

A DISSERTATION ON
"A CLINICAL STUDY ON PREDICTORS OF ABDOMINAL
WOUND DEHISCENCE AND MANAGEMENT IN
POST-LAPAROTOMY PATIENTS IN RGGGH"

Dissertation Submitted To

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

CHENNAI – 600 032.

DISSERTATION SUBMITTED FOR THE DEGREE OF

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MADRAS MEDICAL COLLEGE CHENNAI.



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

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CHENNAI – 600 032.

MAY 2018

CERTIFICATE

This is to certify that the dissertation entitled "**A CLINICAL STUDY ON PREDICTORS OF ABDOMINAL WOUND DEHISCENCE AND MANAGEMENT IN POST-LAPAROTOMY PATIENTS IN RGGGH**" is the bonafide work done by **Dr.G.WASHINGTON** during his M.S. (General Surgery) course 2015-2018 done under my supervision and is submitted in partial fulfillment for the requirement of the M.S. (BRANCH-I) - General Surgery May 2018 examination of The Tamilnadu Dr.M.G.R Medical University.

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DECLARATION

I hereby declare that this dissertation "**A CLINICAL STUDY ON PREDICTORS OF ABDOMINAL WOUND DEHISCENCE AND MANAGEMENT IN POST-LAPAROTOMY PATIENTS IN RGGGH**" represents a genuine work of mine. The contributions of any supervisors to the research are consistent with normal supervisory practice and are acknowledged.

I also affirm that this bonafide work or part of this work was not submitted by me or any others for any award degree or diploma to any other University board either in India or abroad. This is submitted to The Tamil Nadu Dr. M.G.R Medical University Chennai in partial fulfillment of the rules and regulations for the award of Master of Surgery Degree Branch- I (General Surgery).

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ACKNOWLEDGEMENT

As I walk down the memory lane I realize with a deep sense of humility that what I have done now would not have been possible but for certain mentors who have enlightened my path to wisdom.

“Surgery is learnt by apprenticeship and not from textbooks not even from one profusely illustrated ” - Ian Aird.

While I put these words together it is my special privilege and great pleasure to record my deep sense of gratitude to my respected Professor and guide **Prof. R.A.PANDYARAJ M.S.FRCS.** but for whose constant guidance help and encouragement this research work would not have been made possible . The unflinching academic moral and psychological support will remain ever fresh in my memory for years to come . Words cannot simply express my gratitude to them for imparting me the surgical skills I have acquired.

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I would be failing in my duty if I do not show my deep sense of gratitude to all the patients who have helped me to become a surgeon and especially those who consented to be part of this study.

With deep reverence I salute my parents and my family and I thank the almighty for blessing me with a wonderful family to whom I have dedicated this thesis.

I sincerely thank my colleagues and junior post graduate **Dr.Vinayak Rengan** for their help and support. Last but not the least I thank all my patients for their kind co-operation in carrying out this study successful.

LIST OF ABBREVIATIONS

BMI	–	Body mass index
SL	–	Suture length
WL	–	Wound length
Hb%	–	Haemoglobin percentage
IP	–	Ileal perforation
GP	–	Gastric perforation
JP	–	Jejunal perforation
MDP	–	Meckel's diverticular perforation
NS	–	Not significant
S	–	Significant

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CERTIFICATE OF APPROVAL

To
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Dear Dr.G.Washington,

The Institutional Ethics Committee has considered your request and approved your study titled **"A CLINICAL STUDY ON PREDICTORS OF ABDOMINAL WOUND DEHISCENCE AND MANAGEMENT IN POST-LAPAROTOMY PATIENTS IN RGGGH " - NO.24012017 (IV).**

The following members of Ethics Committee were present in the meeting hold on **31.01.2017** conducted at Madras Medical College, Chennai 3

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We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.


Member Secretary - Ethics Committee

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This is to certify that this dissertation work titled ***"A CLINICAL STUDY ON PREDICTORS OF ABDOMINAL WOUND DEHISCENCE AND MANAGEMENT IN POST-LAPAROTOMY PATIENTS IN RGGGH"*** of the candidate **Dr.G.WASHINGTON M.B.B.S.** with registration Number **221511001** for the award of **MS Branch-I in General Surgery.** I personally verified the urkund.com website for the purpose of plagiarism Check. I found that the upload thesis file contains from introduction to conclusion pages and result shows **12% (Twelve percentage)** of plagiarism in the dissertation.

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INTRODUCTION

INTRODUCTION

“Turn your wounds into wisdom.”

- Oprah Winfrey

Wound dehiscence is described as partial or complete disruption of an abdominal wound closure with or without protrusion and evisceration of abdominal contents. Before cutaneous healing.¹

Wound dehiscence is a serious postoperative complication associated with high mortality and morbidity. Having significant impact on health care cost associated with a mortality rate of 15-20%. Because of high mortality medical and surgical preventive measures are necessary in peri-operative period. Good knowledge of risk factors is mandatory for prevention.² This study is aimed at identifying factors contributing to disruption of incision and to evaluate the management strategies in wound dehiscence .

OBJECTIVES OF THE STUDY

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1. To identify risk factors in the development of abdominal wound dehiscence.
2. To identify role of diseases in developing wound dehiscence.
3. To study the role of different types of incision leading to wound dehiscence.
4. To study the incidence of wound dehiscence in elective and emergency surgery.
5. To study the management protocols in wound dehiscence.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

History

A wound has been defined as a disruption of normal anatomic structure and function. The healing wound is an overt expression of an intricate and tightly choreographed sequence of cellular and biochemical responses directed toward restoring tissue integrity and functional capacity following injury.³

An Egyptian papyrus discovered by Edward Smith in 1862 describes the use of cotton sutures and the technique of bandaging learned from embalmers.⁴ Celsus described the cardinal signs of inflammation - rubor calor dolor and tumor.⁵

John Hunter in 1763 AD described the phenomenon of wound contraction and clearly observed the factors that delayed or promoted wound healing.⁶ Wounds covered with dressing materials heal faster with less contracture such that dressing materials forming a barrier between wound and the environment thereby preventing bacterial infection and wound dehiscence.

A study at Long Island Jewish Medical Center from 1984 to 1989 shows that out of 2761 intra abdominal surgery 31 patients (1%) develop

wound dehiscence with Sero Sanguinous discharge prior to dehiscence on average 11.1 days post operatively⁷.

In a study done at Oulu University Hospital from 1989-1992 48 patients developed wound dehiscence after midline laparotomy of them 31 patients – 65% were with pre-operative hypoalbuminemia⁸.

No single factor is responsible for wound dehiscence. If before the functional and structural integrity is regained then the wound edges break apart. Many such factors like anaemia jaundice uraemia diabetes hypoalbuminemia chronic obstructive pulmonary diseases advanced malignancy steroid use obesity wound infection and emergency surgery have been defined.¹⁰ In Addition other variables such as suture technique type use of suture material, incision location and oxygenation may influence wound dehiscence.

Good understanding of risk factors is essential for prevention. Patients found as high risk may benefit from close observation and early intervention. Placement of retention sutures have not been found to decrease the incidence of fascial dehiscence.¹² Transverse incisions have lower rate of dehiscence than longitudinal incisions⁴⁰. Paramedian incisions have wound dehiscence in lower rate compared with midline, oblique.⁴¹

Risk Factor Scores for Abdominal Wound Dehiscence.

Risk Factor	Score
Cerebrovascular accident/stroke without deficit	4
History of chronic obstructive pulmonary disease	4
Current pneumonia	4
Emergency procedure	6
Operative time >2.5 hours	2
Postgraduate year 4 as surgeon	3
Clean wound classification	-3
Superficial wound infection	5
Deep wound infection	17
Failure to wean	6
One or more complications	7
Return to the operating room	-11

Risk Category	Total Score	Predicted Rate of Dehiscence
Low	≤3	1.47%
Medium	4-10	2.70%
High	11-14	4.53%
Very High	>14	10.90%

It has been suggested that vacuum assisted closure may be an effective means of managing wound dehiscence compared to conventional techniques of wound debridement and secondary suturing.³⁹

ANTERIOR ABDOMINAL WALL¹³

The abdominal wall is defined superiorly by the costal margins inferiorly by the symphysis pubis and pelvic bones posteriorly by the vertebral column.

Boundaries:

Boundaries of anterior abdominal wall are superiorly lower margin of the thorax and the pubis iliac crest and inguinal ligament inferiorly.

Six layers of abdomen:

1. Skin, 2. Superficial Fascia, 3. Muscles, 4. Fascia Transversalis, 5. Extra Peritoneal Connective Tissue, 6. Peritoneum.

Superficial Fascia:

Divided into

- 1) a superficial fatty layer - Fascia of Camper
- 2) a deep membranous layer - Fascia of Scarpa.

