“COMPARATIVE STUDY BETWEEN SKIN STAPLERS AND 2 CYANOACRYLATE GLUE IN CLOSURE OF ABDOMINALINCISION”

By

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LIST OF ABBREVIATIONS USED

OCA	-	Octylcyanoacrylate
MCHS	-	Modified Cosmoses Hollander Score
VAS	–	Visual Analogue Score
PDGF	-	Platelet derived growth factor
FGF	-	Fibroblast derived growth factor
MMP	-	Metalloproteinase
TNF	-	α :Tumour necrosis factor – alpha
TGF	–	β :Tumour growth factor - beta

ABSTRACT

Background:

There are various options currently available to close abdominal incisions. The choice of wound closure is based on cosmesis, postoperative pain, convenience of use, easy availability and cost effectiveness. A new technology is surgical glue, 2-cyanoacrylate which is easy to use and provides a flexible, water resistant skin closure.

Objectives:

To compare the outcome of abdominal skin closure between staplers and glue (2 cyanoacrylate) with respect to ease of application, postoperative pain , cosmesis , duration of wound healing and complications.

Methods:

This is a comparative study conducted on 82 patients in two groups at Shri B M Patil Medical College and Hospital, Bijapur. Cases undergoing clean elective surgical procedures were randomly selected and put in two groups. Skin closure was done with 2 cyanoacrylate glue in one group and skin closure was achieved with skin staplers in other group. This study was conducted between October 2012 to Feb. 2015. The outcome of wound was assessed on 3^{rd}, 5^{th} and 7^{th} postoperative days using ASEPSIS score. Wound cosmesis was assessed on 3^{rd}, $7^{th}$and 30^{th} postoperative days using modified Hollander cosmesis scale ranging from 0-6

Results:

Wound cosmesis assessment at 1 month, the adhesive glue group was significant p=0.04 yields better cosmesis than stapler group. Wound cosmoses assessment on day 3 and day 7 was insignificant.

Conclusion:

2 cyanoacrylate provides an effective and reliable means of skin closure and yields betterlong term cosmetic results as with skin staplers. The incidence of infection and wound complications are comparable in both the groups.

Keywords: 2 Cyanoacrylate, Adhesive Glue, Skin Staplers

TABLE OF CONTENTS

LIST OF TABLES

LIST OF GRAPHS

LIST OF FIGURES

LIST OF PHOTOGRAPHS

INTRODUCTION

Cyanoacrylate tissue adhesives are a newer and alternative method of skin closure. These adhesives come in a liquid monomer formulation and undergo an exothermic reaction when coming into contact with a fluid or basic medium, leading to polymerization and bonding to skin. Octyl-2-cyanoacrylates have a longer side chain, forming stronger and more flexible bonds, with a breaking strength 4 times that of N-butyl-2-cyanoacrylate and a prolonged degradation time.[1]

Multiple studies have consistently demonstrated that wound closure with 2 octylcyanoacrylate (OCA) is comparable with other standard wound closure devices, yet offers many additional benefits.[2]The tissue adhesives have many advantages over standard wound closure devices in addition to their rapid application. They are relatively painless to apply and may not require the use of painful local anesthetics. They also slough off spontaneously within 5 to 10 days eliminating the need for suture removal allowing a wider time range for wound follow-up if required. This is especially advantageous in young or noncompliant patients. The cyanoacrylate tissue adhesives have also been shown to have a barrier function against microbial penetration and serve as an optimal wound dressing that creates a moist wound environment enhancing wound healing. As they do not require needles, the adhesives also eliminate the risk of an accidental needle stick.[2]

In the operating room setting, use of OCA instead of sutures can save time improving the efficiency of the surgical procedure. The major disadvantage of the cyanoacrylate tissue adhesives is their reduced tensile strength. OCA is comparable with 5-0 sutures yet should not be used alone in high-tension areas. When compared with butylcyanoacrylates, OCA has been shown to have three times the breaking strength.[2]

Ideally, a wound closure method should be cost effective, time efficient, easy to perform, and produce the optimal cosmetic result. The primary goals of treating wounds in general and skin incisions in particular are rapid closure with the creation of the functional and esthetic scar. Over the years, research on acute wound healing has resulted in the development of technologies such as staples and adhesives (glue) to allow surgeons to replace their tedious suturing techniques, resulting in the optimal cosmetic appearance of the scar and avoiding infections by immediately sealing the wounds by using wide varieties of skin closure materials. As such, many investigators in both medical and applied science disciplines have experimented with different materials, tissues and models to close wounds, including laser assisted tissue bonding (LTB).

