHAN	44044	33	M	L		4 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
GOPAL	42563	64	M	L		1 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
PALANIYANDI	34594	57	M	L		2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
RAJU	49504	53	M	L		4 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
MURUGAN	50286	61	M	L		3 INFECTED	N	N	SUPERFICIAL	2D	4	**CONVERTED TO FULL COURSE ANTIBIOTIC**	>1 HR
ANDIYAPPAN	44152	72	M	R		2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
KUMARANDI	49511	64	M	R		2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
MARUDHUPANDI	20634	34	M	L		3 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
PERIYAKARUPPU	50773	86	M	B/L	L-1,R-2	N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	1-2 HRS
GANESAN	48134	57	M	R		4 N	N	N		1A	1	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
KATHAR MOIDEEN	21270	51	M	R		4 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
ABDUL JABAR	18042`	76	M	R		2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
RAVIKUMAR	1627	43	M	L		2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	1-2 HRS
NADARAJAN	19363	58	M	R		1 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
MURUGESAN	16698	57	M	L		3 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	1-2 HRS
THAILAMAL	56610	72	F	L		1 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
KARTHIGAIRAJA	1637	35	M	L		3 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
NAGARAJ	2210	73	M	L		3 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR

RAJAN	16702	66 M	R	2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
KARUPANNAN	33281	61 M	R	2 N	N	N		1A		1 PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
MANI	19361	78 M	R	4 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
SETHURAMAN	1827	72 M	L	2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
VELADURAI	921	47 M	R	4 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
MALAIRAJA	16716	58 M	L	2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
RAM KUMAR	9636	39 M	L	3 INFECTED	N	N	SUPERFICIAL	2D		4 **CONVERTED TO FULL COURSE ANTIBIOTIC**	>1 HR
PONNUSAMY	717	58 M	L	2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
SOLAMALAI	6707	45 M	L	3 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
MOKKAYAN	6774	67 M	L	4 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
MUTHUPANDI	5202	23 M	L	3 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
MARUTHUVELAI	2134	69 M	R	2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
PARAMASIVAN	6702	71 M	R	3 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
SUNDARAM	8177	60 M	L	5 INFECTED	N	N	SUPERFICIAL	2D		6 **CONVERTED TO FULL COURSE ANTIBIOTIC**	1-2 HRS
ALAGARSAMY	715	78 M	R	2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
SIVANKALAI	13893	55 M	R	2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
MARUTHAN	107501	60 M	L	1 N	N	N		1A		1 PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	1-2 HRS
PERIYASAMY	107496	49 M	L	2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
GURUSAMY	107328	36 M	L	2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
JOSEPH	5213	59 M	L	4 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
PAULRAJ	531	56 M	L	2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	1-2 HRS
VEERAPAN	208819	65 M	R	4 N	N	N		1A		1 PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
VILLARNAGARAJAN	216	70 M	L	4 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	>1 HR
PALANI	13863	54 M	R	2 N	N	N			0	PROPHYLACTIC SINGLE DOSE ANTIBIOTIC	1-2 HRS