“A COMPARATIVE STUDY OF 2-0 VICRYL VS 2-0 PROLENE FOR RECTUS CLOSURE”

Dissertation submitted in partial fulfilment of the regulations of

M.S. DEGREE EXAMINATION
BRANCH 1 GENERAL SURGERY

Department of General Surgery
GOVT.STANLEY MEDICAL COLLEGE AND HOSPITAL
CHENNAI – 600001

THE TAMILADU DR.M.G.R MEDICAL UNIVERSITY

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CERTIFICATE

This is to certify that this dissertation titled

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is the bonafide work done by Dr. Madhuri Sudhakar, Post Graduate student(2014-2017) in the Department of General Surgery, Government Stanley Medical College and Hospital, Chennai under my guidance and supervision, in partial fulfilment of the regulations of The Tamilnadu Dr.M.G.R Medical University, Chennai for the award of M.S. Degree(General Surgery) Branch – I, Examination to be held in April 2017.

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Dean
Govt.Stanley Medical College and Hospital
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DECLARATION

I, DR. MADHURI SUDHAKAR solemnly declare that this dissertation titled

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is a bonafide work done by me in the Department of General Surgery, Government Stanley Medical College and Hospital, Chennai under the guidance and supervision of my unit chief

Prof. D. NAGARAJAN, M.S.,
Professor of Surgery

This dissertation is submitted to the Tamilnadu Dr.M.G.R. Medical University, Chennai in partial fulfilment of the university regulations for the award of M.S., Degree (General Surgery) Branch – I, Examination to be held in April 2017.

Place: Chennai Dr. Madhuri Sudhakar

Date: September 2016

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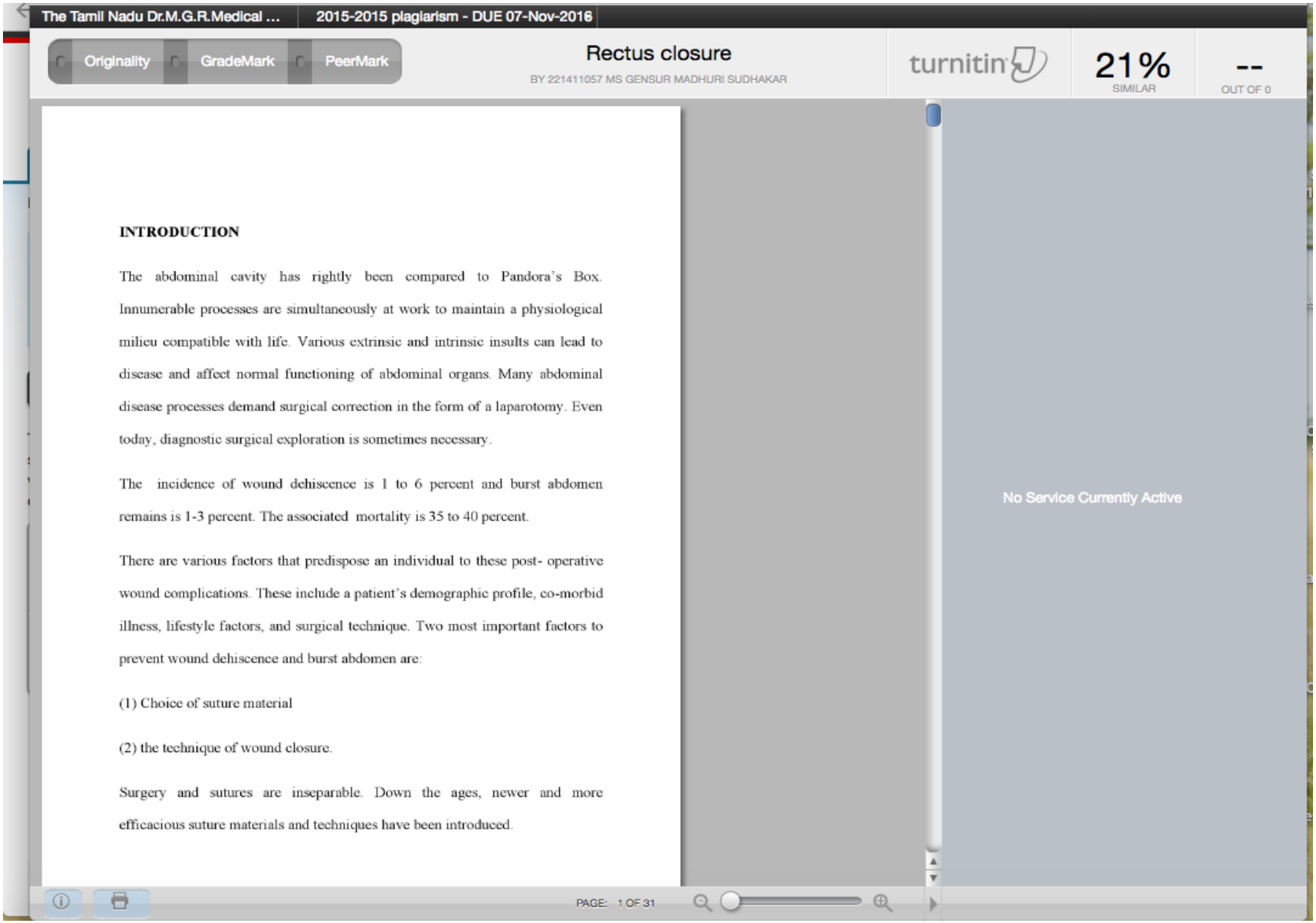
I would be failing in my duty without acknowledging the contribution of my seniors Dr. Aravind, Dr. Prasanna and Dr. Sakthi Balan in helping completing this dissertation.

It is my earnest duty to thank my parents without whom accomplishing this task would have been impossible.

I am extremely thankful to my patients who consented and participated to make this study possible.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INTRODUCTION
The abdominal cavity has rightly been compared to Pandora's Box. Innumerable processes are simultaneously at work to maintain a physiological milieu compatible with life. Various extrinsic and intrinsic insults can lead to disease and affect normal functioning of abdominal organs. Many abdominal disease processes demand surgical correction in the form of a laparotomy. Even today, diagnostic surgical exploration is sometimes necessary.
The incidence of wound dehiscence is 1 to 6 percent and burst abdomen remains is 1-3 percent. The associated mortality is 35 to 40 percent.
There are various factors that predispose an individual to these post- operative wound complications. These include a patient's demographic profile, co-morbid illness, lifestyle factors, and surgical technique. Two most important factors to prevent wound dehiscence and burst abdomen are:
(1) Choice of suture material
(2) the technique of wound closure.
Surgery and sutures are inseparable. Down the ages, newer and more efficacious suture materials and techniques have been introduced.
No Service Currently Active
PAGE: 1 OF 31

TABLE OF CONTENTS

LIST OF TABLES & CHARTS

ANNEXURES

I	INFORMED CONSENT
II	ETHICAL COMMITTEE
III	MASTER CHART
IV	PROFORMA

INTRODUCTION

The abdominal cavity has rightly been compared to Pandora's Box. Innumerable processes are simultaneously at work to maintain a physiological milieu compatible with life. Various extrinsic and intrinsic insults can lead to disease and affect normal functioning of abdominal organs. Many abdominal disease processes demand surgical correction in the form of a laparotomy. Even today, diagnostic surgical exploration is sometimes necessary.

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Surgery and sutures are inseparable. Down the ages, newer and more efficacious suture materials and techniques have been introduced.

The finest duty of a surgeon is letting a wound heal by primary intention. Among all wound closures, abdominal wound closure is the most challenging task for a

surgeon. There are different techniques according to suture material, suturing technique and length of suture material that have been suggested optimal for rectus closure. These prospects are still under study and are controversial. Early dehiscence usually occurs from the fifth to eighth post operative day presenting as serosanguinous discharge from wound site and feeling of ‘give way’’ . Collagen formation in a wound occurs by two weeks until which the tensile strength of the suture material is required to provide mechanical strength to the wound. The tensile strength of vicryl is two to three weeks and that of prolene is many years. Theoretically vicryl gets absorbed faster than prolene .This study is to compare the efficacy of vicryl and prolene for rectus closure by studying the occurrence of Burst Abdomen following their usage.

REVIEW OF LITERATURE

ANATOMY

ABDOMINAL CAVITY –

Divided into

- Abdominal cavity proper
- Pelvic cavity

Boundaries of abdominal cavity proper -

Superiorly – Diaphragm and sternum

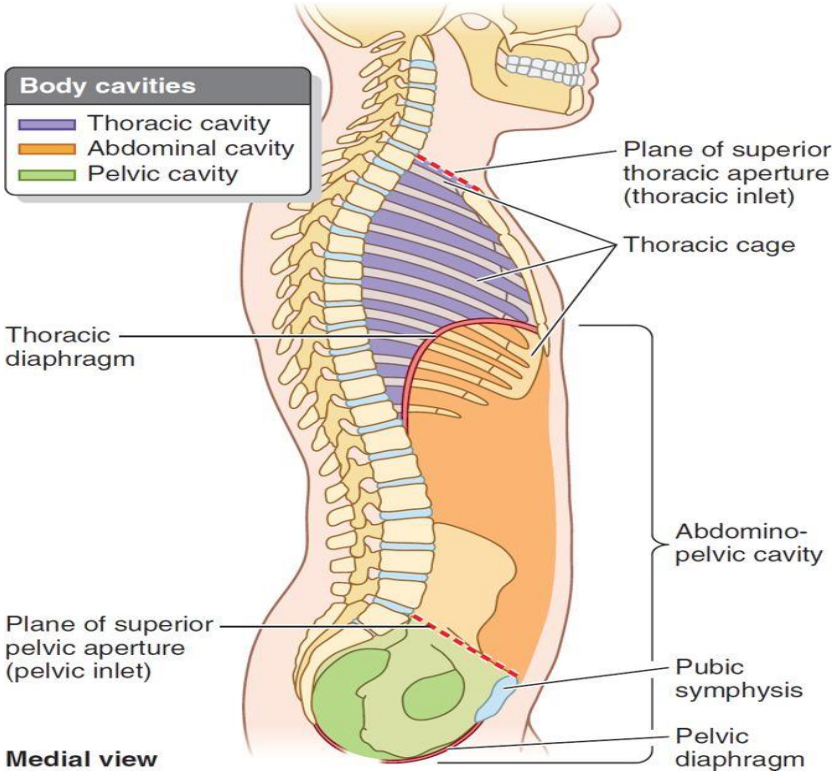
Superolaterally - ribs and intercostal muscles

Anteriorly – Anterior abdominal wall

Posteriorly – Lumbar vertebra and sacrum

Pelvic cavity –

Below and behind the pelvic brim (connecting the pubic symphysis and sacrum)



The anterior abdominal wall can be considered to have two parts:

- anterolateral muscles
- middle (or midline) muscles

The anterolateral portion consists of

- external oblique (EO)
- internal oblique (IO)
- transversus abdominis muscles. (TA)

The middle portion is composed of

- rectus abdominis (RA)
- pyramidalis muscles.

ANTEROLATERAL PORTION-

EXTERNAL OBLIQUE –

Origin:

External surfaces and lower border of lower eight ribs

Direction:

Downwards and forwards

Insertion:

With the exception of the fibres from the last two ribs all the others form an extensive aponeurosis.

Upper fibres – xiphoid process

Middle fibres- Linea alba

Lower fibres- pubic crest and tubercle, laterally form the inguinal ligament.

Fibres from last two ribs insert into the iliac crest

INTERNAL OBLIQUE –

Origin:

- Uppermost fibres – thoracolumbar fascia
- Middle fibres- Iliac crest
- Lower fibres- Lateral 2/3 of deep aspect of inguinal ligament

Insertion:

- 9,10,11,12ribs

- Costal margin
- Linea alba
- Through the conjoint tendon to pecten pubis and pubic crest

TRANSVERSUS ABDOMINIS –

Origin:

Costal margin (lower six costal cartilages)

Thoracolumbar fascia

Iliac crest

Lateral 1/3 rd of inguinal ligament

Insertion:

Through aponeurosis into linea alba

Through conjoint tendon into pecten pubis and pubic crest

Actions –

1. Support the abdominal viscera, counteracting the effect of gravity
2. By active contraction they increase the intra abdominal pressure
3. Bend the trunk forwards and laterally.

RECTUS ABDOMINIS (MASTER MUSCLE)

Origin –

Pubic symphysis and pubic crest

Insertion –

Cartilages of ribs 5-7, xiphoid process.

Nerve Supply –

It is supplied by intercostal nerves 6-12.

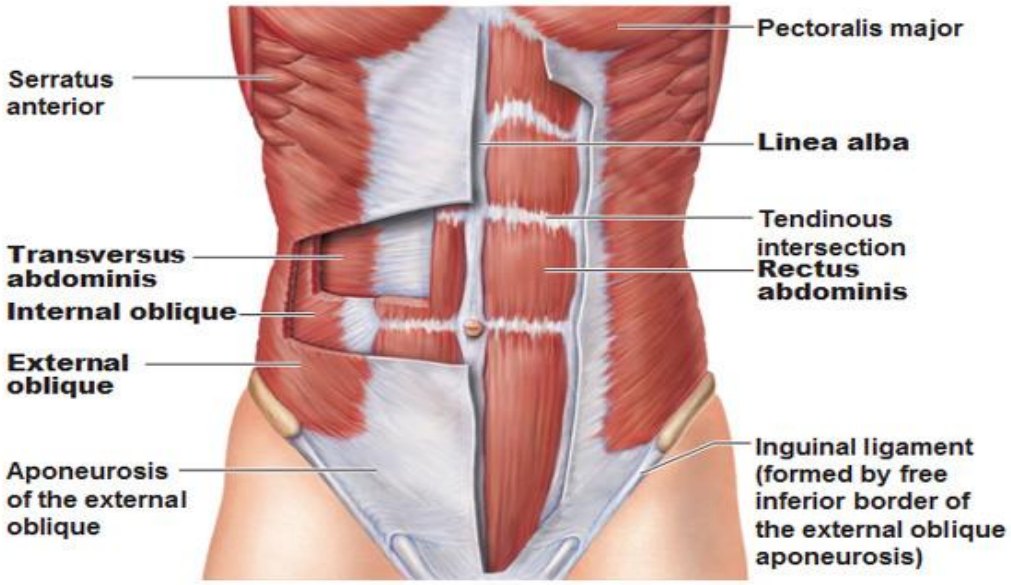
Action –

Compresses abdomen, flexes spine and lifts the chest. .

It is broader superiorly. Each rectus muscle is traversed by three tendinous inscriptions at the level of

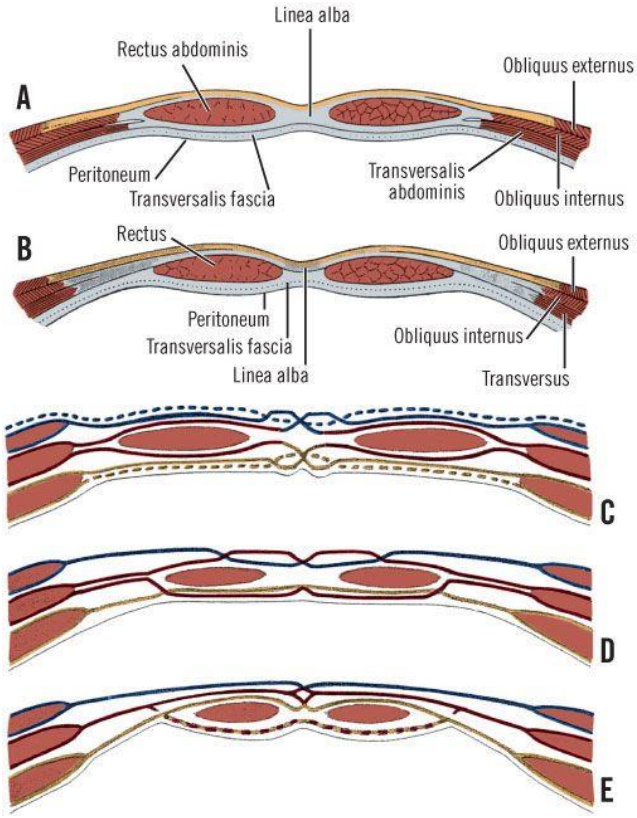
- xiphoid process,
- umbilicus
- halfway between xiphoid process and umbilicus

These tendinous intersections represent embryonic segmentations of the muscle depicting the myotomes forming the muscle. They are tightly attached to the anterior rectus sheath but not to the posterior rectus sheath. Sometimes there are few intersections present below the umbilicus also.