When 2 cyanoacrylate glue is applied to wound, it polymerises to form a firm adhesive bond, the wound does need to be clean, dry, with near perfect hemostasis and under no tension. Although it is relatively expensive, it is quick to use, does not delay wound healing and it is associated with an allegedly low infection rate.[5]

AIMS AND OBJECTIVE

To compare the outcome of abdominal skin closure between staplers and glue (2 octylcyanoacrylate) with respect to duration of skin closure using both methods, postoperative pain , cosmesis , duration of wound healing and complications.

REVIEW OF LITERATURE

The original cyanoacrylates (the chemical name for the glue) were discovered in 1942 in a search for materials to make clear plastic gun sights during World War II, when a team of scientists headed by Harry Coover Jr. stumbled upon a formulation that stuck to everything that it came in contact with; it was rejected for the application. In 1951 cyanoacrylates were rediscovered by Eastman Kodak researchers Harry Coover Jr. and Fred Joyner, who recognized their true commercial potential; "Eastman #910" (later "Eastman 910") was the first cyanoacrylate adhesive to be sold, in 1958.[3]

During the 1960s, Eastman Kodak sold cyanoacrylate to Loctite, which in turn repackaged and distributed it under a different brand name "Loctite Quick Set 404". In 1971 Loctite developed its own manufacturing technology and introduced its own line of cyanoacrylate, called "Super Bonder". Loctite quickly gained market share, and by the late 1970s it was believed to have exceeded Eastman Kodak's share in the North American industrial cyanoacrylate market. National Starch and Chemical Company purchased Eastman Kodak's cyanoacrylate business and combined it with several acquisitions made throughout the 1970s forming Permabond. Other manufacturers of cyanoacrylate include LePage (a Canadian company acquired by Henkel in 1996), the Permabond Division of National Starch and Chemical, Inc., which was a subsidiary of Unilever. Together, Loctite, Eastman and Permabond accounted for approximately 75% of the industrial cyanoacrylate market. As of 2013 Permabond continued to manufacture the original 910 formula.[3]

ANATOMY OF THE SKIN:

The human skin consists of stratified, cellular epidermis and underlying dermis of a connective tissue. The structure of skin has been organized into various sections that are not independent functional unit.[6]

Skin comprises two layers:

- Epidermis
- Dermis

EPIDERMIS:

The epidermis contains no blood vessels and is entirely dependent on the underlying dermis for nutrient delivery and waste disposal via diffusion through the dermoepidermal junction. The epidermis is a stratified, squamous epithelium that consists primarily of keratinocytes in progressive stages of differentiation from deeper to more superficial layers. The named layers of the epidermis include the stratum germinativum, stratum spinosum, stratum granulosum, and stratum corneum.[4]

The epidermis forms derivative structures like hair, sebaceous gland, apocrine glands, sweat glands and nails. The thickness of epidermis varies between 0.4 and 1.5mm. Keratinocytes consists more than 95 % of epidermal cells. Keratinocytes progressively move outwards from their attachment to the epidermal basement membrane.[6]

Stratum Basale:

Also called as stratum germinativum is a continuous layer that is generally described as only one cell thick, but may be two or three cells thick in glabrous skin and hypoprofilerative dermis. Basal cells are small, cuboidal with large, dark staining nuclei and dense cytoplasm that contains many ribosomes and tonofilaments.[6]

Stratum Spinosum:

Also called as Prickle cell layer, contains 8 to 10 layers of cells. These cells are polyhedral with round nucleus. The cells in the upper layer are large, more flattened and contain organelles called 'lamellar granules'[6]

Stratum Granulosum:

