# TITLE: A COMPARATIVE STUDY OF INCIDENCE OF SURGICAL SITE INFECTION USING SUBCUTANEOUS NEGATIVE SUCTION DRAIN VERSUS PASSIVE DRAIN IN ABDOMINAL SURGERIES

# INTRODUCTION

The term "surgical site infection", (formerly known as "postoperative wound infection") refers to infections that most likely developed as a result of surgery and that happen within 30 days of the operation or a year if an implant was used within the patient. With a 5 percent incidence across all surgical operations and up to 30-40 percent in abdominal surgeries, depending on the extent of contamination, 1 SSI is the cause of up to 20 percent of nosocomial infections. 2

Increased morbidity, mortality, patient discomfort, discontent, increased healthcare expenses, and problems from open wounds are all caused by surgical site infections.3

Many risk factors contribute to SSI. The main contributing factors are smoking, being overweight, having diabetes, being malnourished, being highly contaminated, using incorrect “antibiotic prophylaxis”, etc. There are three types of SSI, organ space infection occurring in any component handled during the surgical operation, deep incisional infection involving fascial and muscle layers, and superficial incisional infection involving skin and subcutaneous tissue.

Regular precautions including hand washing, shaving as little as possible, prepping the skin, and “antibiotic prophylaxis” is known to lower the risk of SSI. 5 The risk of SSI is increased by the presence of serous fluids, hematoma, or any other “dead space in the incisional wounds”. By eliminating infectious content and seroma, simple or passive drain and “negative suction” drain in the subcutaneous level have been found to lower the “risk of infection”.[6]

Postoperative subcutaneous wound drainage is used, however, it's not always preferred. Additionally, drains themselves could be ineffective, uncomfortable, and prolong hospital stays

[18].

**Need for Study:**

We occasionally employ a variety of techniques to lessen these difficulties. One of them is the application of subcutaneous drain to surgical wounds. The use of a subcutaneous drain is justified because the serum or debris that is accumulating there and closing off any empty area will reduce the risk of infection and wound problems. There aren't many articles on the topic of the subcutaneous drain's function in preventing local wound problems, and those that are accessible had mixed findings and were mostly conducted on female patients having breast or gynecological surgery.

In our institution's general surgical units, elective abdominal surgeries are frequently performed, and subcutaneous collections in these patients enhance morbidity.

Therefore, this study was carried out to compare the incidence of surgical site infection caused by passive drain and subcutaneous negative suction drain in abdominal surgeries.

# AIM AND OBJECTIVES

## AIM:

To Compare the Incidence of Surgical Site Infection Using Subcutaneous Negative Suction Drain Versus Passive Drain in Abdominal Surgeries

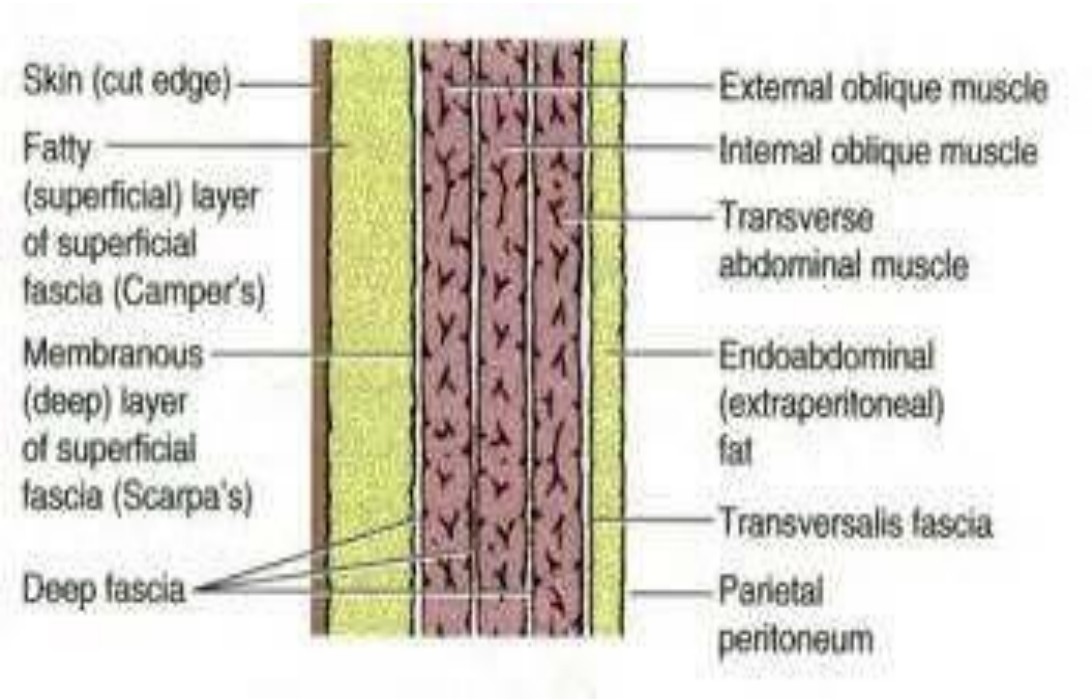
**OBJECTIVES OF THE STUDY**

1. "To determine the role of subcutaneous negative suction drainage in the incidence of surgical site infections in abdominal surgeries"
2. "To determine the role of the subcutaneous passive drain in the incidence of surgical site infections in abdominal surgeries"
3. "To determine the role of subcutaneous negative suction drain versus passive drain in the incidence of surgical site infection in abdomenal- surgeries"

# “REVIEW - OF LITERATURE”

## ANATOMY ABDOMENAL WALL:

“The layers of abdomenal wall includes following”




- Skin
- Subcutaneous tissue having superficial fatty Camper fascia and deep Scarpa fascial layer
- External oblique aponeurosis and associated ligaments
- Internal oblique and Transverse abdominis muscles
- Rectus abdominis and rectus sheath[24]

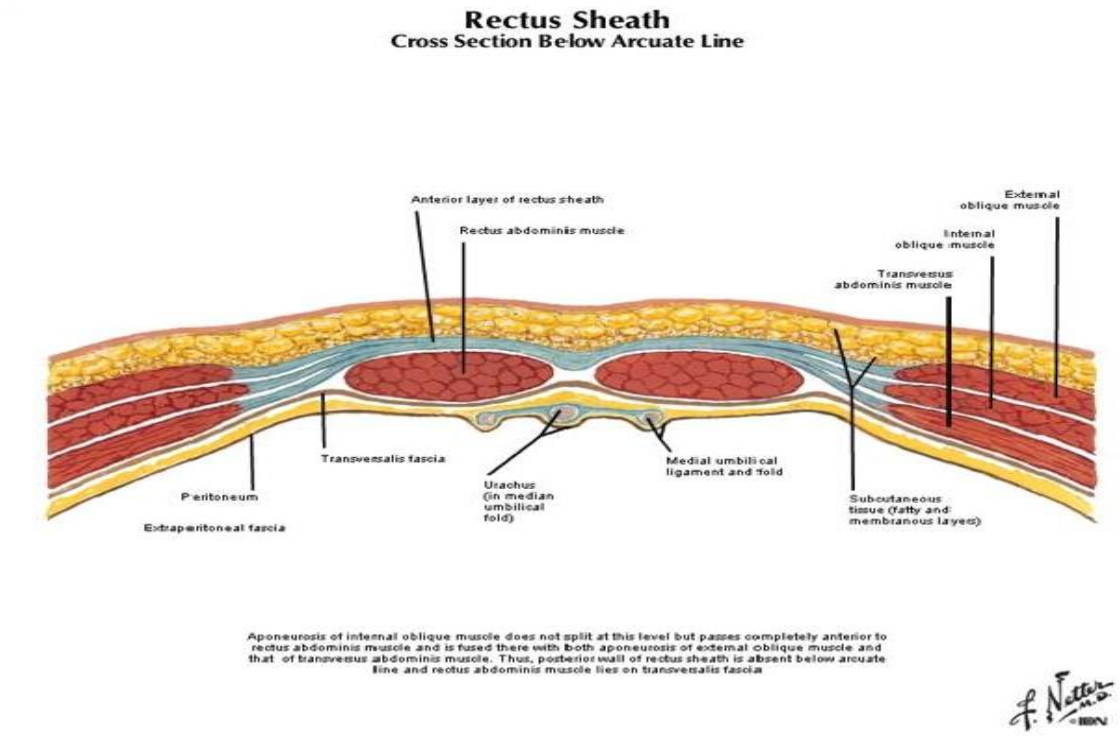
Incisions can be planned by the horizontal lines of cleavage in skin that is present around the trunk. Blood arteries, lymphatics, adipocytes make up subcutaneous layer. Under the skin,

“there is a layer of fatty tissue called camper fascia, which is continuos with outer fascial layers which covers perineum”. The scrotum's dartos muscle fibres can also be found in this layer. The lymphatics, which pass through this layer will drain to the inguinal nodes and axillary nodes above. The Campers fascia contains superficial epigastric, superficial circumflex iliac vessels, superficial external pudendal,. The second layer, scarpa fascia, iScarpaosed of compressed fibrous components. This creates the “clitoris” or the “penis” suspensory ligament. In the perineum, it unites with the Colles fascia's membrane layer of the superficial fascia.

“The lower six thoracic and first lumbar nerves anterior rami provides cutaneous nerve supply to anterior abdominal wall”. These neurons severs rectus sheath to reach the abdominal wall.27

## MUSCLES, LIGAMENTS, AND APONEUROSIS

The tranversus abdominis; internal oblique; and external oblique muscles are positioned from exterior to interior. Rectus abdominis muscles are located on either side of the midline. The three aponeurosis meet in the middle at the linea alba. A tiny muscle called the pyramidal is located in the rectus sheath's bottom region. “The spermatic cord is covered by the cremaster muscle, which originates from the internal oblique”.




## EXTERNAL OBLIQUE MUSCLE AND ASSOCIATED LIGAMENTS-

These muscle fibres originate from lower back's posterior part.

nine ribs. These muscle fibres are oblique in their lower section and horizontal in their higher part.

the lowest and centre portions. Linea inserts them into xiphoid process.

“Anterior portion of iliac crest, the pubic crest, and the pubic tubercle, the alba”.

The inguinal ligament is formed by the lowest fibres folding back on themselves.

the iliac crest, the lattissimus anterior fibres, and the posterior-most fibres

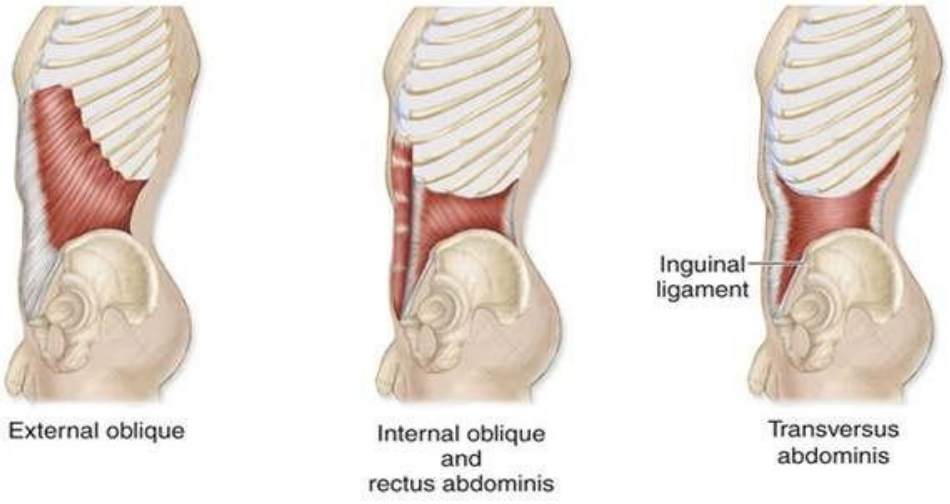
“Inferior lumbar triangle of Petit” is formed by the dorsi.

the superficial inguinal ring's - medial and lateral crus. The cord of the sperm

or the genital branch of the ilioinguinal nerve, the round ligament, and the
This hole lets the “genitofemoral nerve” pass through. The emergence of external spermatic fascia from these clast-margin areas. The superior pubic, is formed by the inguinal ligament by joining forces with the opposing inguinal ligament and anterior rectus sheath. The inguinal ligament descends to the superior pubic ramus, where it continues to create Gimbernat's ligament30. The Pectineal ligament of Cooper is created by the lateral extension of the inguinal ligament.

## INTERNAL OBLIQUE AND TRANVERSUS MUSCLES AND APONEUROSIS

The lumbar fascia, the anterior two-thirds of the iliac crest, and the lateral two-thirds of the inguinal ligament are the sources of the internal oblique. The lowest three ribs' costal cartilages, xiphoid process, linea alba, and pubic symphysis all receive the fibers. The anterior two-thirds of the iliac crest, the lumbar fascia, the lateral third of the inguinal ligament, and the lower six costal cartilages are the sources of the transversus abdominis muscle31. The rectus sheath and falx inguinalis are formed by the transverse abdominis fibers. The interior surface of the transversus abdominis muscle, iliacus, psoas, and obturator int




ernus muscles are covered by the transversalis fascia, also known as the endo- abdominal fascia.

## ANTISEPSIS AND ASEPSIS

Major surgical procedures would result in serious consequences if effective asepsis and antisepsis were not used. The introduction of scientifically supported antisepsis in management of wounds and conduct of surgeries is largely credited to Joseph Lister (1827–1912). He could see that the surgery patient could not be exposed to extreme heat. He,

therefore, applied carbolic acid to wounds and bandages as a chemical asepsis. Around the surgical field and the operating table, Lister sprayed carbolic acid. He downplayed the significance of washing one's hands and held the opinion that doing so would leave cracks in the palm, which could serve as a breeding ground for bacteria and sickness. By creating sterile absorbable sutures like carbolic catgut sutures, he also made strides in the field. Because of this, all of his proposals were poorly received. The autoclave has been advertised as a means of instrumensterilizationon. As a result, the idea of drains to prevent collecting in surgical wounds evolved8.

## WOUND HEALING

It is a process that involves a coordinated response by a variety of blood cells, including polymorphs, monocytes, macrophages, and fibroblasts, to restore the anatomical, physiological integrity of the damaged tissues.

## TYPES - WOUND HEALING

Primary healing is healing accomplished with the initial desire. happens in fresh wounds. Sutures or staplers are used to approximate the wound's edges, and epithelium regenerates more readily there than fibrosis does. It will leave a scar that is smooth and linear.

The healing that results from a secondary intention. Burns and other wounds involving significant tissue loss typically heal through secondary intention wound healing (fibrosis). A broad, hypertrophied scar is the result. A constricted scar is the outcome, and this could make you disabled.

Tertiary healing is when the main closure occurs later or with a third goal. Devitalized tissues are removed, and the incision is then stitched up[19].

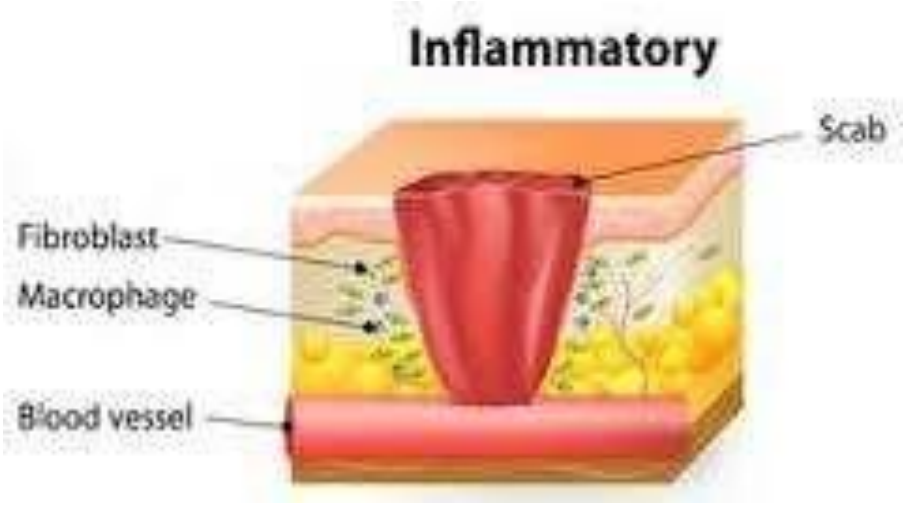
**“STAGES OF WOUND HEALING”**

- Stage of inflammation
- Stage of epithelialization.
- Stage of granulation tissue formation
- Stage of scar formation and resorption
- Stage of maturation.

**“PHASES OF WOUND HEALING”**

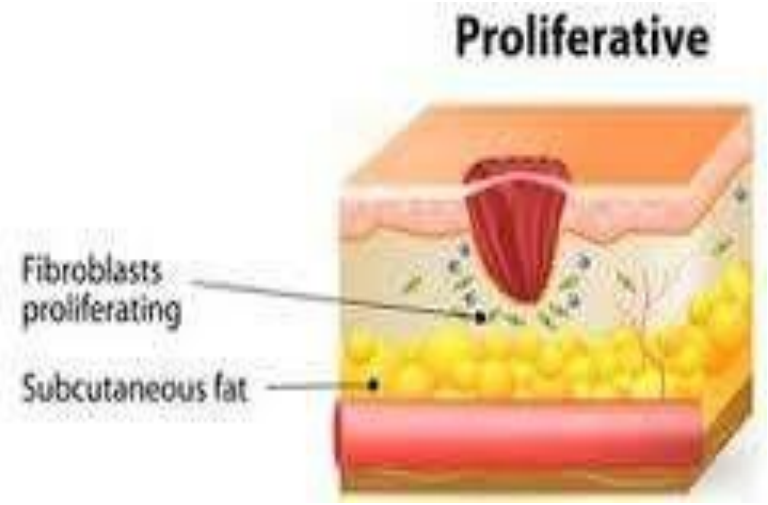
**“INFLAMMATORY- PHASE”**

It is an exudative or lag phase. It starts right away following injury which lasts for 72 hours. Coagulation is included. Vasospasm and thrombus development will first occur, followed by vasodilation later on. Rubor, calor, tumor, pain, and loss of function are the five essential characteristics of inflammation. Diabetes mellitus and other immunocompromised states inhibit chemotaxis and the release of inflammatory mediators[19].



## PROLIFERATIVE PHASE

It is sometimes referred to as the fibroblastic or collagen phase. It starts on 1st day and lasts for 3 to 6 weeks. This phase is made up of the production of granulation- tissue. Fibroblasts, capillaries, collagen, and fibronectin make up granulation tissue. VEGF is a factor in angiogenesis. Type 3 collagen and fibroblast growth cause fibroplasia. To aid in wound closure, basal layer of the epidermis which migrates to the surface and then multiplies, differentiates, stratifies.




## REMODELING PHASE

Additionally called the maturing phase. It can last up to a year and begins at six weeks. Due to cross-linking and collagen fiber alignment along the line of tension, the scar's tensile strength is a result of collagen maturation. The myofibroblast is responsible for wound contracting.

Type 1 collagen is responsible for the collagen's maturation. Type 3 collagen makes up granulation tissue. Type 1 collagen can be found in the extracellular matrix and the final scar. The mature scar is avascular and acellular in its final state. Type 1 collagen predominates in normal skin. After a wound has healed after four weeks, collagen production decreases. B - Lymphocytes play no part in the healing of wounds. A normally healed wounds has 50% of the tensile strength by 6 weeks[19].