RECTUS SHEATH:

Rectus muscle is enclosed between a sheath which is formed by extensions of all muscles both anteriorly and posteriorly. The space between the muscle and sheath allow muscle to contract freely. The linea semilunaris (of Douglas) is located between the umbilicus and pubic symphysis. At this junction aponeurosis changes to fascia. If the change from aponeurosis to fascia is gradual, the line is poorly defined. If the change is abrupt, the line is well marked.



Above this line –

Anterior rectus sheath is formed by external oblique aponeurosis and anterior lamina of internal oblique aponeurosis

The posterior rectus sheath is made up of the posterior lamina of the internal oblique aponeurosis, the aponeurosis of the transversus abdominis muscle, and the transversalis fascia.

Below this line –

Anterior rectus sheath is formed by all three muscles external oblique aponeurosis, internal oblique aponeurosis and transversus abdominis.

The posterior rectus sheath is formed by transversalis fascia alone.

The deep epigastric arteries and veins course along the posterior surface of the rectus muscle, so below the linea semicircularis they are separated from the peritoneum by only transversalis fascia.

The two recti are separated by the linea alba in its entire length. Linea alba is a tendinous line formed by decussation of all three muscles in the midline.. This helps in the contractile properties of the abdominal wall. The linea alba is wider above the umbilicus narrow below it. Thus, a midline incision inferior to the umbilicus will tend to pass through the laminae of the rectus sheath.

PYRAMIDALIS MUSCLE:

Origin –

Pubic crest and pubic symphysis

Insertion –

Linea alba (landmark for midline incision)

The pyramidal muscle is absent in 20 % people.

Nerve Supply –

Subcostal nerve

Action-

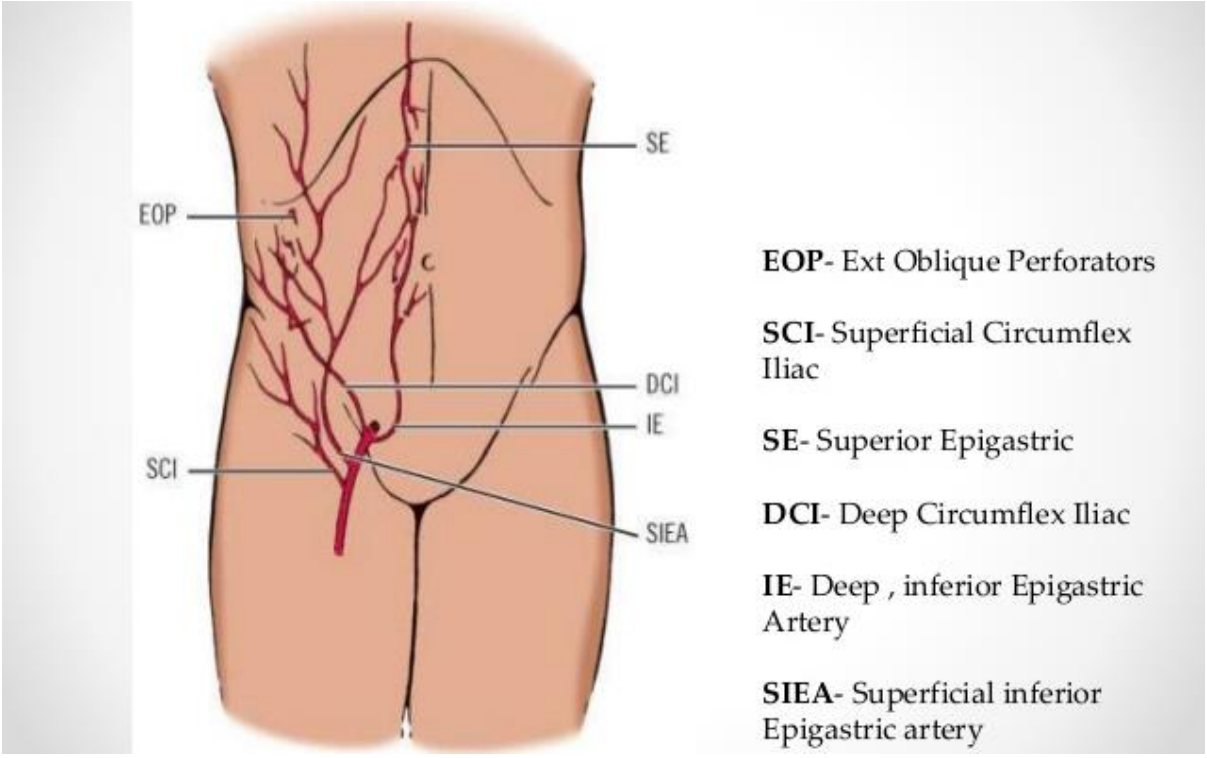
Tenses the linea alba

BLOOD SUPPLY OF RECTUS MUSCLE -

The superior and inferior epigastric arteries are the blood supply of the rectus

muscle. The superior epigastric vessels arise from the internal thoracic artery. The inferior epigastric artery arise from the external iliac artery. They both anastomose in the middle third of the muscle between the muscle and posterior rectus sheath. When the muscle contracts they both glide into sheath preventing hematoma formation.

Two veins, the superior and inferior epigastric venae comitantes, accompany each epigastric artery.

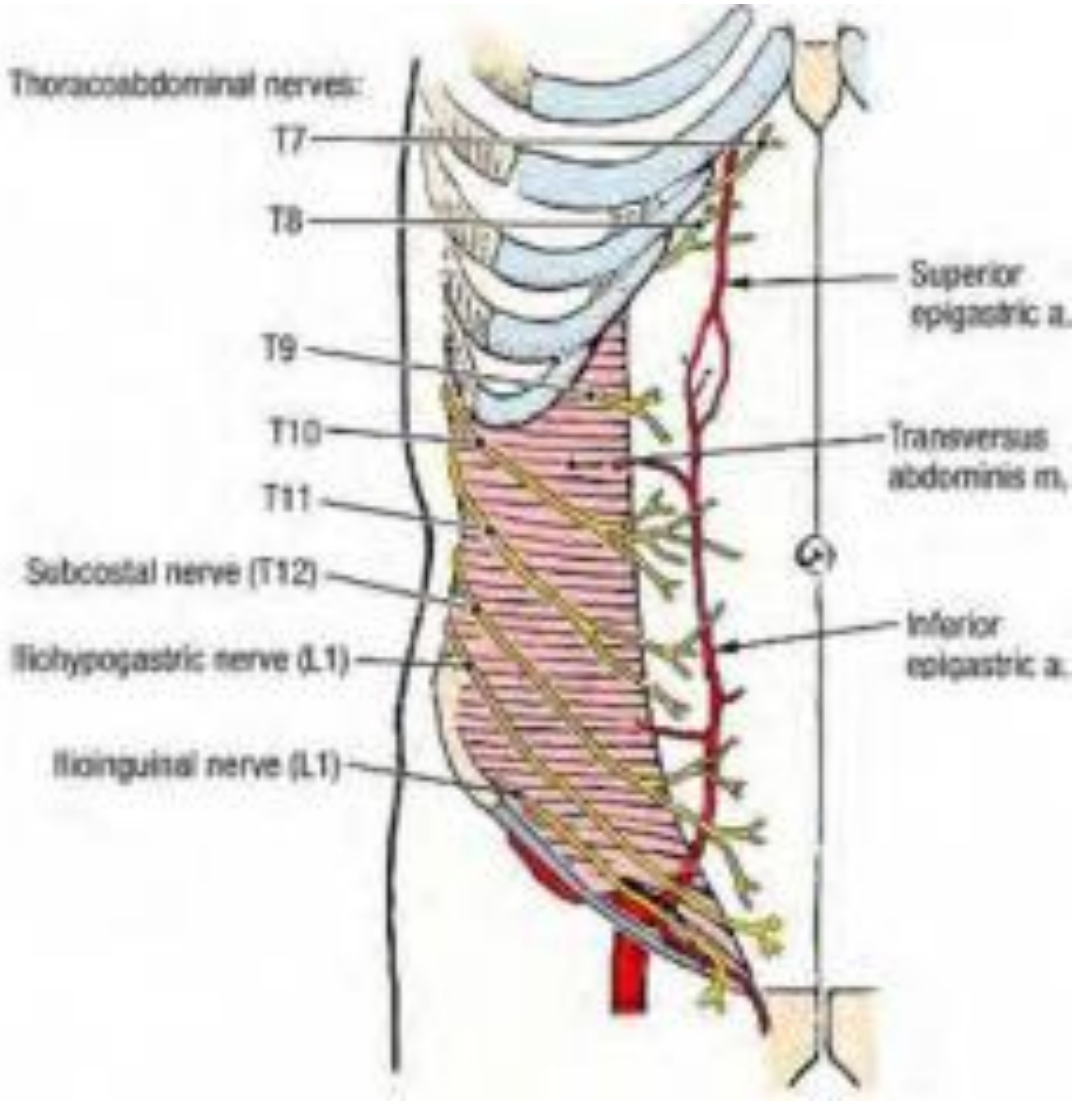


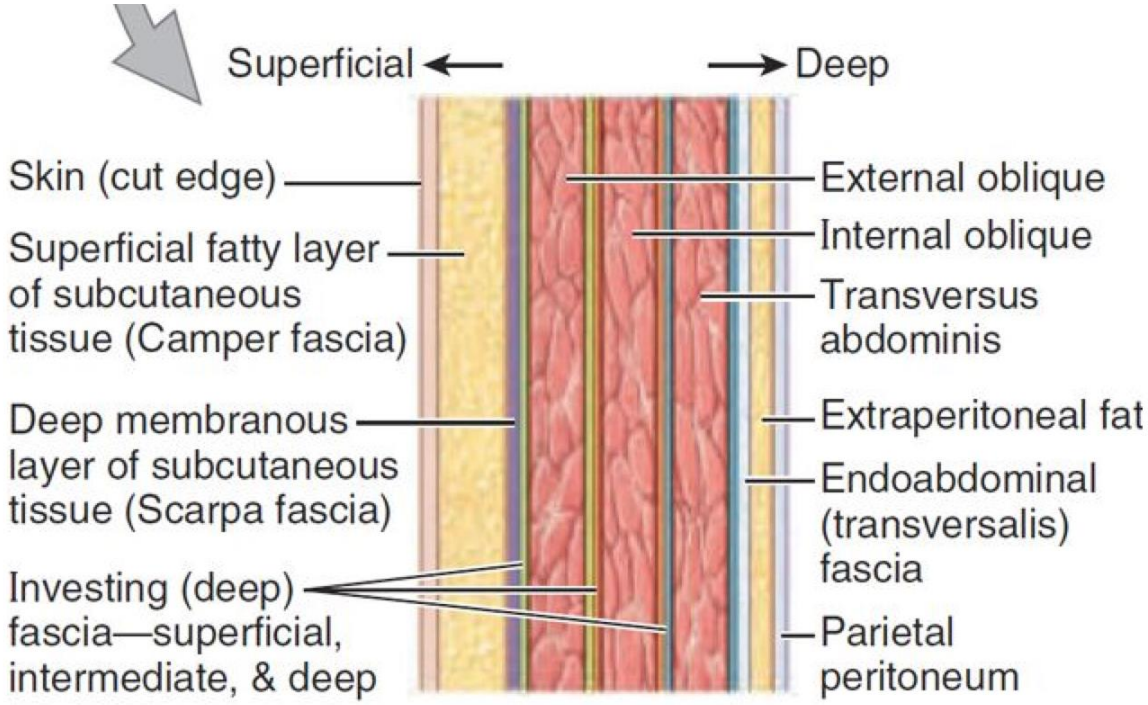
NERVE SUPPLY OF MUSCLES OF ANTERIOR ABDOMINAL WALL-

The intercostal nerves and subcostal nerve gives branches to external oblique, internal oblique, transversus abdominis and rectus abdominis. The iliohypogastric nerve gives branches to internal oblique and transversus

abdominis. The ilioinguinal nerve gives branches only to the internal oblique.

The subcostal nerve supplies the pyramidalis.





(B) Longitudinal section

WOUND

Injury to any of the tissues by physical means and with disruption of continuity is called wound. Wound healing is a natural process.

There are four basic tissues in the body: 1) epithelium 2) connective tissues, including blood, bone and cartilage 3) muscle tissue 4) nerve tissue.

PARAMETERS FOR MEASURING THE STRENGTH OF NORMAL BODY TISSUE

• Tensile Strength—The load per cross-sectional area unit at the point of rupture.

• Breaking Strength—It is the load required to break a wound regardless of its dimension.

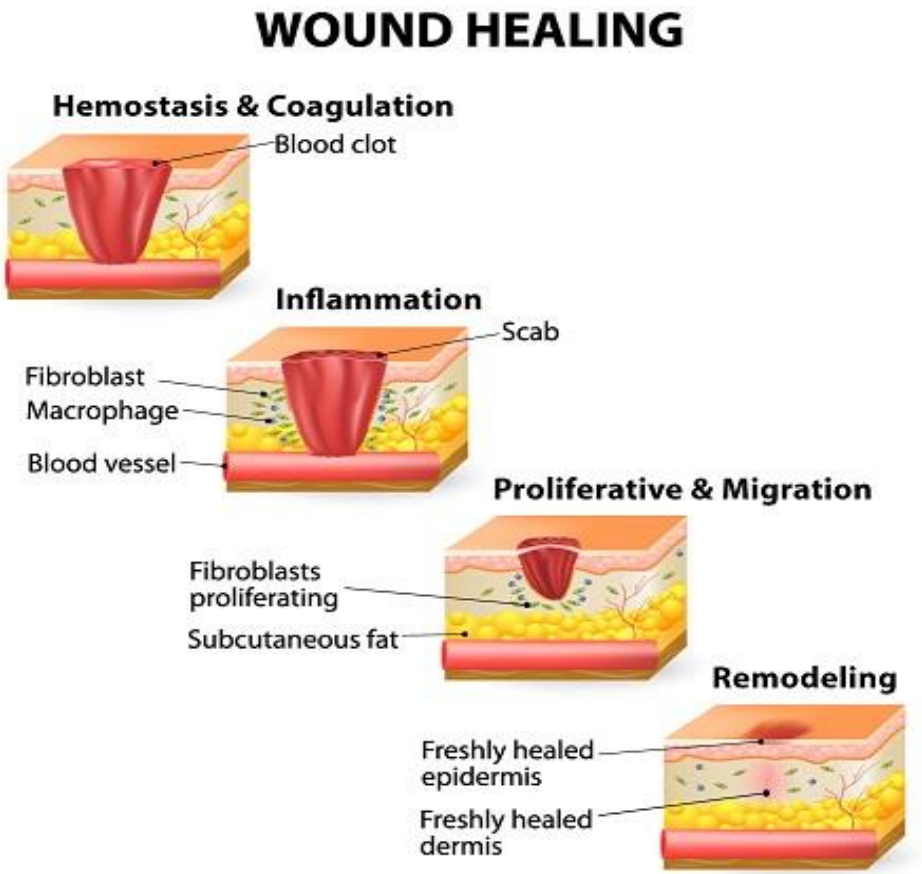
• Burst Strength—The pressure required to rupture a viscus.

The tensile strength depicts the tissue s ability to withstand injury. Collagen accumulates in a wound during its reparative phase. But it takes time to reach a plateau until which the wound requires extrinsic support in the form of sutures. The skin and fascia are strong structures but take a long time to recover in contrast to hollow viscera.

ACUTE WOUND HEALING

Three phases:

1. Inflammatory phase
2. Proliferative phase
3. Remodelling



INFLAMMATORY PHASE

Trauma results damage to blood vessels and exposure of sub endothelial collagen to which platelets adhere, activate coagulation pathway and cause initial

vasoconstriction .Later they get activated to release vasoactive amines resulting in increased vascular permeability and vasodilatation resulting in accumulation of inflammatory cells initially neutrophils then lymphocytes causing removal necrotic tissue, foreign bodies and bacteria.

PROLIFERATIVE PHASE

As the inflammatory phase is over new blood vessels are formed, fibroblasts are deposited and epithelialization begins. These result in the formation of granulation tissue.