Also called the granular layer due to presence of intracellular basophilic keratohyaline granules, is2 to 5 cells thick. The cytoplasm of the keratinocytes of this layer and uppermost of spinous cells contain lamellated granules known as Odland bodies.[6]

Stratum corneum:

It is composed of 20 to 25 layers of cornified cells, called corneocytes, which are the largest cells in the epidermis. They are flattened and have lost their nuclei and cytoplasmic organelles. They are joined by desmosomes.[6]

Stratum lucidim:

The thick epidermis of palms and soles has an additional layer and present between stratum granulosum and stratum corneum. These cells are nucleated and referred as transitional cells.[6]

DERMIS:

The primary function of the dermis is to sustain and support the epidermis. The dermis is a more complex structure and is composed of 2 layers, the more superficial papillary dermis and the deeper reticular dermis. The papillary dermis is thinner, consisting of loose connective tissue containing capillaries, elastic fibers, reticular fibers, and some collagen. The reticular dermis consists of a thicker layer of dense connective tissue containing larger blood vessels, closely interlaced elastic fibers, and coarse bundles of collagen fibers arranged in layers parallel to the surface.[4]

The reticular layer also contains fibroblasts, mast cells, nerve endings, lymphatics, and epidermal appendages. Surrounding the components of the dermis is the gel-like ground substance, composed of mucopolysaccharides (primarily hyaluronic acid), chondroitin sulfates, and glycoproteins. The deep surface of the dermis is highly irregular and borders the subcutaneous layer, the panniculusadiposus, which additionally cushions the skin.[4]

Dermoepidermal Junction:

The dermoepidermal junction is an undulating basement membrane that adheres the epidermis to the dermis. It is composed of 2 layers, the lamina lucida and lamina densa. The lamina lucida is thinner and lies directly beneath the basal layer of epidermal keratinocytes. The thicker lamina densa is in direct contact with the underlying dermis. These structures are the target of immunologic injury in bullous pemphigoid and epidermolysis bullosa.[4]

Dermal papillae from the papillary dermis contain a plexus of capillaries and lymphatics oriented perpendicular to the skin surface. These fingerlike projections are surrounded by similar projections of the epidermis. This highly irregular junction greatly increases the surface area over which oxygen, nutrients, and waste products are exchanged between the dermis and the avascular epidermis.[4]