**“SURGICAL - COMPLICATIONS”**

Complication from surgery continue to be annoying and challenging to treat. No matter how skilled and qualified a surgeon is technical, postoperative problems are a reality for everyone. There are many reasons why these difficulties arise. It can be because the disease process has already weakened the patient's health, there were technical issues with the surgery, or difficulties could finally develop because of the disease itself. To some extent, these issues can be avoided by

with due prudence. Patients should have a thorough evaluation that takes into account their nutritional status, lung health, and cardiac condition. When it comes to surgical problems, the timing of the procedure—whether it is done on an elective or emergency basis—also matters a lot. It will be necessary to know the patient's condition, such as their lung or cardiac health, to determine whether they can handle the stress of the treatment. Before undergoing certain treatments, obese people must reduce their body weight for the procedures to be successful. Technical considerations including gently manipulating tissues, thorough dissection, and respecting tissue planes are always crucial in minimizing sound problems. The use of antibiotics before surgery affects patients' outcomes. After the treatment is finished, careful postoperative monitoring is essential to spot issues early and administer the appropriate care. This monitoring entails looking over all of the wounds, checking the patient's performance levels, checking the patient's temperature, pulse rate, intake and output charts, and checking for any post-procedure pain.

**“SURGICAL WOUND COMPLICATIONS”**

**‘SEROMA”**

The accumulation of liquid fat, serum, or lymphatic fluid behind the incision is known as a seroma. The subcutaneous layer of the skin will contain mostly clear, yellow, or viscous collection. This is a well-known complication that most frequently happens following the raising of significant skin flaps during operations like mastectomy, axillary dissection, groin dissection, or large ventral hernias, as well as when a prosthetic mesh-like polytetrafluoroethylene mesh is used in the repair of ventral hernias.

It could show up as a localized swelling that hurts or occasionally as a clear liquid leak from the open wound. Suction drains can be positioned under the flaps to prevent this seroma. It can be aspirated while taking sterile measures, then pressure dressing can be applied. After two aspirations, if the seroma recurs, it should be emptied by opening the incision and packing the wound with gauze wet with saline to promote secondary intention healing. Seroma should only be drained in the operating room and should then be closed again in layers with a suction drain if it develops after the placement of synthetic mesh. Any synthetic mesh should be removed if active sepsis or spreading cellulitis is present.[5].

**HEMATOMA**

An abnormal blood collection, such as a splenic hematoma after splenectomy or a pelvic hematoma following a proctectomy, can arise in the subcutaneous layer of a recent incision or posa sible gap in the abdominal cavity after the removal of an organ. Secondary infections are more likely to occur in hematomas. Inadequate hemostasis, a lack of clotting factors, or the presence of coagulopathy are some of the causes of this. Myeloproliferative disorders, liver diseases, renal failure, sepsis, and clotting

factor are among the illnesses that can cause coagulopathy. Antiplatelet medications like aspirin, clopidogrel, ticlopidine, eptifibatide, and abciximab, as well as anticoagulants like unfractionated heparin, low molecular weight heparin like enoxaparin, dalteparin sodium or tinzaparin, and vitamin k antagonists like warfarin sodium, can all cause coagulopathy.

It may manifest as a painful surgical incision site or as an unattractive swelling that is enlarging. Airway compromise in the event of a neck hematoma, paralytic ileus in the case of a retroperitoneal hematoma, or abdominal compartment syndrome in the case of an abdominal cavity hematoma are just a few of the symptoms that depend on where the hematoma develops. A localized soft swelling and purplish-blue staining of the skin above can be used to identify a hemorrhage. When it manifests, it may feel sore to the touch or occasionally, a dark crimson fluid may drip from a newly opened wound.

Preoperative correction of clotting factor abnormalities and the cessation of medications that can affect the coagulation pathways can both help to prevent the formation of hematomas. Before surgery, antiplatelets, anticoagulants, or vitamin K antagonists should be temporarily halted if they are prescribed for disorders including coronary artery disease, stroke, or valve procedures. The type of surgery being performed and the need for thrombolytic therapy will both affect the risk of bleeding. To lower the INR value to 1.5 or below, patients taking vitamin K antagonists like warfarin sodium should cease taking them five days before surgery. Patients should discontinue taking unfractionated heparin, which has a half-life of 45 minutes, four hours before surgery. Patients using 16–24 half-lives of low molecular weight heparin hours must come to an end the day before the operation. Heparin administration can be postponed for two or three days in patients undergoing major surgery who have a very high risk of bleeding. Patients using clopidogrel should have ceased taking it at least seven days before surgery, or else the procedure may need to be postponed until the course of treatment is finished. After surgery, antiplatelet therapy can be started again 24 hours later. Aspirin and clopidogrel should be continued during the perioperative period in patients with bare metal stents who require surgery

within six weeks of the installation of the stent. With the use of vitamin K treatment and fresh frozen plasma or prothrombin concentrate transfusions, warfarin-treated patients who require urgent surgery can be reversed. Additionally, before the incision is closed, bleeding during surgery can be stopped using a ligature, electrocautery, fibrin glue, or topical bovine thrombin. When the output is not bloody and sparse, closed suction drains inserted in big potential gaps should be removed postoperatively. Retroperitoneal hematomas can be treated by coagulopathy correction or hematoma evacuation in the operating room 5.

## ACUTE WOUND FAILURE

Burst abdomen, also known as acute wound failure or wound dehiscence, is the term for the postoperative separation of the abdominal musculoaponeurotic layers. Evisceration, the potential for recurring dehiscence, surgical wound infection, and incisional hernia development are all risks associated with it. This problem occurs in 1-3 percent of all abdominal procedures. Most frequently, it happens between 7 and 10 days after surgery. The technical error in fascial closure and emergencies are the causes of wound dehiscence.

Surgery, intra-abdominal infections, old age, wound infections, hematomas, seromas, elevated intra-abdominal pressure, obesity, chronic corticosteroid use, prior wound dehiscence, malnutrition, radiation therapy, chemotherapy, and systemic diseases like uremia or diabetes mellitus are some examples of conditions that may require surgery. Acute wound failure is also influenced by the kind of wound closure. Continuous closure poses a risk since a suture break in one spot weakens the suture as a whole.

Evisceration makes the diagnosis clear even if there are no symptoms. In 25% of individuals, dehiscence may be preceded by the abrupt dramatic draining of a sizable volume of clear,

salmon-colored fluid. Patients may express discomfort as ripping. By probing the wound with a gloved finger or a sterile cotton-tipped applicator, one can identify partial dehiscence. Acute wound failure can be avoided by paying close attention to the fascial closure, including the suture's spacing, the fascia's bite depth, the patient's relaxation throughout the closure, and other factors[7].

If an incisional hernia develops, it may be repaired using the component separation approach, skin graft removal, and installation of a permanent prosthetic. Under tension, closure may result in intra-abdominal pressure or subsequent dehiscence. The closure can be accomplished with temporary device, biological or synthetic mesh, or negative pressure wound therapy. The open abdomen approach avoids intra-abdominal hypertension, protects the fascia, and primarily makes it easier to regain access to the abdominal cavity. Here, the secondary purpose will cause the wound to heal. It will be accompanied by a protracted healing process, fluid loss, desiccation, the development of an enterocutaneous fistula, and—most importantly—traumatic damage to the exposed intestinal loop. Using temporary techniques with vacuum closure w helps preserve the abdominal contents and prevent the

Laparotomy's secondary problems. It is possible to apply a fenestrated polyethylene sheet

that should not attach to the bowel omentum. It is possible to cover the wound with an iodophor-impregnated dressing and moist surgical gauze with drains on top. Suction can be given continuously while being monitored. Once seven to 10 days have passed, the closure can be attempted. It is allowed to granulate and then closed with skin grafting if clothe the sure is not possible. The benefit of absorbable synthetic mesh is that it offers wound stability and infection resistance. But it might result in a hernia or a fistula formation. Nonabsorbable mesh can cause issues such as abscess formation, dehiscence, wound infection, mesh extrusion, and fistula formation if it is employed. The synthetic nonabsorbable meshes that are readily available are made of polypropylene, polyethylene, and polytetrafluoroethylene. Polytetrafluoroethylene mesh can cause persistent infections, although it is pricey, does not permit granulation, and is nonadherent to the underlying intestine. One option is to employ a bio-prosthesis such as an acellular dermal matrix. It serves as a tissue scaffold for tissue ingrowth and gives the wound mechanical support. This device lessens long-term difficulties and encourages cellular adhesion, migration, the development of new blood vessels, and the repopulation of the implanted graft. Bio-prostheses come in two different varieties. These are derived from animals, such as cross-linked pig skin collagen and porcine intestine.

The idea of wound suction is the foundation of negative pressure wound treatment. It's common to use vacuum-assisted closure technology. A vacuum pump, canister with connecting tubing, open pore foam, and semiocclusive dressing make up the apparatus. It provides a lot of benefits. The benefits include quick wound coverage, acting as a temporary dressing, requiring no suturing to the fascia, lowering the risk of intra-abdominal hypertension, and preventing domain loss. The open-pore foam shrinks and transfers the negative pressure to the adjacent tissue when a suction of 125 mm Hg is applied to the

incision. This causes the wound to compress, a process known as macro deformation. As a result, extracellular fluid is eliminated by reducing intestinal edema, removing extra abdominal fluid, and shrinking the incision. It controls the micro-deformation of the foam wound interface as well as the wound environment. Angiogenesis and cellular proliferation will result from these actions. It hastens the healing of wounds. The amount of bacteria is lessened. It speeds up wound healing. These devices have several downsides, including pain, "bleeding, evisceration, hernia development", and development of "enterocutaneous fistulas".

## SURGICAL SITE -INFECTION (WOUND INFECTION)(SSI):- HISTORY OF WOUND INFECTION

Father of medicine, Hippocrates, employed vinegar in irrigating open wounds and covered wounds with bandages to stop additional damage. For generations, no one disputed his beliefs. Galen, a Roman gladiatorial physician, was first to realize pus from the gladiators' injuries signalled beginning of healing.

Koch was the first to identify that microbial development was a secondary source of infective foci. The idea of wound infection was changed by Joseph Lister and Louis Pasteur. 13 recommendations made by Londonian Erichsen for preventing surgical site infections are still in effect today. Lister understood how antisepsis may stop wound infections[20]. A persistent and significant issue that contributes significantly to postoperative morbidity are surgical site infections. It is significant because it costs the health care system money and results in severe morbidity for the patient. If left unchecked, it can cause fatal deep sepsis. For surgical patients, it accounts for about 40% of hosphospital-acquiredections. The complete surgical wound is defined as the region of the body that includes it, both internally

and externally. The following are the many types of surgical wound complications:

- Subcutaneous tissue and the skin are considered to be superficial.

- Deep, encompassing the muscle and fascia

- Organ space that contains the body's internal organs when they are involved in the surgery. As well as the idea that bacteria within the biofilm enter a latent condition as a result of local nutrient deprivation within the biofilm, it is thought that the difficulty in producing positive cultures is attributable to sampling the wrong places. According to certain research, a bacterial biofilm that can get embedded in implanted foreign bodies and related soft tissue surfaces can cause chronic SSI. A frequent surgical consequence is surgical site infection (SSI), and managing SSI with no culture can be quite challenging. Following surgical examination of chronic, culture-negative SS, explanted foreign bodies (sutures) are examined using confocal laser scanning microscopy and fluorescent in situ hybridization. Bacilli and cocci are seen adhering to the surface using confocal microscopy discarded stitches in a diverse biofilm. On these occasions, the infection was treated by removing the sutures22. The prevalence of SSI has decreased as a result of the growing usage of minimally invasive procedures. Smaller incisions, earlier mobilization post-operative pain, improved immune system function maintenance, and less use of central venous catheters are the key factors contributing to the lower incidence of SSI in minimally invasive procedures10.

In addition to microbiological proof, clinical signs and symptoms of infection must also be present to define an SSI. Although SSI often only affects the surface tissues, some more severe infections can also affect the deeper tissues or other sections of the body that were

handled during the treatment. Within 30 days of an operation, the majority of SSIs manifest, typically between the fifth and postoperative days. However, SSIs affecting the deeper tissues may happen months after the procedure when a prosthetic implant is employed. Other reliable measures based on clinical signs and symptoms have been described, such as the "Southampton" and "ASEPSIS" methods11, despite though outcome measure for SSI used by many studies is based on standard definitions such as those described by the central disease control and prevention or surgical site infection surveillance service. The following criteria have been suggested by the Centers for Disease Control and Prevention for the diagnosis of surgical site infections

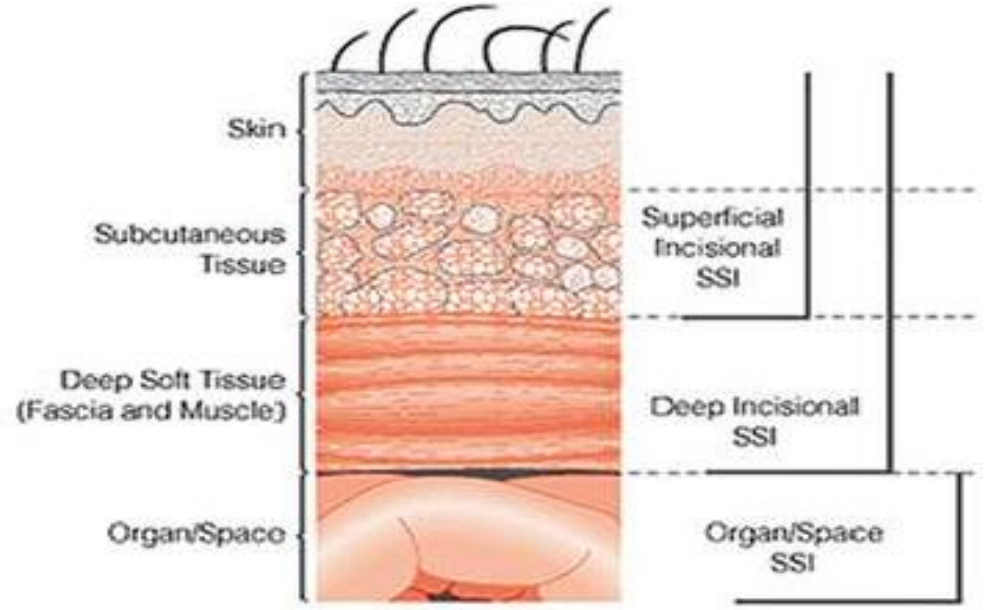
## DEEP INCISIONAL INFECTION:

Infections occurring in less than a year after surgery with an implant or involving deep soft tissues (fascia and muscle) along with purulent discharge, abscess found in deep space on direct, radiological examination or reoperation, diagnosis of deep space infection by a surgeon, symptoms of fever, pain, and tenderness leading to dehiscence or reopening by a surgeon, or infections occurring less than 30 days after surgery with no implant or soft tissue involvement.[12]

## ORGAN SPACE INFECTION:

Any part of the operation that has been opened or manipulated, as well as purulent discharge coming from the organ space drain, cultured organisms from material aspirated from the organ space, a deep abscess discovered, or a surgeon's diagnosis of an organ space infection within less than 30 days of surgery with no implant or within less than a year of surgery with an implant infection.[13].

infection that effects the skin, subcutaneous tissue less than 30 days after the surgery and causes discharge, makes a diagnosis of superficial surgical infection by a surgeon, discomfort, and local edoema[12].



The contamination is primarily to blame for these surgical site infections.

of the surgical wound is contaminated by microbes. The bacteria in question could

when break in the skin or a break in the muscle occurs, endogenous

as in case of enterocutaneous fistulas, wall of the hollow viscous organ. The

Exogenous sources could result from a breach in the sterile surgical environment.

procedures including tainted tools, implants, gloves, or inadequate aseptic techniques used by the staff. The site may be one of risk factors for the surgical site infections, host variables, trauma. and sepsis, as well as the relationship between the host and the therapy
The stress response to injury includes

-Activation of the autonomic nervous system

-Hypophyseal-pituitary-adrenal axis getting activated

-Production of pro-inflammatory and anti-inflammatory cytokines

- Peripheral insulin resistance

-Production of reactive oxygen species and nitrogen intermediates

-Recruitment and activation of neutrophils, monocytes, macrophages, andlymphocytes

- Acute phase changes of hepatic protein synthesis

-Upregulation of procoagulant activity

A portal of entry, which is damaged tissue, or an incision, a punctute site for the vascular access, or an catheter, is necessary for possible pathogens in environment to infiltrate the body's normal tissue. Inflammation, a healing mechanism brought on by infection, amplifies the auto destructive effects15. A group of senior people who are above 65 years old typically has negative effects after infections.Following damage, immunological dysfunction includes

- Monocytosis results in upregulated acute phase proteins, enhanced inflammatory cytokines

production, and also elevated eicosanoid production.

- Lymphopenia results in downregulation of T & B lymphocyte proliferation, natural killer cell activity, and reduced interleukins expression.

- Decreasing the generation of neutrophils[16]

## HORMONAL RESPONSES TO SURGICAL STRESS:

The anterior pituitary releases corticotrophin, growth hormones, the posterior pituitary releases arginine vasopressin, the adrenal cortex releases cortisol and aldosterone, the pancreas releases insulin, and the thyroid gland releases thyroid hormones.

The following are some implications of glucose dyshormogenesis under stress and how it affects cellular immunity:

## "EFFECTS OF HYPERGLYCEMIA ON IMMUNE CELL FUNCTION"

-A decreased respiratory burst of alveolar macrophages

-Decreased insulin-stimulated chemokinesis

-Glucose-induced protein kinase C activation

-Increased adherence

-Increased adherence to molecule generation

-Spontaneous activation of neutrophils[17]

## EFFECTS OF STRESS RESPONSE ON CARBOHYDRATEMETABOLISM

-Enhanced peripheral glucose uptake

-Hyperlactatemia

-Depressed glycogenolysis

-Increased gluconeogenesis

-Peripheral insulin resistance

The medical conditions known to increase the risk of postoperative infectionincludes[18]

-Extremes of ages (neonates or very old adults)

-OBESITY

- Malnutrition

- Diabetes mellitus

- Prior site irradiation

- Hypothermia

- Corticosteroid therapy

- Coexisting infection remote to the surgical site

-Recent operation of chest or abdomen

-Chronic inflammation

-hypocholesterolemia

## "GENETICS AND GENOMICS OF TRAUMA AND SEPSIS:"

Whether gender affects the host response in infection and sepsis is a subject of constant debate. In both animal and in vitro experiments, androgens inhibit the immune system. Human data do not provide confirmation. According to genetics, the susceptibility to infection and the body's reaction to it are influenced by single nucleotide polymorphisms or single point mutations of inflammatory genes including Tumor Necrosis Factor-alpha and

interleukins[18].