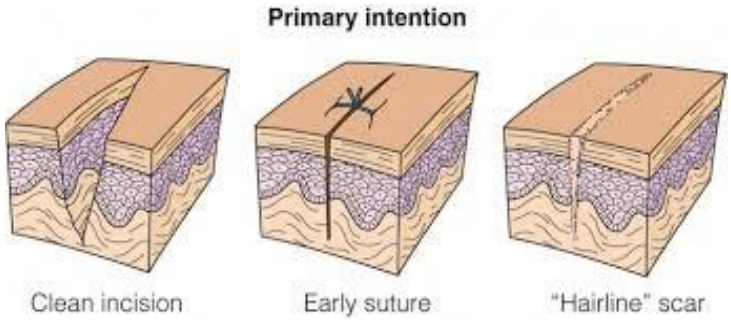
REMODELLING

The fibroblasts and new blood vessels decrease in number and collagen cross linking takes place which increases wound strength by contraction in 6 weeks and reaches a plateau in one year.

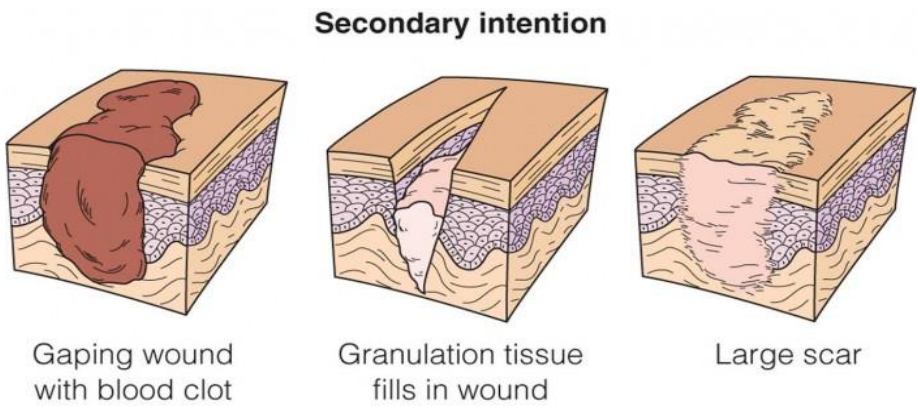
TIMING OF WOUND HEALING

A **PRIMARY INTENTION**

- Occurs when the wound is closed during the time of index surgery.
- Prerequisites are that the wound should be clean , closed without tension with adequate blood supply within 6 hours (golden period)



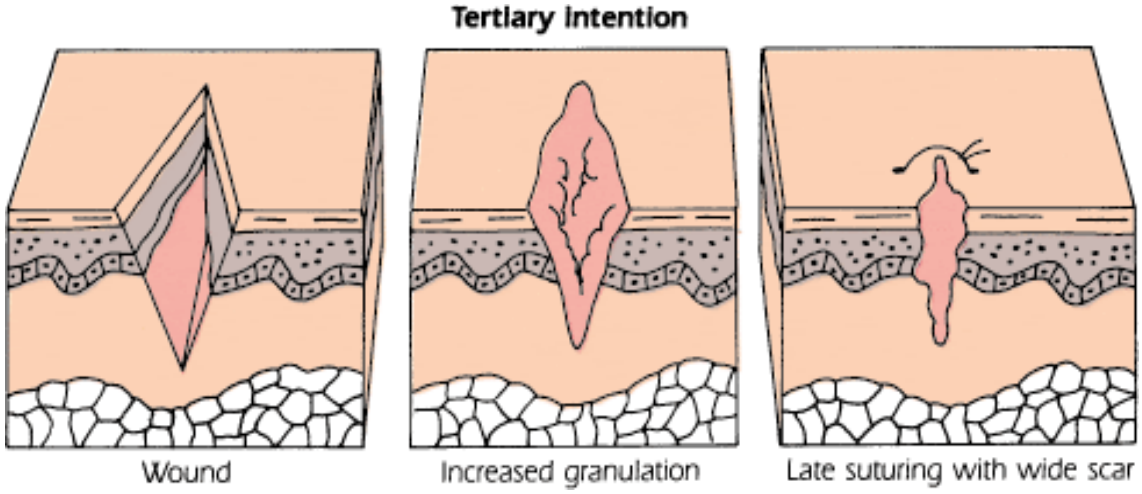
B **SECONDARY INTENTION**, OR SPONTANEOUS HEALING,



- Occurs for infected wounds , greater than six hours when the wound is not closed primarily. Allowed to contract on its own by myofibroblasts thus decreasing the circumference of the wound.

C TERTIARY INTENTION, OR DELAYED PRIMARY CLOSURE

- Occurs when the wound is left open at the time of primary surgery and closed after one week . Done in heavily contaminated wounds when the bacterial load decreases after one week.



CHRONIC WOUND HEALING

Physiology of the chronic wound-

A chronic wound is a wound that fails to heal in a reasonable amount of time given the wound's etiology, location, and tissue type. Most chronic wounds are slowed or arrested in the inflammatory or proliferative phases of healing and have marked increased levels of matrix metalloproteinases, which bind up or degrade the various cytokines and growth factors at the wound surface.

FACTORS AFFECTING WOUND HEALING

INTRINSIC OR LOCAL FACTORS

They are abnormalities within the wound that prevent normal wound healing.

1. **Ischemia and hypoxia**

Oxygen needed for collagen crosslinking and migration of fibroblasts.

2. **Infection**

3. **Foreign bodies and necrotic tissue**

Hematomas, seromas, devascularized bone, and sequestrum are all factors that can increase the susceptibility of a wound to infection.

4. **Chronic venous insufficiency**

5. **Edema.** Acute swelling, especially can lead to skin breakdown, infection .

6. **Microenvironment of the chronic wound** This occurs through inadequate synthesis of extracellular matrix proteins, increased degradative enzymes.

EXTRINSIC OR SYSTEMIC FACTORS

These factors are primarily linked to the underlying general health of the patient.

1. **Malnutrition**

Vitamin C deficiency produces inadequately hydroxylated collagen.

2. **Diabetes mellitus**

   The lack of insulin (due to trophic effects on healing tissues), hyperglycemia (affecting the migratory and phagocytic functions of inflammatory cells), neuropathy, and the micro/macrovascular disease that occurs in diabetics contribute to poor healing.

3. **Steroids and antineoplastic drugs** Steroids decrease the immunity. Chemotherapeutic agents decrease mesenchymal cell proliferation

4. **Collagen vascular diseases**

   Due to accompanying vasculitis and drugs used for treatment which impair the immunity.

5. **Cleansing agents**

   Chlorhexidine or povi-done-iodine (Betadine) affect cell migration.

6. **Repetitive trauma**

   Due to shearing or pressure forces often leads to a failure in healing.

7. **Renal disease and liver disease**.

8. **Hematopoietic disorders.**

9. **Age** — Decreases both skin and muscle tissue lose their tone and elasticity.

10. **Weight** — Obese have excess fat at the wound site that may prevent securing a good closure and decrease blood flow.

11. **Dehydration –** causes electrolyte imbalances which causes cardiac, renal injury, alters blood oxygenation and cellular metabolism.

12. **Radiation therapy**

13. **Smoking** cause cutaneous vasoconstriction and decrease the oxygen-carrying capacity of hemoglobin.

SURGICAL PRINCIPLES

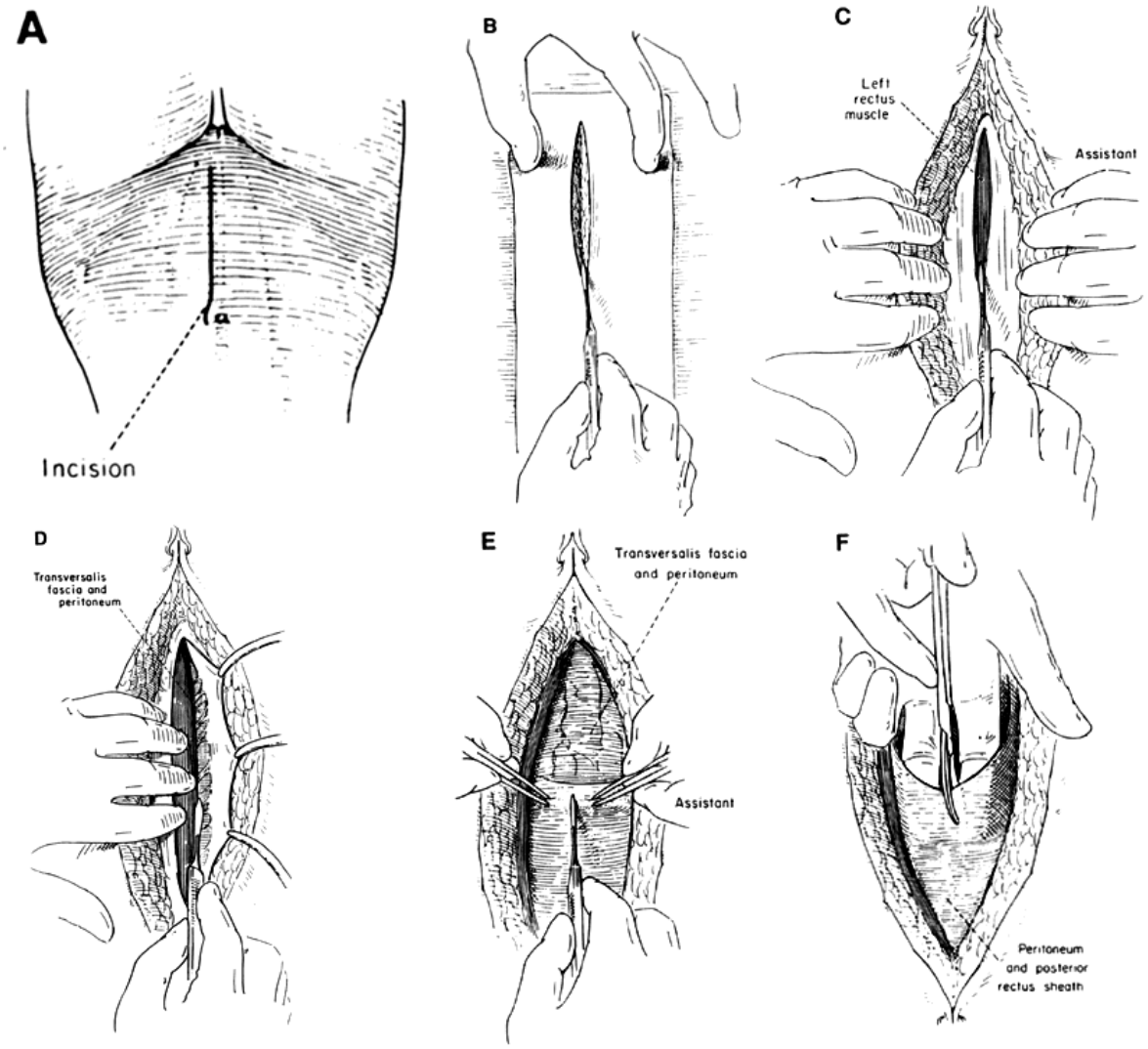
- **D**irection of incision is parallel to tissue fibres
- Minimal tissue handling
- Adequate hemostasis
- Moisture maintenance
- Foreign body exclusion
- Lack of tension in sutured tissues
- Post operative distraction forces
- Immobilization

INCISIONS – Making incisions and facilitating their closure play a major role in occurrence of Burst Abdomen and Incisional hernias.

PARAMETER	TRANSVERSE	VERTICAL
Pain	Less	More
Time	Time consuming	Quick
Skill	More skill	Less skill
Incisional hernia	Less	More
Cosmesis	More	Less
Wound dehiscence	Less	More
Access to upper abdomen	Less	More

VERTICAL INCISIONS

Midline Incisions



Advantages-

- Fastest approach
- Adequate exposure to almost every region of the abdominal cavity and retroperitoneum.
- Bloodless
- No division of muscle fibers or sectioning of nerves.

The upper midline incision, or the epigastric midline incision, provides exposure for most operations on the esophageal hiatus, abdominal esophagus and vagus

nerves, stomach, duodenum, gallbladder, pancreas, and spleen . The lower midline incision, or infraumbilical incision, provides exposure for most operations on the lower abdominal and pelvic organs.

Using either electocautery or a cold blade, the incision is carried down to the linea alba (decussation of fascial fibers in midline). The linea alba, extraperitoneal fat, and peritoneum are divided. When negotiating the umbilicus, the vertical incision is carried around it in a curvilinear manner(skirting of umbilicus) Alternatively, the skin may be held taut by an assistant towards him- or herself, allowing the surgeon to carry the midline incision in a continuous and straight direction .

TRANSVERSE AND OBLIQUE

There are several variations of transverse and oblique incisions. Transverse incisions can be strictly horizontal or they may curve to varying degrees. Likewise, oblique incisions may be curved or straight and will vary in angle. The wound may be limited to the lateral abdominal wall oblique muscles, or may divide a portion of one rectus muscle, the entire rectus muscle, or can even divide the complete width of both rectus muscles.

- Advantage - Transverse and oblique incisions generally follow Langer's lines of tension and result in better cosmesis .Sectioning of nerves is usually limited to one and rarely two nerves.
- Disadvantage – Pain

Kocher Subcostal Incision

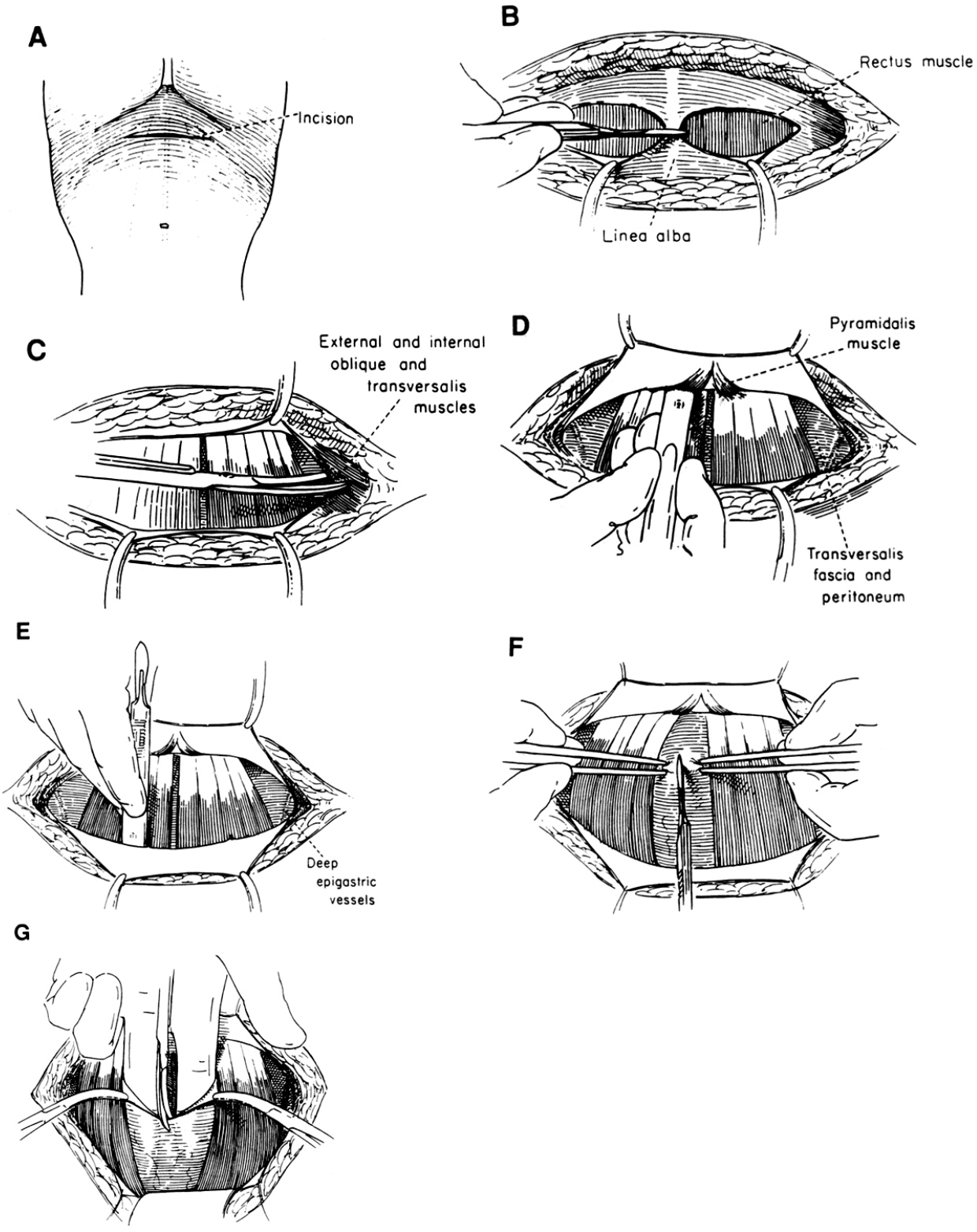
A right subcostal incision is used commonly for open operations of the gallbladder, pancreas, liver, stomach , adrenals and biliary tree. It is particularly valuable in obese or muscular patients with wide subcostal angles. The left-sided subcostal incision is used less often, mainly for elective splenectomy. The incision may be carried across the midline as a bilateral subcostal incision. This "arrowhead" or "bucket handle" or “chevron “ incision .