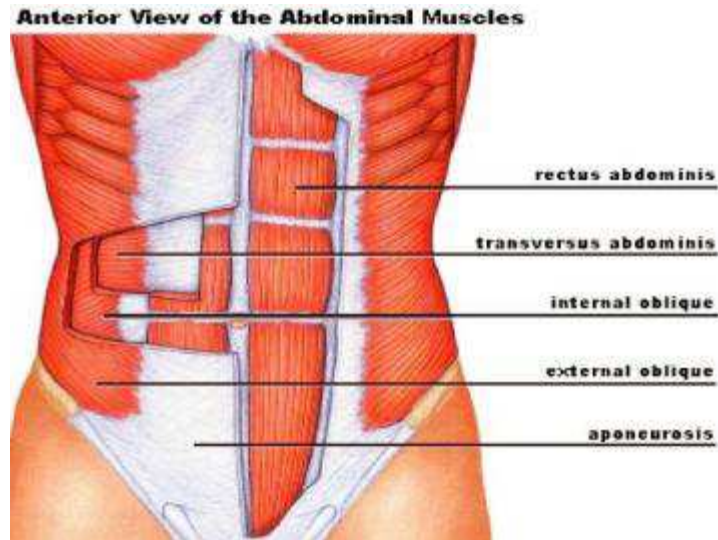


Fig.1: Muscles of the anterior abdominal wall

1. External Oblique, 2. Internal Oblique, 3. Transversus Abdominis,
4. Rectus Abdominis, 5. Pyramidalis, 6. Cremaster

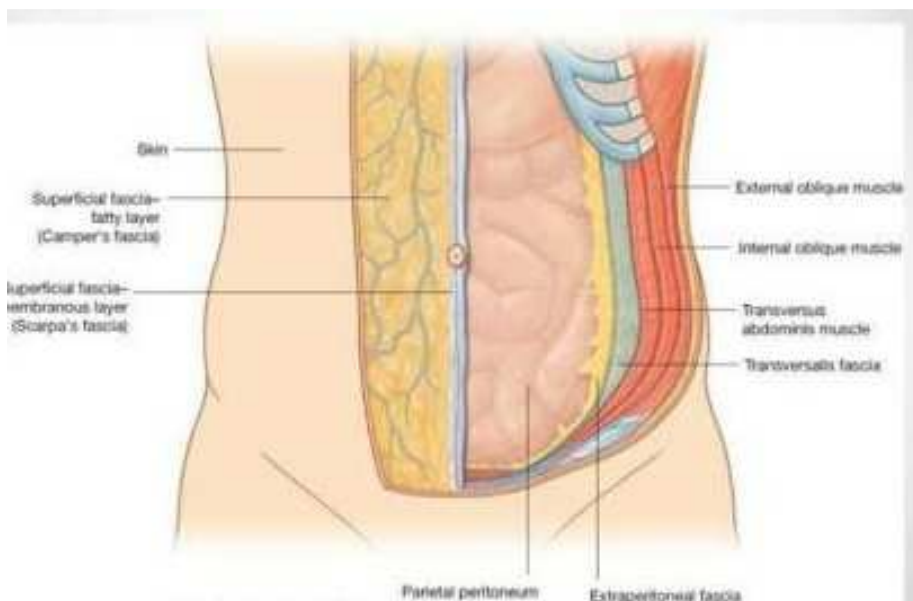
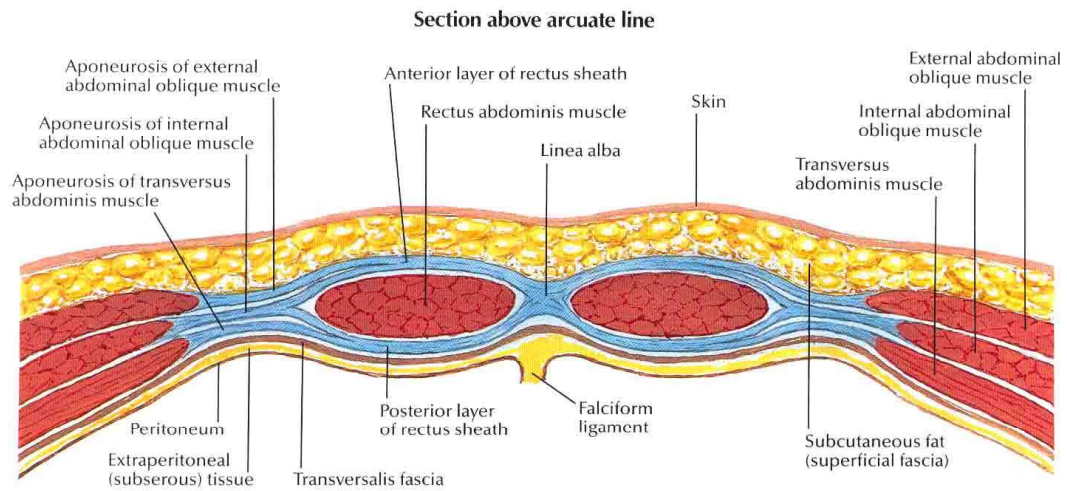
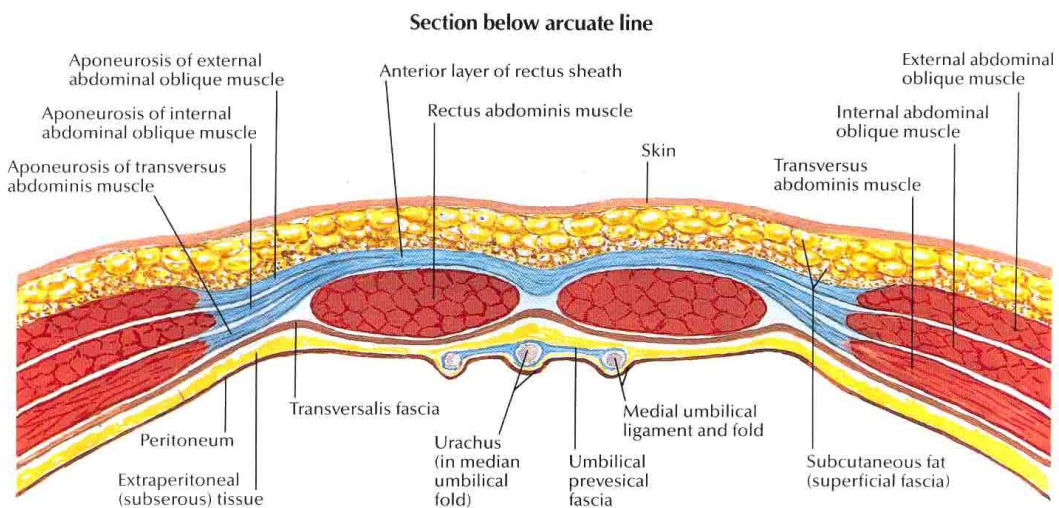


Fig.2: Layers of the abdominal wall



Aponeurosis of internal abdominal oblique muscle splits to form anterior and posterior layers of rectus sheath. Aponeurosis of external abdominal oblique muscle joins anterior layer of sheath; aponeurosis of transversus abdominis muscle joins posterior layer. Anterior and posterior layers of rectus sheath unite medially to form linea alba



Aponeurosis of internal abdominal oblique muscle does not split at this level but passes completely anterior to rectus abdominis muscle and is fused there with both aponeurosis of external abdominal oblique muscle and that of transversus abdominis muscle. Thus posterior wall of rectus sheath is absent below arcuate line and rectus abdominis muscle lies on transversalis fascia

Fig.3: Transverse section of the abdominal wall

INCISION¹⁴

Principles of Ideal incision - 1. Accessible, 2. Extensible, 3. Suitable, 6.Durable, 7. Cosmetic.

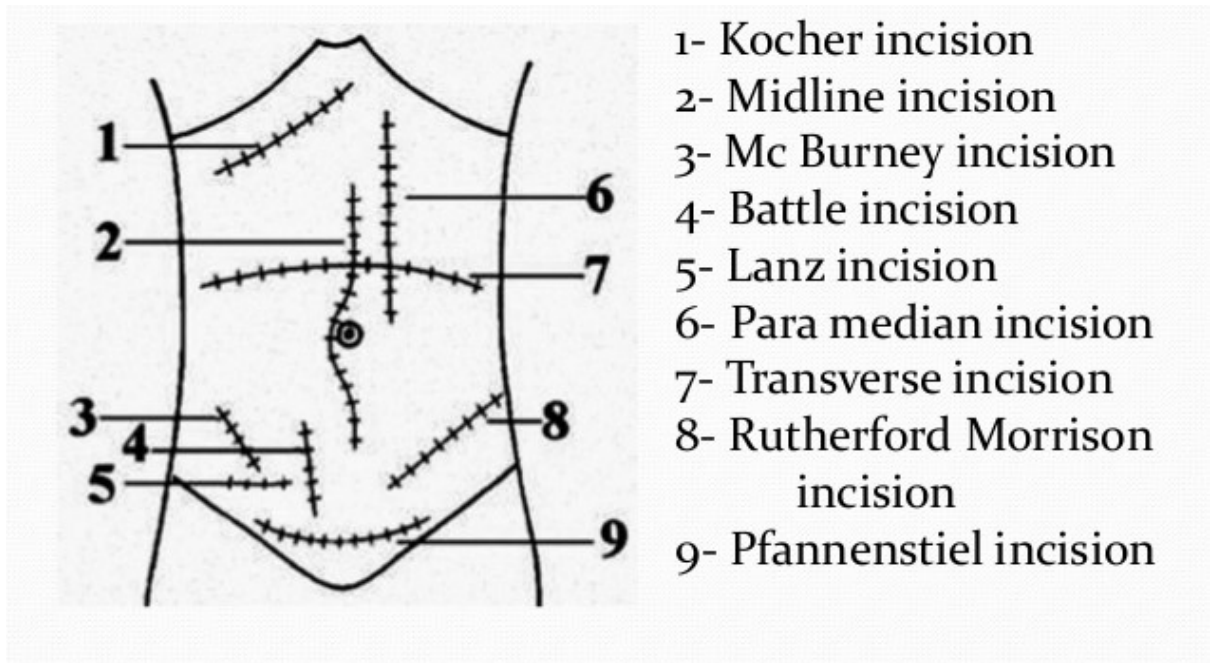


Fig.4: Common abdominal incisions

1. Midline Incision :

Vertical - Supra or Infraumbilical.

This Incision divide through Linea alba.

Advantage:

- 1) linea alba is almost blood less without dividing muscle and without injuring nerves
- 2) with good exposure of upper and lower abdominal viscera

3) easy to close swiftly

4) can be extended above and below.

2. Paramedian :

This incision made on either side of midline and parallel to the midline extending both supraumbilical and infraumbilically 1inch from the midline.

Advantage: Strong scar.

Disadvantage: long time for performing when previous laparotomy scar has to be reopened.

3. Mcburney Gridiron Incision :

This incision made at right angle to spino - umbilical line at the junction of middle and outer one third. The external oblique aponeurosis is divided in the direction of its fibres and the internal oblique and transversus are split and peritoneum is opened in the line of skin incision.

Advantage: For better exposure when required extension in upward or downward direction muscles can be divided,

Disadvantage: chance of Ilioinguinal nerve damage causing incisional hernia.¹⁰

4. Lanz Incision :

This incision made transversely in the interspinous crease where muscles are split as in the Gridiron approach. Advantage: less visible scar.

5. Oblique Muscle Cutting Incision (Rutherford Morrison) :

This incision is an extension of the Mc Burney incision which can be extended by division of rectus sheath medially and oblique muscle laterally of iliac fossa.

6. Subcostal Incision (Kocher's incision) :

This incision at the middle about 2.5 to 5cm below the Xiphisternum runs outwards and downwards one inch below and parallel to costal margin. On the Right side used for the Gall bladder and Biliary tract and on left side for splenectomy.

This incision is closed in three layers :

1. Peritoneum and posterior rectus sheath and more laterally internal oblique and transversus abdominis.
2. Anterior rectus sheath and laterally external oblique.
3. Skin.

7. Transverse Incision :

This incision can be used both supra and infra umbilicus. All the layers are divided transversely. Rectus will be separated vertically and transversalis fascia and peritoneum incised vertically.

Advantage:

- 1) no interference with the nerve supply to rectus muscles.
- 2) These incisions fall in the Langer's lines healing with good scar.

8. Pfannenstiel Incision :

Used in gynaecological operations and retropubic prostatectomy placed in the curving interspinous crease its central point being 5cm above the symphysis pubis.

Advantage: it leaves an almost imperceptible scar.

Disadvantage: exposure is limited.

9. Oblique Lumbar Incision :

Used for exposing kidney begins in the renal angle and passes just below and parallel to the 12th rib anteriorly upto the lateral border of rectus abdominis.

Disadvantage: This incision may divide lateral cutaneous branch of 12th thoracic nerve.

The principles governing abdominal incisions¹⁵:

1. Adequate enough for ready access to the part to be dealt with.
2. Should traverse muscle rather than fascia as the scar in the peritoneum best protected by muscle.
3. Should not divide nerves.
4. At possible muscle must be retracted or split in the direction of their fibres.
5. The drainage tubes must be inserted through a separate small incision.
6. Reexploration of the abdomen must be performed through the previous incision since hernia can be repaired simultaneously.

ROLE OF VARIOUS FACTORS CAUSING ABDOMINAL WOUND DEHISCENCE

Process and lead to the progression of post operative abdominal wound dehiscence.

1. Wound Infection:

The most common factor in developing wound dehiscence is infection of the wound which impairs wound healing process resulting in a wound that contains less collagen and in which the collagen is not

highly cross linked as in a normally healed wound. Wound healing processes affected by bacteria:

Most individuals expect that healing is an inevitable outcome:

"It has been said, 'time heals all wounds.' I do not agree. The wounds remain. In time, the mind, protecting its sanity, covers them with scar tissue and the pain lessens. But it is never gone."

- Rose Kennedy

If one debrides the nonviable tissue and repairs it in a physiologic manner the normal phases of wound healing-reaction regeneration and remodeling will proceed without difficulty.¹⁸ However bacteria and bacterial products can cause disturbances of this orderly scheme and affect each of the processes of healing.¹⁹

Infection in clinical surgical practice has been defined as the product of the entrance growth metabolic activities and resultant pathophysiologic effects of microorganisms in the tissues of the patient.²² When no infection is present there is an equilibrium between the factors of host resistance and the actions of the bacteria. If this equilibrium remains stable host resistance factors eventually overcome any contamination of the wound.