After significant blood loss during surgery, blood transfusions can save lives, but they can

**"INTERACTIONS BETWEEN THE HOST AND THERAPY:"**

The infection may develop as a result of trauma, weakened host defences, resuscitation, or end-of-life treatment. Hypothermia can develop as a result of exposure, the infusion of sizable amounts of cold fluids or blood, or evaporative losses that take place during intracavitary surgery. To maintain heat, cutaneous and peripheral vasoconstriction occurs. However, the flow of microcirculatory blood is reduced as a result. activation, inflammation, and hypovolemia, disruption of the coagulation cascade is also brought on by a drop in red blood cell levels. Since hypothermia impairs cardiovascular function and suppresses the immune system, it raises the mortality rate after surgery or trauma. Additionally, tissue hypoxia results in surgery site infections. Injury to the face, airways, and lungs, significant blood loss, disturbance of the microcirculation, acute respiratory distress syndrome, and cardiovascular instability can all lead to this. The results of investigations on hypoxia and surgical site infections have shown that the provision of additional oxygen can lower the frequency of surgical site infections.

potentially spread infection. A change to the T helper cell phenotype and altered leukocyte antigen presentation may result from the blood transfusion. Immunosuppression results from this. Long-term blood product storage causes the loss of membrane high-energy phosphates, which affects erythrocyte deformability, disrupts the microcirculatory system, and impairs oxygen offloading. In cases of severe sepsis, blood transfusions may not increase oxygen consumption, but they do stimulate organ activity. When administering blood products to surgical patients in intensive care units, it is usually preferable to be cautious.

## “CONTROL OF BLOOD SUGAR:”

The catabolism and the insulin resistance brought on by the stress of surgery are reflected in hyperglycemia. The immune system of the host is compromised by hyperglycemia. Poor

Following infections in surgical patients, poor perioperative glucose management is a major factor in poor outcomes. A fourfold increased risk of surgical site infections is associated with moderate hyperglycemia, defined as blood sugar levels more than 200 mg/dl. For surgical patients, a blood glucose level maintained at less than 110 mg/dl has resulted in a 40% reduction in the mortality rate. To restore anabolism, nutritional management is crucial. To recover the anabolism, more calories—more than 25 to 30 kcal per day—and more nitrogen—more than 1 g nitrogen/kg per day—will be needed. It will be advantageous to start enteral feeding during the first 48 hours.

## “INFECTION CONTROL:”

One of the most crucial factors in the management of surgical site infections is infection control. Strict aseptic procedures must be followed when inserting central venous catheters. Drains are to be stayed away from and taken out as soon as feasible. The most crucial and efficient method of preventing surgical site infection is good hand cleanliness. With the exception of Clostridium difficile spores, which must be cleaned with soap and water, alcohol gel hand cleaners are efficient against practically all infections. When there is a possibility of splashing bodily fluids, general safety procedures such hats, masks, gowns, gloves, and protective eyewear must be followed.

The majority of bacterial infections are derived from endogenous flora. Inanimate surfaces including bed rails and computer terminals as well as skin surfaces, airways, gut lumen,

wounds, and catheters may all become colonised. Therefore, percutaneous catheters, airway, or urine catheters create a conduit for the introduction of infections if there is any breach in the natural epithelial barriers caused by incisions. The most frequent method of infection transmission is by the fecal-oral route, mostly due to the involvement of medical professionals. The most effective strategy for preventing infections is contact isolation, which also aids in the management of pathogens like methicillin-resistant staphylococcus aureus and vancomycin-resistant enterococci.

**RISK FACTORS FOR THE DEVELOPMENT OF SURGICAL SITE INFECTIONS:** It can be divided into

1) Patient factors
2) Treatment factors
3) Environmental factors

**PATIENT FACTORS:**

1) Ascites in case of abdominal surgery
2) Corticosteroid therapy
3) Chronic inflammation
4) Obesity
5) Diabetes
6) Hypocholesterolemia
7) Extremes of ages
8) Hypoxemia

9)Peripheral vascular disease

10) Postoperative anemia

11) Prior site irradiation

12) Recent operation

13) Remote infection

14) Skin or nasal carriage of staphylococci

15) Undernutrition

16) Skin disease in the area of infection such as psoriasis

**ENVIRONMENTAL FACTORS:**

1) Contaminated infections
2) Inadequate skin antisepsis
3) Inadequate disinfection or sterilization
4) Inadequate ventilation

**TREATMENT FACTORS:**

1) Drains
2) Hypothermia
3) Emergency procedure
4) Inadequate antibiotic prophylaxis
5) Oxygenation
6) Prolonged operative time
7) Prolonged preoperative hospitalization

## "CLASSIFICATION OF SURGICAL WOUNDS:"

1) 1) Clean wounds: These are wounds in which there was no hollow viscus entry, primary wound closure was performed, there was no inflammation, no antiseptic technique breaks, and the surgery was elective. It has an infection rate between one and three percent.

2) Clean-contaminated wounds: these are wounds where a hollow viscus entered but was contained, where there is no inflammation, where the initial wound is closed, where a little break-in antiseptic treatment is employed, where a mechanical drain is utilised, and where the bowel is prepared beforehand. It has an infection incidence of 8% to 12%.

Contaminated wounds include those that have an uncontrolled viscus spill, visible inflammation, are open or traumatic, or have a significant aseptic technique breakdown. It has a 20–25 percent infection rate.

1) Untreated, uncontrolled viscus spilling, pus in surgical wounds, open sores that are suppurating, and severe inflammation are examples of dirty wounds. It carries a 30-to-40% infection rate.[16].

## MICROBIOLOGY OF SURGICAL SITE INFECTIONS:

1) More than half of illnesses are caused by gramme positive organisms. The three most often isolated organisms are Staphylococcus coagulase-negative, Staphylococcus aureus, and Enterococcus spp. In one-third of surgical site infections, gram negative bacteria like E. coli, P. aeruginosa, and Enterobacter spp. are isolated

2) The risk of patients in the Nosocomial Infections Surveillance System is divided into three categories as follows:

3) wound classification(contaminated or dirty),

4) longer duration of the operation, defined as one that exceeds the 75th percentile for a given procedure,

5) medical characteristics of the patients as determined by the American Society ofAnesthesiology score of 3,4 or 5.

Nowadays drug-resistant organisms such as Methicillin-resistant Staphylococcus or Vancomycin-resistant Enterococcus are on the rise[18].

## PRESENTATION OF SURGICAL SITE INFECTIONS:

Most surgical site infections present with symptoms within 30 days of the operation. Erythema, pain, edoema, and occasionally discharge are characteristics of both superficial and deep surgery site infections. At the infection site, the wound will be soft or even fluctuant, which contrasts with the normal hardness of the healing ridge elsewhere in the wound9.

According to the Joint Commission (TJC), the wound is said to be infected if

- There is drainage of grossly purulent material from the wound
- Wound spontaneously opens and drains purulent fluid
- Wound drains the fluid that is culture positive or Gram stain positive for bacteriaThe surgeon notices the erythema or drainage and opens the wound after determining it to be infected[17]

## "TREATMENT OF SURGICAL SITE INFECTIONS"

Finding and eliminating modifiable risk factors is essential to the prevention of surgical site infections. Age, severe obesity, and procedure complexity are a few risk variables that cannot be changed.

Following things can be modified include

- Heavy smokers can be advised to stop smoking at least 30 days before theprocedure
- Glucose levels in diabetic patients must be corrected appropriately
- Obese patients must be encouraged to lose weight if the procedure iselective and if there is adequate time to achieve weight loss
- Severely malnourished patients should be given nutritionalsupplementation at least 7 to 14 days before the procedure
- Patients taking corticosteroids should wean off of them or start taking them at a reduced dose.
- Hair can be removed by cutting and applying the antiseptic solution to the spot. - Intestine preparation for colon and small bowel operations can be done with lavage or cathartic and nonabsorbable oral antibiotics.
- prophylactic antibiotics can be administered in certain procedures to prevent surgical site infections.
- The insertion of a prosthesis, such as in the case of a hernioplasty, would need the use of a first-generation cephalosporin such as cefazolin. Giving a second-generation cephalosporin like cefoxitin or a beta-lactamase inhibitor to patients undergoing upper gastrointestinal surgery, complicated biliary tract surgeries, or elective colonic resection will be helpful. Ertapenem may be used for lower gastrointestinal operations. It's important to provide the prophylactic antibiotic at the right time. The antibiotic must be given within 30 minutes of making the incision in order for it to be most effective so that

- it is at therapeutic levels when the patient is exposed to bacterial contamination. Extended drug administration after surgery should be avoided as it can result in the emergence of drug-resistant microorganisms and problems such colitis linked to Clostridium difficile15.

- Surgery-related precautions are required to reduce surgical site infections.

- These includes

1) Personal hygiene of the operating team such as hand scrubbing
2) Draping in a sterile fashion
3) Thorough skin preparation of the patient
4) Careful handling of the tissues
5) Meticulous dissection, hemostasis, and debridement of devitalized tissue
6) Compulsive control of intraluminal contents
7) Preserving blood supply to the operated organs
8) Elimination of foreign bodies from the wound
9) Maintenance of strict asepsis by the operating personnel such as no holes in the gloves, avoiding contaminated instruments, avoidance of environmental contamination such as debris falling from overhead
10) Thorough drainage and irrigation of any purulent pockets with warm saline
11) Ensuring the euthermic state of the patient

and wounds with very large flaps to prevent seroma or hematoma is a worthwhile practice.

## DRAINS IN SURGERY:

After the primary wound has healed, a drain is a conduit that has been made to allow any accumulated fluid (blood, pus, and any other fluids) to escape. In order to eliminate the dead space and prevent fluid from collecting in the subcutaneous area, the collected fluid is removed using a subcutaneous drain. You can also deliver wash through a tube drain[3].

## CLASSIFICATION I

- Closed drain and open drain
- Active drains are maintained by suction, while passive drains operate using the difference in pressure between the cavity and the outside atmosphere.
- Red rubber drain and sialastic drain[4].

## CLASSIFICATION II

- - Corrugated rubber drain: this drain works on the capillary action and gravity principles. However, the drain that emerges soaks the dressing and, if not properly maintained, can introduce an infection from the outside into the body.

- Glove drain

- A parallel air vent is included in the sump drain system to stop the nearby tissues from being sucked. Due to the air vent, the sump drain is never obstructed.

- Tube drains include Malecot catheter drain, Penrose soft latex rubber tube drain, and multiple perforated tubes.

- Closed suction tube drain.

- Wick drain - in this case, a gauze drain is kept to drain pus, discharge[1].

## CLASSIFICATION OF DRAIN SYSTEM:

- Open (static) drains: this includes corrugated drains, and Penrose drains.

The infection rate is higher.

- Closed syphon drains: in this configuration, the drain is joined to a sterile bag via a one-way valve or not. It lessens infection.
- Closed suction drain: in this setup, a vacuum is created by applying negative pressure to drain the secretions. About 70 to 170 mm Hg of negative pressure are maintained in a suction drain.
- Sump suction drains: in this case, negative suction and a parallel air vent are utilised to keep the surrounding soft tissues from being drawn into the drain's lumen.
- A pleural space drain with an underwater seal.

## DRAIN MANAGEMENT

The indications for applying a surgical drain are

1. To collapse the dead space in areas of excessive redundant tissue.
2. To enable focused drainage of pus in abscess, thereby preventing premature closure of abscess cavity.
3. To ensure the warning of the surgical leak (feces, urine). Hence it is known as a sentinel drain.
4. To control an established fistula leak[6].

**ADVANTAGES OF TUBE DRAINS:**

- Quantity of fluid like bile, and pus can be measured.
- Skin excoriation will not occur.
- It can be kept for longer times
- Patient will be more comfortable.
- Removal is easier.

- Infection rate is less.
- Dye can be injected and cavity or communication can be assessed using‘C-ARM’.
- Collection of irritant discharge.
- Collection of secretion having activated enzymes
- Gravity and capillary action are how corrugated drains operate. Technically, it is possible. The biggest drawback of a corrugated drain is that it can cause the dressing to leak, which could be uncomfortable for the patient.

Drains made of silica are inert. Red rubber drains cause a severe inflammatory tissue reaction around the tube, increasing the likelihood that a permanent tract may form. When there is a leak, a drain may occasionally behave as a controlled fistula. The end of a corrugated drain is covered with sterile gauze, and it is an open drain. When compared to tube drains, corrugated drains have a higher infection rate.

**DRAIN CARE**

1) Daily sterile dressing should be done around the drain site.

2) The drain should be emptied daily by measuring the quantity and natureof the drain.

3) The drain can be removed according to the amount of fluid drained.

When the drain is in place, antibiotics are frequently not necessary because the drain allows for direct source control. Antibiotics can be administered prophylactically 24–48 hours following the drain installation.

## COMPLICATIONS OF DRAIN

Flakes or clots can obstruct or clog drains. If they are blocked, fluid will be retained, which might increase the risk of infections. Regular inspections of the drain's integrity are recommended. As soon as the drain becomes blocked, the obstruction needs to be taken out. Rate If the drain becomes loose, the risk of reinfection rises. When the drain is displaced, it can not drain properly and produce a misleading impression. Drain can occasionally cause internal healing to be delayed.

## STUDIES PUBLISHED IN LITERATURE:

Negative-pressure wound therapy in closed incisions (cINPT) was initially described by Gomoll et al. [2], and their findings shown that its application for treating closed wounds in orthopaedic surgery can lower the incidence of SSI.

The purpose of the review and analysis of 52 randomised controlled trials with a total of 6930 operations by Kosins et al. [3] in 2013 was to establish the scientific merit of preventive draining of subcutaneous wounds in surgery. Subgroups were chosen based on particular surgical techniques or traits (cesarean delivery, abdominal wound, breast reduction, breast biopsy, femoral wound, axillary lymph node dissection, hip and knee arthroplasty, obesity, and clean-contaminated wound). In the drain group there were 3495 operations, while in the no-drain group there were 34,35.Only the prevention of seromas during axillary node dissections and the prevention of hematomas during breast biopsy operations showed a statistically meaningful benefit from prophylactic subcutaneous drainage. Drainage did not provide a benefit in any of the other methods analysed.

For high-risk patients undergoing colorectal surgery, such as those with dense subcutaneous

fat tissue and those having emergency surgeries, Fuji et al. evaluated the effectiveness of subcutaneous drains. For SSI, they included 79 of their high-risk patients. Incisional SSI occurred in a total of 27.8% of cases. With or without a subcutaneous drain, these cases had incidences of incisional SSI of 14.3% and 38.6%, respectively. The authors came to the conclusion that subcutaneous drains are useful for reducing incisional SSI in patients undergoing colorectal surgery who have dense subcutaneous fat. [4]

In order to test the effectiveness of a passive drainage system for reducing surgical site infections during major colorectal surgery, Numata et al. [5] enrolled 246 patients (124 of whom underwent passive drainage and 122 of whom underwent no drainage). Patients were given either no drainage at all or passive subcutaneous drainage at random. The incidence of superficial SSI was the main outcome that was measured. Hematoma, seroma, and wound dehiscence development were the secondary outcomes monitored. Patients allocated to the passive drainage and no drainage groups showed a significant difference in the incidence of superficial SSIs (3.2 percent vs. 9.8 percent, respectively, P = 0.041). In neither group were there any instances of hematoma, seroma, or wound dehiscence. The authors came to the conclusion that in patients undergoing large colorectal procedures, subcutaneous passive drai nage is preferable to no drainage.

In a research involving 100 cases with perforation peritonitis, M. Vashist et al. 50 patients in Group A underwent abdominal wall closure, sheath suturing with continuous sutures, and n egative suction drain drainage of the subcutaneous region. 50 patients in Group B had standa rd sheath closure with interlocking continuous sutures but no negative suction drain. They sa w that group A patients had significantly reduced rates of wound dehiscence, wound infectio n, and respiratory problems. Patients who had abdominal wall closure with a negative suctio n drain experienced quicker wound healing**.** In a study of 76 patients who underwent emerge ncy laparotomies, **Rakesh Kagita et al**. came to the conclusion that subcutaneous negative

pressure avoids post-

operative SSIs with a statistically significant difference (p0.05) and shortens hospital

In the research population of 60 cases, **Yagnesh Vaghani et al**. found that the group with a negative pressure closure had a much lower average rate of wound infection, hospital stay, and the requirement for a second operation in the form of secondary suturing and burst abdomen repair. More negative pressure closure decreases hospital stay and morbidity while preventing wound infection by eliminating the collection.

There were 60 patients in the control group and 70 patients in the study group, according to **Zuo Jun Zhen et al**. The research group saw significantly shorter hospital stays and faster wound healing times. The study group has a decreased rate of reinfection.

Between November 2015 and March 20, **Jyothi Bindal et al**. conducted a prospective study on 100 patients admitted to the Department of Obstetrics and Gynecology at Kamla Raja Hospital, G.R.M.C., Gwalior. The study was divided into two groups, each with 50 patients: group I, which included women with no subcutaneous drains, and group II, which included women with subcutaneous drains that were still present when the skin was closed. Preoperative Hb > 9 and BMI > 30 kg/m2 were included in the study. Patients without drains spent an average of 9.4 days in the hospital, while those with drains stayed an average of 8.2 days. Patients with drains often had haemoglobin levels of 8.6 gm%, whereas those without drains typically had haemoglobin levels of 9.4 gm%. In the non-

drain group, there were 13 cases of wound seroma and 4 cases of superficial disintegration, c ompared to 5 cases and 2 cases in the drain group. Patients with drains have lower wound se roma rates, shorter hospital stays, and less postoperative discomfort, but there are little benef its in terms of postoperative fever, superficial SSI, wound disintegration, and haemoglobin c oncentration.

# MATERIAL AND METHODS

**Source of Data:** Department of Surgery, R.L. Jalappa Hospital and Research Centre, Sri Devraj Urs Medical College, Tamaka, Kolar.

**Study Population:** Patients receiving abdominal surgery at the R.L. Jalappa Hospital an d Research Centre, Tamaka, Kolar, a component of Sri Devraj Urs Medical College, betwee n the ages of 18 and 65 who are not immunocompromised.

## Inclusion Criteria:

All the patients undergoing abdominal surgeries for peritonitis in the Department of G eneral Surgery in R.L Jalappa Hospital in the age group between 18 -

65 of either sex were included

## Exclusion Criteria:

1. Patients with superficial skin infections.

**Duration of study:** December 2020- August 2022 [One year and 6 months]

**Study Design:** Prospective observational study

**Sampling technique:** Random sampling

**Sample size: 72 in each group**

Was estimated based on the difference in the proportion of SSI between cases (Subcutaneous suction drains) and Controls (no drains). The proportion of SSI in Cases was 23% and in co ntrols was 45% from the study by **Junaid Nabi Wani** et al. Using these values in the below -mentioned formula

$$N = 2 ( Z_{\alpha/2} + Z_{\beta})^2 P ( 1-P)$$

$$(p_1 - p_2)^2$$

Where,

$Z_{\alpha/2=} Z_{0.05/2}=Z_{0.025}$ = 1.96 at type 1 error of 5%

$Z_{\beta}=Z_{0.20}$= 0.842= At 80% power

$p_1 - p_2$= Difference in proportion in the two different groups = 22%

P= Pooled prevalence = [ Proportion in Cases ($p_1$) + Proportion in Control Group ($p_2$)]/2 = [ 23 + 45 ]/2 = 34

$$N = \frac{2 \times 34 \times 66 (1.96 + 0.84)^2}{22 \times 22} = 35185/ 484 = 72 \text{ in each group}$$

Hence 72 cases and 72 controls were included in the study

Wani JN, Bhat JA. Role of Negative Suction Subcutaneous Drains in Contaminated Abdominal Surgeries. J Gastrointest Dig Syst. 2019;9(1):587.