- The subcostal incision commences in the midline about 2.5 - 5 cm below the xiphoid process .It is extended laterally and inferiorly about 2.5 cm below the costal margin for 12 cm.
- The incision should leave sufficient room from the costal margin so that adequate superior abdominal wall tissues are available for repair (if hernia develops)
- Following incision of the rectus sheath along the plane of the skin incision, the rectus muscle is divided using electrocautery or ligatures to control branches of the superior epigastric artery. The incision can be continued on to the lateral abdominal muscles for a short distance . The eighth intercostal nerve may be encountered and divided, though care should be taken to preserve the ninth nerve. The incision is then taken through the peritoneum in the plane of the skin incision.

Pfannenstiel incison –

The Pfannenstiel incision is used frequently for gynecologic operations and for access to the retropubic space in the male for extraperitoneal retropubic prostatectomy.

- Skin incision is placed in the curving interspinous crease that lies approximately 5 cm superior to the symphysis pubis for about 12 cm .The rectus sheaths are divided horizontally along the line of skin incision. Hemostats are used to create plane superiorly upto umbilicus and inferiorly upto pubic symphysis.
- Rectus is retracted laterally.
- Peritoneum opened vertically
- Care is taken to avoid bladder
- Advantage – cosmetic scar
- Disadvantage – Inadequate exposure to upper abdomen


A
Incision
B
Rectus muscle
Linea alba
C
External and internal oblique and transversalis muscles
D
Pyramidalis muscle
Transversalis fascia and peritoneum
E
Deep epigastric vessels
F
G

PRINCIPLES OF ABDOMINAL CLOSURE

Tight Sutures and Ischemia

Increased tension over muscle causes necrosis and sloughing off resulting in cutting through and loosening of suture.

Suture Placement

Distance from the wound edge is important.

- The inflammatory process at the wound edge produces collagenases for about 1.5 cm from the edge and partially digest fascia.
- The farther from the edge the suture is placed, the greater the amount of fascia the suture would have to tear cut through.

TECHNIQUE OF CLOSURE –

Continuous suture

A continuous, running suture will result in more secure wound closure than a series of sutures placed in an interrupted fashion.

Advantage:

- Distribution of tension differences across the suture line and the ability of the wound to adjust to the stresses and strains of the postoperative period. This should minimize tissue strangulation and

wound rupture from suture under strain cutting through fascia.

- Quick
- Lesser number of knots resulting in decreased sinus tract formation

Disadvantage:

- A single thread holds the fascia together and its breakage jeopardizes the entire wound.

Interrupted sutures

Advantage –

- Even if one knot slips away others stay in place

Disadvantage –

- Increased number of knots resulting in increased sinus tract formation
- Increased operating time

SUTURE MATERIAL

Absorbable suture –

- Resorbable sutures bear an intrinsic loss of tensile strength during the vulnerable postoperative period, and may result in an increase in wound disruption and ventral hernia. Synthetic absorbable sutures with delayed degradation were introduced to combine the advantages of absorbability with strength comparable to nonabsorbable materials. The resorbable sutures polyglycolic acid (Dexon), polyglactic acid (Vicryl), polydioxanone (PDS), and polyglyconate (Maxon) have been shown to

be equally as effective as nonabsorbable suture with respect to wound dehiscence and incisional hernia.

Non absorbable suture –

- Increased infection and sinus formation

Multifilament suture

- They provide a better growth environment for bacteria and is associated with a higher incidence of wound sepsis .Bacteria are drawn into the fibers of multifilament suture by capillary action and thrive there by escaping phagocytosis.
- Increased knot security
- Does not cut through tissue easily

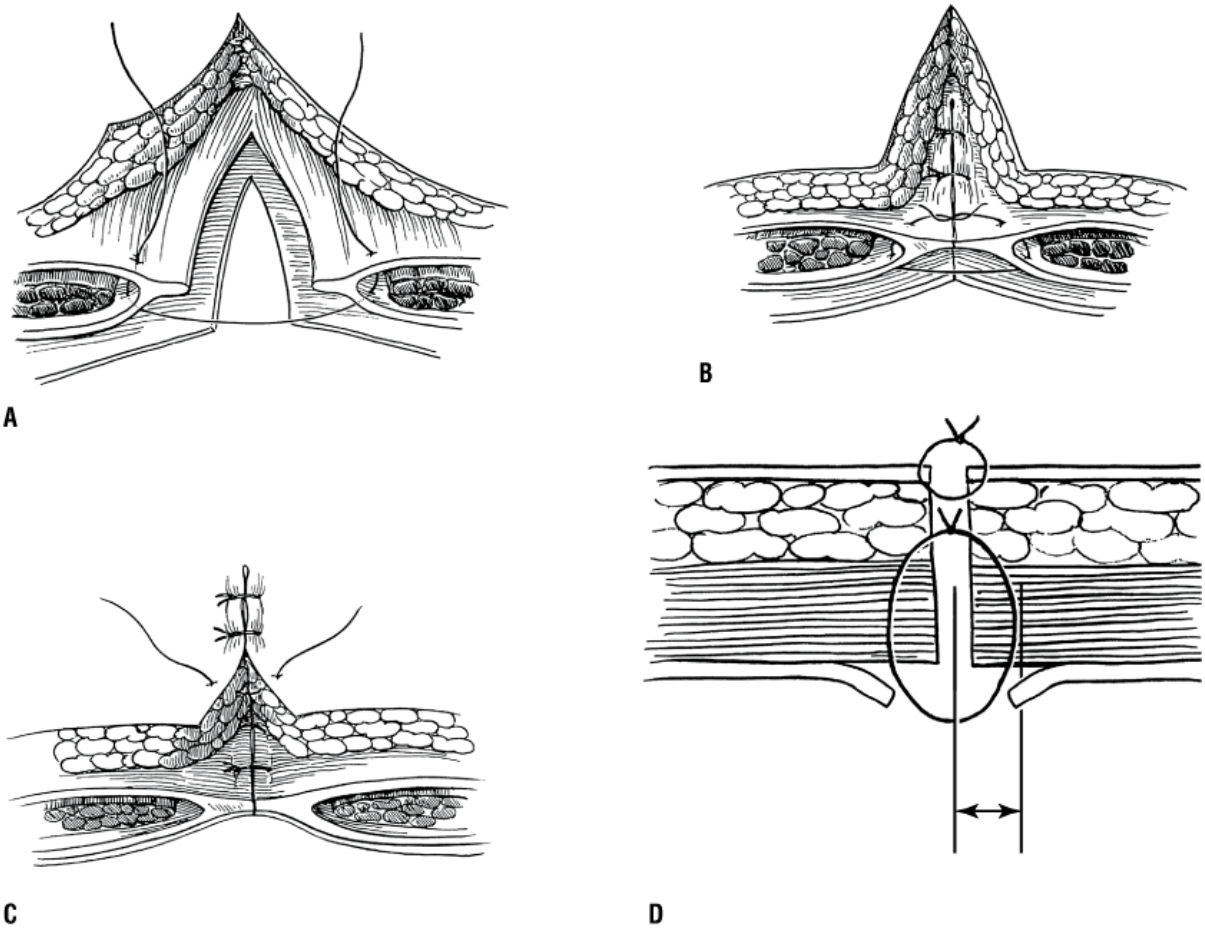
Monofilament suture

- Cuts through easily
- Decreased knot security
- Decreased infection

MASS CLOSURE OF THE ABDOMEN

Healing of the wound takes place by formation of a dense fibrous scar that unites the opposing faces of the wound . Continuous sutures through sheath and muscle

without peritoneum is mass closure.Skin closed separately.



Retention Closure of the Abdomen

2-0 nylon interrupted sutures including the skin , sheath and muscle (2.5 cm from each other and the wound edge). Plastic tubing put at skin level to decrease skin breakdown.

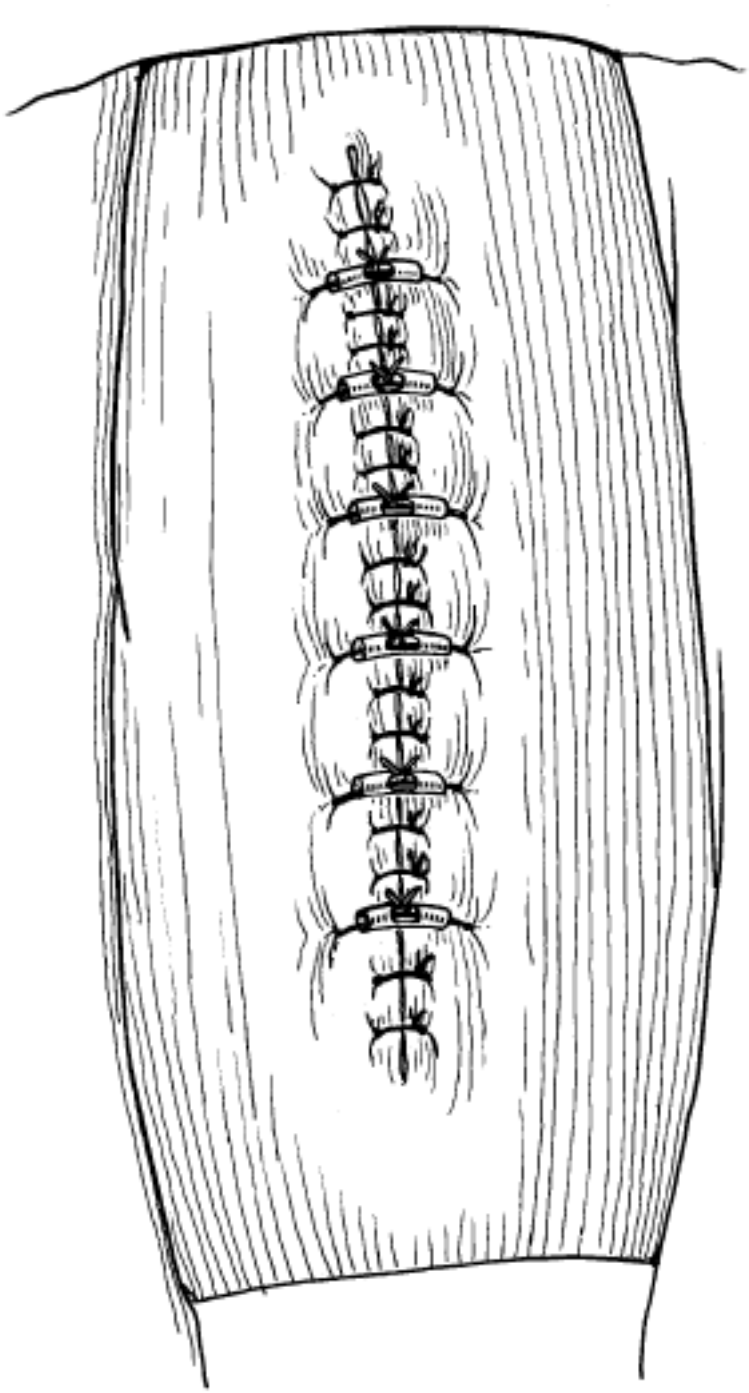
The purpose of using retention sutures in this setting is to relieve tension along the primary suture line to prevent wound disruption and allow normal relaxed wound healing.

Prophylactic retention sutures –

- Obesity
- Cancer cachexia
- Anticipated Ileus
- Cirrhosis

The disadvantages of retention sutures are

- Trapped viscera
- Significant postoperative pain
- Residual cross-hatched scar
- Leakage of intraperitoneal fluid through the wound.



BURST ABDOMEN = ABDOMINAL WOUND DEHISCENCE

Partial or complete separation of all layers of the abdomen with or without evisceration of contents.

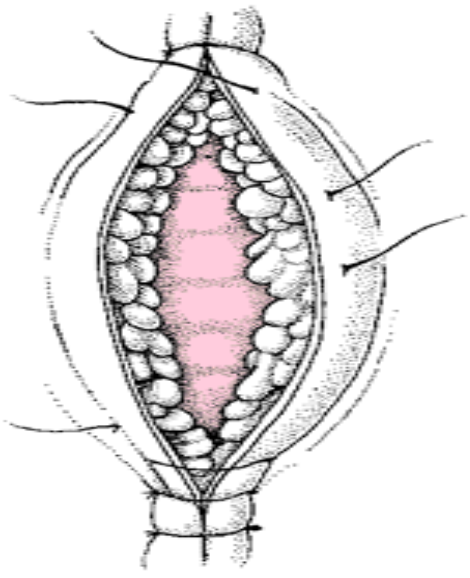
- Partial separation of wound layers is called abdominal dehiscence.

Types:

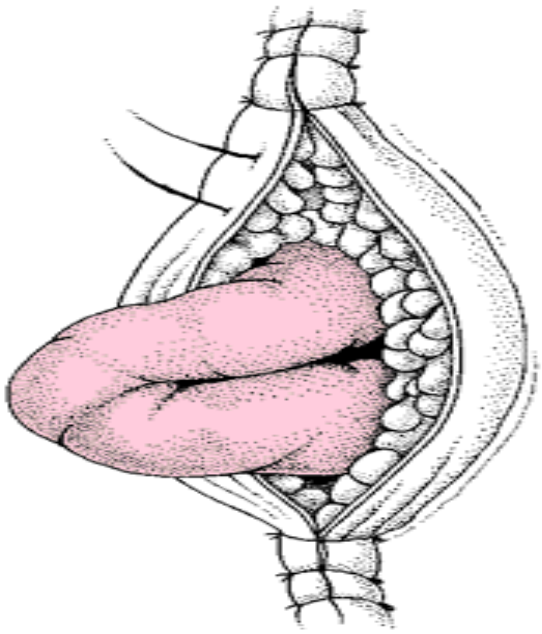
BURST ABDOMEN Partial(covert/latent)	When there is separation of skin, with no evisceration, but with loosening of fascial sutures	surgery or conservative
Complete	Evisceration of gut	surgery is mandated

Presentation:

- Salmon colored fluid from the wound or persistent soakage of dressings
- Or sometimes the patient may complain of "give way" feeling – especially in partial burst abdomen
- The salmon colored fluid is due to exudate from the gut or from the peritoneum



Dehiscence



Evisceration

BURST ABDOMEN – A) WITHOUT EVISCERATION

B) WITH EVISCERATION

RISK FACTORS

PRE OPERATIVE RISK FACTORS

- Sex - M:F = 2:1
- Age > 45 years - 5.4 %
- Emergency surgery – maybe related to haemodynamic instability
- Obesity
- Diabetes
- Renal failure – probably due to uraemia induced malnutrition
- Jaundice - probably due to malnutrition associated to biliary obstruction
- Anaemia – not a consistent factor
- Malnutrition – Protein, Vit C & Zinc defiency
- Corticosterioids – topical or systemic
- Malignancy
- Radiation and chemotherapy

OPERATIVE RISK FACTORS

- Incision type - midline at greater risk than transverse
- Closure
- Suture material
- Suture technique

- Hasty closure
- Friable tissue
- Inadequate distance from wound edge
- Digestion by pancreatic and intestinal enzymes

POST OPERATIVE RISK FACTORS

- Elevated intra-abdominal pressure
- Violent coughing
- Vomiting
- Prolonged ileus
- Intra abdominal sepsis
- Wound infection