Once the equilibrium is upset either by an impairment in the host defense mechanisms or by an increase in the bacterial inoculum clinical infection may result.²⁴ A wealth of clinical and experimental data has shown that a level of bacterial growth of greater than 100000 organisms per gram of tissue is necessary to cause wound infection.

Liedburg et al²⁶ found that skin grafts were destroyed on rabbits when applied to beds inoculated with bacteria in concentrations greater than 10⁵ or 100000 organisms per milliliter.

Elek demonstrated that it requires an average of 7.5×10^6 staphylococci to produce a pustule in normal human skin and that this number could be reduced 10000 fold in the presence of a single silk suture.²⁵

Kass reported a quantitative relationship between bacteria in urine and symptoms. Patients with pyelonephritis had greater than 100000 organisms per milliliter of urine. If fewer than 100000 organisms per milliliter were present asymptomatic bacteruria existed.

Lindsey et al²⁸ found that goats whose experimental wounds were inoculated with Clostridium died when the Clostridia level reached 10 organisms per milliliter.

Bendy et al showed that significant healing of decubitus ulcers occurred only when bacterial counts were less than 10⁶/mL. They found that despite the healthy appearance of a wound healing did not occur if the bacterial level was greater than 10⁶/mL.

Just as Liedburg had demonstrated for experimental skin graft Krizek et al ²⁹ demonstrated the quantitative relationship between bacteria and skin graft survival in humans. In 50 granulating wounds they performed quantitative bacterial cultures while preparing the wounds for grafting. Although all wounds are grafted purely on clinical grounds when the bacterial counts were reviewed the average graft survival was found to be 94% when the bacterial count was 10⁵ or fewer bacteria per gram of tissue and only 19% when the bacterial count was greater than 10⁵.

Similar data have been reported for wounds undergoing delayed closure.³⁰ In these wounds various topical antibacterial creams were evaluated for controlling bacteria in the wounds. The evaluation was performed using quantitative bacterial tissue cultures. The wounds were closed on clinical criteria alone without knowledge of the bacterial counts. Review of the bacterial counts performed at the time of delayed wound closure revealed that 28 of 30 wounds that contained 10 or fewer bacteria per gram of tissue progressed to

uncomplicated healing whereas none of the 10 wound closures performed on wounds with greater than 10⁵ organisms per gram of tissue were successful.³⁰ This study was followed by one using quantitative bacteriology in a prospective manner. In that study it was found that 89 of 93 wounds closed when the bacterial count was 10⁵ or fewer bacteria per gram of tissue progressed to rapid uncomplicated healing.³¹

Experimentally successful closure of wounds by pedicled flaps also depends on the bacterial load in the wound at the time of closure.³² In heavily contaminated wounds containing 10⁶ bacteria per gram of tissue neither a random nor a musculocutaneous flap was able to prevent bacterial proliferation and all flaps dehisced. In minimally contaminated wounds containing 10⁴ or fewer bacteria both the random and musculocutaneous flaps achieved wound healing and decreased the bacterial level in the wound. However in an intermediate group containing 10³ bacteria per gram of tissue musculocutaneous flaps lowered the bacterial count and allowed wound closure whereas the random flaps did not control the bacterial growth and failed.³²

It is apparent from the preceding information that bacteria present in a wound at high levels can inhibit the normal wound healing processes

and prevent wound closure by either direct approximation skin graft pedicled flap or even spontaneous contraction and epithelialization.

2. Age :

Wound dehiscence becomes more frequent as the age of the patient increases. Wound healing in older patients is retarded could be due to the extent of dissection and the potential for intra operative contamination are greater in operations conducted in older patients especially extensive resection in cancer also lack of bulky muscle and its poor tone with aging.

3. Obesity :

Excessive fat in the subcutaneous tissue and the omentum results in increase strain on the wound with all body movements in the early postoperative period with associated poor muscle tone and lack of muscle mass with increased potential for postoperative pulmonary complications resulting in the development of wound dehiscence.

4. Malnutrition :

Secondary to acute and chronic illness with Malnourished patients particularly those who have lost a significant amount of weight over a relatively short period before operation and whose levels of serum

albumin and other proteins reflect a state of malnutrition are at higher risk for poor wound healing.

5. Abdominal Incisions :

With limited substantiated clinical studies low tension of the suture lines in the transverse and oblique incisions wound than in the midline incisions as thought to be associated with lower rate of wound dehiscence⁴⁰. In clinical studies wound dehiscence has indeed been reported to be very low in muscle splitting incision but with limited exposure.

6. Sutures and suturing techniques :

Absorbable suture materials that lose 80% of their strength within 14 days wound dehiscence shown to be more common. Multifilament suture materials are associated with more wound infection because of bacteria being enclosed in the interstices of multifilament sutures. Very tight single stitch in an interrupted closure ischemia will develop in the tissue enclosed. Similarly more knots more foreign materials will be deposited resulting in wound infection. Excessive tension on the suture compromises local blood flow associated with increased wound infection.

7. Postoperative Pulmonary Complication :

Postoperative coughing and straining are established factors in causing wound dehiscence.

8. Steroids :

Because steroids on long term blunt the normal inflammatory response which are essential for wound healing process resulting in impaired collagen deposition and polymerization in the wound causing in wound dehiscence.

9. Chemotherapy :

The early postoperative administration of chemotherapy is associated with impaired wound healing. It is preferable to delay such treatment for several weeks to permit maximal wound healing.

10. Ascites :

Patients with liver cell failure and ascites have increased abdominal pressure and they are severely malnourished so more prone for abdominal wound dehiscence.

11. Type of Operation :

Laparotomy for peritonitis in patients with perforated peptic ulcer appendicitis, intra abdominal malignant diseases and reoperation

through original incision within the 1st 6 month after initial procedure. Have increased tendency for wound dehiscence due to the factors already discussed above. The cause of the wound failure is not in the operation itself but in the presence of many of the factors previously mentioned.

12. Type of surgical wounds :

Surgical wounds are classified on the basis of presumed magnitude of bacterial load during surgery.

Clean wounds - Class I: no infection is present only skin micro flora potentially contaminate the wound.

Clean contaminated - Class II: a hollow viscus such as the respiratory alimentary or genitourinary tracts with indigenous bacterial flora is opened under controlled circumstances without significant spillage of contents. Elective colorectal cases have been included as class II cases.

Contaminated wounds - Class III: open accidental wounds encountered early after injury introduction of bacteria into a normally sterile area of the body due to major breaks in the sterile technique. ex: spillage of content from intestine.

Dirty wounds - Class IV: traumatic wounds with a significant delay in treatment and wound with necrotic tissue is present and those created in the presence of purulent material.³³

PREVENTIVE MEASURES

Some factors identified as important causative for abdominal wound dehiscence may not be possible to correct preoperatively, such as patient age or over weight which could not be influenced in an emergency laparotomy for a grossly contaminated abdomen. However its in the hands of the surgeon - the suture technique which is strongly related to the wound dehiscence.

Incisions:

The rate of wound complications is different for midline paramedian lateral paramedian oblique transverse and muscle splitting incisions. When limited access to the abdomen is sufficient muscle splitting incisions are preferred as they are associated with a much lower rate of wound complications because of a shutter mechanism that tends to close the wound.

Suture Materials:

1. Because the bacteria being enclosed within the interstices of multifilament sutures and Monofilament suture materials are associated with a lower rate of wound infection than multifilament.
2. Non absorbable suture materials allow support of the wound during the entire healing period.

3. With slowly absorbable monofilament suture materials that retain an acceptable strength for at least 6 weeks (polydioxone) the rate of wound dehiscence has been similar to non absorbable.
4. With absorbable suture materials 80% of their strength is lost within 14 days wound dehiscence has been shown to be more common.

The method of wound closure :

It is recommended for laparotomy incisions to be closed by a continuous suture technique in one layer. Show that less foreign material and fewer knots are deposited and allow even distribution of tension along the suture line. In place of anchor knot self-locking knots should be used.

In vertical midline incisions closure should include aponeurotic tissue and placed at least 1cm from the wound edge. The length of each stitch should be less than 5cm; otherwise it will be associated with an unnecessary high rate of wound infection. Incorporating peritoneum muscle or subcutaneous fat in the suture is not necessary. Wound should be closed by an SL:WL ratio of less than 4 with an optimal SL:WL ratio between 4 & 5.

Wound infection :

In wounds with intra-operative contamination the incidence of infection can be reduced by administration of appropriate pre operative antibiotic. Applying principles of gentle tissue dissection with use of optimal suture material during closure and wound wash to remove debris blood clots and foreign matter with meticulous haemostasis significantly reduces the incidence of abdominal wound dehiscence.

METHODOLOGY

METHODOLOGY

"A CLINICAL STUDY ON PREDICTORS OF ABDOMINAL WOUND DEHISCENCE AND MANAGEMENT IN POST-LAPAROTOMY PATIENTS IN RGGGH" was conducted at Institute of General Surgery Madras Medical College on patients admitted in Institute of General Surgery between June 2016 and September 2017 who had undergone routine and emergency laparotomies who developed abdominal wound dehiscence following Laparotomy.

Inclusion criteria :

Patient admitted in the general surgery department and undergoing routine and emergency laparotomies who developing abdominal wound dehiscence after Laparotomy.

Exclusion criteria :

- Patients with previous laparotomies will be excluded.
- Patients age below 18 yrs.

A detail study on various factors influencing development of abdominal wound dehiscence in these patients were done as per Proforma:-

Underlying pathology, age, Nutritional status (BMI<18.5) Obesity (BMI>29.9), Diabetes Mellitus, Pulmonary Diseases with cough, Use of

Steroids, Immunodeficiency, Anaemia, Hyperbilirubinemia, Hypoproteinemia Chronic liver Disease with Ascites, Malignancy, Type of Incision, Type of Surgical Wound, Emergency /Elective Laparotomy Operating surgeon's experience, Post- operative cough and vomiting.

Data will be analysed statistically and definitive conclusion will be arrived on predictors leading to post-operative abdominal wound dehiscence and management of wound dehiscence.

RESULTS

RESULTS

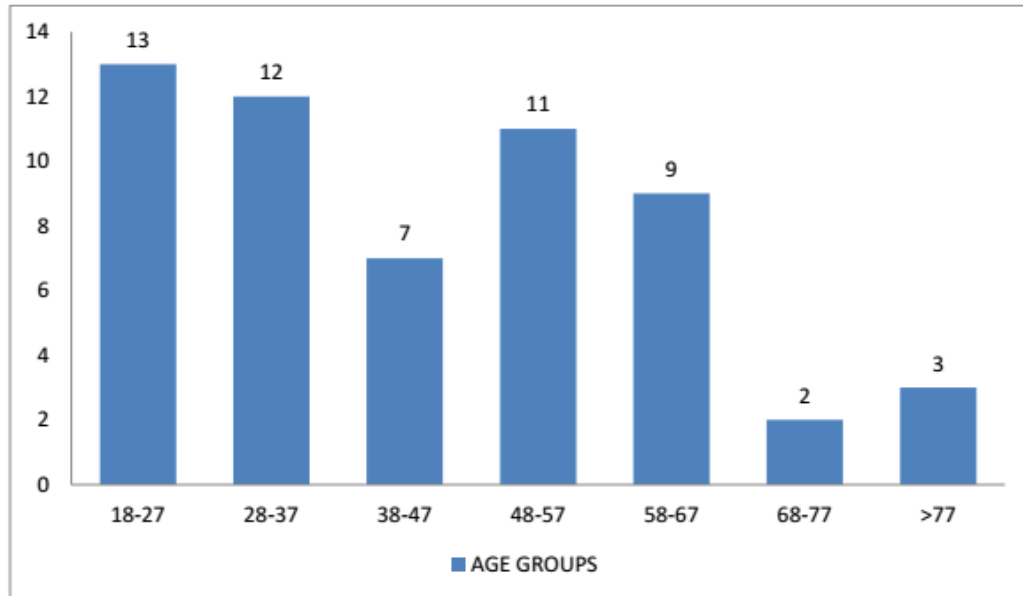
AGE WISE DISTRIBUTION OF ABDOMINAL WOUND

DEHISCENCE

Age	No. of cases	Percentage
18 – 27	13	22.80
28 – 37	12	21.05
38 – 47	7	12.28
48 – 57	11	19.29
58 – 67	9	15.78
68 – 77	2	3.50
> 77	3	5.26
	57	99.96

In this study the youngest patient was 18 year old and oldest patient was 90 years. The mean age of patients affected was 43.68 years.