## Method of Data Collection:

All patients between the ages of 18 and 65, of either sex, who were having abdominal procedures at the R.L. Jalappa Hospital's Department of General Surgery for peritonitis were included.
Data collection involved the use of a structured proforma.
144 patients in total were split into two groups, Group 1 and Group 2, using randomization. The package included the randomization strategy.
Patients in Group 1 underwent abdominal operations and were sutured shut using subcutaneous negative suction drainage. Patients in Group 2 who were undergoing abdominal operations and closure with passive subcutaneous drainage

**ASSESSMENT OF WOUND:**

**ASEPSIS SCORING:**

**ADDITIONAL TREATMENT:**

Antibiotics: 10

Drainage of pus under local anesthetics: 5

Debridement of wound (general anesthetics) 10

Drainage of pus under local anesthetics: 5

Serous Discharge: Daily: 0-5

Erythema: Daily: 0-5

Purulent Exudates: Daily: 0-10

Erythema: Daily: 0-5

Separation of Deep Tissues: Daily :0-10

Isolation of Bacteria:10

Stay in Hospital Prolonged Over 14 Days: 5

**Criteria of infection:**

0-10 = satisfactory healing

11-20 = disturbance of healing

20-30=minor wound infection

31-40=moderate wound infection

>40=severe wound infection

All patients underwent the following investigations:

CBC:

RBS:

Blood Urea:

Serum Creatinine:

Serum Sodium:

Serum Potassium:

**Financial burden:** All the investigations involved were part of the routine management of t he patient

**References for Statistical Methods:**


1. Yan F, Robert M, Li Y. Statistical methods and common problems in medical or bio medical science research. Int J Physiol Pathophysiol Pharmacol. 2017;9(5):157-163.
2. Krousel-Wood MA, Chambers RB, Muntner P. Clinicians' guide to statistics for medical pract ice and research: part I. Ochsner J. 2006;6(2):68-83.
3. Ali Z, Bhaskar SB. Basic statistical tools in research and data analysis. Indian J Anae sth. 2016;60:662–669.


**Statistical analysis:**

Using the SPSS 22 version of software, data were examined after being entered into a Micro soft Excel data sheet. Data that was categorical was displayed as frequencies and proportions . For testing the importance of qualitative data, the chi-square test was employed. Mean and standard deviation were used to depict continuous data. The Kolmogorov-Smirnov test and the Shapiro-Wilk test were used to determine whether the continuous data were normal. In order to deter mine the mean difference between two quantitative variables, an Independent t-test was performed as a test of significance.

a graphical display of the data We utilised MS Word and Excel to create many kinds of grap hs, including bar diagrams.

After taking into consideration all the guidelines for statistical tests, a p-

value (Probability that the result is true) of 0.05 was deemed statistically significant..

**Statistical software:** MS Excel**,** SPSS version 22 **(**IBM SPSS Statistics, Somers NY, USA) was used to analyze data.

## Ethical consideration:

1. Institutional Ethical clearance was obtained before the start of the study
2. Informed consent was obtained from all the patients recruited before the start of the stud y
3. Standard of Care was provided to all the patients during the study period and follow-up.RESULTS

**Table 1: Mean Age comparison between two groups**

| | Type of Drain | | | | p-value |
|---|---|---|---|---|---|
| | Negative | | Passive | | |
| | Mean | SD | Mean | SD | |
| Age | 40.68 | 15.07 | 42.01 | 14.87 | 0.590 |

The mean age in the passive drain was 42.01 years and 40.68 years in the negative suction d rain, respectively. There was no discernible difference in the mean Age of the two groups..

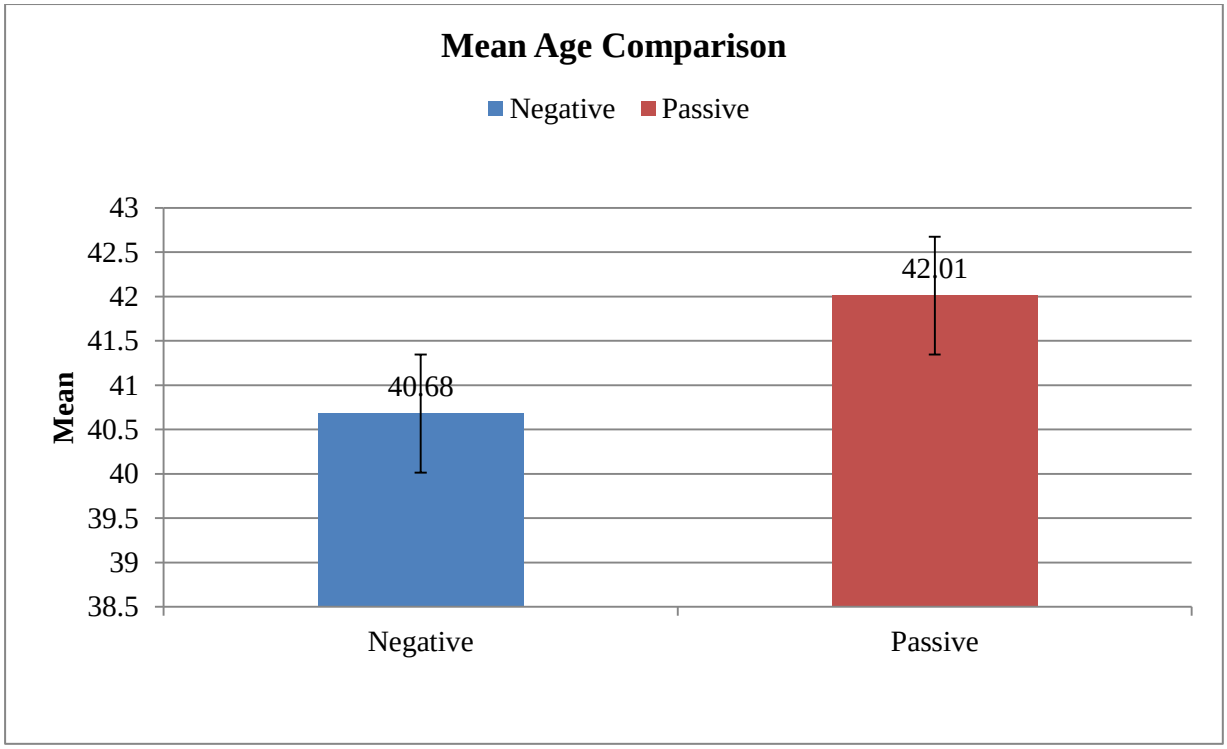



**Figure 1: Bar diagram showing mean age comparison between two groups**

**Table 2: Age Distribution between two groups**

| | | Type of Drain | | | |
|---|---|---|---|---|---|
| | | Negative | | Passive | |
| | | Count | % | Count | % |
| Age | <20 years | 8 | 11.11% | 4 | 5.56% |
| | 21 to 30 years | 13 | 18.06% | 17 | 23.61% |
| | 31 to 40 years | 18 | 25.00% | 13 | 18.06% |
| | 41 to 50 years | 12 | 16.67% | 16 | 22.22% |
| | 51 to 60 years | 10 | 13.89% | 13 | 18.06% |
| | >60 years | 11 | 15.28% | 9 | 12.50% |

$\chi 2$ = 3.836, df = 5, p = 0.573

In Negative Suction Drain, 11.11% were <20 years, 18.06% were in 21 to 30 years, 25% we re in 31 to 40 years, 16.67% were in 41 to 50 years, 13.89% were in 51 to 60 years and 15.2 8% were >60 years.
In Passive Drain, 5.56% were <20 years, 23.61% were in 21 to 30 years, 18.06% were in 31 to 40 years, 22.22% were in 41 to 50 years, 18.06% were in 51 to 60 years and 12.5% were >60 years.
There was no significant difference in Age Distribution between the two groups.

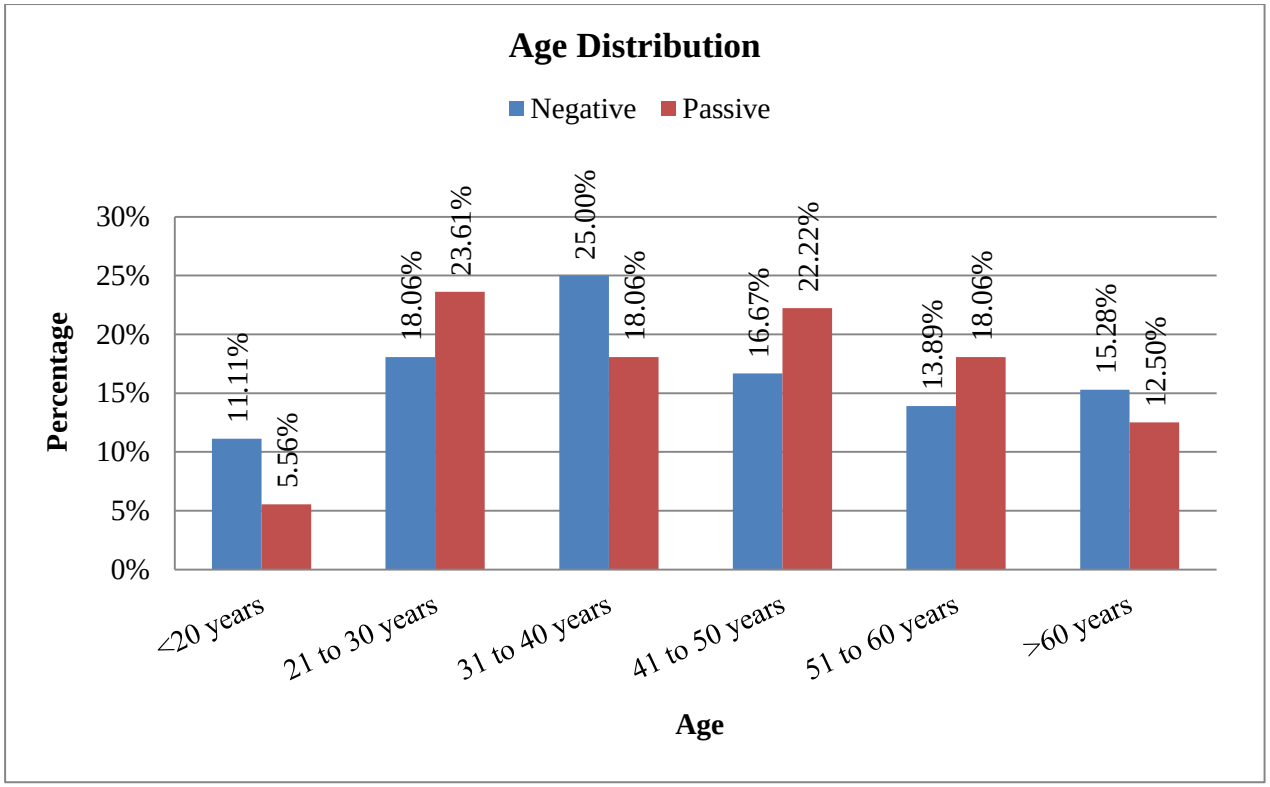



**Figure 2: Bar diagram showing Age distribution between two groups**

**Table 3: Sex Distribution between two groups**

| | | Type of Drain | | | |
|---|---|---|---|---|---|
| | | Negative | | Passive | |
| | | Count | % | Count | % |
| Sex | Female | 20 | 27.78% | 25 | 34.72% |
| | Male | 52 | 72.22% | 47 | 65.28% |

$\chi 2$ = 0.808, df = 1, p = 0.369

In the Negative Suction Drain, 27.78% were Female and 72.22% were Male.
In Passive Drain, 34.72% were Female, 65.28% were Male,
There was no significant difference in sex distribution between the two groups.

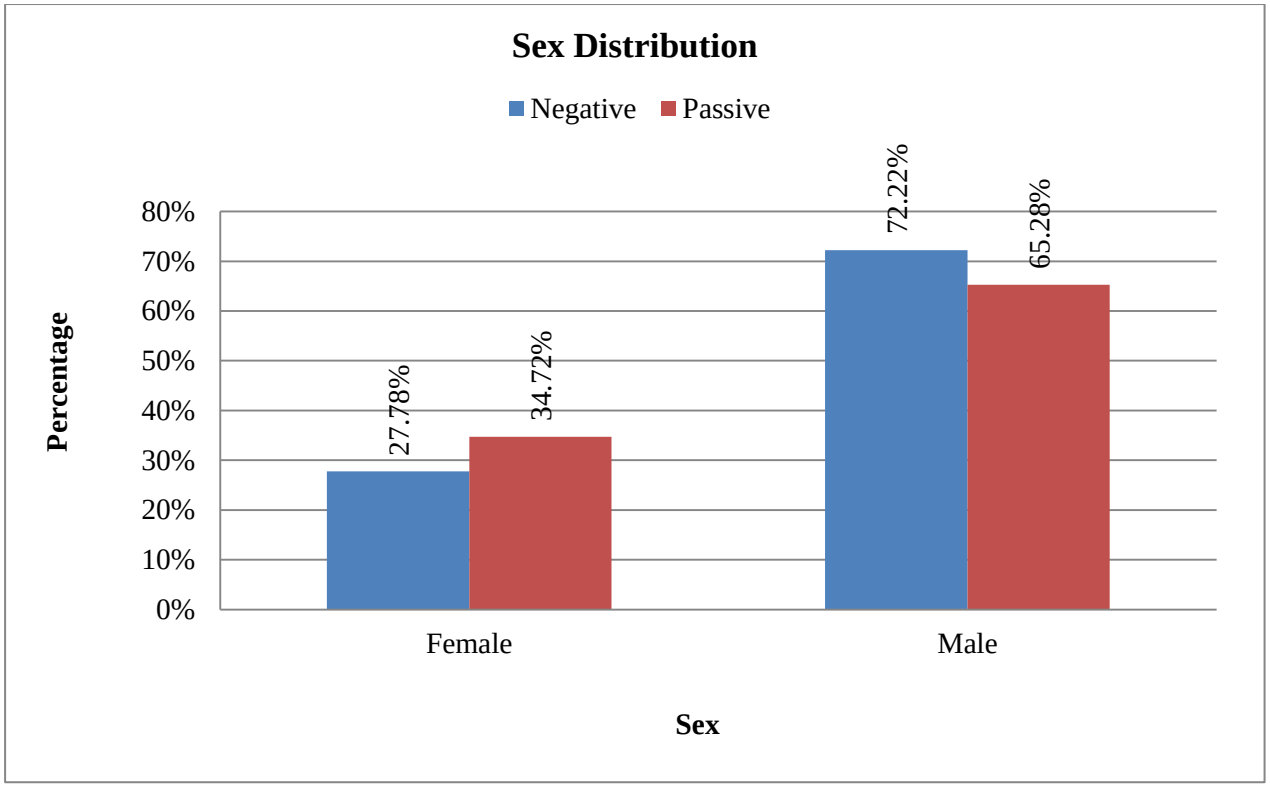



**Figure 3: Bar diagram showing Sex distribution between two groups**

**Table 4: Type of surgery Distribution between two groups**

| | | Type of Drain | | | |
|---|---|---|---|---|---|
| | | Negative | | Passive | |
| | | Count | % | Count | % |
| Type of surgery | Elective | 29 | 40.28% | 34 | 47.22% |
| | Emergency | 43 | 59.72% | 38 | 52.78% |

$\chi 2$ = 0.705, df = 1, p = 0.401

In Negative Suction Drain, 40.28% had Elective and 59.72% had Emergency.
In Passive Drain, 47.22% had Elective and 52.78% had Emergency.
There was no significant difference in the Type of surgery Distribution between the two gro ups.

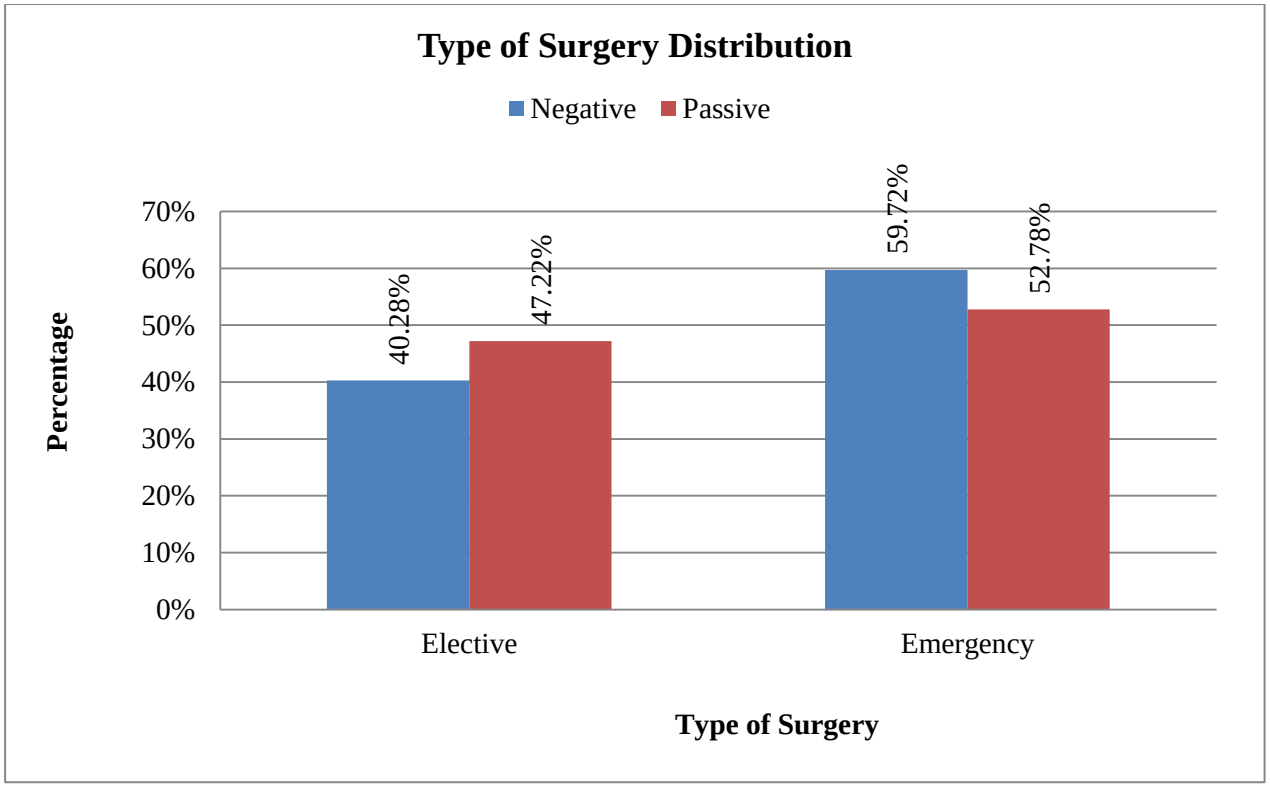



**Figure 4: Bar diagram showing the type of surgery distribution between two groups**

**Table 5: Mean Points acquired comparison between two groups**

| | Type of Drain | | | | p-value |
|---|---|---|---|---|---|
| | Negative | | Passive | | |
| | Mean | SD | Mean | SD | |
| Points acquired | 14.51 | 7.31 | 16.44 | 10.45 | 0.2 |

The mean Points acquired in the Negative Suction Drain were 14.51 ± 7.31 and in Passive D rain was 16.44 ± 10.45. There was no significant difference in mean Points acquired compari son between the two groups.