INDICES FOR BURST ABDOMEN

- Webster risk index
- Rotterdam criteria
- VAMC score

WEBSTERS RISK INDEX

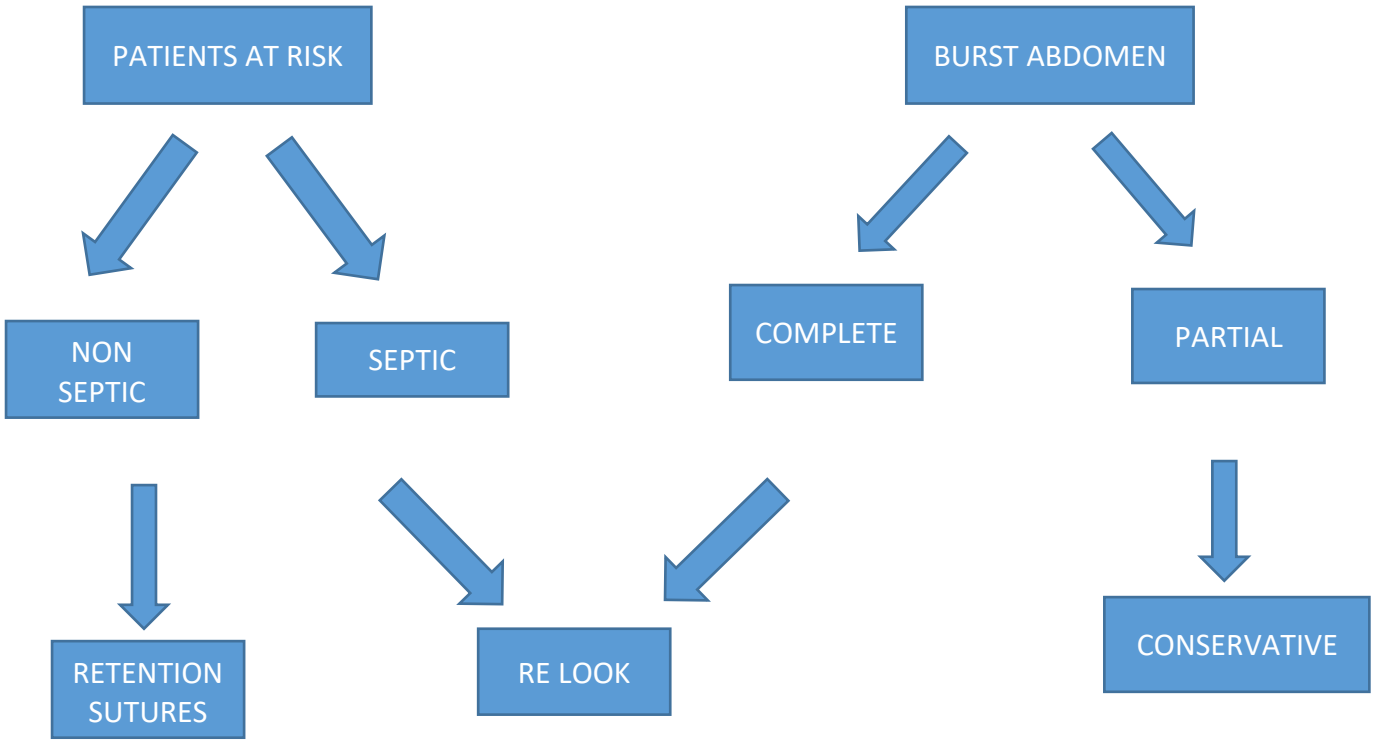
- COPD
- Pneumonia at present

- CVA
- Emergency
- Return to OR during admission
- Duration of surgery more than 2.5 hous
- SSI
- Wound type
- Post op complications
- Patient in ventilator

SCORE 11-14 – 5 % RISK

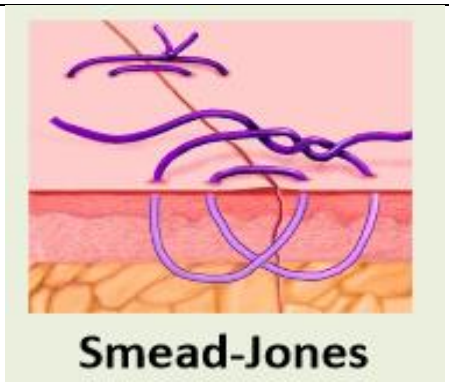
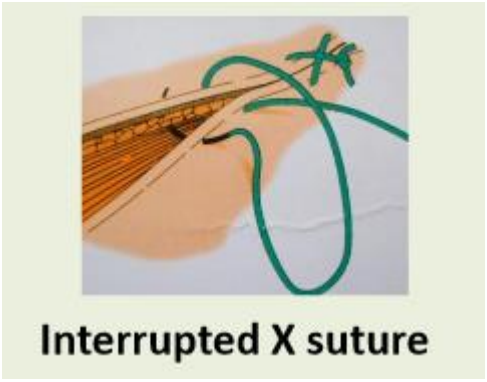
SCORE >14 – 10 % RISK

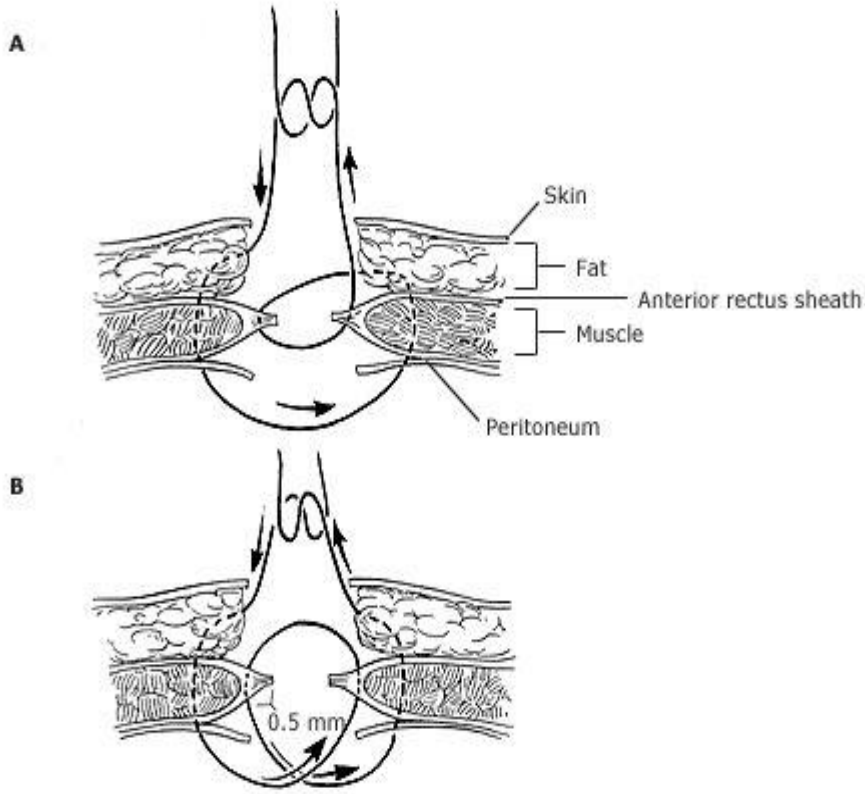
ALGORITHM OF MANAGEMENT



Management:

Complete burst abdomen	• Immediately to OT ; ETGA with good muscle relaxation is advised • **Starting afresh is the rule – never repair only the burst area.** if there is burst abdomen, there is high chance of burst or impending burst above or below • Suturing techniques - Mass closure - Retention sutures - Interrupted X sutures - Z technique - Smead Jones - Far near near Far technique - Mesh - VAC therapy • If there is difficulty in getting the wound edges together, don't tighten the wound – it will cause IAH. Losing the wound is better than losing the organs • If there is difficulty in bringing the edges together, suture a non absorbable mesh to the fascial edges. **Don't forget the bring the omentum to the undersurface of the**

	mesh, so that the gut doesn't get attached much to the mesh
	 Smead-Jones  Interrupted X suture



(A) Smead-Jones closure - Far-far-near-near.

(B) Alternative closure - Far-near-near-far.

Non operative management:

- Can be used in partial burst abdomen
- Can be used when the burst is late and can cause inadvertent enterotomies, when re-opening

AIMS AND OBJECTIVES:

To compare the use of 2-0 vicryl and 2-0 prolene for rectus closure in elective cases and following up their rates of early dehiscence (upto two weeks)

MATERIALS AND METHODS:

PLACE OF STUDY

Department of General Surgery, Govt Stanley Medical College and Hospital, Chennai

DURATION

6 months

STUDY DESIGN

Prospective study

SAMPLE SIZE

40 Patients

STUDY POPULATION

All patients admitted to my unit (Stanley Medical College and Hospital, Department of General Surgery) during the period of study were filtered according to the inclusion criteria and included in the study

INCLUSION CRITERIA

All patients undergoing laparotomy for all pathologies in elective settings

EXCLUSION CRITERIA

- Old age >80 years
- COPD
- Morbid obesity
- Chronic steroid intake

METHODOLOGY:

BRIEF PROCEDURE:

- Ethical clearance will be obtained from the institute ethical committee
- Written informed consent will be obtained from all patients before subjecting them for the study
- All patients undergoing laparotomy in elective setting (other than exclusion criteria) are registered and followed up in the early postoperative period upto two weeks watching out for wound dehiscence and burst abdomen.
- Patients are divided into two groups A and B. A – 2-0 Prolene used for closure, B- 2-0 vicryl used for closure
- All wounds are closed in a standardized manner to prevent bias, ratio of suture material length to wound length being 4:1, continuous suturing, inter suture distance 1 cm , and distance from wound edge being 2 cm.
- Patients are followed upto two weeks of surgery

- Other parameters like demographic and clinical variables were also observed.
- The observations were recorded and tabulated.

DATA COLLECTION INSTRUMENT

According to Proforma (see Annexure)

DESCRIPTION OF DATA COLLECTION INSTRUMENT

Divided into

- Demographic Variables (Age and Gender)
- Clinical Variables subdivided into surgeon and patient factors
    - Surgeon Factors (Diagnosis , Surgery done , Material used , Duration of surgery , Intra op hypotension and blood loss)
    - Patient Factors (Glycemic Status , Wound Infection and Respiratory Tract Infection)

OPERATIONAL DEFINITIONS :

Suturing technique: is defined as the method and material used in the closure of the fascial layer. Rectus in all wounds are closed by a continuous technique with a suture material is to wound length ratio of 4:1 , interbite distance 1 cm and distance from the wound edges 2 cm

Suture material Group A – 2-0 vicryl, Group B – 2-0 prolene

Post-operative complications: are defined as early wound complications occurring following laparotomy

Early complications: are those wound complications that usually occur within 14 days following closure of rectus. They include:

Wound infection: is defined as pus discharge at the wound site, which may or may not be confirmed by a bacteriological culture.

Wound dehiscence: is defined as post-operative wound separation that involves some but not all of the layers of the abdominal wall.

Burst abdomen: is defined as post-operative wound separation that involves all layers of the abdominal wall with or without protrusion of abdominal viscera through the wound.

Demographic variables: include the age and gender of the subjects.

Clinical variables:

SURGEON FACTORS

- Duration of surgery
- Intra operative blood loss
- Intra operative hypotension

PATIENT FACTORS

- Glycemic status
- Respiratory tract infection
- Surgical Site Infection

DATA ANALYSIS

Data was analysed using chi – square test for the difference between two proportions.

CHARTS AND TABLES

TABLE 1 – GENDER DISTRIBUTION

Demographic Factors		
Gender	Male	52.50%
	Female	47.50%

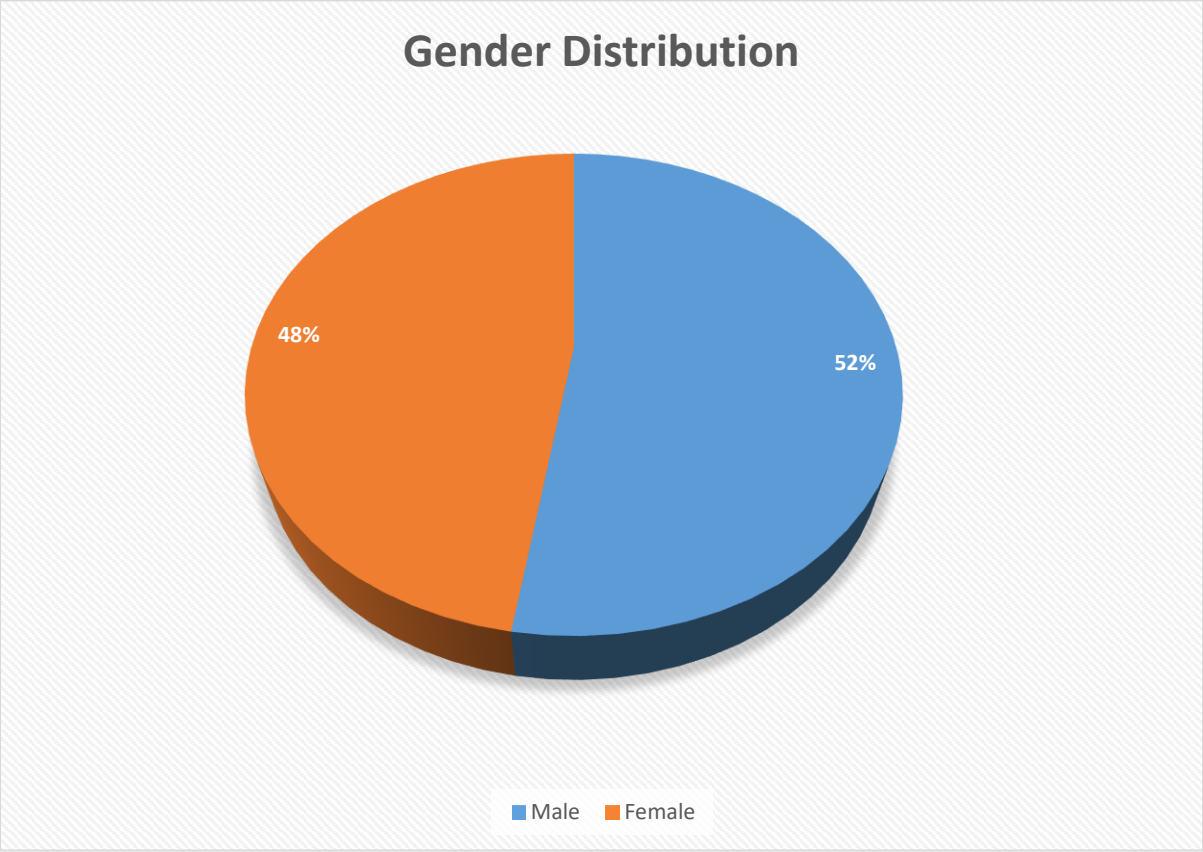


TABLE 2 – AGE DISTRIBUTION

Age Distribution	Frequency
Less than 20	0
20-30	4
30-40	8
40-50	16
50-60	8
60-70	4