AGE WISE DISTRIBUTION OF ABDOMINAL WOUND DEHISCENCE

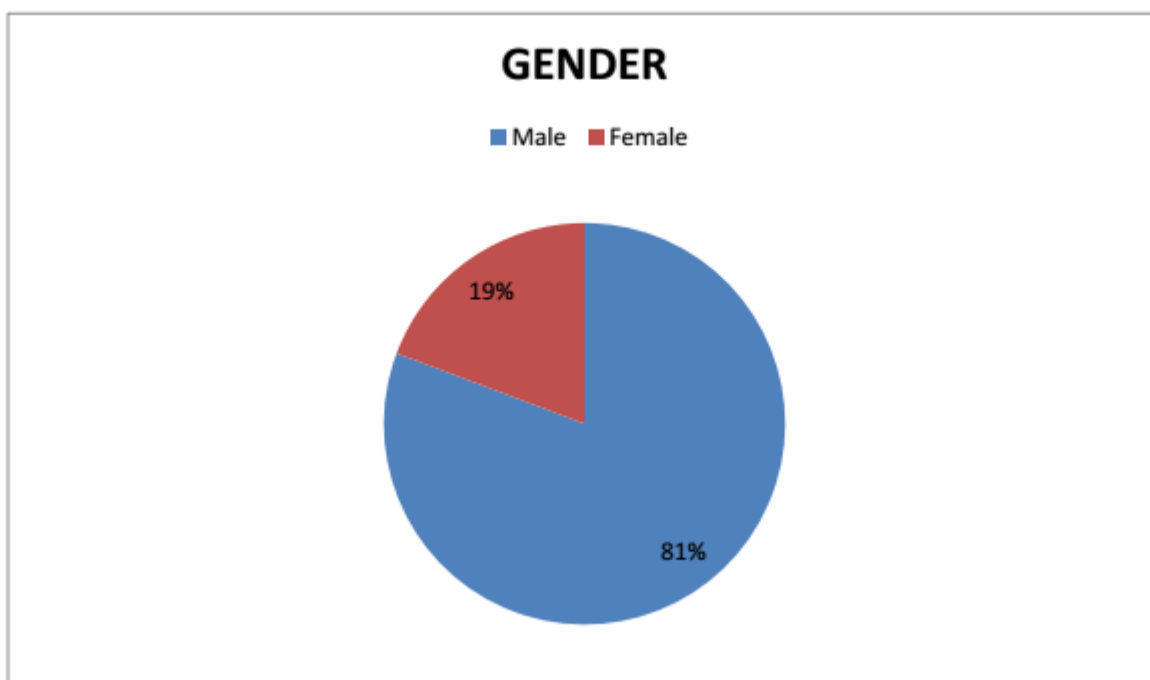


**GENDER WISE DISTRIBUTION OF ABDOMINAL WOUND
DEHISCENCE**

Gender	No. of cases	Percentage
Male	46	80.70
Female	11	19.29

Out of 57 cases 46 cases were male and there were 11 female cases.

**GENDER WISE DISTRIBUTION OF ABDOMINAL WOUND
DEHISCENCE**

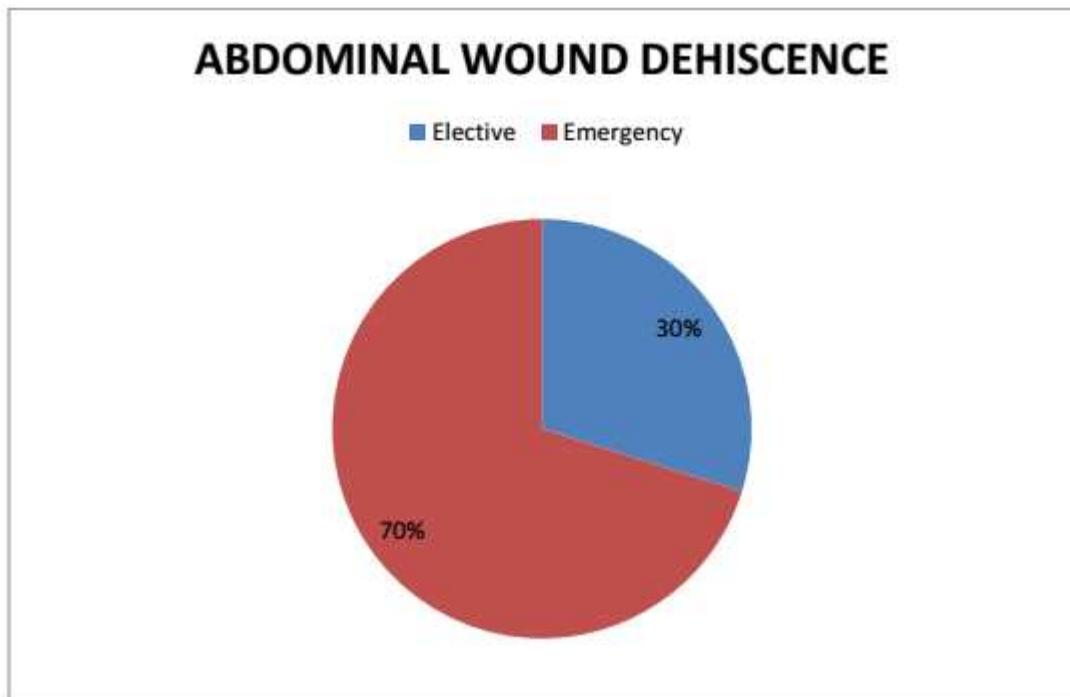


**EFFECT OF EMERGENCY OPERATIONS IN DEVELOPING
ABDOMINAL WOUND DEHISCENCE**

Surgery	No. of cases	Percentage
Elective	17	29.82
Emergency	40	70.17

Out of 57 cases 40 cases (70.17%) were operated as emergency surgery and 17 cases (29.82%) as elective surgery ($P < 0.0001$, S)

**EFFECT OF EMERGENCY OPERATIONS IN DEVELOPING
ABDOMINAL WOUND DEHISCENCE**

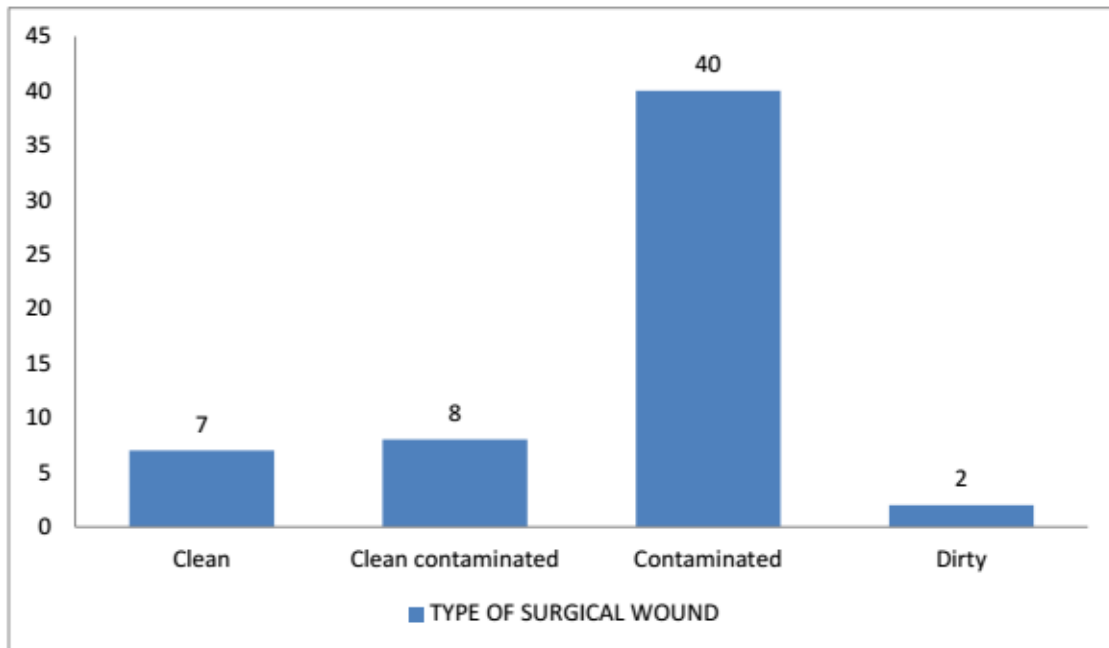


**TYPE OF SURGICAL WOUND IN DEVELOPING ABDOMINAL
WOUND DEHISCENCE**

Type of surgical wounds	No. of cases	Percentage
Clean	7	12.28
Clean Contaminated	8	14.03
Contaminated	40	70.17
Dirty	2	3.50

40 cases (70.17%) in the study have been classified as contaminated wound

TYPE OF SURGICAL WOUND IN DEVELOPING ABDOMINAL WOUND DEHISCENCE

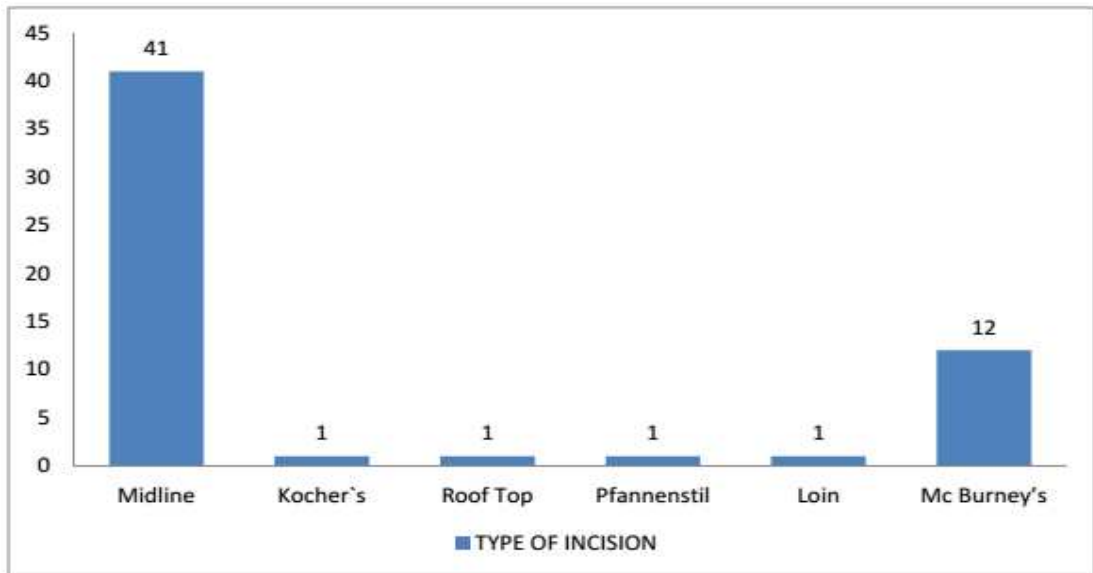


**FREQUENCY OF ABDOMINAL WOUND DEHISCENCE IN
RELATION TO THE TYPE OF INCISION**

Type of incision	No. of cases	Total
Midline	41	71.92
Kocher's	1	1.75
Roof Top	1	1.75
Pfannenstil	1	1.75
Loin	1	1.75
Mc Burney's	12	21.05
Total	57	