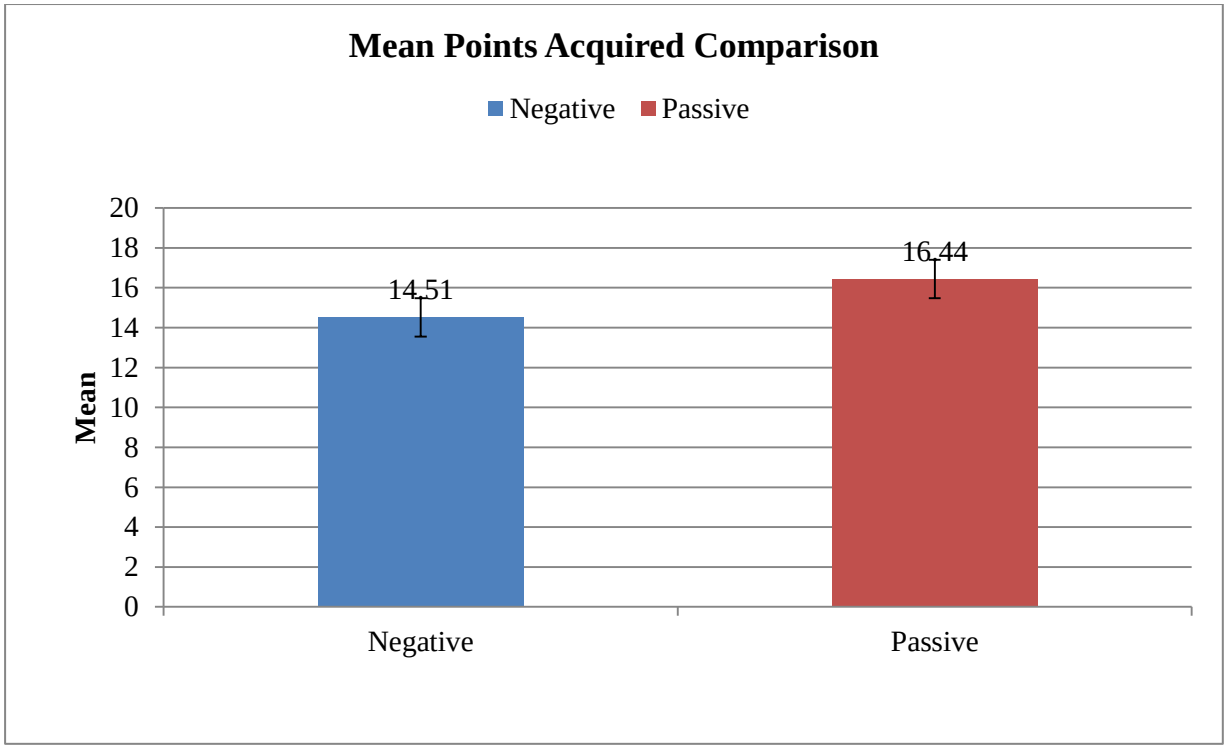



**Figure 5: Bar diagram showing mean points acquired comparison between two group s**

**Table 6: Mean Drain removal day comparison between two groups**

| | Type of Drain | | | | p-value |
|---|---|---|---|---|---|
| | Negative | | Passive | | |
| | Mean | SD | Mean | SD | |
| Drain removal day | 6.4 | 1.75 | 6.49 | 1.74 | 0.78 |

The mean Drain removal day in the Negative Suction Drain was 6.4 ± 1.75 and in Passive D rain was 6.49 ± 1.74. There was no significant difference in mean Drain removal day compa rison between the two groups.

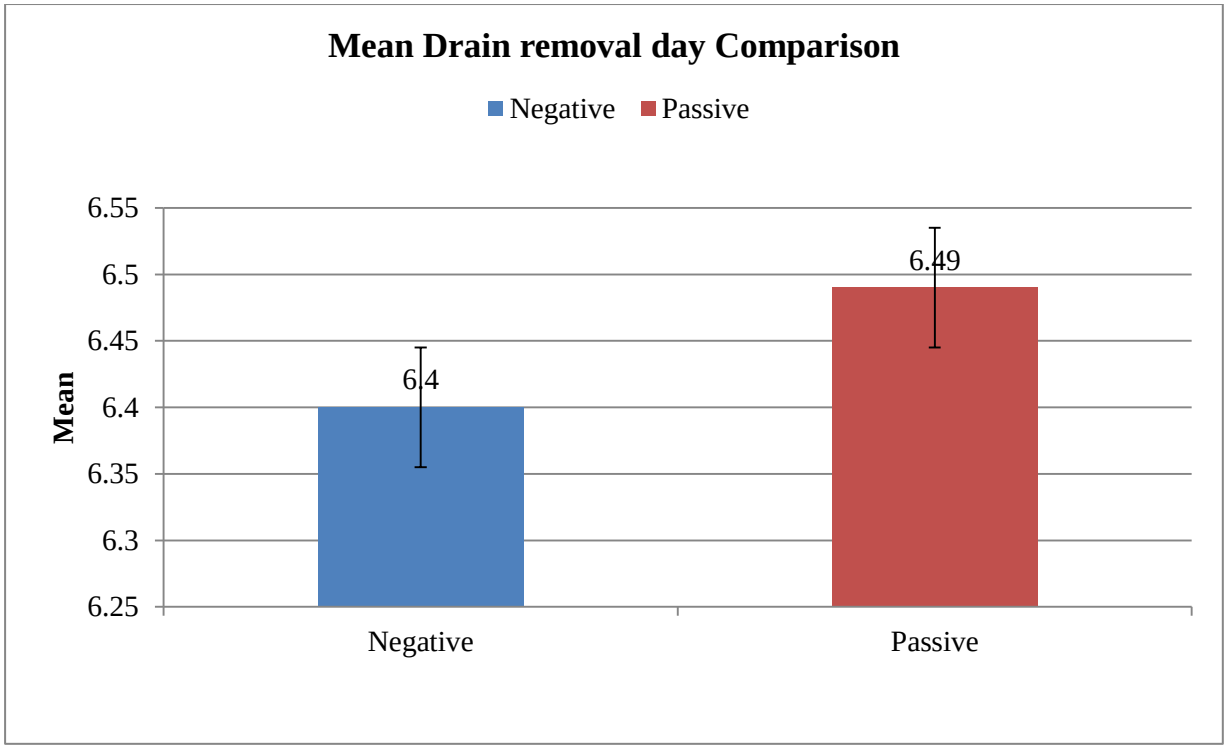



**Figure 6: Bar diagram showing mean Drain removal day comparison between two gr oups**

**Table 7: Mean Hospital stay in days comparison between two groups**

| | Type of Drain | | | | p-value |
|---|---|---|---|---|---|
| | Negative | | Passive | | |
| | Mean | SD | Mean | SD | |
| Hospital stay | 7.99 | 2.65 | 8.13 | 2.26 | 0.74 |

Mean Hospital stay in days in the Negative Suction Drain was 7.99 ± 2.65 days and in Passi ve Drain was 8.13 ± 2.26 days. There was no significant difference in mean hospital stay in days comparison between the two groups.

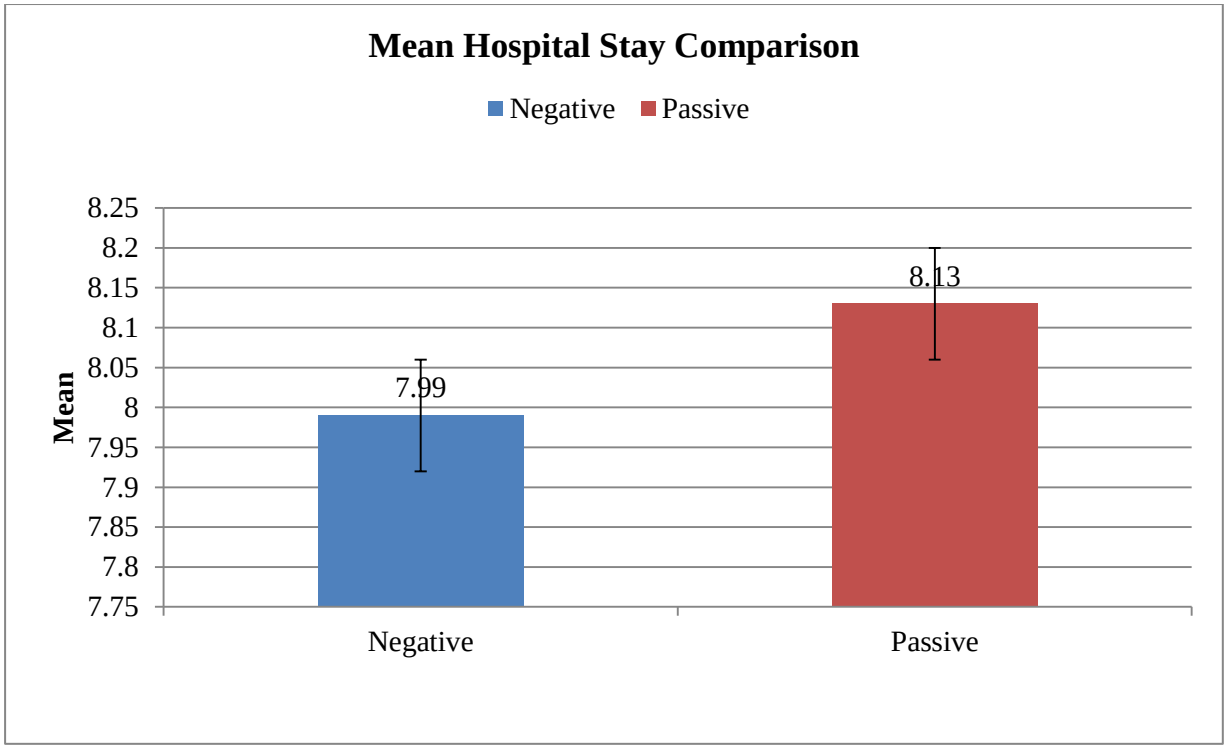



**Figure 7: Bar diagram showing mean hospital stay comparison between two groups**

**Table 8: Wound Complication Distribution between two groups**

| | | Type of Drain | | | |
|---|---|---|---|---|---|
| | | Negative | | Passive | |
| | | Count | % | Count | % |
| Wound complication | Disturbance | 15 | 20.83% | 0 | 0.00% |
| | Minor | 9 | 12.50% | 12 | 16.67% |
| | Moderate | 4 | 5.56% | 8 | 11.11% |
| | Satisfactory | 44 | 61.11% | 50 | 69.44% |
| | Severe | 0 | 0.00% | 2 | 2.78% |

$\chi 2$ = 19.145, df = 4, p = 0.001*

In Negative Suction Drain, 20.83% had Disturbance, 12.5% had Minor, 5.56% had Moderate and 61.11% had Satisfactory.
In Passive Drain, 16.67% had Minor, 11.11% had Moderate, 69.44% had Satisfactory and 2. 78% had Severe.
There was a significant difference in Wound Complication Distribution between the two gro ups

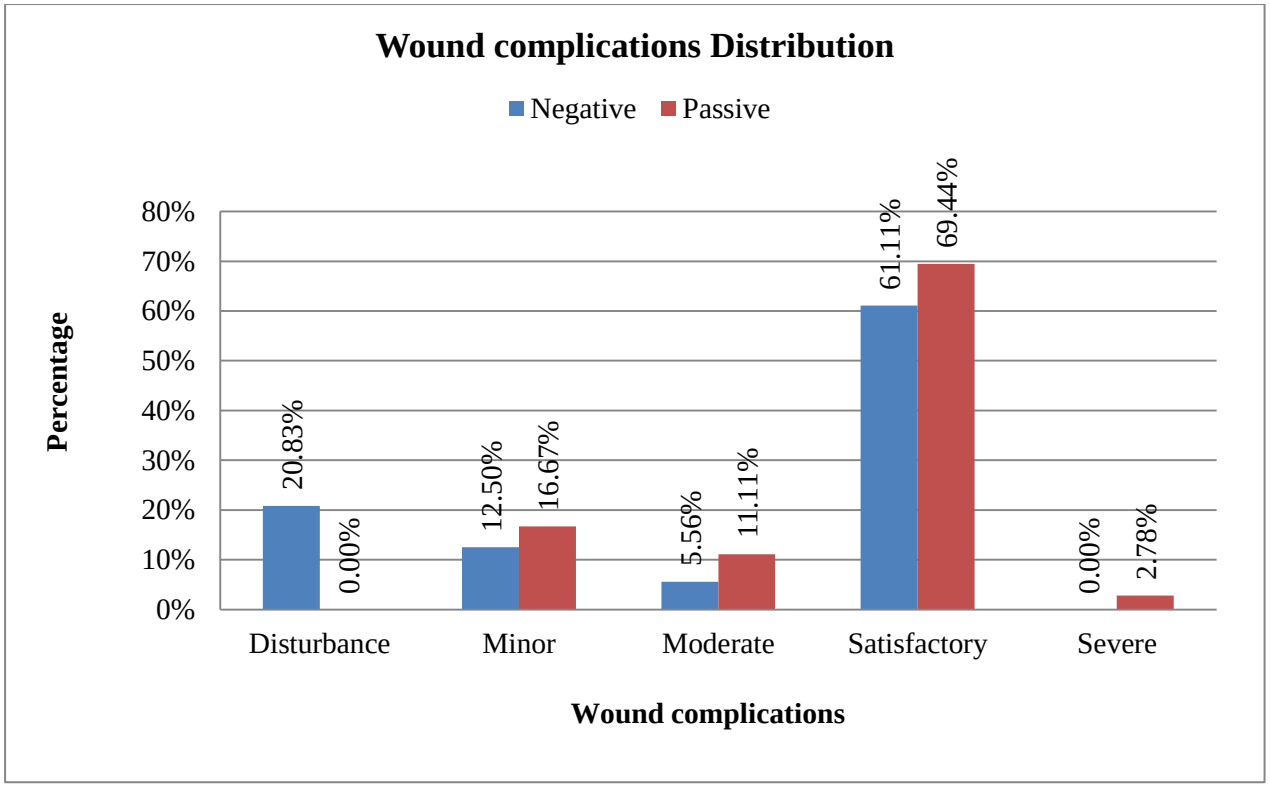



**Figure 8: Bar diagram showing wound complications distribution between two groups**

**Table 9: Complication Distribution between two groups**

| | Type of Drain | | | | P value |
|---|---|---|---|---|---|
| | Negative | | Passive | | |
| | Count | % | Count | % | |
| Type 2 DM | 14 | 19.44% | 13 | 18.06% | 0.831 |
| Previous Abd surgery | 11 | 15.28% | 6 | 8.33% | 0.197 |
| Antibiotics | 72 | 100.00% | 72 | 100.00% | - |
| Drainage of Pus LA | 7 | 9.72% | 17 | 23.61% | 0.025* |
| Debridement of wound | 1 | 1.39% | 4 | 5.56% | 0.172 |
| Serous discharge | 24 | 33.33% | 21 | 29.17% | 0.590 |
| Erythema | 5 | 6.94% | 10 | 13.89% | 0.173 |
| Purulent exudates | 1 | 1.39% | 3 | 4.17% | 0.310 |
| Separation of deep tissues | 3 | 4.17% | 9 | 12.50% | 0.070 |
| Isolation of bacteria | 2 | 2.78% | 5 | 6.94% | 0.245 |
| Stay in the hospital for> 14 days | 4 | 5.56% | 7 | 9.72% | 0.347 |

There was a significant difference in the Drainage of Pus LA distribution between the two gr oups.

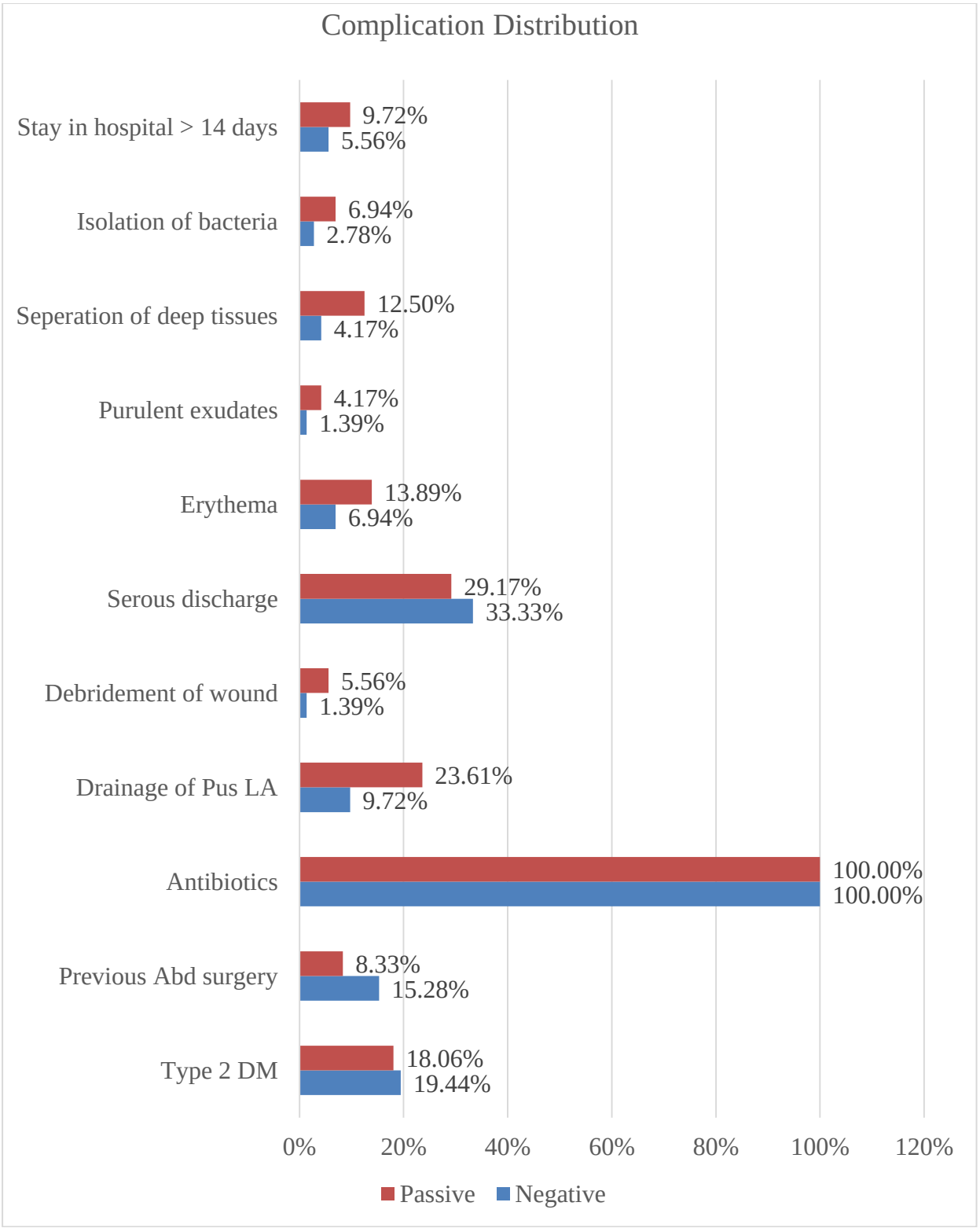



**Figure 9: Column Diagram Showing Complication Distribution**

# DISCUSSION

Another method comparable to subcutaneous negative pressure wound drainage is negative pressure wound treatment. Negative pressure therapy has been in use to control wounds effe ctively since it was introduced in late 1990s. 22 23 An adhesive cover, a closed system made of pore polyurethane foam, a vacuum pump that creates negative pressure and aspirates flui d from the wound make up the device.