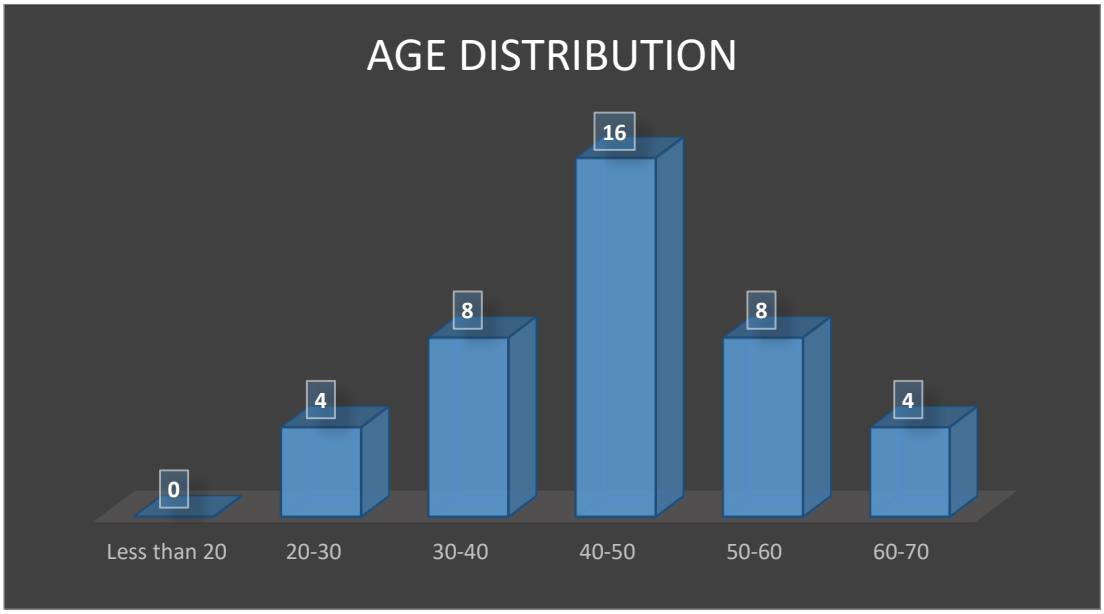


TABLE 3

MATERIAL USED

Material Used	
Prolene	50.00%
Vicryl	50.00%

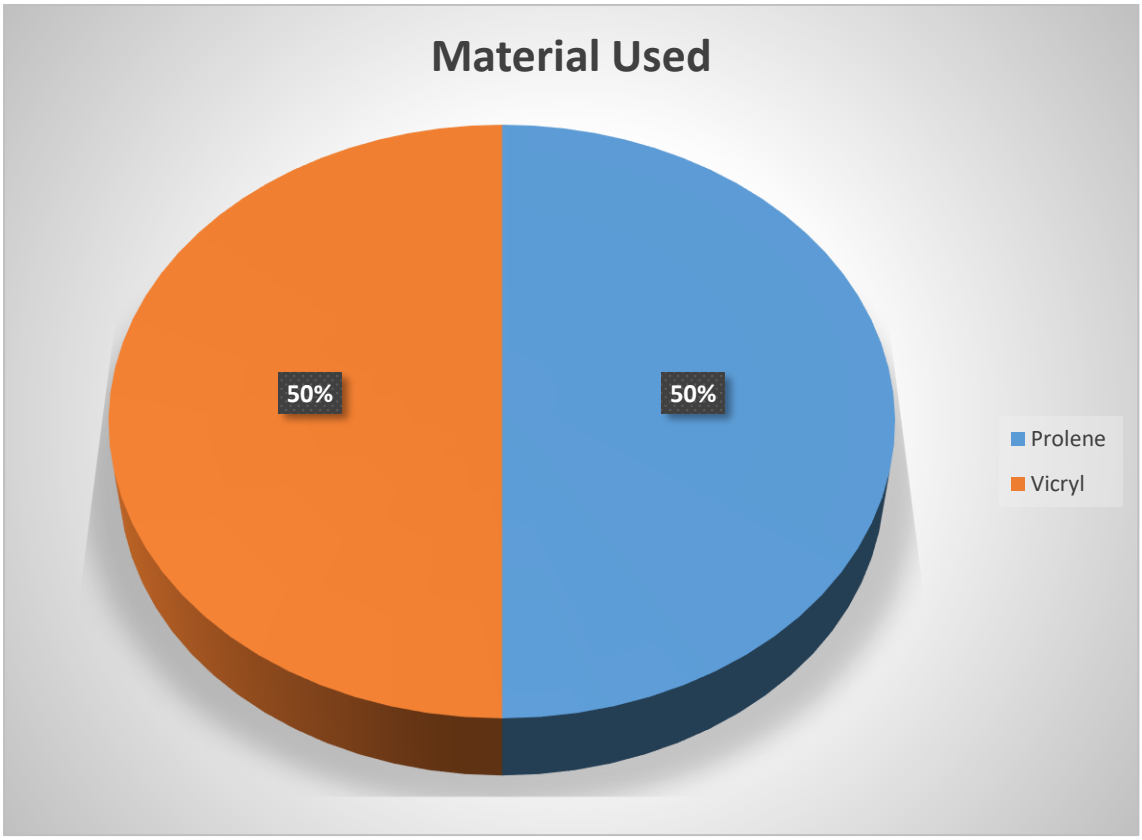


TABLE 4

BURST ABDOMEN OCCURRENCE

Burst Abdomen	Occurrence
Yes	4
No	36

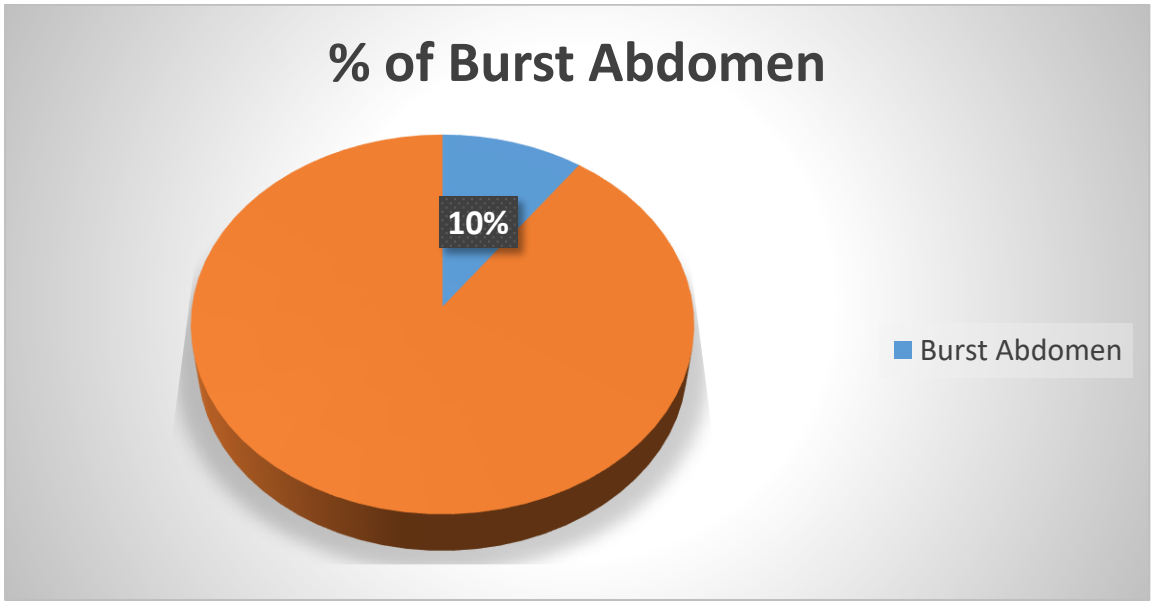


TABLE 5

DAY OF OCCURRENCE

Day of Burst *	**Number of patients**
Day 2	1
Day 5	1
Day 8	2

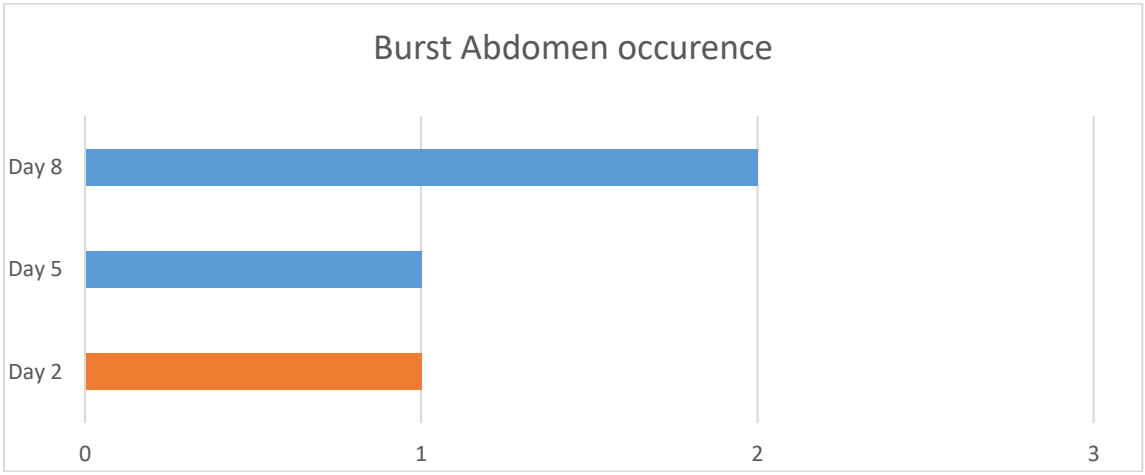


TABLE 6

DURATION OF SURGERY

Duration of surgery	Frequency
1 Hours	3
1.5 Hours	4
2 Hours	9
2.5 Hours	5
3 Hours	11
3.5 Hours	5
4 Hours	2

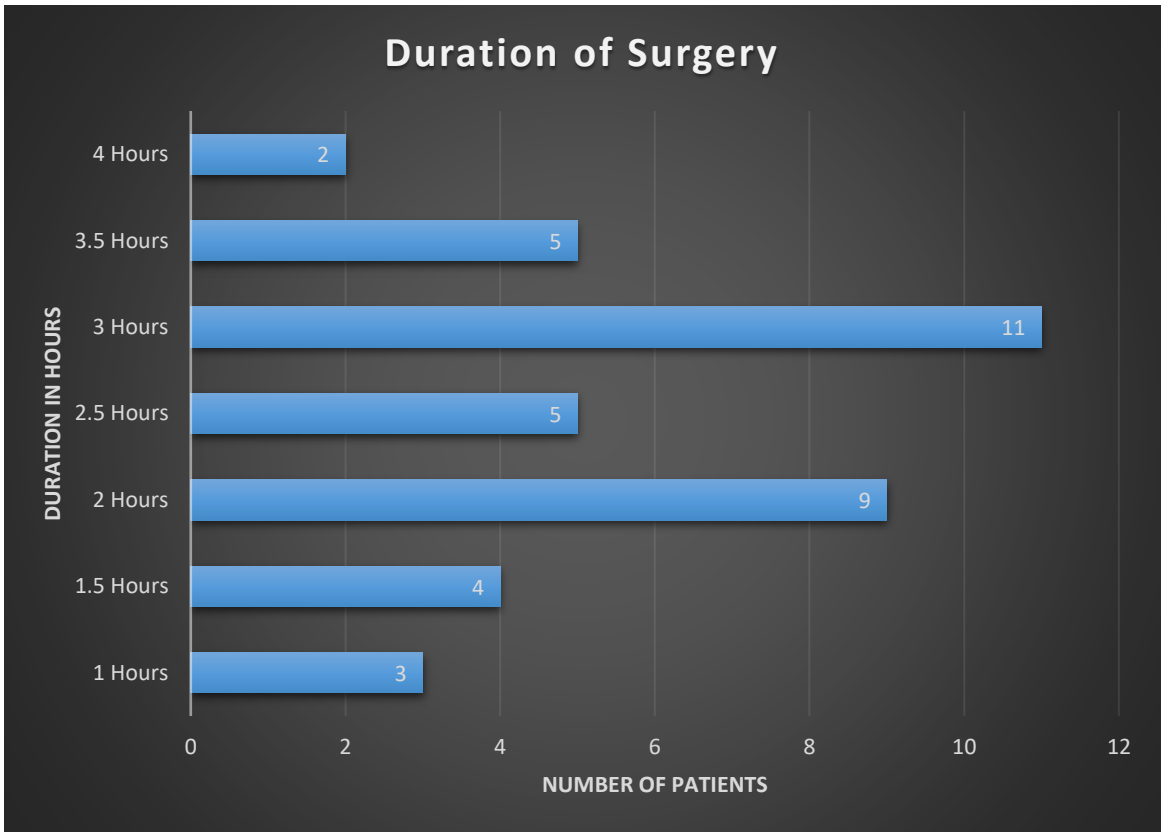


TABLE 7

RESPIRATORY TRACT INFECTION

RTI	
Yes	7.50%
No	92.50%

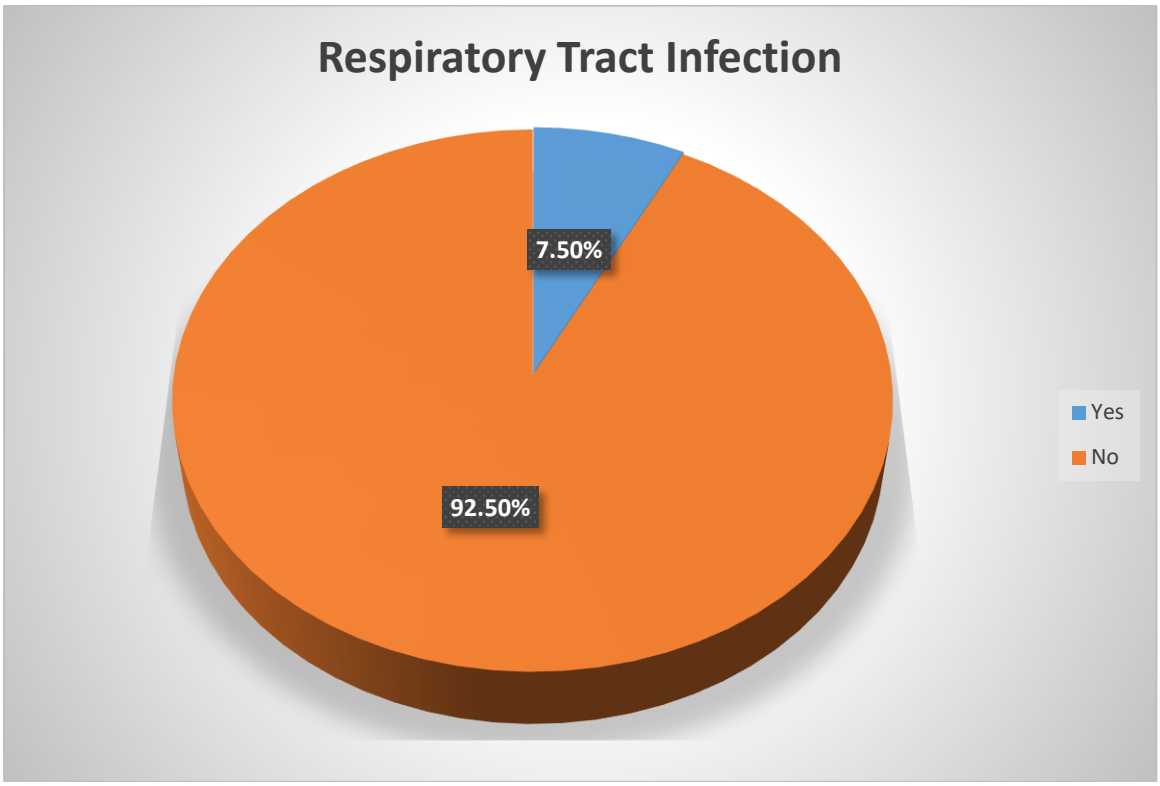


TABLE 8

GLYCEMIC STATUS

Glycemic Status	
Diabetic	32.50%
Non Diabetic	67.50%

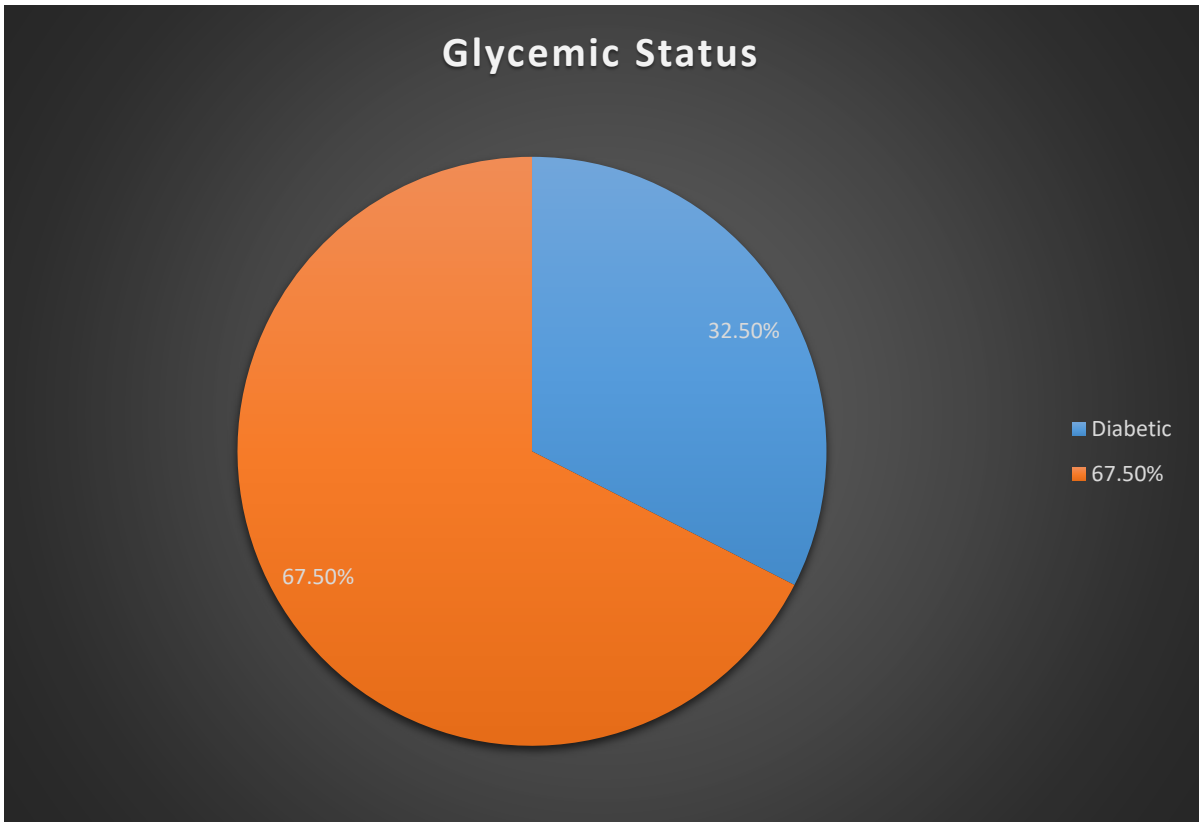


TABLE 9

GLYCEMIC STATUS SUBDIVIDED

Glycemic Status subdivided	Total 13
Diabetic (under control)	84.61%
Diabetic (uncontrolled)	16.00%