STRUCTURE OF THE SKIN

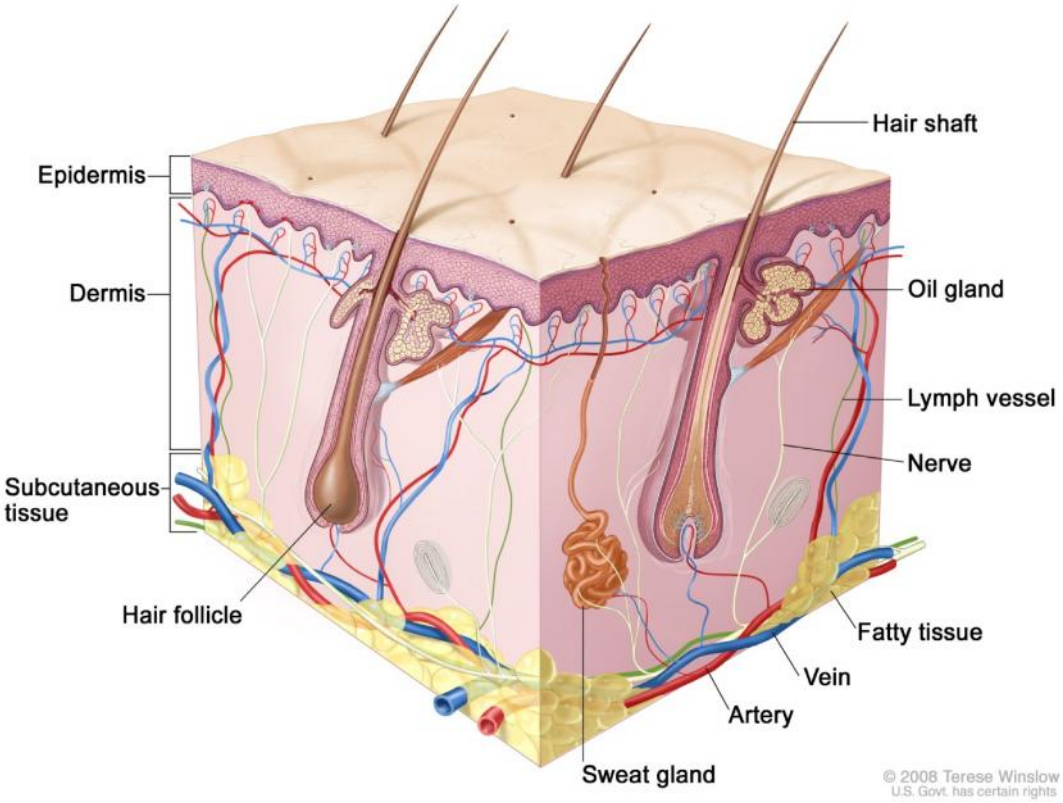


FIGURE NO.1

INCISIONS ON ABDOMEN

A well-calculated and well-performed incision is of paramount importance to abdominal surgery. Of equal importance is a proper method of wound closure. Any error, such as a poorly chosen incision, unsatisfactory means to close, or unsuitable selection of suture material, may result in serious complications including hematoma, hernia, wound infection, stitch abscess, unpleasant scar, and the dreaded wound dehiscence and evisceration.[7]

Ellis outlined three basic principles to guide selection of the incision and closure of the wound. These are accessibility, flexibility, and security.[7]

- **Accessibility**:
    - The incision should provide direct and timely exposure to the diseased or injured anatomy and must provide sufficient space for the procedure to be well performed. Exposure is greatly facilitated not only by a well-made incision, but also by the apt use of retractors and packs, correct posture of the patient on the operating room table, and optimized lighting. [7]
- **Flexibility:**
    - The incision should be amenable to extension if the complexity of the procedure demands greater exposure than originally anticipated. It should, however, interfere as little as possible with the function of the abdominal wall, limiting sacrifice of nerve supply to the abdominal musculature, preferably the sacrifice of only a single segmental nerve trunk. [7]

- **Security:**
    - Closure of the wound must be strong and reliable. Ideally, it should leave the abdominal wall with integrity comparable to or superior to its preoperative state.[7]

TYPES OF INCISIONS:

Abdominal incisions can be divided into four main anatomic categories.

- **VERTICAL:**

Vertical incisions may be midline or paramedian. They may be supraumbilical or infraumbilical and can be extended superiorly or inferiorly in either direction. For optimal exposure of the entire abdominal cavity, as in the case of abdominal trauma, a midline vertical incision can be taken superiorly to the xiphoid process and inferiorly to the symphysis pubis.[7]The midline incision is the fastest approach toward the peritoneal cavity and have a number of advantages. The upper midline incision, or the epigastric midline incision, provides exposure for most operations on the esophageal hiatus, abdominal esophagus and vagus nerves, stomach, duodenum, gallbladder, pancreas, and spleen. The lower midline incision, or infraumbilical incision, is similar to the upper midline incision and may extend superiorly to join it. It provides exposure for most operations on the lower abdominal and pelvic organs.

- **TRANSVERSE AND OBLIQUE:**

These incisions can be placed in any of the four quadrants of the abdomen. Common incisions include the Kocher subcostal incision for biliary surgery, the Pfannenstiel infraumbilical incision for gynecologic surgery, the McBurney incision for appendectomy, and the transverse or oblique lateral incision for exposure of the colon. Transverse incisions can be strictly horizontal or they may curve to varying degrees. Transverse and oblique incisions generally follow Langer's lines of tension

and result in better cosmesis than vertical incisions. Sectioning of nerves is usually limited to one and rarely two nerves. A properly placed infraumbilical transverse incision can provide satisfactory exposure to the pelvic organs and the rectosigmoid and rectum. Exposure is limited, however, when pathology is located in both the upper and lower abdomen.[7]

- **ABDOMINOTHORACIC:**

This incision provides superior exposure of the upper abdominal organs by joining the peritoneal cavity, pleural space, and mediastinum into a single operative field. It is particularly useful for extensive exposure of the liver and esophagogastric junction. The thoracoabdominal incision provides excellent exposure by converting the peritoneal and pleural spaces into one common cavity. When the operation can safely be performed through an abdominal incision, this is preferable, as morbidity is increased with the opening of the two cavities. Some of the more commonly encountered anatomic complications to be avoided include splenic injury and phrenic nerve injury with subsequent diaphragmatic dysfunction.