Out of 57 cases 41 cases (71.92%) were operated with midline incision. 12 cases (21.05%) were operated using Mc Burney's incision (p = 0.0001, S) to calculate p value midline and Mc Burney's values are only considered

**FREQUENCY OF ABDOMINAL WOUND DEHISCENCE
INRELATION TO THE TYPE OF INCISION**

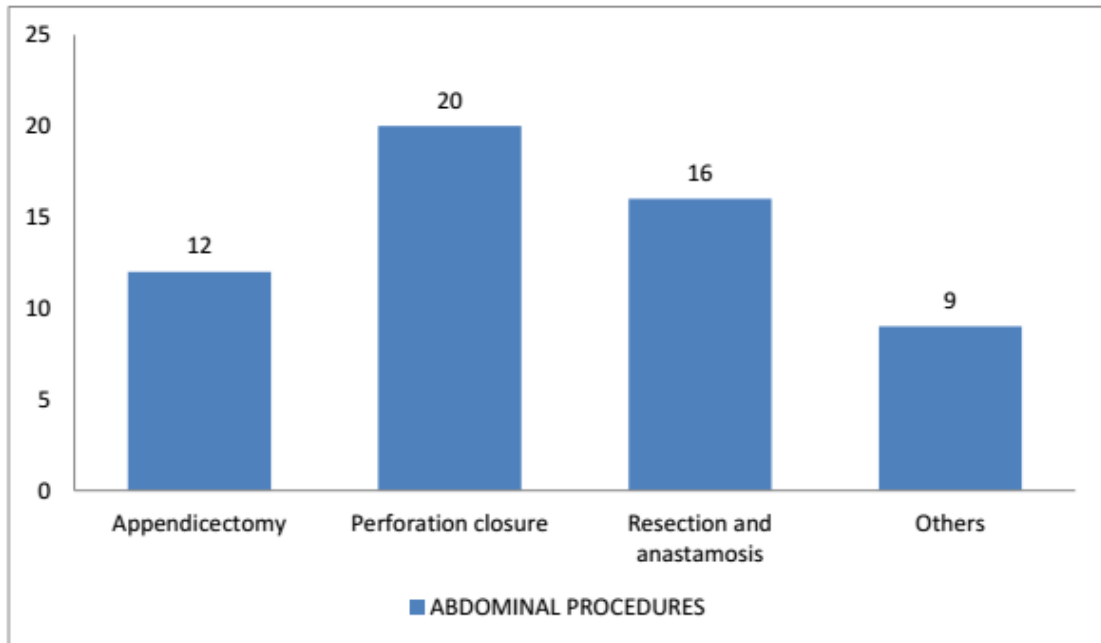


**ABDOMINAL WOUND DEHISCENCE IN VARIOUS
ABDOMINAL PROCEDURES**

Procedure	No. of cases
Appendicectomy	12
Perforation closure	20
Resection and anastamosis	16
Others	9
Total	57

Out of 57 cases studied, 20 cases were perforation closure. 16 cases were resection and anastomosis.

ABDOMINAL WOUND DEHISCENCE IN VARIOUS ABDOMINAL PROCEDURES

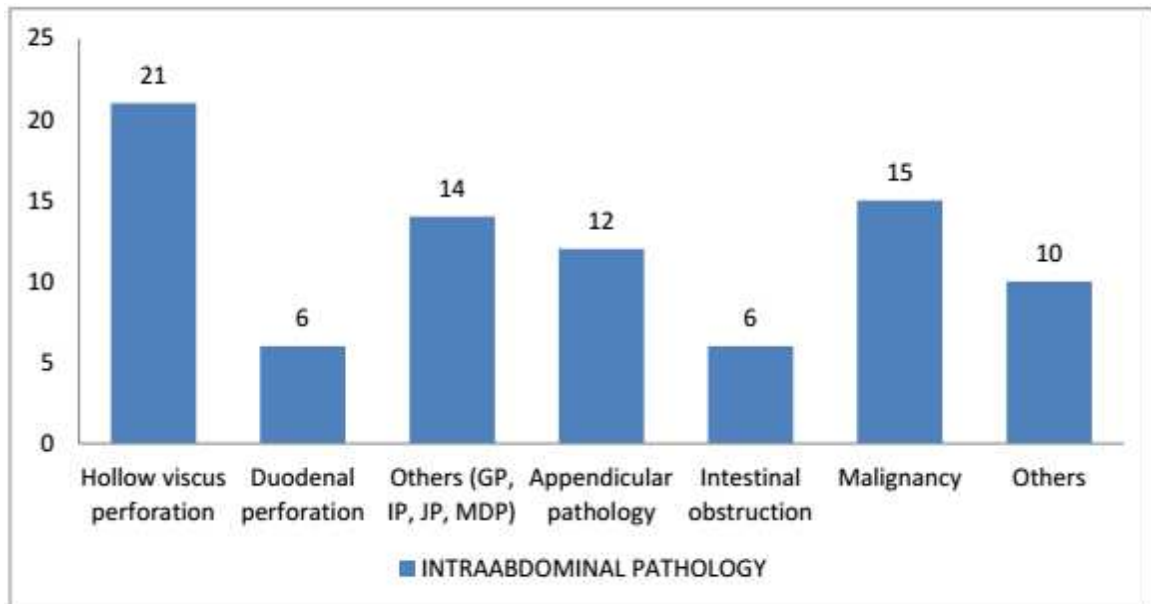


**DISTRIBUTION OF PATIENTS WITH ABDOMINAL WOUND
DEHISCENCE IN RELATION TO INTRA ABDOMINAL
PATHOLOGY**

Diagnosis	No. of cases
Hollow viscus perforation	21
Appendicular pathology	12
Duodenal perforation	6
Others (GP IP JP MDP)	14
Malignancy	15
Intestinal obstruction	6
Others	10

Out of 57 cases studied 21 patients were diagnosed to have peritonitis secondary to hollow viscus perforation. 15 patients were having malignancy, 12 patients had appendicular pathology 6 patients with intestinal obstruction.

**DISTRIBUTION OF PATIENTS WITH ABDOMINAL WOUND
DEHISCENCE IN RELATION TO INTRA ABDOMINAL
PATHOLOGY**

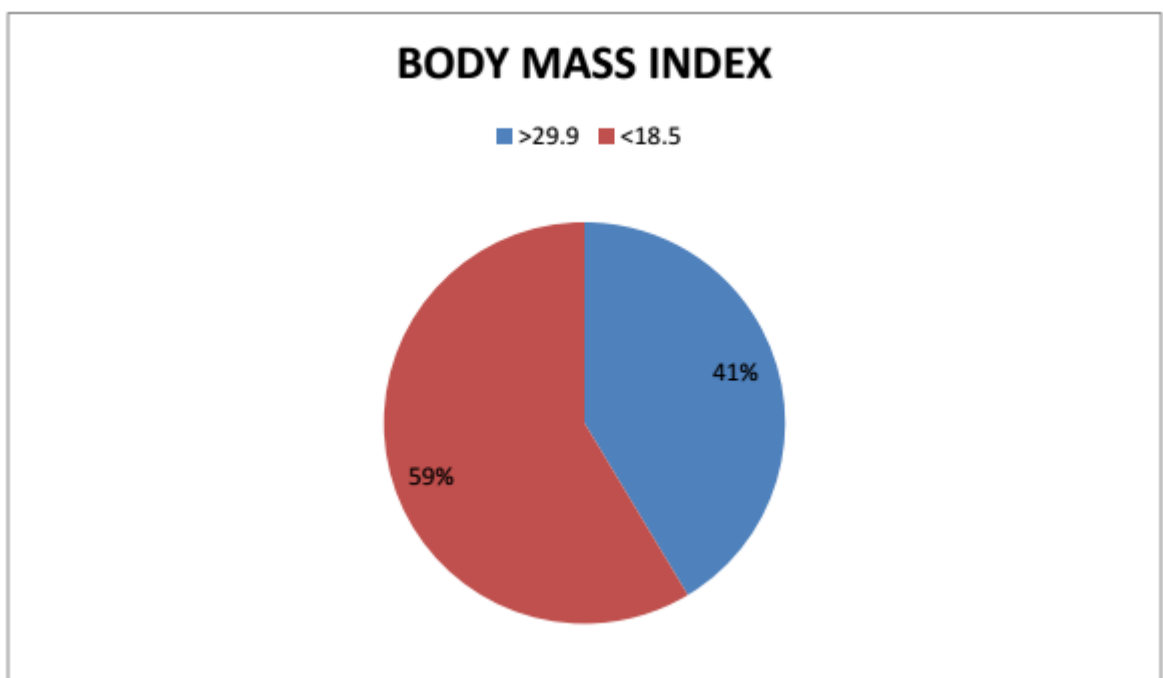


**FREQUENCY OF ABDOMINAL WOUND DEHISCENCE IN
RELATION TO BODY MASS INDEX**

BMI	No. of cases
>29.9	12
<18.5	17

Out of 57 cases studies 12 patients were with BMI above 29.9 and 17 patients were BMI below 18.5 (p = 0.282 NS)

**FREQUENCY OF ABDOMINAL WOUND DEHISCENCE IN
RELATION TO BODY MASS INDEX**

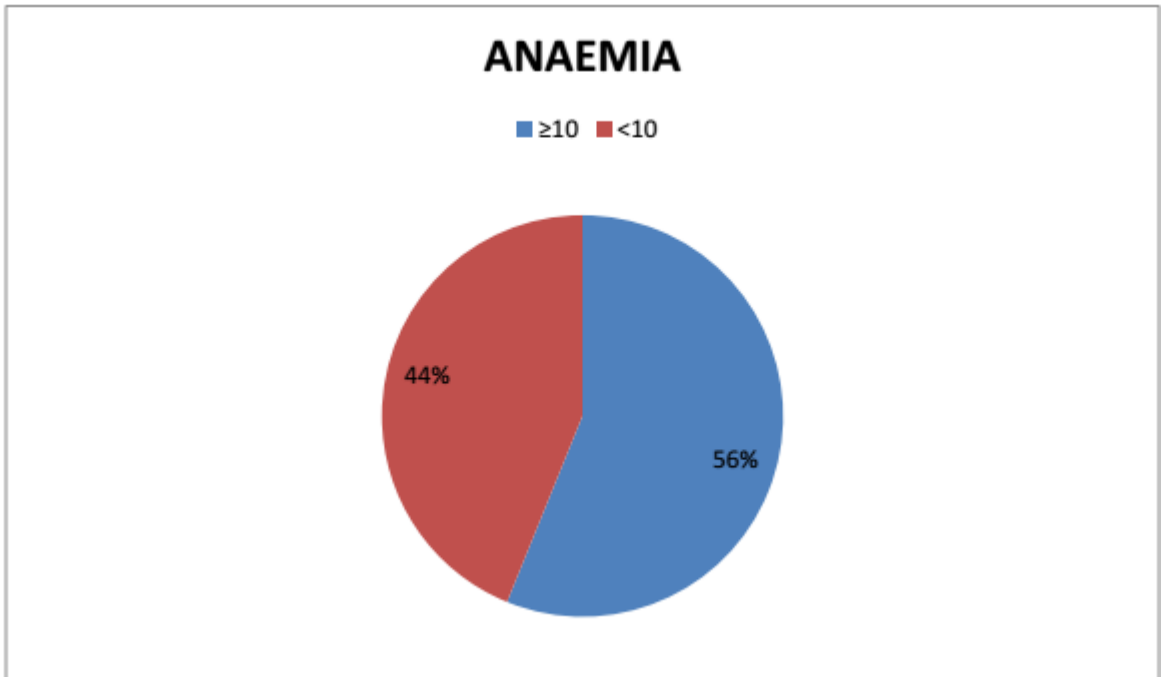


**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
ANAEMIC PATIENTS**

Hb%	No. of cases
≥ 10	32
< 10	25

Out of 57 cases studied 25 patients were with Hb% < 10 gm% and 32 patients were with ≥ 10 gm% and more than 10 gm% (p = 0.19 NS)