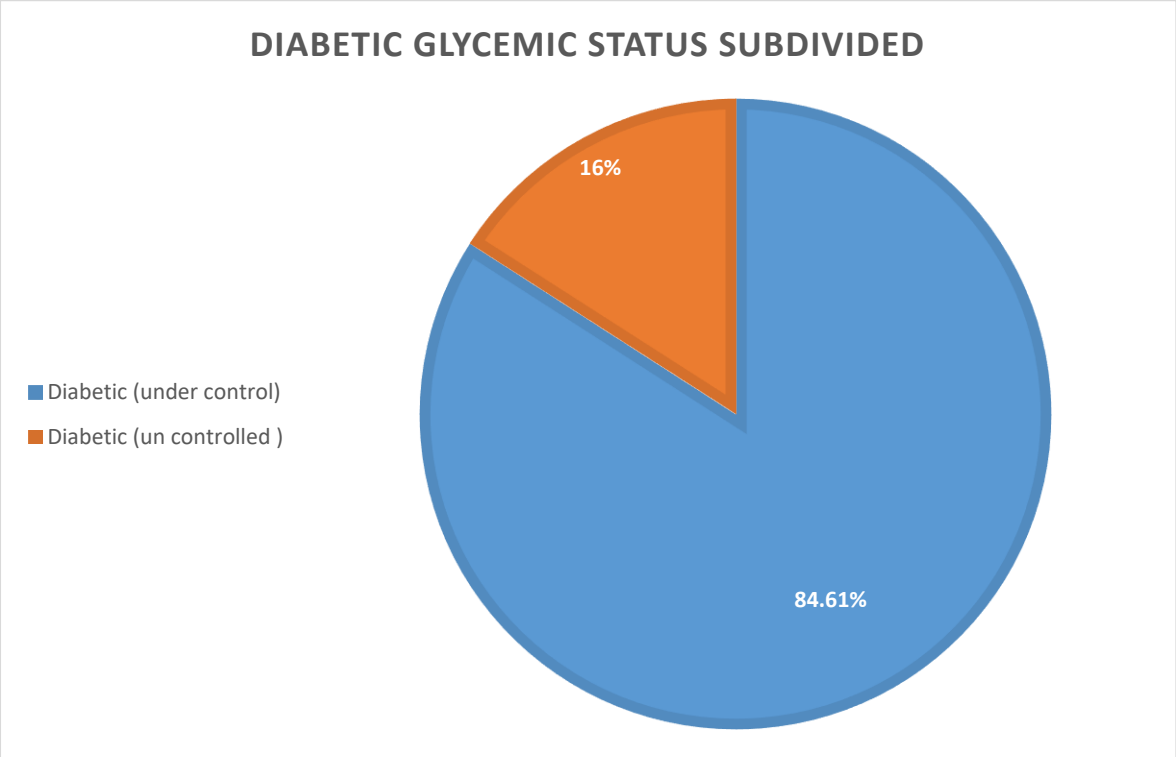
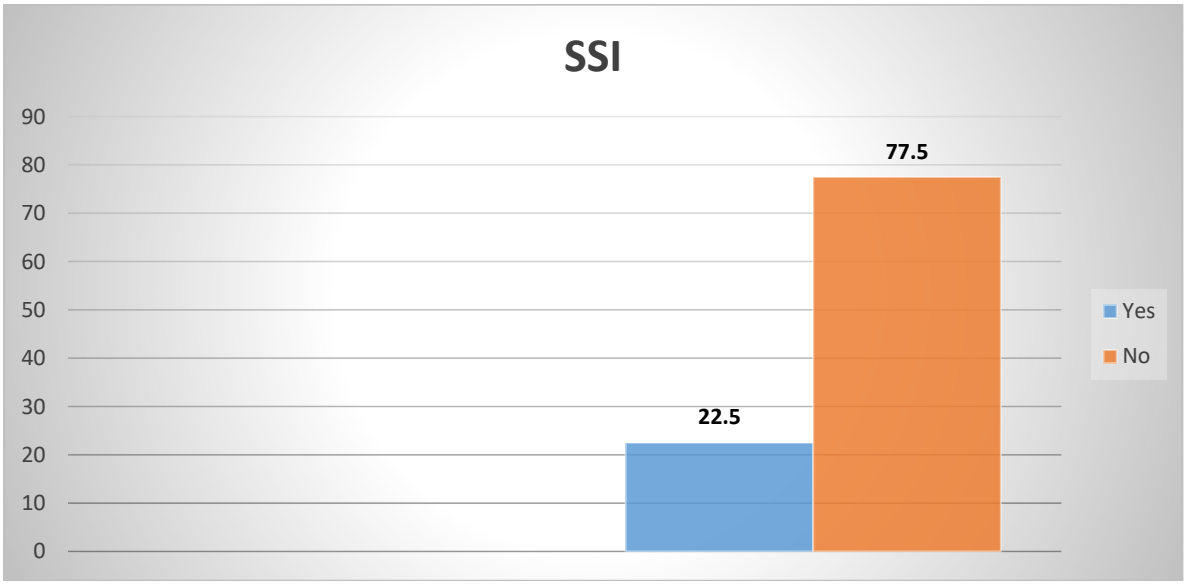


TABLE 10

SURGICAL SITE INFECTION

Surgical Site Infection (SSI)			
Yes	22.5%	Yes(infected seroma)	56%
		Yes (Pus discharge)	44%
No	77.5 %		



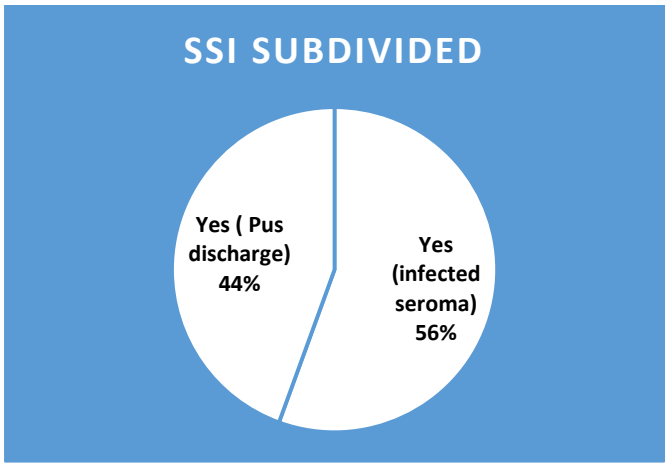


TABLE 11

PREVALENCE OF RISK FACTORS **Risk factors**	**Prevalance**	**% of Prevalance**
Duration of surgery (> 2.5 Hours)	18	45%
Prevalence of Intra operative hypo tension	3	7.50%
Diabetics	13	32.50%
Respiratory tract infection	5	12.50%
SSI	10	25%
Incision Type (Midline/Others)	15	37.50%
Age > 45	21	53%
Gender (Male)	21	52.50%
Malignancy	10	25%
Post NACRT	5	12.50%

CLINICAL ASSOCIATION

TABLE 12

AGE

Demographic variables	**Burst Abdomen (BA)**	
Age	**Yes**	**No**
20-30	1	3
30-40	1	7
40-50	1	15
50-60	1	7
60-70	0	4
The chi-square statistic is 1.8056. The p-value is .771466. The result is not significant at $p < .05$.		

TABLE 13

GENDER

Gender	BA Yes	No
Male	3	17
Female	1	19
The chi-square statistic is 1.1111. The p-value is .291841. The result is not significant at $p < .05$.		

TABLE 14

DURATION OF SURGERY

Clinical Variables	**Burst Abdomen**	
	Yes	No
Duration of surgery		
Less than 2.5 Hours	0	22
Greater than 2.5 Hours	3	15
P value	The chi-square statistic is 3.964. The p-value is .046484. The result is significant at p < .05.The chi-square statistic is 3.964. The p-value is .046484. The result is significant at p < .05.	

TABLE 15

INTRA OP HYPOTENSION

Prevalance of Intra operative hypo tension	BA Yes	No
Yes	0	3
No	4	33
P value		
	The chi-square statistic is 0.3604. The p-value is .548306. The result is not significant at p < .05.The chi-square statistic is 0.3604. The p-value is .548306. The result is not significant at p < .05.	

TABLE 16

GLYCEMIC STATUS

	BA Yes	No
Diabetic	1	12
Non Diabetic	3	24
P value	The chi-square statistic is 0.114. The p-value is .73568. The result is not significant at p < .05.The chi-square statistic is 0.114. The p-value is .73568. The result is not significant at p < .05.	

TABLE 17

SSI

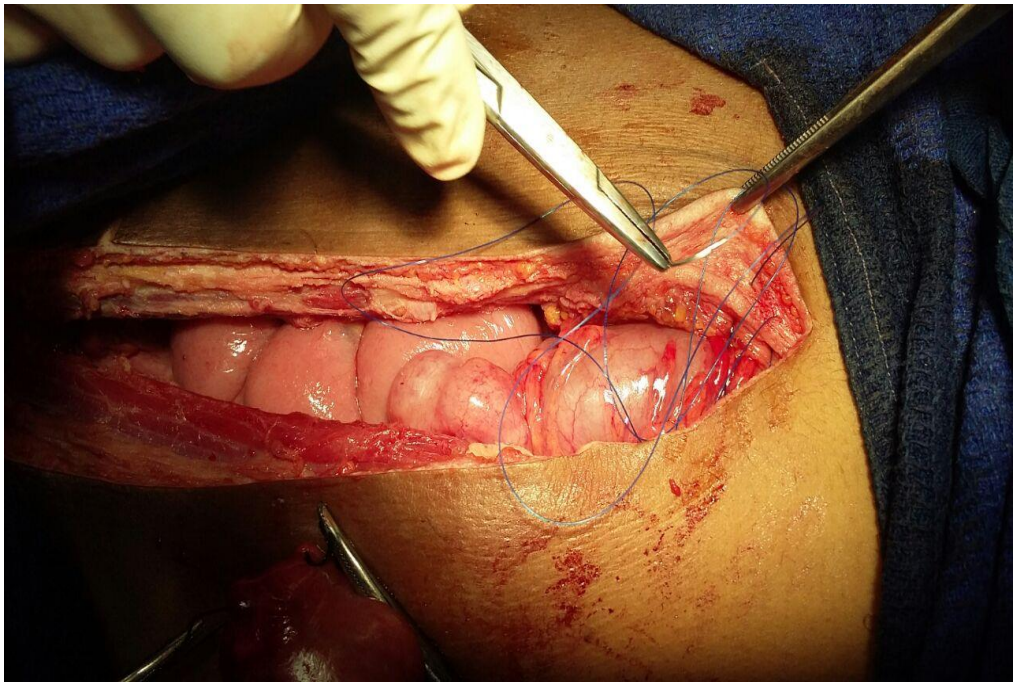
SSI	BA Yes	No
Yes	2	6
No	2	30
P value	The chi-square statistic is 2.5. The p-value is .113846. The result is not significant at p < .05.The chi-square statistic is 2.5. The p-value is .113846. The result is not significant at p < .05.	

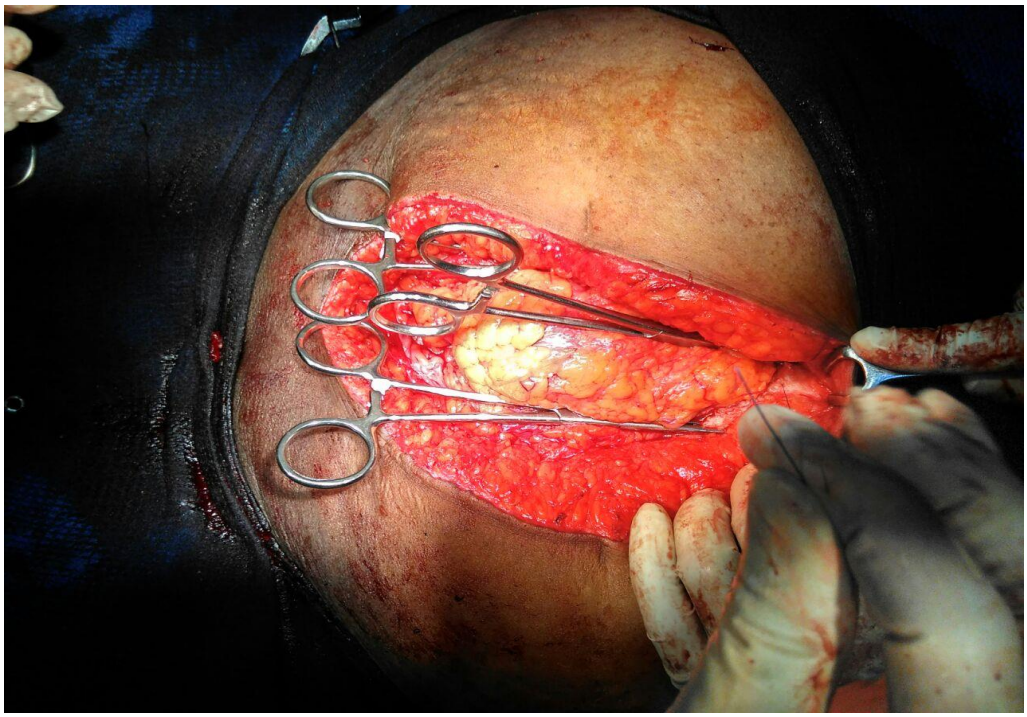
TABLE 18

SUTURE MATERIAL

	BA Yes	No
Prolene	3	17
Vicryl	1	19
p value	The chi-square statistic is 1.1111. The p-value is .291841. The result is not significant at p < .05.	

SUTURING WITH 2- 0 PROLENE (A & B)





BURST ABDOMEN A) AND C) APR PATIENT B) HEMICOLECTOMY PATIENT

OBSERVATIONS AND RESULTS -

- The best method of wound closure is one that maintains tensile strength throughout the healing process with good tissue approximation, does not promote wound infection or inflammation, is well tolerated by patients, and is technically simple and expedient
- Any method of abdominal wall closure is usually judged in the short-term by the number of wound infections, wound dehiscence rates, and frequency of burst abdomen. The long-term complication can be assessed by the rate of development of incisional hernia
- The occurrence of burst abdomen was used as a parameter to assess the efficacy of the suture material.
- The other minor parameters that were assessed -

  Age

  Gender

  Duration of surgery

  Intra op hypotension

  Intra op Blood loss

  Wound Infection

  Glycemic Status

  Respiratory Tract Infection

- Objective was to compare the use of 2-0 vicryl and 2-0 prolene for rectus closure in elective cases and following up their rates of early dehiscence
- Total no. of patients enrolled in the study period – 40
- The patients chosen by inclusion criteria were categorized into two groups of 20 each with Vicryl & Prolene
- The comparison was made by assessing the prevalence of Burst Abdomen (within two weeks) in all patients
- The common surgeries taken into consideration were
    - Umbilical and Paraumbilical Hernia
    - Open Cholecystectomy
    - Incisional Hernia
    - Pancreatic surgeries , UGI and LGI malignancies
- Gender distribution revealed more male involvement **(M>F 52.5%vs 47.5%).** There was no significant association with development of Burst Abdomen
- The median Age group in the study was between the range 40-50 years (53% prevalence of age > 45 years) and there was no significant association with development of Burst Abdomen
- There was **45% prevalence of Duration of Surgery > 2.5 Hours** which had significant association with the occurrence of Burst Abdomen
- Out of 40 patients, four developed Burst Abdomen **(10%)** , out of which three (**60%)** – 2-0 Prolene , one **(40%)** – 2-0 Vicryl. There was no

significant association between the type of suture material with development of Burst Abdomen

- Among the four who developed Burst Abdomen , two had SSI, one was diabetic and all four had duration of surgery > 2.5 Hours
- All patients who developed Burst Abdomen had a midline incision (1 Female & 3 Male)
- All patients who developed Burst abdomen had LGI Malignancy of which 3 were Post NACRT
- Out of the 40 patients enrolled in the study
    i. **7.5%** of the population had RTI
    ii. **32.5%** were Diabetic (**16%** had uncontrolled diabetes)
    iii. **22.5%** had SSI

None of which individually contributed to the occurrence of Burst Abdomen.