The patient is placed in the "corkscrew" position on the operating room table for maximal access into both the abdominal and thoracic cavities. The abdomen is tilted approximately 45 degrees from the horizontal by using sandbags, and the thorax is twisted into the full lateral position. The abdominal part of the incision may consist of a midline or upper paramedian incision, which allows preliminary exploration of the abdomen.

- **RETROPERITONEAL AND EXTRAPERITONEAL**:

These incisions are ideal for surgery of the kidney, adrenal gland, aorta, and for renal transplantation. The retroperitoneal approach to the lumbar area is frequently used in aortic surgery, nephrectomy, lumbar symphathectomy, and ureterolithomy. The patient is positioned with the operative side elevated 30–45 degrees with knee and hip flexed. The incision is carried from the level of the umbilicus at the lateral margin of the rectus sheath toward the twelfth rib for approximately 12–14 cm. A portion of the twelfth rib is resected if further exposure is required, taking care not to injure the underlying pleura. The external oblique, internal oblique, and transversalis muscles are exposed, undermined, and opened in the direction of their fibers. The retroperitoneum is entered and the peritoneum and retroperitoneal fat are moved anteriorly by blunt dissection, being mindful to not dissect behind the psoas muscle. The lower pole of the kidney, ureter, and sympathetic chain are easily identified. The vena cava is exposed on the right and the aorta on the left. If the peritoneum is unintentionally entered, it is closed immediately with continuous absorbable suture. At the conclusion of the procedure, the retroperitoneal fat and viscera fall back into place and the muscles of the abdominal wall are repaired in layers.

Common Abdominal Incisions

1- Kocher incision
2- Midline incision
3- McBurney incision
4- Battle incision
5- Lanz incision
6- Paramedian incision
7- Transverse incision
8- Rutherford Morrison incision
9- Pfannenstiel incision

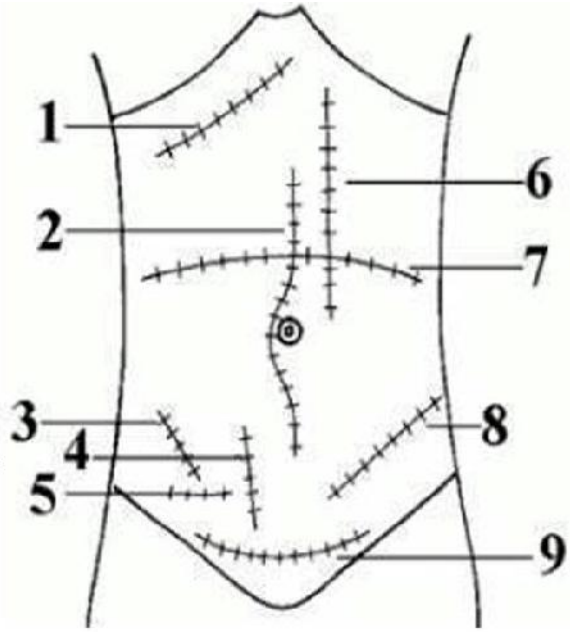


FIGURE NO. 2

SKIN CLOSURE:

If the surgical site is heavily contaminated (class III or class IV wound), the skin should be left open to heal by secondary intention or by delayed primary skin closure. A number of closure techniques for clean (class I) and clean-contaminated (class II) wounds are available for the skin. These include interrupted suture, subcuticular suture, surgical staples, surgical tape, and adhesive glues. Goals of skin closure are tissue approximation, minimizing wound infection, acceptable cosmesis, and minimizing postoperative pain. These goals should be achieved with a simple, rapid, and cost-effective method.