**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
ANAEMIC PATIENTS**



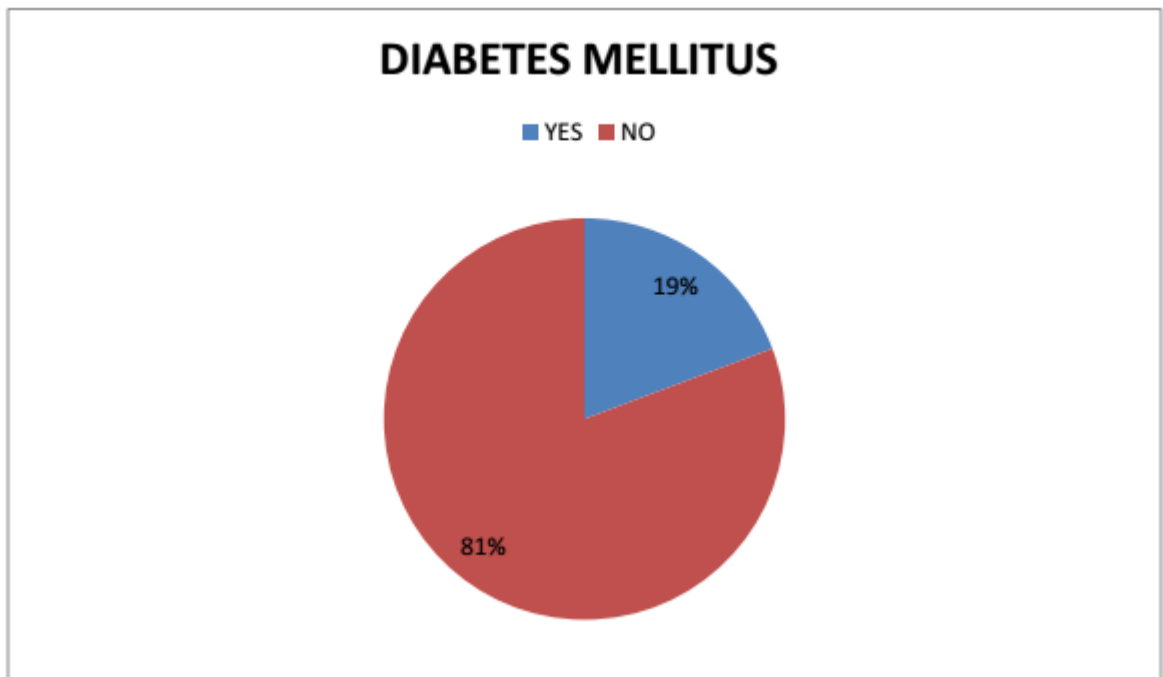
**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
DIABETES MELLITUS PATIENTS**

Diabetes Mellitus	No. of cases
Yes	11
No	46

Out of 57 cases studied 11 patients were having diabetes mellitus

($p > 0.0001$, S)

**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
DIABETES MELLITUS PATIENTS**

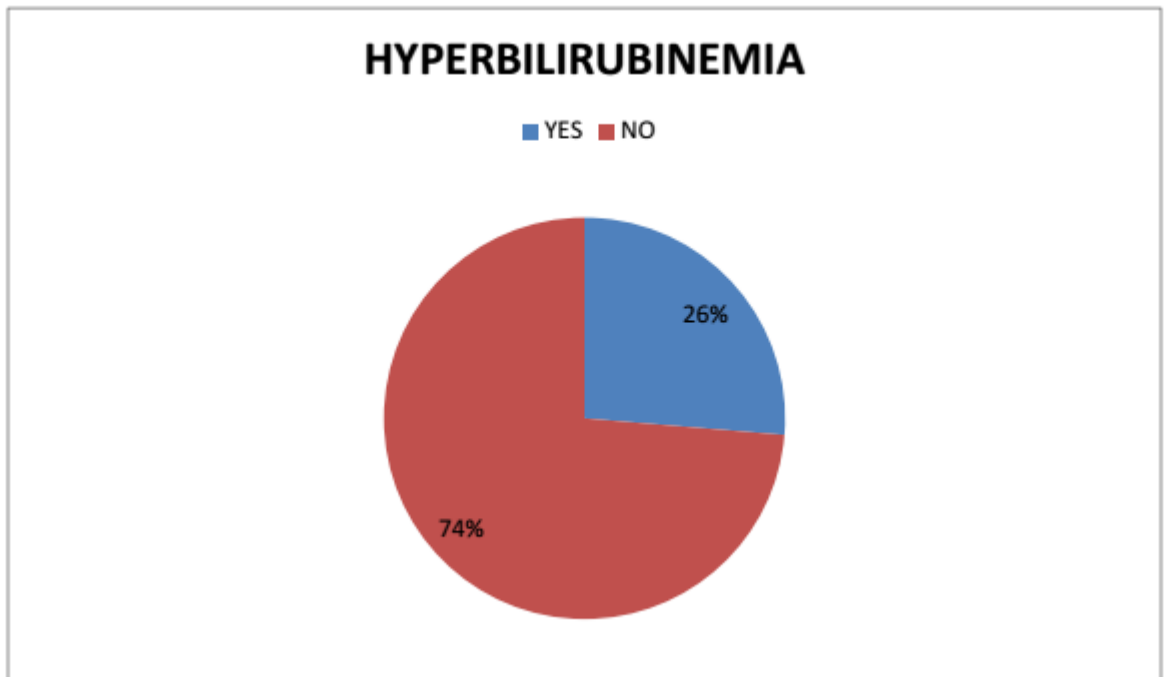


**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
PATIENTS WITH HYPERBILIRUBINEMIA**

Hyperbilirubinemia	No. of cases
Yes	15
No	42

Out of 57 cases studied 15 patients were having Hyperbilirubinemia
($p > 0.0001$, S)

**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
PATIENTS WITH HYPERBILIRUBINEMIA**

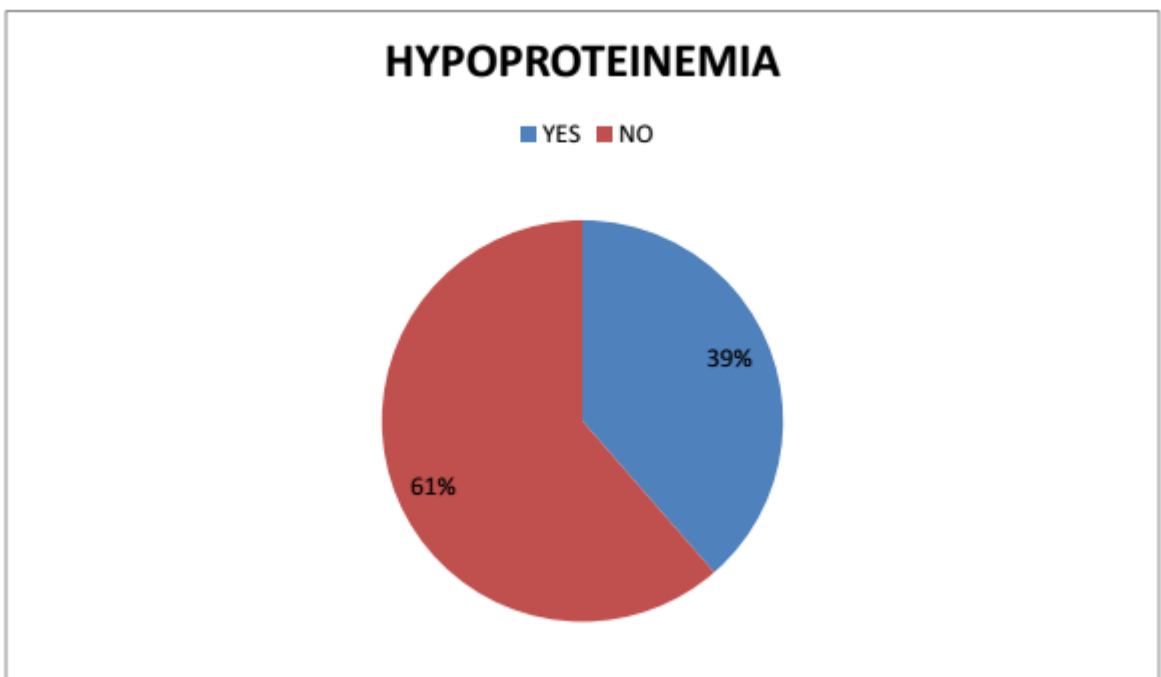


**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
PATIENTS WITH HYPOPROTEINEMIA**

Hypoproteinemia	No. of cases
Yes	22
No	35

Out of 57 cases studied 22 patients were with Hypoproteinemia (p > 0.019, S).

**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
PATIENTS WITH HYPOPROTEINEMIA**

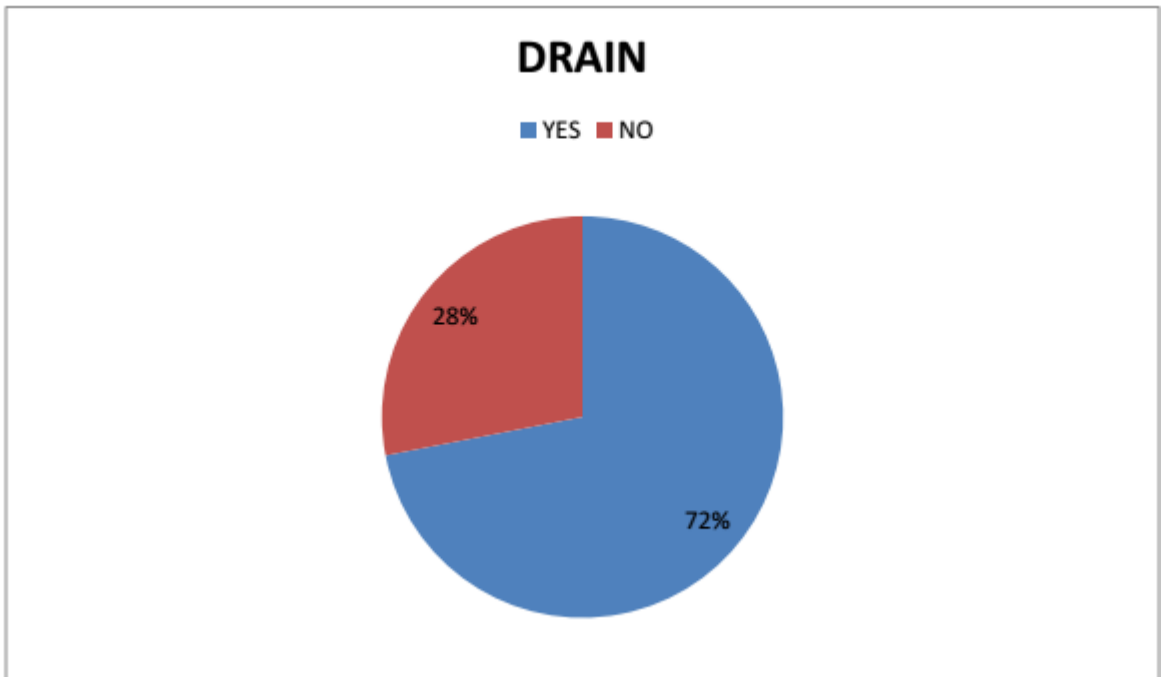


**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
PATIENTS WITH DRAIN**

Drain	No. of cases
Yes	41
No	16

Out of 57 cases studied in 41 patients drain was placed ($p > 0.0001$, S).