Subcutaneous wound drains, as opposed to negative pressure wound care, are more cost-effective, however, these devices are still pricey.

**"22 Webster J, Liu Z, Norman G, *et al*. Negative pressure wound therapy for surgical wounds healing by primary closure. *Cochrane Database Syst Rev* 2019;3."**

**"23 Argenta LC, Morykwas MJ. Vacuum-assisted closure: a new method for wound control and treatment: clinical experience. *Ann Plast Surg* 1997;38:563–77. discussion 577."**

In the Department of General Surgery at R.L. Jalappa Hospital, 144 patients aged between 18 and 65 of either sex who were having abdominal procedures for peritonitis participated in a prospective observational study. The study lasted for one year and six months, from December 2020 to August 2022. Total 144 patients were divided into two groups. A negative suction drain was employed in Group 1 and passive drain was used in Group 2. To collect information from each patient, a structured proforma was used. Before the study began, institutional ethical clearance was acquired. Before the trial began, informed consent was sought from each patient who was included. The study's goal was to compare prevalence of surgical site infections following abdominal surgeries using subcutaneous negative suction drainage vs passive drainage.

**General Profile:**

In the current study, mean age in passive drain group was 42.01 years and the mean age in the negative suction drain was 40.68 years and 15.07 years. There was no discernible difference in the mean age of two groups. In Negative Suction Drain, there were 72.22 percent of men and 27.78 percent of women. 34.72 percent of the people in Passive Drain were female, while 65.28 percent were men. In terms of sex distribution, there was no discernible difference between the two groups.

According to **Dharmendra Dugad et al**., patients between the ages of 41 and 50 saw the highest number of cases, followed by those between the ages of 31 and 40. In this study, 44.2 years old was the average age. There were 14 female patients and 36 total male patients (72%) in total (28 percent ) The ratio of men to women was 2.6:1.

This result is consistent with study by **Kapoor et al. [6],** in which 69 percent of participants were between the ages of 21 and 50. In our study, the male -to- female ratio was 2.6:1.

The average age of the patients, according to **Akter B et al**., was 32.59, 11.88 years (range 18 to 60 years). The age group of 21 to 30 years had the highest percentage of patients (41.1%), followed by that of 31 to 40 years,(17.8%), 18 to 20 years(16.7%), 41 to 50 years (15.5%), and 51 to 60 years (15.5%). (8.9 percent ). The male-to-female ratio was 2:1, with two-third cases being male (66.7%) and one-third being female (33.3%).

According to **Saigal et al.** [20], the study population's mean age was 45.34 and 17.02 years. According to Patel et al. [21], the age groups with the highest percentage of patients were those between the ages of 21 and 30 and 31 to 40. (24.19 percent ). This finding that there was 72 percent of men and 38 percent of women among the patients was supported by Gupta and Kumar [19]. According to **Kumar et al. [**22], 42.0 percent of cases were female and 58.0 percent of patients were men.

Due to their higher rates of smoking and painkiller misuse, young guys are more likely to develop perforation peritonitis. This age group is more vulnerable to road-side collisions that result in perforation and intra-abdominal damage.

**"Dugad D, Mohanty D, Mahobia DH, Saha A. A comparative study of subcutaneous negative pressure versus simple closure of skin incision following surgery for hollow viscus perforation. Int J Surg Sci. 2021; 5:269-71."**

**"Kapoor S, Sharma R, Srivastava A, Kumar A, Singh A, *et al.* Study Of Surgical Complications Of Explorative Laparotomy And Their Management –A Study Of 100 Cases. Journal of Dental And Medical Science 2017; 16:36-41."**

**"After B, Anwar A, Tabibul Islam M, Baishnab AK, Abdul Qadir M, Faridul Haque M, Mizanur Rahman M, Kabir A. Incidence of surgical site infections after emergency laparotomy for perforation peritonitis. Int J Surg Sci. 2021;5(2):335-8."**

**"19. Gupta P, Kumar R. Role of the subcutaneous suction drain in reducing surgical site infections after emergency laparotomy. Int Surg J 2017;4:2717-20."**

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**Type of Surgery:**

40%.28% of Negative Suction Drain patients underwent elective surgery, while 597.2% received emergency surgery. Emergency was present in Passive Drain in 52.78 percent of cases and Elective in 47.22 percent. The type of surgery did not significantly differ from one another. sharing between two groups.

**Wound score:**

Mean Wound Scores for Passive Drain and Negative Suction Drain were respectively 14.51 7.31 and 16.44 10.45. Between the two groups, there was no discernible difference in mean Points Acquired.

**Drain Removal day:**

The mean Drain Removal Day for the Passive Drain was 6.49 1.74 and for the Negative Suction Drain was 6.49 1.75. Between the two groups, there was no discernible difference in the mean Drain removal day.

**Hospital stay:**

The average hospital stay in days for a passive drain was 8.13 days and for a negative suction drain was 7.99 days and 2.65 days. Between the two groups, there was no discernible difference in mean hospital stay in terms of days.

In their study**, Ibrahim SA et al**. found that patients with subcutaneous drains had consider ably longer postoperative hospital stays than those without subcutaneous drains (p-value 0.040).

The average hospital stay was found to be 6.913.10 days in cases and 10.615.93 days in cont rols in the study by Naik AK et al. With a p-value of -0.0001, statistics revealed that this was statistically very significant. The investigations cond ucted by Patel et al. produced similar findings, with the average hospital stay in cases with d rains being 10.1 days and in controls being 13.2 days, with a significant p-value of 0.05. Inpatient stays were 9.644.15 days in cases and -

12.265.55 days in the control-

group, according to a study by **Zhuang J et al**.[8] Inpatient stays were 9.644.15 days in cases and -12.265.55 days in the control group, according to

Zhuang J et al's study, which was statistically significant with a p-value of 0.004.12. According to **Manoharan et al**, the average length of hospital stay was 9.17 days for patients who had drains and 14.17 days for those who didn't. 13 The postoperative hospital stay was not statistically significant, according to a study by **Kagita et al**, with a p-value of -0.346.7.

**Rakesh Kagita, Sameer Ahmed Mulla, Srinivas Pai B, Mallikarjun Desai. Subcutaneo us negative pressure versus simple closure of skin incision following an emergency lap arotomy: a randomized control study. Int Surg J. 2019;6(4):1230-1237."**

**"Mukherjee R, Samanta S. A comparative study of primary skin and subcutaneous ti ssue closure and open skin technique in emergency laparotomy for perforative perito nitis: an observational and prospective study. Int Surg J 2019; 6:166-72."**

**"Ibrahim SA, Abdalla MM, Elshafei RM. Evaluation of subcutaneous drainage syste m versus tissue re-**

**approximation alone using Pfannenstiel incision in obese females undergoing cesarean section."**

**"12. Zhuang J, Zheng W, Yang S, Ye J. Modified subcutaneous suction drainage to prevent incisional surgical site infections after radical colorectal surgery. Transl Cancer Res. 2020;9(2):910-7."**

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**Incidence of SSI:**

In the current study, incidence of SSI was 18.06% in the Negative Suction Drain group, 30.56% in Passive group. There was no discernible change in the distribution of SSI incidence between the two groups.

In a study conducted by **Poonam Gupta et al.**, there was a higher incidence of SSIs in obese patients, with SSIs occurring in 24% patients in the drain group and 50% of patients in the

non-drain group (P value-0.05). Age, superficial SSIs, and post-operative fever were not significantly different, according to prospective research by **Jyothi Bindal et al**., Differences in wound seroma, discomfort, and average hospital stay are significant. In drain group, 10% experienced seroma, compared to 26% in the non-drain group; the average hospital stay was 8.2 days in the drain group. According to **Akter B et al**., surgical site infections occurred in 7 (16.3 percent) of patients with subcutaneous suction drains and 17 (36.2 percent) of patients without them. Those who had a subcutaneous suction drain saw a markedly reduced risk of surgical site infection.

The finding that incidence of surgical site infection was lower in drain group than in the no-drain group, which is statistically significant (p 0.05), was validated by **Gupta and Kumar** [19]. According to Kumar et al. [22], use of a subcutaneous suction vacuum drain decreased wound infection by 58 percent compared to 16 percent, with a p-value of 0.001.

In the study by **Naik AK et al.**, it was found that 25 (46.08 percent) controls and 13 (24.08 percent) patients out of 54 cases experienced statistically significant SSI development. The research conducted by **Kagita et al**. revealed similar results; SSI was reported as 12.50 percent in patients and 69.44 percent in controls with substantial. 7 According to Patel et alstudy, 's patients with drains had a 16 percent incidence of SSI while those without drains had a 40 percent incidence, which was statistically significant. 8 The study by **Wani JN et al**. produced similar findings, with the rate of SSI in patients being 15.3% and in controls being 30% with statistical significance. 9 Studies by **Nasta et al. and Manzoor et al**., in contrast, revealed that subcutaneous suction drains were not used to prevent surgical site infections..[10,11]

"Naik AK, Arya SV, Sharma AK. Role of the subcutaneous suction drain in reducing surgical site infection in emergency laparotomy. Int Surg J 2022;9:616-9."

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a prospective study of 100 cases. Int J Health Sci Res. 2015;5(9):119-24.

11. Manzoor B, Heywood N, Sharma A. Review of Subcutaneous Wound Drainage in Redu cing Surgical Site Infections after Laparotomy. Surg Res Pract. 2015;2015:715803

**Wound Complication:**

A negative suction drain was the subject of the current study in 20.83 percent of cases, 12.5 percent in minor cases, 5.56 percent in moderate cases, and 61.11 percent in satisfactory cases. 16.67% of Passive Drain cases were Minor, 11.11% were Moderate, 69.44% were Satisfactory, and 2.78% were Severe. The distribution of wound complications between the two groups differed significantly. In the current study's Negative Drain group, 9.72 percent experienced Drainage of Pus LA, 1.39 required wound debridement, 33.3 had serous discharge, 6.94 had erythema, 1.39 had purulent exudates, 4.17 had separation of deep tissues, 2.78 had bacterial isolates, and 5.56 needed to stay in the hospital for more than 14 days. In the current study, in the passive drain group, 23.61 percent had drainage of Pus LA, 5.56 required wound debridement, 29.17 had serous discharge, 13.89 had erythema, 4.17 had purulent exudates, 12.5 had separation of deep tissues, 6.94 had bacterial isolates, and 9.72 needed to stay in the hospital for more than 14 days. Between the two groups, there was a considerable variation in the amount of pus that local anesthetics could drain.

**Dharmendra Dugad** and others, Six individuals (24%) out of 25 suffered complications du

e to wounds. 14 patients (or 56%) of 25 patients with primary skin closure who underwent surgery reported local complications. Patients with subcutaneous drains experienced much fewer complications. The rate of wound complications varied significantly between the two groups. Negative suction drain group complications such as seroma wound gaping, and burst abdomen were less common than in the control group**.**

This is consistent with the research conducted by **Fujii et al**. [7]. Placing a subcutaneous drain next to the incision removes the serosanguinous fluid and the accumulated blood, which thus improves the capillary circulation, lowers the bacterial load, and encourages the creation of granulation tissue. **Ibrahim SA et al.** noted that seroma accounts for 9.5% of complications, hematoma, accounts for 3.5%, and abscess accounts for about 6.5%. Patients in the subcutaneous drain group experienced less frequent serous discharge (18 patients) and lower hematoma formation (6 patients) than patients in the non-subcutaneous drain group (8 patients). In the study by Naik AK et al., 5 (9.26%) patients out of 54 cases and 18 (33.33%) patients out of 54 controls experienced statistically significant wound dehiscence, which manifested as a wound gap or wound dehiscence. Studies by **Wani et al**. produced similar findings, with wound dehiscence developing in 12.3% of cases and 45.3% of controls, with a significant p-value of 0.001.14. According to research by **Khan et al,** 14% of patients who had drains and 42% of those who had none reported wound dehiscence, with a significant p-value of 0.002.15

According to a study by Alsafrani et al, the aforementioned results are false.[16]

**Fujii T, Tabe Y, Yajima R, Yamaguchi S, Tsutsumi S, Asao T *et al*. Effects of Subcut aneous Drain for the Prevention of Incisional SSI in High-**

**Risk Patients Undergoing Colorectal Surgery. Int J Colorectal Dis. 2011;26:1151-5."**

**14. Wani JN, Bhat JA. Role of Negative Suction Subcutaneous Drains in Contaminate d Abdominal Surgeries. J Gastrointest Dig Syst. 2019;9(1):587.**

**15. Khan AQ, Mahesh Kodalkar. Role of Negative Suction Drain in Subcutaneous Plane in Reducing Laparotomy Wound Infection. International Journal of Science and Research. 2016;5(1):692-4.**

CONCLUSION

According to the study's findings, the incidence of SSI was lower in negative suction drain group than the passive drain group.

Majority of individuals in Negative suction drain group scored their wound complications more favorably than those in Passive drain group.

Complications include Drainage of Pus Local Anaesthetics, Debridement of Wound, Erythema, Purulent exudates, Separation of Deep Tissues, and Hospital Stay for More Than 14 Days were less common in the Negative Drain Group when compared to Passive Drain Group.

In light of the aforementioned findings, negative suction drainage performed better in surgical wounds than passive drainage.

**RECOMMENDATIONS**

The study recommends for use of a Negative suction drain in place of a passive drain due to its advantages in

1. Reduced incidence of SSI
2. Better Wound Complication grade
3. Reduced Stay in Hospital
4. Lower complication rates such as the Need for Drainage of Pus using Local anesthetics, Debridement of wound, Erythema, Purulent exudates, Separation of deep tissues

Hence Negative suction drain is preferred over a Passive drain where ever feasible.

## LIMITATIONS

1. Observational prospective study design – Randomized controlled trial would provide better results.
2. Blinding was not followed due to procedural issues. Procedures could not be blinded.
3. Training status – Trained surgeons can put better drains hence it could play an important role in infection. This aspect was not studied in the present study.
4. Cost of both procedures was not evaluated. Hence cost effective analysis to be conducted in future studies.

## SUMMARY

In the Department of General Surgery at R.L. Jalappa Hospital, 144 patients aged between 18 and 65 of either sex who were having abdominal procedures for peritonitis participated in a prospective observational study. The study lasted for one year and six months, from December 2020 to August 2022. A total of 144 patients were split into two groups. A negative suction drain was employed in Group 1 and a passive drain was used in Group 2. To collect information from each patient, a structured proforma was used. Before the study began, institutional ethical clearance was acquired. Before the trial began, every patient who was included provided their informed permission.

1. Mean Age in the Negative Suction Drain was 40.68 ± 15.07 years and in Passive Drai n was 42.01 ± 14.87 years.
2. In Both groups majority of the subjects were males. There was no significant differen ce in sex distribution between two groups.
3. In both groups majority of them underwent emergency surgery. There was no discern ible difference in the Type of surgery Distribution between the two groups.
4. Mean Wound score in Negative Suction Drain was 14.51 ± 7.31 and in Passive Drain was 16.44 ± 10.45. There was no discernible difference in mean Points acquired

comparison between the two groups.

5. Mean time for Drain removal in the Negative Suction Drain was 6.4 ± 1.75 days and in Passive Drain was 6.49 ± 1.74 days. There was no discernible difference in mean Drain removal day comparison between the two groups.
6. Mean Hospital stay in the Negative Suction Drain was 7.99 ± 2.65 days and in Passive Drain was 8.13 ± 2.26 days. There was no discernible difference in mean Hospital stay comparison between the two groups.
7. Incidence of SSI In the Negative Suction Drain group was 18.06% and in the Passive group was 30.56%. There was no discernible difference in the Incidence of SSI Distribution between the two groups
8. Of the negative suction drains, 20.83 percent had disturbance, 12.5% had minor, 5.56% had moderate, and 61.11% had satisfactory results. 16.67% of Passive Drain cases were Minor, 11.11% were Moderate, 69.44% were Satisfactory, and 2.78% were Severe. Between the two groups, there was a considerable difference in wound complications.
9. In the group with negative drainage, 9.72 percent required drainage of pus under local anesthetics, 1.39 required wound debridement, 33.3 required serous discharge, 6.94 required erythema, 1.39 required purulent exudates, 4.17 required deep tissue
10. Separation, 2.78 required bacterial isolates, and 5.56 required a stay in the hospital longer than 14 days. In the group with passive drains, 23.61 percent experienced drainage of pus under local anesthesia, 5.56 required wound debridement, 29.17 had serous discharge, 13.89 had erythema, 4.17 had purulent exudates, 12.5 had separation of deep tissues, 6.94 had bacterial isolates, and 9.72 needed to stay in the hospital for more than 14 days. Between the two groups, there was a considerable variation in the drainage of pus under local anesthesia

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# ANNEXURE – I: PROFORMA

**Particulars of patient**

Name:

Sex:

Occupation:

UHID number:

Phone number:

Address:

DOA:
DOD:
Presenting complaints:

Previous history:

Family history:

History:

**General physical examination**

Appearance:
Temperature:
Pulse:
Blood pressure:

**LOCAL EXAMINATION:**

Inspection:

Palpation:

Auscultation:

Percussion:

**INVESTIGATIONS:**

HB:

RBC:

PCV:

WBC:

PLATELETS:

RBS:

BLOOD UREA:

SERUM CREATININE:

SERUM SODIUM:

SERUM POTASSIUM:

**ASSESSMENT OF WOUND:**

ASEPSIS SCORING:

ADDITIONAL TREATMENT:

Antibiotics: 10

Drainage of pus under local anesthetics: 5

Debridement of wound (general anesthetics):10

SEROUS DISCHARGE: Daily: 0-5

ERYTHEMA: Daily: 0-5

PURULENT EXUDATES: Daily: 0-10

SEPERATION OF DEEP TISSUES: Daily :0-10

ISOLATION OF BACTERIA:10

STAY IN HOSPITAL PROLONGED OVER 14 DAYS: 5

**Criteria of infection:**

0-10 = satisfactory healing

11-20 = disturbance of healing

20-30=minor wound infection

31-40=moderate wound infection

>40=severe wound infection

# ANNEXURE – II: PATIENT INFORMATION SHEET

**Study title**: A COMPARITIVE STUDY OF INCIDENCE OF SURGICAL SI TE INFECTION USING SUBCUTANEOUS NEGATIVE SUCTION DRAIN VERSUS PASSIVE DRAIN IN ABDOMINAL SURGERIES

Study location: R L Jalappa Hospital and Research Centre attached to Sri Deva raj Urs Medical College, Tamaka, Kolar.

Details-

Name:

Address: Ward:

Age: Study Number :

UHID No;

Sex:

Please read the following details and talk to your family about them. You are welcome to ask any questions about the study. If you agree to take part in the study, we will ask you, someone who is in charge of you, or both, to provide information (as per the proforma). A pertinent history will be collected. This data will only be used for publications and disser tations. Your personal information will be kept private and will not be s hared with anyone else. Your identify won't be made public. You are we lcome to get in touch with a member of the institutional ethics committ ee after they have examined this study. You are not required to consent to this study. Even if you choose not to participate, you will still receive

the same level of care. Only if you willingly decide to take part in this study, will you be asked to sign or leave a thumbprint. This research co mpares the effectiveness of preventing surgical site infections during ab dominal surgery closure using passive drain versus negative suction dra in.