DISCUSSION

Laparotomy wound can give way in many ways. Abdominal wound dehiscence is give way of few layers and Burst Abdomen is the give way of all layers which can be with or without evisceration. The occurrence of Burst Abdomen depends on a number of factors including patient factors (like age, gender, glycemic status, RTI , SSI, malnutrition, obesity etc) and technical factors (like surgery done, suture material used, suturing technique used, duration of surgery, incision used, intra op sepsis, blood loss, hypotension and method of closure). Older age, male gender, Uncontrolled diabetes, SSI, violent coughing, prolonged duration of surgery, sepsis and midline incisions are associated with a higher risk.

Therefore a single factor solely leading to Burst Abdomen is usually not possible. One or more of these factors are associated with each other and contribute to Burst Abdomen.

Usually the technique followed is continuous ,mass closure with delayed absorbable suture with suture is to wound length being 4 :1 , 1.5 cm interbite distance and 1.5 – 2 cm from the wound edge. High risk patients are prophylactically closed with retention sutures. Numerous preoperative comorbidities, intra op sepsis and post op complications are associated with Burst Abdomen. There are different risk indices like Rotterdam, Webster and VAMC for risk assessment in Burst Abdomen. There are numerous new methods of suturing available for rectus closure.

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ANNEXURES

ANNEXURE I

INFORMED CONSENT

GOVT.STANLEY MEDICAL COLLEGE, CHENNAI- 600 001
INFORMED CONSENT

DISSERTATION TOPIC: "A COMPARATIVE STUDY OF 2 – 0 VICRYL VS 2- 0 PROLENE FOR RECTUS CLOSURE"

PLACE OF STUDY: GOVT. STANLEY MEDICAL COLLEGE, CHENNAI

NAME AND ADDRESS OF PATIENT:

I, _____ have been informed about the details of the study in my own language.

I have completely understood the details of the study.

I am aware of the possible risks and benefits, while taking part in the study.

I understand that I can withdraw from the study at any point of time and even then, I will continue to receive the medical treatment as usual.

I understand that I will not get any payment for taking part in this study.

I will not object if the results of this study are getting published in any medical journal, provided my personal identity is not revealed.

I know what I am supposed to do by taking part in this study and I assure that I would extend my full co-operation for this study.

Name and Address of the Volunteer:

Signature/Thumb impression of the Volunteer

Date:

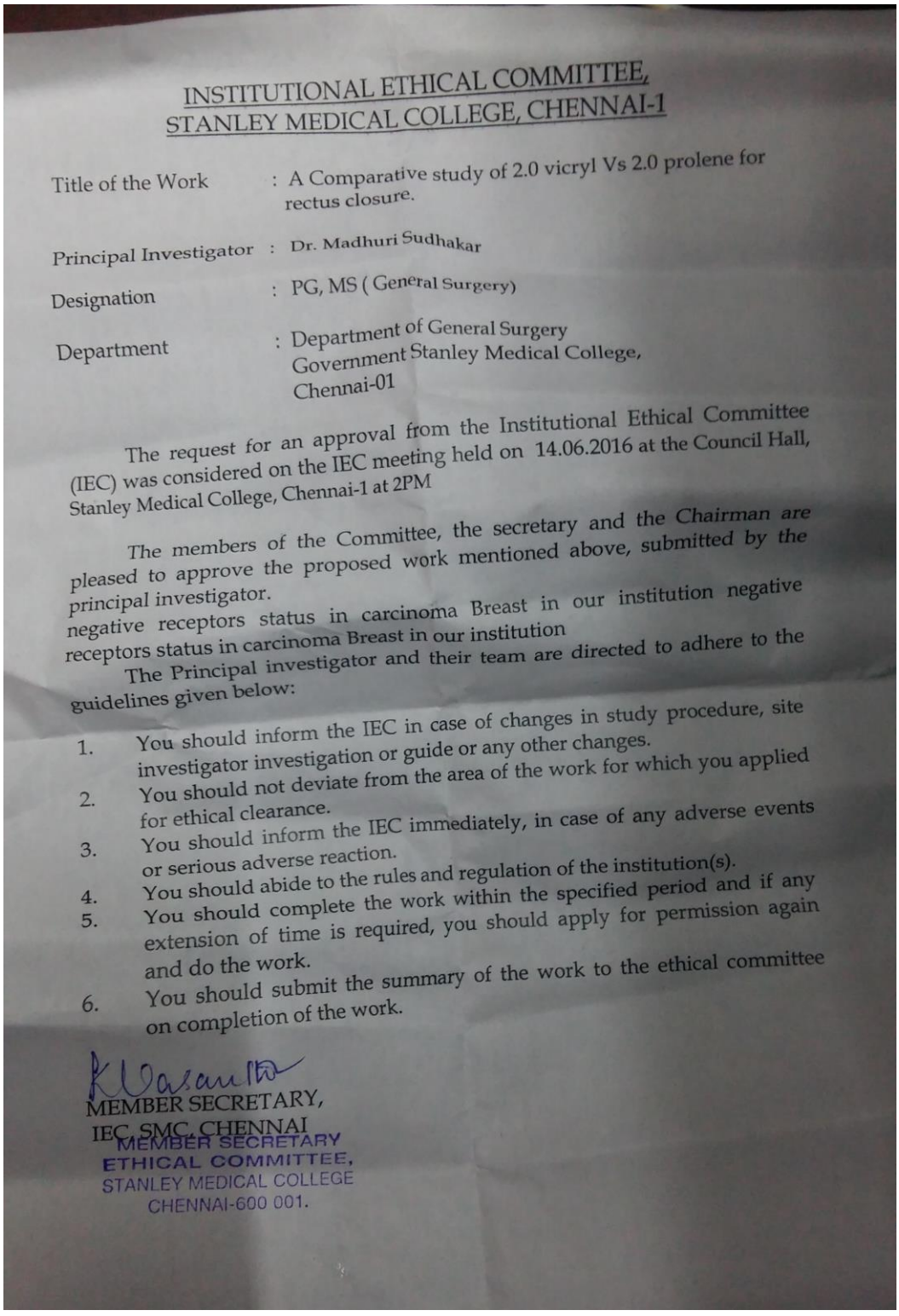
Witnesses:
(Signature, Name & Address)
Date:

Name and signature of investigator:

(Dr .MADHURI SUDHAKAR)

ANNEXURE II

ETHICAL COMMITTEE



INSTITUTIONAL ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE, CHENNAI-1

Title of the Work : A Comparative study of 2.0 vicryl Vs 2.0 prolene for rectus closure.

Principal Investigator : Dr. Madhuri Sudhakar

Designation : PG, MS (General Surgery)

Department : Department of General Surgery
Government Stanley Medical College,
Chennai-01

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 14.06.2016 at the Council Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.
negative receptors status in carcinoma Breast in our institution negative receptors status in carcinoma Breast in our institution

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate from the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

MEMBER SECRETARY,
IEC, SMC, CHENNAI

MEMBER SECRETARY
ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE
CHENNAI-600 001.

ANNEXURE III - MASTER CHART

S.No	Name	Age	Sex	Diagnosis	Procedure Done	Day of Burst Abdomen	Duration of surgery	Introperative blood loss	Intra operative hypo tension	glycemic status	respiratory tract infection	wound infection	Material
1	Murugan	46	M	CA rectosigmoid	extended Left Hemicolectomy with colorectal anastomosis	Yes (POD #5)	3.5 Hours	250 ml	No	Non Diabetic	No	No	Prolene
2	Shanmu	38	F	CA anorectum post NACRT	APR	Yes (POD #8)	3 Hours	250 ml	No	Diabetic (under control)	No	Yes	Prolene
3	Saritha Kumari	28	F	incisional hernia of laparotomy scar	open sandwich mesh repair with TAH with BSO with appendectomy with adhesiolysis	No	3 hours	550 ml	No	Non Diabetic	No	No	vicryl
4	Bhavani	49	F	choledocholithiasis	open Cholecystectomy with CBD exploration with Roux en Y hepaticojejunostomy	No	3 Hours	100 ml	No	Diabetic (under control)	No	No	Vicryl
5	Kaliya perumal	69	M	metastatic Carcinoma stomach with Gastric Outlet Obstruction	palliative AGJ	No	1 hour	50 ml	Yes (on support)	Diabetic (under control)	No	No	Prolene
6	Chandra	45	F	choledocholithiasis with cholangitis	open cholecystectomy with CBD exploration with choledochoduodenotomy	No	2 Hours	250 ml	No	Diabetic (under control)	No	No	vicryl
7	Chinnamma	69	F	CA Peri ampullary region	Whipples procedure	No	4 Hours	150 ml	No	Non Diabetic	No	No	Prolene
8	Anudha	36	F	fibroid uterus	TAH with BSO	No	3 Hours	250 ml	No	Non Diabetic	No	No	Prolene
9	Rajendran	54	M	CA anorectum	APR	Yes (POD #2)	4 hours	200 ml	No	Non Diabetic	No	No	vicryl
10	Chinnakarandi	55	M	icisional hernia of laparotomy scar	open onlay mesh repair	No	2 Hours	50 ml	No	Non Diabetic	No	No	vicryl

S.No	Name	Age	Sex	Diagnosis	Procedure Done	Day of Burst Abdomen	Duration of surgery	Introperative blood loss	tra operative hypo tensio	glycemic status	respiratory tract infection	wound infection	Material
11	Rayar	46	M	incisinal hernia of laparotomy scar	open sandwich mesh repair	No	3 Hours	50 ml	No	Non Diabetic	Yes , LRI	No	vicryl
12	Dharmendra	29	M	CA anorectum	APR	Yes (POD #8)	3 Hours	150 ml	No	Non Diabetic	Yes , LRI	Yes (Pus in the sub cutaneous plane)	Prolene
13	Sudhakaran	47	M	metastatic CA stomach	open palliative AGJ	No	1.5 Hours	50 ml	No	Diabetic (under control)	No	No	Prolene
14	Murugan	43	M	Umblical Hernia	Open mesh repair	No	2 Hours	50 ml	No	Non Diabetic	No	Yes (Pus discharge)	Prolene
15	Suresh	35	M	Umblical Hernia	Open Sandwich mesh repair	No	2 Hours	50 ml	No	Diabetic (under control)	No	No	vicryl
16	Usha	43	F	Fibroid uterus	Total abdominal Hysterectomy with Bilateral Salphingo	No	3 hours	100 ml	No	Non Diabetic	No	No	Prolene
17	Sekar	43	M	Metastatic carcinoma stomach	Paliative Anterior Gastro Jejunostomy	No	1.5 Hours	75 ml	Yes (on Iono tropicsupport)	Non Diabetic	No	No	Prolene
18	Saradha	69	F	Para umblical hernia	Open mesh repair	No	2 Hours	75 ml	No	Diabetic (un controlled in post-operative period)	No	Yes (infected Seroma)	Prolene
19	Venkatesan	48	M	Emphysematuus Pancreatic necrosis	Open necrosectomy with Transverse colostomy	No	2 Hours	1500 ml	Yes (on Iono tropicsupport)	Diabetic (under control)	No	Yes	vicryl
20	Ramalingam	51	M	CA rectosigmoid	Low anterior resection	No	2.5 Hours	350 ml	No	Non Diabetic	No	No	vicryl
21	Nadhiya	25	F	Incisinal hernia of LSCS Scar	Open mesh repair	No	2.5 Hours	150 ml	No	Non Diabetic	No	No	Prolene
22	Dinakaran	38	M	Chronic calcifying pancreatitis	Whipples procedure	No	3.5 Hours	200 ml	No	Diabetic (un controlled on insulin infusion)	No	No	vicryl
23	Bhavani	22	F	Post laprotomy , small bowel resection with Ileostomy status	Ileostomy take down	No	2.5 Hours	100 ml	No	Non Diabetic	Yes	Yes (Pus discharge)	Prolene
24	Kanakavalli	42	F	Incisional Hernia of LSCS Scar	Open mesh repair	No	3 hours	75 ml	No	Non Diabetic	Yes (on Iv Antibiotics)	Yes (Pus discharge)	vicryl
25	Selvaraj	31	M	Chronic calcifying pancreatitis	Freys Procedure	No	3.5 Hours	150 ml	No	Non Diabetic	No	Yes (infected seroma)	vicryl

S.No	Name	Age	Sex	Diagnosis	Procedure Done	Day of Burst Abdomen	Duration of surgery	Introperative blood loss	Intra operative hypo tensio	glycemic status	respiratory tract infection	wound infection	Material
26	Sokku	51	M	Bilateral inguinal hernia	Stoppas Repair	No	2 Hours	30 ml	No	Non Diabetic	Yes	NO	vicryl
27	Rahmath Nisha	64	M	Acute cholecystits	Open cholesystectomy	No	3 hours	50 ml	No	Diabetic (under control)	No	Yes	vicryl
28	Rajendran	41	M	Umblical Hernia	Open mesh repair	No	1.5 Hours	50 ml	NO	Diabetic (under control)	No	No	Prolene
29	Gnana soundari	32	f	Incisional Hernia of LSCS Scar	Open sandwich mesh repair	No	3 hours	100 ml	No	Non Diabetic	No	No	Prolene
30	Susheela	51	F	Fibroid uterus	TAH with BSO	No	2 Hours	75 ml	No	Non Diabetic	No	No	Prolene
31	Stephen	49	M	Umblical Hernia	Open mesh repair	No	1 hour	75 ml	No	Non Diabetic	No	No	Prolene
32	Vasudevan	60	M	CA Ano rectum, Post NACRT	Abdomino Perineal Resection	No	3.5 Hours	250 ml	No	Non Diabetic	No	Yes (Pus discharge)	vicryl
33	Raghunath	50	M	Umblical Hernia	Open mesh repair	No	2 Hours	75 ml	No	Non Diabetic	No	No	Vicryl
34	Bhuvaneshwari	32	F	Infra Umblical Hernia	Open mesh repair	No	1 hour	50 ml	No	Non Diabetic	No	No	Prolene
35	Chandrika	59	F	Para umblical hernia	Open mesh repair	No	2 Hours	75 ml	No	Diabetic (under control)	No	No	Vicryl
36	Chitra	41	F	Umblical Hernia	Open mesh repair	No	1.5 Hours	75 ml	No	Non Diabetic	No	No	Prolene
37	Vanitha	38	F	Calculous Cholecystitis	Lap converted to Open Cholecystectomy	No	3.5 Hours	200 ml	No	Non Diabetic	No	No	Vicryl
38	Jamuna	45	F	Incisional Hernia of LSCS Scar	Open mesh repair	No	2.5 Hours	75 ml	No	Non Diabetic	No	No	Vicryl
39	Jameela	55	F	Calculous Cholecystitis	Lap converted to Open Cholecystectomy	No	3 Hours	125 ml	No	Diabetic (under control)	No	No	Vicryl
40	Latha	42	F	Fibroid uterus	TAH with BSO	No	3 Hours	100 ml	NO	Non Diabetic	No	NO	Prolene

ANNEXURE IV

PROFORMA:

NAME: AGE: IP NO:

1	Presenting complaints	
2	Preoperative Diagnosis	
3	Intra operative Diagnosis	
4	Intra operative findings	
5	Surgery done	
6	Suture material used for rectus closure	
7	Symptoms and signs of early wound dehiscence • Serosanguinous discharge • ‘ Feeling of give way’ • Evisceration	
8	Intra operative period • Duration of surgery • Intra op hypotension	

	• Intra op blood loss • Sepsis Early Late	
9	Post operative period • Glycemic status • Wound infection • Respiratory tract infection • Duration of stay in hospital	
10	Cost effectiveness	