**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
PATIENTS WITH DRAIN**



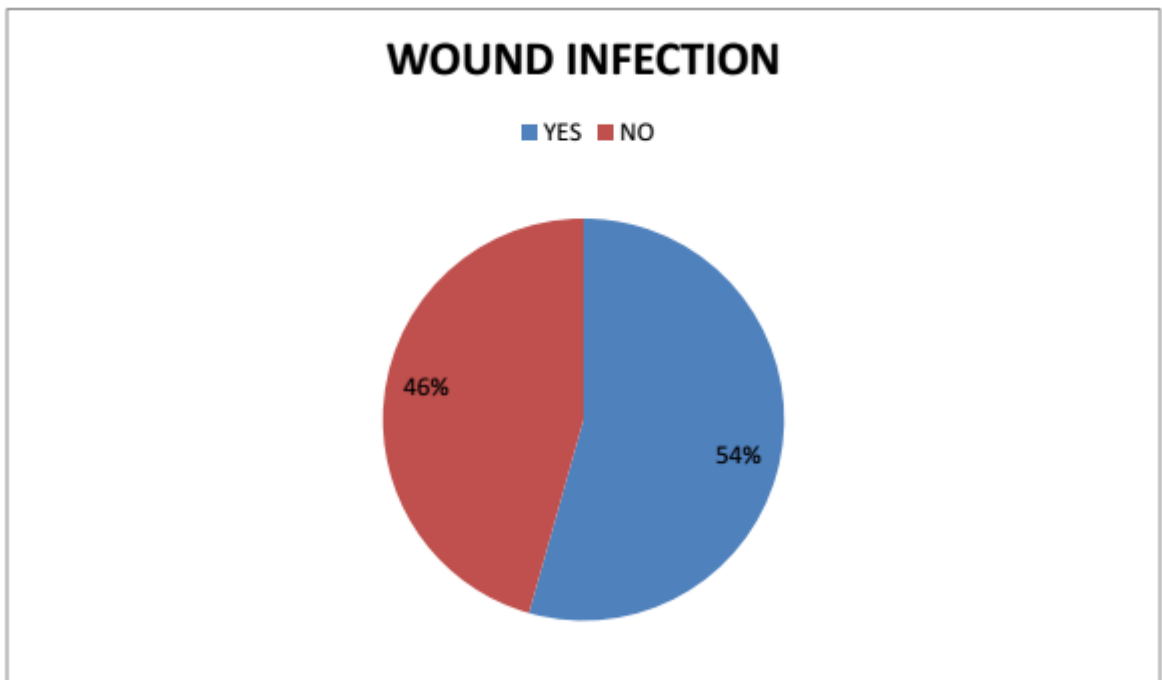
**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
PATIENTS WITH WOUND INFECTION**

Wound Infection	No. of cases
Yes	31
No	26

Out of 57 cases studied 31 patients wound infection was noted

(p = 0.349, NS).

**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
PATIENTS WITH WOUND INFECTION**

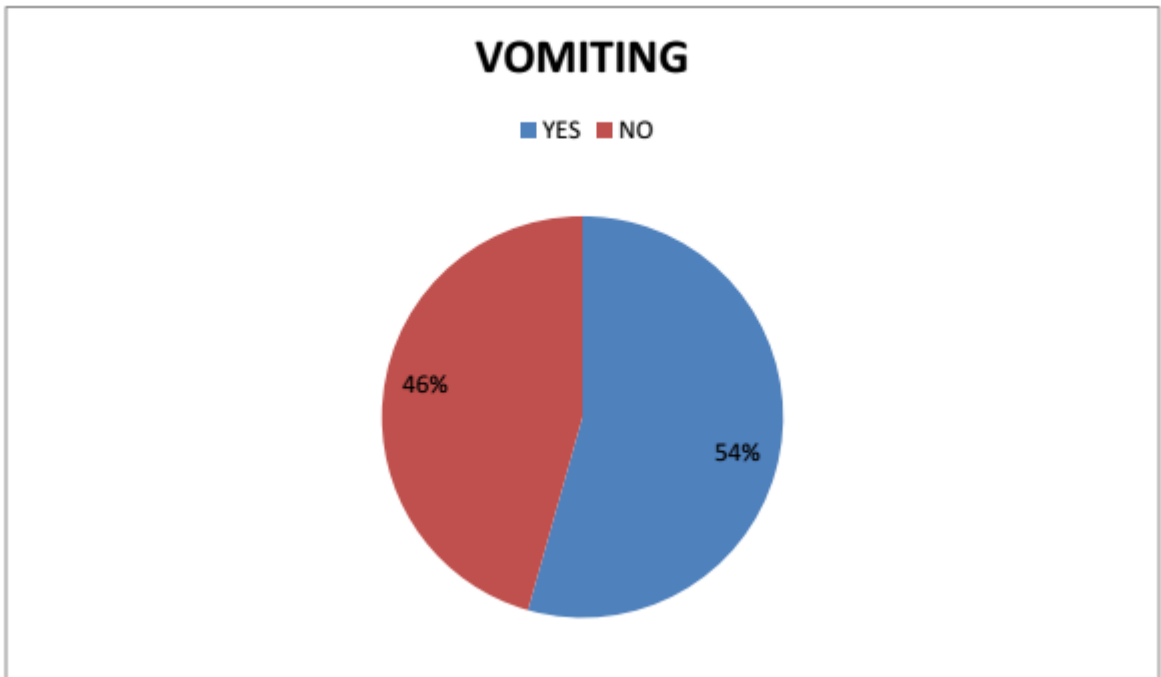


**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
RELATION TO VOMITING**

Vomiting	No. of cases
Yes	31
No	26

Out of 57 cases studied 31 patients complaint of vomiting post operatively. (p = 0.349, NS).

**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
RELATION TO VOMITING**

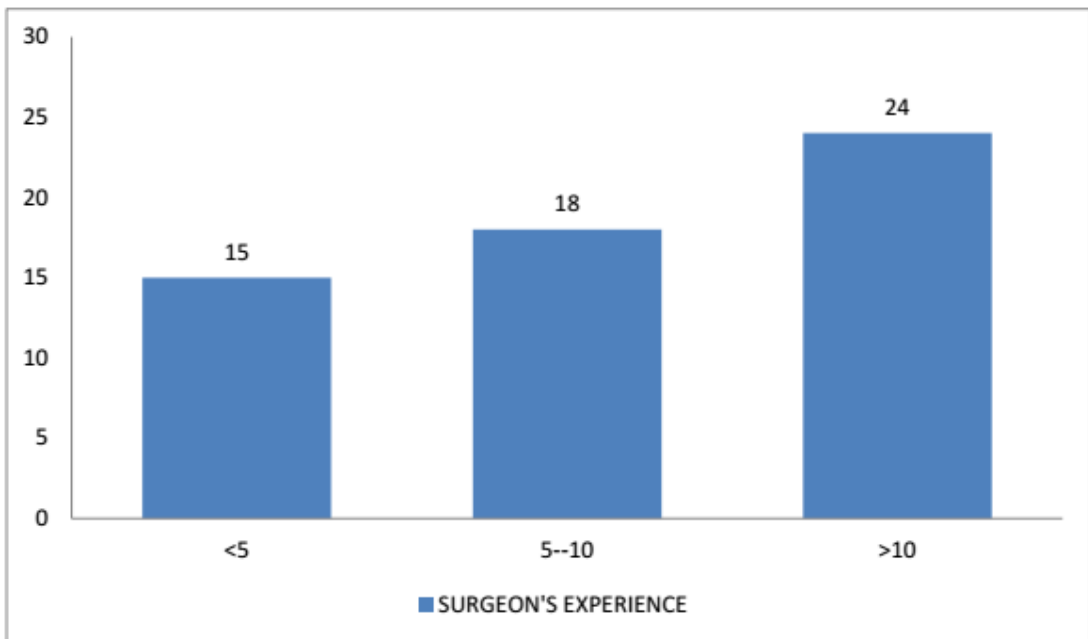


**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
RELATION TO SURGEON EXPERIENCE**

Surgeon's Experience	No. of cases
<5 years	15
5—10 years	18
>10 years	24

Out of 57 cases studied 24 patients were operated by doctors with experience >10 years, 18 patients were operated by surgeon with 5-10 years of experience (p = 0.583, NS)

**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
RELATION TO SURGEON EXPERIENCE**



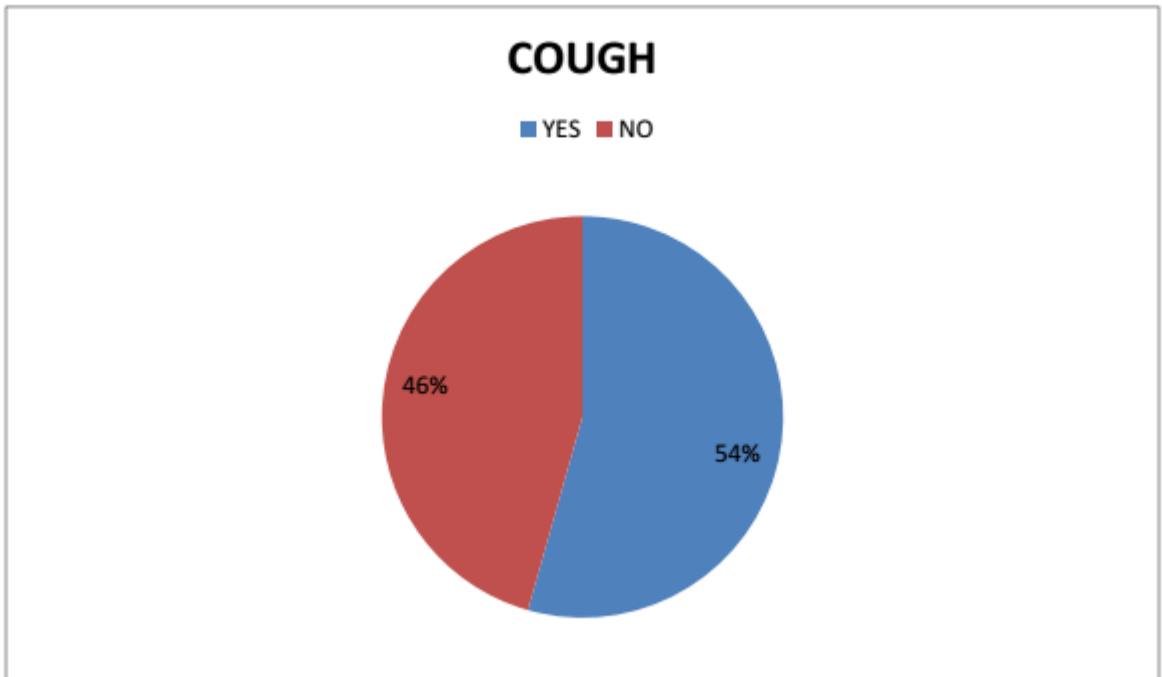
**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
RELATION TO COUGH**

Cough	No. of cases
Yes	31
No	26

Out of 57 cases studied 31 patients had postoperative cough.