For further information contact:

Dr. Yarremsetty SaiVikram [postgraduate]
Department of General Surgery
SDUMC, Kolar.

## ರೋಗಿಯ ಮಾಹಿತಿ ಹಾಳೆ

ಅಧ್ಯಯನ ಶೀರ್ಷಿಕೆ:

ಸಕ್ರಿಯ ವರ್ಸಸ್‌ನಲ್ಲಿನ ಸರ್ಜಿಕಲ್ ಸೈಟ್
ನ ಸೋಂಕಿನ ಬಗ್ಗೆ ಒಂದು ತುಲನಾತ್ಮಕ ಅಧ್ಯಯನವು ಹೆಚ್ಚಿನ ಅಪಾಯದ ಎಮರ್ಜೆನ್ಸಿ ಅಬ್ಡೋ
ಮಿನಲ್ ಸರ್ಜರಿಗಳಲ್ಲಿ ಸರ್ಜಿಕಲ್ ವೌಂಡ್‌ಗಳ ವೇಗದ ಒಳಚರಂಡಿ

ಅಧ್ಯಯನದ ಸ್ಥಳ: ಕೋಲಾರದ ತಮಾಕಾದ ಶ್ರೀ ದೇವರಾಜ್ ಉರ್ಸ್ ವೈದ್ಯಕೀಯ ಕಾಲೇಜಿಗೆ ಲಗತ್ತಿಸಲಾದ ಆರ್ ಎಲ್ ಜಲಪ್ಪ ಆಸ್ಪತ್ರೆ ಮತ್ತು ಸಂಶೋಧನಾ ಕೇಂದ್ರ.

ವಿವರಗಳು-

ಈ ಅಧ್ಯಯನದ ವಿಷಯವು ಅಗತ್ಯವಿರುವಂತೆ ತನಿಖೆಗೆ ಒಳಗಾಗಬೇಕಾಗುತ್ತದೆ.

ಅಧ್ಯಯನಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ ನೀವು ಯಾವುದೇ ಪ್ರಶ್ನೆಯನ್ನು ಕೇಳಬಹುದು. ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನೀವು ಒಪ್ಪಿದರೆ ನಾವು ನಿಮ್ಮಿಂದ ಅಥವಾ ನಿಮ್ಮ ಅಥವಾ ಇಬ್ಬರ ಜವಾಬ್ದಾರಿಯುತ ವ್ಯಕ್ತಿಯಿಂದ ಮಾಹಿತಿಯನ್ನು (ಪ್ರೊಫಾರ್ಮಾದ ಪ್ರಕಾರ) ಸಂಗ್ರಹಿಸುತ್ತೇವೆ. ಸಂಬಂಧಿತ ಇತಿಹಾಸವನ್ನು ತೆಗೆದುಕೊಳ್ಳಲಾಗುವುದು. ಸಂಗ್ರಹಿಸಿದ ಈ ಮಾಹಿತಿಯನ್ನು ಶೈಕ್ಷಣಿಕ ಉದ್ದೇಶ ಮತ್ತು ಪ್ರಕಟಣೆಗೆ ಮಾತ್ರ ಬಳಸಲಾಗುತ್ತದೆ.

ನಿಮ್ಮಿಂದ ಸಂಗ್ರಹಿಸಲಾದ ಎಲ್ಲಾ ಮಾಹಿತಿಯನ್ನು ಗೌಪ್ಯವಾಗಿಡಲಾಗುತ್ತದೆ ಮತ್ತು ಯಾವುದೇ ಹೊರಗಿನವರಿಗೆ ಬಹಿರಂಗಪಡಿಸುವುದಿಲ್ಲ. ನಿಮ್ಮ ಗುರುತು ಬಹಿರಂಗಗೊಳ್ಳುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನವನ್ನು ಸಾಂಸ್ಥಿಕ ನೈತಿಕ ಸಮಿತಿಯು ಪರಿಶೀಲಿಸಿದೆ ಮತ್ತು ನೀವು ಸಾಂಸ್ಥಿಕ ನೈತಿಕ ಸಮಿತಿಯ ಸದಸ್ಯರನ್ನು ಸಂಪರ್ಕಿಸಲು ಮುಕ್ತರಾಗಿದ್ದೀರಿ. ಈ ಅಧ್ಯಯನವನ್ನು ಒಪ್ಪಿಕೊಳ್ಳಲು ಯಾವುದೇ ಬಲವಂತವಿಲ್ಲ. ನೀವು ಭಾಗವಹಿಸಲು ಇಚ್ if ಿಸದಿದ್ದರೆ ನೀವು ಪಡೆಯುವ ಕಾಳಜಿ ಬದಲಾಗುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನೀವು ಸ್ವಯಂಪ್ರೇರಣೆಯಿಂದ ಒಪ್ಪಿಕೊಂಡರೆ ಮಾತ್ರ ನೀವು ಹೆಬ್ಬೆರಳು ಅನಿಸಿಕೆಗೆ ಸಹಿ / ಒದಗಿಸುವ ಅಗತ್ಯವಿದೆ.

ಹೆಚ್ಚಿನ ಮಾಹಿತಿಗಾಗಿ ಸಂಪರ್ಕಿಸಿ

ಡಾ.

ಕಿರಿಯ ನಿವಾಸಿ

ಸಾಮಾನ್ಯ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ಇಲಾಖೆ

ಎಸ್‌ಡಿಯುಎಂಸಿ, ತಮಾಕಾ, ಕೋಲಾರ

# ANNEXURE – III: CONSENT FORM

I Mr./Mrs. have explained in my understandable language, that I will be included in a study A Comparative Study Of Incidence Of Surgical Site Infection Using Subcutaneous Negative Suction Drain Versus Passive Drain In Abdominal Surgeries which is being conducted in R L Jalapp a Hospital.

My clinical findings, investigations, intraoperative results, and postoperative co urse will be evaluated and recorded for study purposes, it has been made clear t o me.

I have been informed that my participation in this study is entirely optional and that I can leave at any time; doing so won't have an impact on how I interact w ith my doctor or how my illness is being treated.

In terms I could comprehend, the follow-
up information as well as potential advantages and disadvantages from actions have been outlined.

I am aware that all of the information about me discovered during the study wil l be kept confidential, and that my information will be concealed when the resu lts are published or shared.

I hereby provide my informed consent to participate in this study in full.

Signature/ thumb impression of the patient:

Name:

Signature/ thumb impression of the witness:

Name:

Relation to patient:

Date: Place:

# ರೋಗಿಯ ಒಪ್ಪಿಗೆ ಪತ್ರ

ನಾನು ಶ್ರೀ. / ಶ್ರೀ. ನನ್ನ ಸ್ವಂತ ಅರ್ಥವಾಗುವ ಭಾಷೆಯಲ್ಲಿ ವಿವರಿಸಲಾಗಿದೆ, ಅಂದರೆ ನನ್ನನ್ನು ಅಧ್ಯಯನದಲ್ಲಿ ಸೇರಿಸಲಾಗುವುದು, ಅಂದರೆ: ಹೆಚ್ಚಿನ ಅಪಾಯದ ಸಂದರ್ಭಗಳಲ್ಲಿ ಸರ್ಜಿಕಲ್ ಸೈಟ್ ಸೋಂಕಿನಲ್ಲಿ ಪೋಸ್ಟ್ ಆಪರೇಟಿವ್ ಸಪ್ಲಿಮೆಂಟಲ್ ಆಕ್ಸಿಜನ್ ಪರಿಣಾಮಕಾರಿತ್ವವನ್ನು ಹೋಲಿಸಲು

ನನ್ನ ಕ್ಲಿನಿಕಲ್ ಆವಿಷ್ಕಾರಗಳು, ತನಿಖೆಗಳು, ಇಂಟ್ರಾಆಪರೇಟಿವ್ ಆವಿಷ್ಕಾರಗಳು, ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ನಂತರದ ಕೋರ್ಸ್ ಅನ್ನು ಮೌಲ್ಯಮಾಪನ ಮತ್ತು ಅಧ್ಯಯನದ ಉದ್ದೇಶಕ್ಕಾಗಿ ದಾಖಲಿಸಲಾಗುವುದು ಎಂದು ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ. ಅಧ್ಯಯನದ ಸಾಧಕ-
ಬಾಧಕಗಳ ಬಗ್ಗೆಯೂ ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನನ್ನ ಭಾಗವಹಿಸುವಿಕೆಯು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ ಎಂದು ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ, ಮತ್ತು ನಾನು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಅಧ್ಯಯನದಿಂದ ಹಿಂದೆ ಸರಿಯಬಹುದು ಮತ್ತು ಇದು ನನ್ನ ವೈದ್ಯರೊಂದಿಗಿನ ನನ್ನ ಸಂಬಂಧ ಅಥವಾ ನನ್ನ ಕಾಯಿಲೆಗೆ ಚಿಕಿತ್ಸೆಯ ಮೇಲೆ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ.

ನನ್ನ ಸ್ವಂತ ಅರ್ಥವಾಗುವ ಭಾಷೆಯಲ್ಲಿ, ಮುಂದಿನ ವಿವರಗಳು ಮತ್ತು ಮಧ್ಯಸ್ಥಿಕೆಗಳ ಕಾರಣದಿಂದಾಗಿ ಸಂಭವನೀಯ ಪ್ರಯೋಜನಗಳು ಮತ್ತು ಪ್ರತಿಕೂಲತೆಗಳ ಬಗ್ಗೆ ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ.

ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ತೆಗೆದ ನನ್ನ ಎಲ್ಲಾ ವಿವರಗಳನ್ನು ಗೌಪ್ಯವಾಗಿಡಲಾಗಿದೆ ಮತ್ತು ಸಂಶೋಧನೆಗಳನ್ನು ಪ್ರಕಟಿಸುವಾಗ ಅಥವಾ ಹಂಚಿಕೊಳ್ಳುವಾಗ, ನನ್ನ ಗುರುತನ್ನು ಮರೆಮಾಚಲಾಗುತ್ತದೆ ಎಂದು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ.

ವಿಚಾರಣೆಗೆ ನನ್ನ ಬಳಿ ಪ್ರಧಾನ ತನಿಖಾಧಿಕಾರಿ ಮೊಬೈಲ್ ಸಂಖ್ಯೆ ಇದೆ.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಸೇರಿಸಲು ನನ್ನ ಸಂಪೂರ್ಣ ಮನಸ್ಸಿನಲ್ಲಿ ನಾನು ಸಂಪೂರ್ಣ ಒಪ್ಪಿಗೆ ನೀಡುತ್ತೇನೆ.

ರೋಗಿಯ ಸಹಿ: ಡಾ.

ಹೆಸರು: ಜೂನಿಯರ್ ರೆಸಿಡೆಂಟ್

PH ಸಂಖ್ಯೆ: 9700634347

ಸಹಿ:

ಸಾಕ್ಷಿಯ ಸಹಿ:

ಹೆಸರು:

ರೋಗಿಗೆ ಸಂಬಂಧ

## ANNEXURE: IV: IMAGES

# ANNEXURE – IV: MASTER CHART

| Slno | Age | Sex | UHID | Diagnosis | Elective | Emergency | Hypertension | Type of Drain | Type 2 DM | Previous Abd surgery | Antibiotics | Drainage of Pus LA | Debridement of wound | Serous discharge | Erythema | Purulent exudates | Seperation of deep tissues |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 65Y | M | 910001 | Acute Intestinal Obstruction | No | Yes | No | Negative | Yes | No | Yes | No | No | Yes | No | No | No |
| 2 | 48y | M | 936999 | Peritonitis | No | Yes | Yes | Passive | Yes | No | Yes | No | No | No | No | No | No |
| 3 | 15y | M | 940168 | Penetrating injury to abdomen | No | Yes | No | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 4 | 40y | F | 941466 | Peritonitis | No | Yes | Yes | Passive | No | No | Yes | Yes | No | Yes | No | No | No |
| 5 | 68y | M | 938409 | Ca Sigmoid colon | No | Yes | Yes | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 6 | 63y | M | 944251 | Peritonitis | No | Yes | No | Passive | Yes | No | Yes | Yes | No | Yes | Yes | No | Yes |
| 7 | 50y | M | 945185 | Peritonitis | No | Yes | Yes | Negative | Yes | No | Yes | No | No | Yes | No | No | No |
| 8 | 40y | M | 945597 | Intestinal Obstruction | No | Yes | Yes | Passive | No | No | Yes | No | No | Yes | No | No | No |
| 9 | 35y | F | 947071 | Acute Intestinal Obstruction | No | Yes | No | Negative | No | No | Yes | Yes | No | No | Yes | No | No |
| 10 | 35y | F | 948215 | Peritonitis | No | Yes | No | Passive | No | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 11 | 20y | M | 950789 | Acute Appendicitis | No | Yes | No | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 12 | 36y | F | 17863 | Incisional hernia | Yes | No | No | Passive | No | Yes | Yes | No | No | No | No | No | No |
| 13 | 62y | F | 40852 | Para umbilical hernia | Yes | No | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 14 | 50y | F | 43091 | Acute Intestinal Obstruction | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 15 | 56y | M | 7137 | Ca Penis | Yes | No | Yes | Negative | Yes | No | Yes | No | No | Yes | No | No | No |
| 16 | 17y | M | 23598 | Patent Urachus | Yes | No | No | Passive | No | No | Yes | Yes | No | Yes | Yes | No | No |
| 17 | 45y | M | 44542 | Blunt trauma abdomen | No | Yes | Yes | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 18 | 25y | M | 44716 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 19 | 42y | M | 38210 | Recurrent Ca rectum | Yes | No | No | Negative | No | Yes | Yes | No | No | Yes | No | No | No |
| 20 | 47y | M | 46357 | Peritonitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 21 | 60y | M | 46324 | Peritonitis | No | Yes | No | Negative | Yes | No | Yes | Yes | No | Yes | Yes | No | No |
| 22 | 29y | F | 46301 | Umbilical hernia | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 23 | 28y | M | 46954 | Peritonitis | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 24 | 19y | M | 47558 | Stab injury over abdomen | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 25 | 50y | M | 48573 | Peritonitis | No | Yes | Yes | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 26 | 43y | M | 48257 | Acute Intestinal Obstruction | No | Yes | No | Passive | Yes | No | Yes | No | No | No | No | No | No |
| 27 | 22y | M | 48846 | Acute Appendicitis | No | Yes | No | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 28 | 28y | M | 51451 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 29 | 27y | M | 520501 | Acute Appendicitis | No | Yes | No | Negative | No | No | Yes | Yes | No | Yes | No | No | No |
| 30 | 23y | M | 53385 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | Yes | No | Yes | No | No | No |
| 31 | 19y | M | 54522 | Peritonitis | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 32 | 30y | M | 56781 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | Yes | No | Yes | Yes | No | Yes |
| 33 | 55y | F | 56751 | Acute Intestinal Obstruction | No | Yes | Yes | Negative | Yes | Yes | Yes | No | No | No | No | No | No |
| 34 | 22y | M | 57122 | Peritonitis | No | Yes | No | Passive | No | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 35 | 35y | M | 49843 |  |  |  | No | Negative | No |  | Yes | No | No | No | No | No | No |
| 36 | 30y | M | 58835 | Obstructed Inguinal hernia | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |

| Slno | Age | Sex | UHID | Diagnosis | Elective | Emergency | Hypertension | Type of Drain | Type 2 DM | Previous Abd surgery | Antibiotics | Drainage of Pus LA | Debridement of wound | Serous discharge | Erythema | Purulent exudates | Seperation of deep tissues |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 32y | M | 59210 | Peritonitis | No | Yes | No | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 38 | 55y | M | 59462 | Peritonitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 39 | 43y | M | 59643 | Obstructed Inguinal hernia | No | Yes | Yes | Negative | No | No | Yes | Yes | No | Yes | No | No | No |
| 40 | 50y | M | 59715 | Umbilical hernia | Yes | No | Yes | Passive | Yes | No | Yes | No | No | No | No | No | No |
| 41 | 35y | M | 61383 | Acute Appendicitis | No | Yes | No | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 42 | 46y | F | 27013 | Right Indirect Inguinal hernia | Yes | No | Yes | Passive | No | No | Yes | Yes | No | Yes | No | No | No |
| 43 | 25y | F | 59162 | Umbilical hernia | Yes | No | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 44 | 59y | M | 62062 | Left indirect inguinal hernia | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 45 | 38y | F | 62885 | Ca Vault recurrence | Yes | No | No | Negative | No | Yes | Yes | No | No | No | No | No | No |
| 46 | 16y | M | 63871 | Peritonitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 47 | 66y | M | 45226 | Ca rectum | Yes | No | Yes | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 48 | 36y | F | 65014 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 49 | 24y | M | 67970 | Left indirect inguinal hernia | Yes | No | No | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 50 | 40y | F | 66705 | Supra umbilical hernia | Yes | No | No | Passive | No | No | Yes | Yes | No | Yes | No | No | No |
| 51 | 55y | M | 66994 | Paraumbilical hernia | Yes | No | No | Negative | Yes | No | Yes | No | No | No | No | No | No |
| 52 | 65y | M | 70162 | Right Indirect Inguinal hernia | Yes | No | Yes | Passive | Yes | No | Yes | No | No | No | No | No | No |
| 53 | 55y | M | 69306 | Left direct inguinal hernia | Yes | No | No | Negative | Yes | No | Yes | No | No | No | No | No | No |
| 54 | 45y | M | 72438 | Peritonitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 55 | 52y | M | 67586 | Right Indirect Inguinal hernia | Yes | No | Yes | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 56 | 24y | M | 72799 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 57 | 19y | M | 73148 | Acute Appendicitis | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 58 | 53y | M | 71659 | Left indirect inguinal hernia | Yes | No | Yes | Passive | No | No | Yes | No | No | No | No | No | No |
| 59 | 25y | M | 74093 | Sigmoid volvulus | No | Yes | No | Negative | No | Yes | Yes | No | No | Yes | No | No | No |
| 60 | 41y | F | 72211 | Rectovaginal fistula | Yes | No | No | Passive | No | Yes | Yes | No | No | No | No | No | No |
| 61 | 38y | F | 71638 | Recurrent Appendicitis | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 62 | 21y | F | 76240 | Sigmoid volvulus | No | Yes | No | Passive | No | No | Yes | Yes | No | Yes | Yes | No | Yes |
| 63 | 36y | M | 77161 | Peritonitis | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 64 | 67y | M | 74163 | Right Indirect Inguinal hernia | Yes | No | Yes | Passive | Yes | No | Yes | Yes | No | Yes | No | No | No |
| 65 | 55y | F | 77468 | post op transverse colostomy | Yes | No | No | Negative | Yes | Yes | Yes | No | No | Yes | No | No | No |
| 66 | 60y | F | 74024 | Recurrent Ca rectum | Yes | No | No | Passive | No | Yes | Yes | No | No | No | No | No | No |
| 67 | 39y | F | 78072 | Acute Appendicitis | No | Yes | Yes | Negative | No | No | Yes | No | No | No | No | No | No |
| 68 | 54y | M | 76836 | Ca rectosigmoid | Yes | No | No | Passive | No | No | Yes | Yes | No | Yes | Yes | No | Yes |
| 69 | 28y | F | 79804 | Acute Appendicitis | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 70 | 63y | M | 74940 | Ca Esophagus | Yes | No | Yes | Passive | No | No | Yes | No | No | No | No | No | No |
| 71 | 46y | M | 81093 | Acute Appendicitis | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 72 | 62y | M | 76135 | Ca Esophagus | Yes | No | No | Passive | Yes | No | Yes | No | No | No | No | No | No |