(p = 0.349, NS)

**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
RELATION TO COUGH**



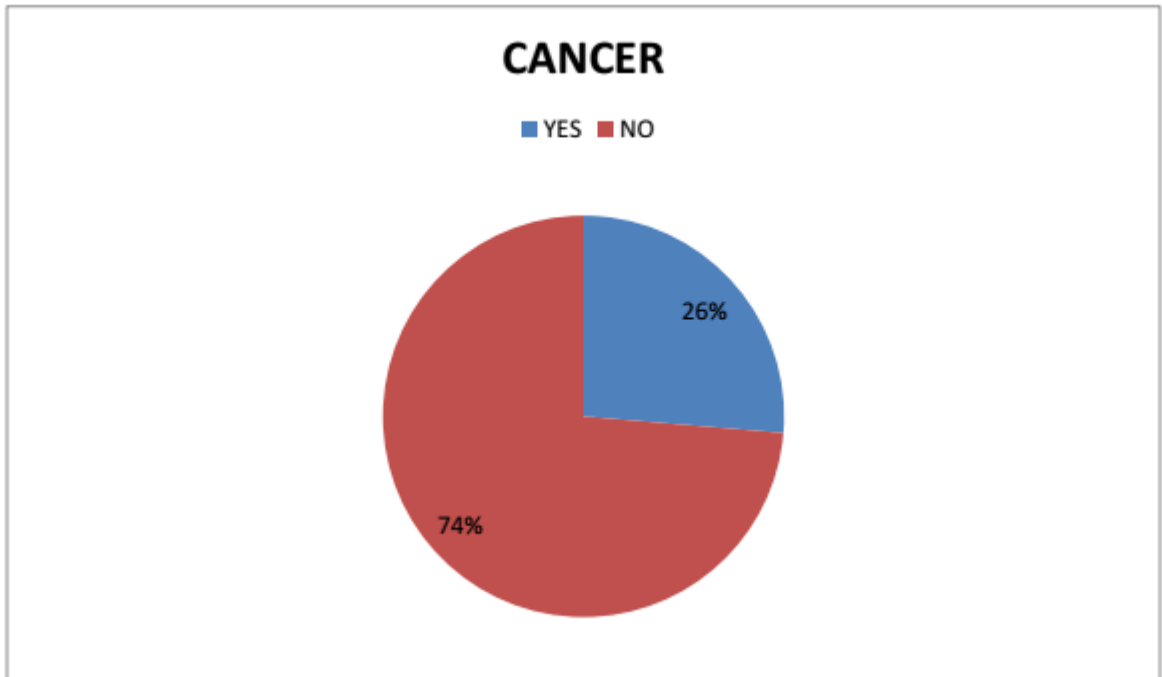
**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
CANCER PATIENTS**

Cancer	No. of cases
Yes	15
No	42

Out of 57 cases studied 15 patients were with malignancy.

($p > 0.0001$, S).

**PREVALENCE OF ABDOMINAL WOUND DEHISCENCE IN
CANCER PATIENTS**

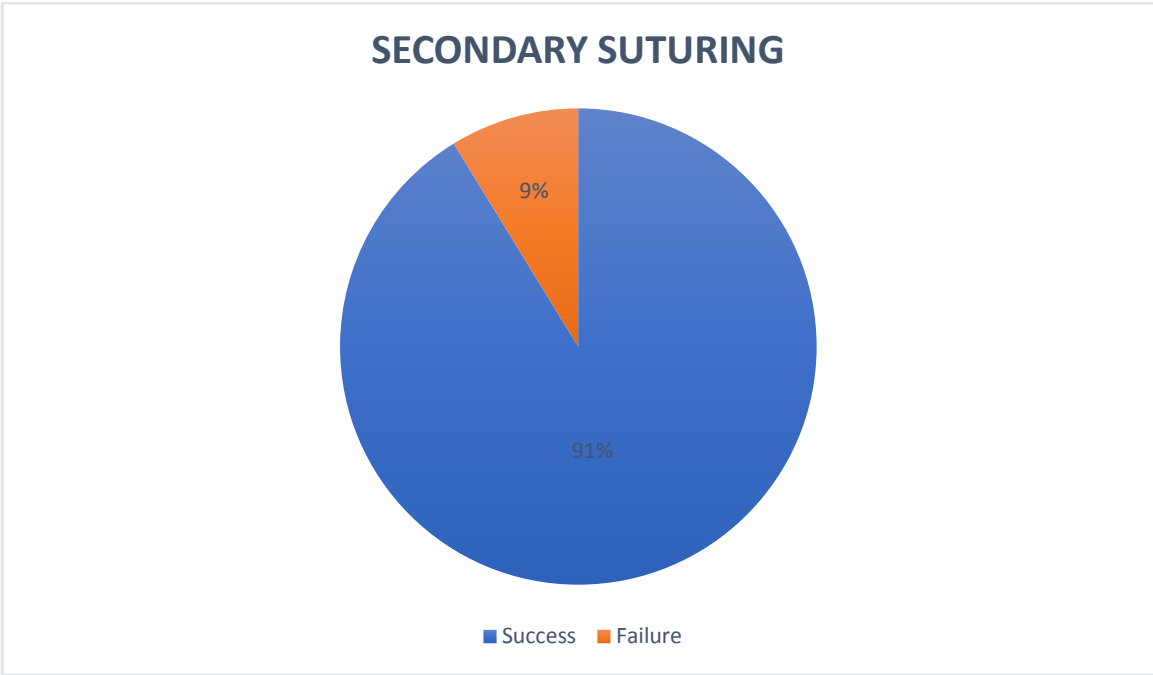


INCIDENCE OF FAILURE OF SECONDARY SUTURING

Secondary suturing	No. of cases
Success	52
Failure	5

All 57 cases were managed with wound debridement and secondary suturing. 5 of the patients had failure of secondary suturing and required re-surgery.

INCIDENCE OF FAILURE OF SECONDARY SUTURING



DISCUSSION

DISCUSSION

In this clinical study 57 patients who developed abdominal wound dehiscence after laparotomy in RGGH were studied between June 2016 and September 2017.

A study conducted at Spain by Dr. Joseph on 12622 patients following laparotomy shown mean age of abdominal wound dehiscence at 70 yrs³⁵. In our study mean age found to be 43.68 yrs as the appendicular perforation and duodenal ulcer perforation were common in this age group.

A study conducted at Mesologgi General Hospital, out of 3500 laparotomies 34 showed abdominal wound dehiscence commonly among male gender of 80.70%. In our study it was male predominance with ratio of 4.18:1, as higher incidence of hollow viscus perforation and intestinal obstruction was among male 78%.

A study conducted at Cleveland Veterans Affairs Medical Centre USA over 7 years showed Intra-abdominal infection followed by wound dehiscence were higher among emergency operations ($p < 0.02$) and in

operations with higher wound contamination ($p < 0.02$). In our study 36.84% of patients with hollow viscus perforation and 26.3% patients with malignancy developed abdominal wound dehiscence.

A study at Mesologgi Hospital involving 3500 laparotomies found that 60% of the patients who developed abdominal wound dehiscence were emergency surgery. In our study it was 70.17% of emergency surgery developed wound dehiscence.

A study at department of SGE Copenhagen University, Hvidovre Hospital showed that incidence of abdominal wound dehiscence more common in midline incision than transverse incisions ($p = 0.0001$). In our study out of 57 patients 41 who developed wound dehiscence were had undergone midline incisions ($p < 0.0001$).

CONCLUSION

CONCLUSION

The most significant risk factors contributing the development of post operative abdominal wound dehiscence:

1. Old age, male sex, anaemia, malnutrition, obesity, peritonitis, emergency surgery, perforation closure, resection and anastomosis.
2. Midline incisions, poor suture technique, surgeons experience and adherence to improper aseptic precautions with potential wound infection followed by abdominal wound dehiscence.
3. Preventive measures are prophylactic optimization of patients comorbid conditions, improving the nutritional status of the patient, proper aseptic precautions, optimising patients lung condition, avoiding other straining conditions like cough and by applying proper surgical technique with adequate skill acquisition.
4. Management of abdominal wound dehiscence needs sincere attention by the treating surgeon on early identification wound dehiscence and effective application of debridement techniques followed by proper suturing techniques. Further studies to investigate management of wound dehiscence and innovative techniques like VAC therapy need to be done.

SUMMARY

SUMMARY

- Male/Female ratio of abdominal wound dehiscence 4.18:1.
- Mean age of patients affected was 43.68 yrs.
- Incidence was more common in patients with peritonitis due to duodenal and appendicular perforation.
- Patients with contaminated wounds developed wound dehiscence more significantly.
- Ratio in emergency versus elective surgery was (2.35:1).
($p < 0.0001$, S)
- Midline incision carried higher risk for wound dehiscence than with other incisions. ($p = 0.0001$, S)
- Diabetes mellitus Hypoproteinemia Hyperbilirubinemia are contributing factors for abdominal wound dehiscence.
- Patients with malignancy are strongly associated with higher incidence of abdominal wound dehiscence.
- Management of abdominal wound dehiscence involves treating the contributing factors improving the patients general conditions following standard debridement and suturing technique.

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ANNEXURE

PROFORMA

Particulars of the Patient:

Case No : IP.No.

Name :

Address :

Age : Sex : Date of Admission:

Ward No : Unit :

Date of Discharge/Death :

RISK FACTORS	RESULTS
Diagnosis	Y/N
Underlying Pathology	Y/N
Age more than 65 years	Y/N
Poor Nutritional Status (BMI<18.5)	Y/N
Obesity (BMI>29.9)	Y/N
Diabetes Mellitus	Y/N
Pulmonary Diseases with Cough	Y/N
Use of Steroids	Y/N
Immunodeficiency	Y/N
Hemoglobin (<10 g/df)	Y/N
Hyperbilirubinemia	Y/N
Hypoproteinemia	Y/N
CLD with Ascites	Y/N
Malignancy	Y/N
Emergency / Elective	EM/EL
Surgeons Experience (<5/5-10 />10 yrs)	
Type of Incision	
Type of Surgical Wound	C/CC/CO/D
Drain Placed	Y/N
Wound Infection	Y/N
Post – Operative Cough	Y/N
Paralytic Ileus	Y/N
Post of vomiting other straining factors	Y/N

PHOTOS



INFECTED WOUNDS



WOUND DEHISCENCE IN PARAMEDIAN INCISION



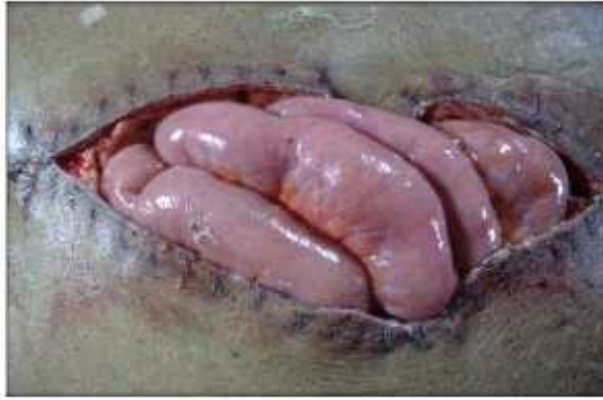
WOUND DEHISCENCE IN MC BURNEY'S INCISION



WOUND DEHISCENCE IN PFANNENSTIEL INCISION



WOUND DEHISCENCE IN MID LINE INCISION



WOUND DEHISCENCE IN MID LINE INCISION



(A) PRE OPERATIVE PICTURE OF MID LINE WOUND DEHISCENCE



(B) INTRA OPERATIVE PICTURE OF MID LINE WOUND DEHISCENCE



(C) POST OPERATIVE PICTURE OF MID LINE WOUND DEHISCENCE