| Slno | Age | Sex | UHID | Diagnosis | Elective | Emergency | Hypertension | Type of Drain | Type 2 DM | Previous Abd surgery | Antibiotics | Drainage of Pus LA | Debridement of wound | Serous discharge | Erythema | Purulent exudates | Seperation of deep tissues |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 73 | 34y | M | 82520 | Acute Appendicitis | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 74 | 22y | M | 82189 | Right Indirect Inguinal hernia | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 75 | 18y | F | 82607 | Acute intestinal obstruction | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 76 | 45y | M | 72438 | Post op ileal resection | Yes | No | No | Passive | No | Yes | Yes | Yes | No | Yes | No | No | No |
| 77 | 46y | M | 84788 | Appendicular perforation | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 78 | 45y | F | 8600 | Ca ovary | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 79 | 62y | M | 85385 | Peritonitis | No | Yes | Yes | Negative | No | No | Yes | No | No | No | No | No | No |
| 80 | 55y | F | 83776 | Paraumbilical hernia | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 81 | 29y | M | 86713 | Obstructed Inguinal hernia | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 82 | 37y | F | 86883 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | Yes | No | Yes | No | No | No |
| 83 | 20y | M | 87344 | pelvic abscess | No | Yes | Yes | Negative | No | No | Yes | No | No | No | No | No | No |
| 84 | 53y | M | 88375 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 85 | 55y | M | 89284 | Peritonitis | No | Yes | No | Negative | Yes | No | Yes | No | No | No | No | No | No |
| 86 | 65y | M | 89422 | Penetrating injury to abdomen | No | Yes | No | Passive | Yes | No | Yes | No | No | No | No | No | No |
| 87 | 22y | M | 89928 | Blunt trauma abdomen | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 88 | 25y | F | 86455 | Right ovarian tumor | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 89 | 17y | F | 85962 | Ileocecal TB | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 90 | 56y | M | 86703 | Ca stomach | Yes | No | Yes | Passive | No | No | Yes | No | No | Yes | No | No | No |
| 91 | 36y | M | 91732 | Appendicular perforation | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 92 | 34y | F | 93141 | Recurrent Incisional hernia | Yes | No | No | Passive | No | Yes | Yes | No | No | No | No | No | No |
| 93 | 45y | F | 93623 | Umbilical hernia | Yes | No | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 94 | 49y | M |  | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 95 | 61y | M | 97646 | Peritonitis | No | Yes | Yes | Negative | No | No | Yes | Yes | No | Yes | Yes | No | Yes |
| 96 | 60y | M | 98186 | Acute Appendicitis | No | Yes | Yes | Passive | Yes | No | Yes | No | No | No | No | No | No |
| 97 | 40y | M | 98069 | Acute intestinal obstruction | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 98 | 49y | M | 100784 | Umbilical hernia | Yes | No | Yes | Passive | No | No | Yes | No | No | Yes | No | No | No |
| 99 | 50y | F | 58782 | Incisional hernia | Yes | No | No | Negative | Yes | Yes | Yes | No | No | No | No | No | No |
| 100 | 31y | M | 102907 | Peritonitis | No | Yes | Yes | Passive | No | No | Yes | No | No | No | No | No | No |
| 101 | 36y | M | 104198 | Acute Appendicitis | No | Yes | No | Negative | No | No | Yes | No | No | Yes | No | No | No |
| 102 | 36y | F | 105920 | Umbilical hernia | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 103 | 27y | F | 106981 | Peritonitis | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 104 | 16y | M | 105445 | Left indirect inguinal hernia | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 105 | 62y | M | 105112 | Right Indirect Inguinal hernia | Yes | No | Yes | Negative | No | No | Yes | No | No | No | No | No | No |
| 106 | 21y | M | 110785 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 107 | 15y | M | 99030 | hepato cellular carcinoma | Yes | No | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 108 | 60y | M | 113351 | Acute Appendicitis | No | Yes | No | Passive | Yes | No | Yes | No | No | Yes | No | No | No |

| Slno | Age | Sex | UHID | Diagnosis | Elective | Emergency | Hypertension | Type of Drain | Type 2 DM | Previous Abd surgery | Antibiotics | Drainage of Pus LA | Debridement of wound | Serous discharge | Erythema | Purulent exudates | Seperation of deep tissues |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 109 | 25y | M | 113338 | Recurrent Appendicitis | Yes | No | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 110 | 42y | M | 114780 | Acute intestinal obstruction | No | Yes | No | Passive | Yes | No | Yes | Yes | No | Yes | Yes | No | Yes |
| 111 | 64y | F | 113201 | Paraumbilical hernia | Yes | No | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 112 | 38y | F | 116088 | Umbilical hernia | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 113 | 35y | F | 115860 | Incisional hernia | Yes | No | No | Negative | No | Yes | Yes | No | No | No | No | No | No |
| 114 | 56y | F | 115966 | Umbilical hernia | Yes | No | No | Passive | Yes | No | Yes | No | No | No | No | No | No |
| 115 | 65y | F | 116904 | Acute intestinal obstruction | No | Yes | Yes | Negative | No | No | Yes | No | No | No | No | No | No |
| 116 | 52y | F | 120102 | Acute intestinal obstruction | No | Yes | No | Passive | No | No | Yes | Yes | Yes | Yes | Yes | No | Yes |
| 117 | 35y | F | 112259 | ca ascending colon | Yes | No | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 118 | 55y | F | 60828 | Incisional hernia | Yes | No | No | Passive | Yes | Yes | Yes | No | No | No | No | No | No |
| 119 | 50y | M | 120879 | Acute intestinal obstruction | No | Yes | No | Negative | No | No | Yes | Yes | No | Yes | Yes | No | Yes |
| 120 | 39y | M | 120916 | Peritonitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 121 | 40y | M | 118318 | Paraumbilical hernia | Yes | No | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 122 | 45y | F | 123657 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 123 | 61y | M | 125133 | Right Indirect Inguinal hernia | Yes | No | Yes | Negative | No | No | Yes | No | No | No | No | No | No |
| 124 | 24y | M | 119747 | ca bladder | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 125 | 62y | M | 126380 | Right Indirect Inguinal hernia | Yes | No | No | Negative | Yes | No | Yes | No | No | No | No | No | No |
| 126 | 67y | M | 119725 | Right Indirect Inguinal hernia | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 127 | 31y | M | 120294 | Incisional hernia | Yes | No | No | Negative | No | Yes | Yes | No | No | No | No | No | No |
| 128 | 50y | F | 127371 | Acute intestinal obstruction | No | Yes | Yes | Passive | No | No | Yes | No | No | No | No | No | No |
| 129 | 54y | M | 1105191 | post op lap cholecystectomy | Yes | No | Yes | Negative | Yes | Yes | Yes | No | No | No | No | No | No |
| 130 | 40y | M | 127393 | Peritonitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 131 | 30y | M | 1294741 | Peritonitis | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 132 | 65y | M | 130387 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 133 | 39y | M | 130667 | Acute intestinal obstruction | No | Yes | No | Negative | Yes | No | Yes | No | No | No | No | No | No |
| 134 | 62y | M | 130722 | Right Indirect Inguinal hernia | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 135 | 52y | M | 120296 | Umbilical hernia | Yes | No | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 136 | 50y | M | 132839 | Umbilical hernia | Yes | No | Yes | Passive | No | No | Yes | No | No | No | No | No | No |
| 137 | 22y | F | 79740 | Incisional hernia | Yes | No | No | Negative | No | Yes | Yes | No | No | No | No | No | No |
| 138 | 28y | F | 133107 | Acute Appendicitis | No | Yes | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 139 | 43y | M |  | Right Indirect Inguinal hernia | Yes | No | No | Negative | Yes | No | Yes | No | No | No | No | No | No |
| 140 | 21y | M | 130924 | Umbilical hernia | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |
| 141 | 50y | F | 45624 | Stoma reversal | Yes | No | Yes | Negative | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 142 | 27y | F | 125249 | Peritonitis | No | Yes | No | Passive | No | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 143 | 31y | M | 136226 | Peritonitis | No | Yes | No | Negative | No | No | Yes | No | No | No | No | No | No |
| 144 | 23y | M | 133541 | Umbilical hernia | Yes | No | No | Passive | No | No | Yes | No | No | No | No | No | No |

| Slno | Isolation of bacteria | Stay in hospital > 14 days | Points acquired | Wound complication | Drain removal day | Hospital stay in days |
|---|---|---|---|---|---|---|
| 1 | No | No | 15 | Disturbance | 6 | 10 |
| 2 | No | No | 10 | Satisfactory | 7 | 8 |
| 3 | No | No | 15 | Disturbance | 6 | 6 |
| 4 | No | No | 25 | Minor | 8 | 8 |
| 5 | No | No | 15 | Disturbance | 5 | 9 |
| 6 | Yes | No | 35 | Moderate | 6 | 10 |
| 7 | No | No | 15 | Disturbance | 5 | 8 |
| 8 | No | No | 25 | Minor | 7 | 9 |
| 9 | No | No | 28 | Minor | 6 | 6 |
| 10 | Yes | Yes | 45 | Severe | 8 | 8 |
| 11 | No | No | 15 | Disturbance | 5 | 11 |
| 12 | No | No | 10 | Satisfactory | 6 | 10 |
| 13 | No | No | 10 | Satisfactory | 8 | 9 |
| 14 | No | No | 10 | Satisfactory | 6 | 8 |
| 15 | No | No | 15 | Disturbance | 7 | 8 |
| 16 | Yes | No | 35 | Moderate | 8 | 12 |
| 17 | No | No | 25 | Minor | 7 | 10 |
| 18 | No | No | 25 | Minor | 9 | 10 |
| 19 | No | No | 15 | Disturbance | 7 | 8 |
| 20 | No | No | 10 | Satisfactory | 8 | 6 |
| 21 | Yes | No | 35 | Moderate | 6 | 12 |
| 22 | No | No | 10 | Satisfactory | 5 | 8 |
| 23 | No | No | 10 | Satisfactory | 8 | 9 |
| 24 | No | No | 10 | Satisfactory | 9 | 8 |
| 25 | No | No | 15 | Disturbance | 7 | 9 |
| 26 | No | No | 10 | Satisfactory | 10 | 8 |
| 27 | No | No | 18 | Disturbance | 9 | 9 |
| 28 | No | No | 10 | Satisfactory | 8 | 8 |
| 29 | No | No | 25 | Minor | 6 | 10 |
| 30 | No | No | 28 | Minor | 5 | 10 |
| 31 | No | No | 10 | Satisfactory | 7 | 8 |
| 32 | Yes | No | 36 | Moderate | 5 | 15 |
| 33 | No | No | 16 | Disturbance | 6 | 9 |
| 34 | Yes | Yes | 45 | Severe | 8 | 18 |
| 35 | No | No | 10 | Satisfactory | 9 | 6 |
| 36 | No | No | 10 | Satisfactory | 6 | 8 |

| Slno | Isolation of bacteria | Stay in hospital > 14 days | Points acquired | Wound complication | Drain removal day | Hospital stay in days |
|---|---|---|---|---|---|---|
| 37 | No | No | 16 | Disturbance | 7 | 10 |
| 38 | No | No | 10 | Satisfactory | 8 | 6 |
| 39 | No | Yes | 28 | Minor | 5 | 12 |
| 40 | No | No | 10 | Satisfactory | 6 | 10 |
| 41 | No | No | 19 | Disturbance | 3 | 16 |
| 42 | No | No | 24 | Minor | 4 | 10 |
| 43 | No | No | 10 | Satisfactory | 3 | 9 |
| 44 | No | No | 10 | Satisfactory | 4 | 8 |
| 45 | No | No | 10 | Satisfactory | 8 | 8 |
| 46 | No | No | 10 | Satisfactory | 9 | 7 |
| 47 | No | No | 16 | Disturbance | 8 | 9 |
| 48 | No | No | 10 | Satisfactory | 7 | 8 |
| 49 | No | No | 24 | Minor | 3 | 12 |
| 50 | No | No | 26 | Minor | 5 | 12 |
| 51 | No | No | 16 | Disturbance | 4 | 13 |
| 52 | No | No | 10 | Satisfactory | 6 | 12 |
| 53 | No | No | 10 | Satisfactory | 8 | 6 |
| 54 | No | No | 10 | Satisfactory | 9 | 8 |
| 55 | No | No | 16 | Disturbance | 6 | 9 |
| 56 | No | No | 10 | Satisfactory | 8 | 8 |
| 57 | No | No | 10 | Satisfactory | 9 | 9 |
| 58 | No | No | 10 | Satisfactory | 6 | 8 |
| 59 | No | No | 24 | Minor | 7 | 10 |
| 60 | No | No | 10 | Satisfactory | 6 | 6 |
| 61 | No | No | 10 | Satisfactory | 8 | 8 |
| 62 | No | Yes | 35 | Moderate | 9 | 12 |
| 63 | No | No | 10 | Satisfactory | 3 | 9 |
| 64 | No | No | 28 | Minor | 8 | 8 |
| 65 | No | No | 27 | Minor | 9 | 9 |
| 66 | No | No | 10 | Satisfactory | 8 | 7 |
| 67 | No | No | 10 | Satisfactory | 5 | 9 |
| 68 | No | Yes | 36 | Moderate | 6 | 8 |
| 69 | No | No | 10 | Satisfactory | 3 | 5 |
| 70 | No | No | 10 | Satisfactory | 4 | 6 |
| 71 | No | No | 10 | Satisfactory | 6 | 2 |
| 72 | No | No | 10 | Satisfactory | 5 | 8 |

| Slno | Isolation of bacteria | Stay in hospital > 14 days | Points acquired | Wound complication | Drain removal day | Hospital stay in days |
|---|---|---|---|---|---|---|
| 73 | No | No | 10 | Satisfactory | 8 | 9 |
| 74 | No | No | 10 | Satisfactory | 6 | 7 |
| 75 | No | No | 10 | Satisfactory | 5 | 5 |
| 76 | No | No | 26 | Minor | 2 | 8 |
| 77 | No | No | 10 | Satisfactory | 3 | 9 |
| 78 | No | No | 10 | Satisfactory | 6 | 6 |
| 79 | No | No | 10 | Satisfactory | 5 | 5 |
| 80 | No | No | 10 | Satisfactory | 5 | 8 |
| 81 | No | No | 10 | Satisfactory | 6 | 6 |
| 82 | No | No | 26 | Minor | 6 | 9 |
| 83 | No | No | 20 | Minor | 8 | 5 |
| 84 | No | No | 10 | Satisfactory | 5 | 9 |
| 85 | No | No | 10 | Satisfactory | 9 | 5 |
| 86 | No | No | 10 | Satisfactory | 10 | 5 |
| 87 | No | No | 10 | Satisfactory | 8 | 6 |
| 88 | No | No | 10 | Satisfactory | 6 | 8 |
| 89 | No | No | 10 | Satisfactory | 7 | 9 |
| 90 | No | No | 24 | Minor | 9 | 6 |
| 91 | No | No | 10 | Satisfactory | 6 | 8 |
| 92 | No | No | 10 | Satisfactory | 8 | 9 |
| 93 | No | No | 10 | Satisfactory | 5 | 5 |
| 94 | No | No | 10 | Satisfactory | 6 | 6 |
| 95 | No | Yes | 36 | Moderate | 5 | 9 |
| 96 | No | No | 10 | Satisfactory | 8 | 8 |
| 97 | No | No | 10 | Satisfactory | 9 | 3 |
| 98 | No | No | 24 | Minor | 6 | 6 |
| 99 | No | No | 10 | Satisfactory | 5 | 5 |
| 100 | No | No | 10 | Satisfactory | 3 | 8 |
| 101 | Yes | No | 24 | Minor | 5 | 9 |
| 102 | No | No | 10 | Satisfactory | 6 | 5 |
| 103 | No | No | 10 | Satisfactory | 8 | 6 |
| 104 | No | No | 10 | Satisfactory | 5 | 7 |
| 105 | No | No | 10 | Satisfactory | 6 | 5 |
| 106 | No | No | 10 | Satisfactory | 8 | 6 |
| 107 | No | No | 10 | Satisfactory | 9 | 9 |
| 108 | No | No | 26 | Minor | 5 | 10 |

| Slno | Isolation of bacteria | Stay in hospital > 14 days | Points acquired | Wound complication | Drain removal day | Hospital stay in days |
|---|---|---|---|---|---|---|
| 109 | No | No | 10 | Satisfactory | 3 | 15 |
| 110 | No | Yes | 36 | Moderate | 6 | 8 |
| 111 | No | No | 10 | Satisfactory | 5 | 9 |
| 112 | No | No | 10 | Satisfactory | 8 | 10 |
| 113 | No | No | 10 | Satisfactory | 6 | 9 |
| 114 | No | No | 10 | Satisfactory | 5 | 8 |
| 115 | No | No | 10 | Satisfactory | 6 | 9 |
| 116 | No | Yes | 38 | Moderate | 5 | 5 |
| 117 | No | No | 10 | Satisfactory | 8 | 2 |
| 118 | No | No | 10 | Satisfactory | 6 | 8 |
| 119 | No | Yes | 34 | Moderate | 7 | 12 |
| 120 | No | No | 10 | Satisfactory | 6 | 6 |
| 121 | No | No | 10 | Satisfactory | 9 | 8 |
| 122 | No | No | 10 | Satisfactory | 6 | 9 |
| 123 | No | No | 10 | Satisfactory | 5 | 8 |
| 124 | No | No | 10 | Satisfactory | 8 | 9 |
| 125 | No | No | 10 | Satisfactory | 6 | 8 |
| 126 | No | No | 10 | Satisfactory | 5 | 6 |
| 127 | No | No | 10 | Satisfactory | 8 | 5 |
| 128 | No | No | 10 | Satisfactory | 3 | 5 |
| 129 | No | No | 10 | Satisfactory | 6 | 5 |
| 130 | No | No | 10 | Satisfactory | 6 | 5 |
| 131 | No | No | 10 | Satisfactory | 7 | 5 |
| 132 | No | No | 10 | Satisfactory | 8 | 5 |
| 133 | No | No | 10 | Satisfactory | 9 | 5 |
| 134 | No | No | 10 | Satisfactory | 6 | 5 |
| 135 | No | No | 10 | Satisfactory | 8 | 6 |
| 136 | No | No | 10 | Satisfactory | 6 | 9 |
| 137 | No | No | 10 | Satisfactory | 6 | 8 |
| 138 | No | No | 10 | Satisfactory | 8 | 7 |
| 139 | No | No | 10 | Satisfactory | 5 | 9 |
| 140 | No | No | 10 | Satisfactory | 6 | 8 |
| 141 | No | Yes | 38 | Moderate | 7 | 6 |
| 142 | No | Yes | 36 | Moderate | 9 | 8 |
| 143 | No | No | 10 | Satisfactory | 8 | 6 |
| 144 | No | No | 10 | Satisfactory | 3 | 9 |