Three randomized controlled studies have compared skin staples to subcuticular sutures. In all studies, no difference in the rate of wound infection could be demonstrated. Two of these studies revealed less postoperative pain and less postoperative analgesia requirement in wounds closed with subcuticular suture. Two of these studies also demonstrated a superior cosmetic result in subcuticular closures over surgical staples; however, this cosmetic difference narrowed over time and became insignificant by 6 months.

Adhesive tapes are often used to reapproximate skin edges in simple lacerations. Following abdominal surgery, adhesive tapes are useful to cover skin incisions closed by subcuticular suture, where they serve to further reapproximate skin edges and to dress the wound. The use of adhesive tape without suture closure was compared to interrupted silk skin suturing of abdominal wounds in one early trial. No difference in the rates of wound infection could be found. The tapes were significantly more comfortable and patients preferred them over sutures, but wide scarring occurred more frequently with surgical tapes.

Synthetic glues are gaining popularity in skin closure of surgical wounds. When compared with traditional skin-closing devices including sutures, staples, or adhesive tapes, some cyanoacrylate glues have been found to be comparable in effectiveness and safety for repair of lacerations. They are applied more rapidly and decrease the amount of required wound care by serving as their own dressings. In elective abdominal procedures with small and large (>4 cm) incisions, these glues have been shown in clinical trials to have similar outcomes with respect to wound durability when compared to traditional techniques, although there are conflicting data on wound healing, cosmesis, and postoperative pain.[7]

WOUND HEALING

"If you cut well and sew well, your patient will get well".

Tissue healing is a topic of intense importance in every branch of surgery.

Without this remarkable living phenomenon surgery as we know, would of course, be impossible. Tissue injury on frank necrosis heals by forming scar tissue. Humans have no ability to regenerate organs, with the exception of bone, liver and epithelium.

Phases of wound healing :[9]

1. Hemostasis,
2. Inflammation,
3. Cellular Migration and Proliferation,
4. Protein Synthesis and Wound Contraction, and
5. Remodeling

Hemostasis:

All significant trauma creates a vascular injury and thereby initiates the molecular and cellular responses that establish hemostasis. The healing process cannot proceed until hemostasis is accomplished. Primary contributors to hemostasis include vasoconstriction, platelet aggregation, and fibrin deposition resulting from the coagulation cascades. The end product of the hemostatic process is clot formation. Clots are primarily composed of fibrin mesh and aggregated platelets along with embedded blood cells. The importance of clot formation is profound. This process prevents further fluid and electrolyte loss from the wound site and limits contamination from the outside environment. Fibrin is also the mesh material in the provisional wound matrix onto which fibroblasts and other cells migrate as the healing process proceeds.[9]

Vasoconstriction:

Vasoconstriction is initiated by the release of vasoactive amines, which occurs when the dermis is penetrated. Epinephrine is released into the peripheral circulation, whereas stimulation of the sympathetic nervous system results in local norepinephrine release. Injured cells secrete prostaglandins, such as thromboxane, that contribute further to vasoconstriction.[9]

PLATELET AGGREGATION:

Platelet aggregation is stimulated by exposure to tissue factors released by damaged cells. Platelets adhere to the vascular subendothelium and to each other in a process involving fibrinogen and vonWillebrand factor. Laminin, thrombospondin, and vitronectin may also be involved. As platelets aggregate and adhere, they release the contents of alpha granules, dense bodies, and lysosomes within their cytoplasm.[9]

Alpha granules contain a variety of immunomodulatory and proteinaceous factors that are involved in both the early and late phases of healing. Specifically, these factors include albumin, fibrinogen, fibronectin IgG, and coagulation factors V and VIII, as well as platelet-derived growth factor (PDGF), transforming growth factors a and b (TGF-a and TGF-b), fibroblast growth factor-2 (FGF-2), and platelet-derived epidermal growth factors (EGFs), and endothelial cell growth factors . Of these factors, PDGF, TGF-b, and FGF-2 are the most important. Dense bodies contain necessary fuel-providing compounds that contribute to the healing process. These compounds include calcium, serotonin, ADP, and ATP. Some of these compounds are also involved in initiation of the coagulation cascades.

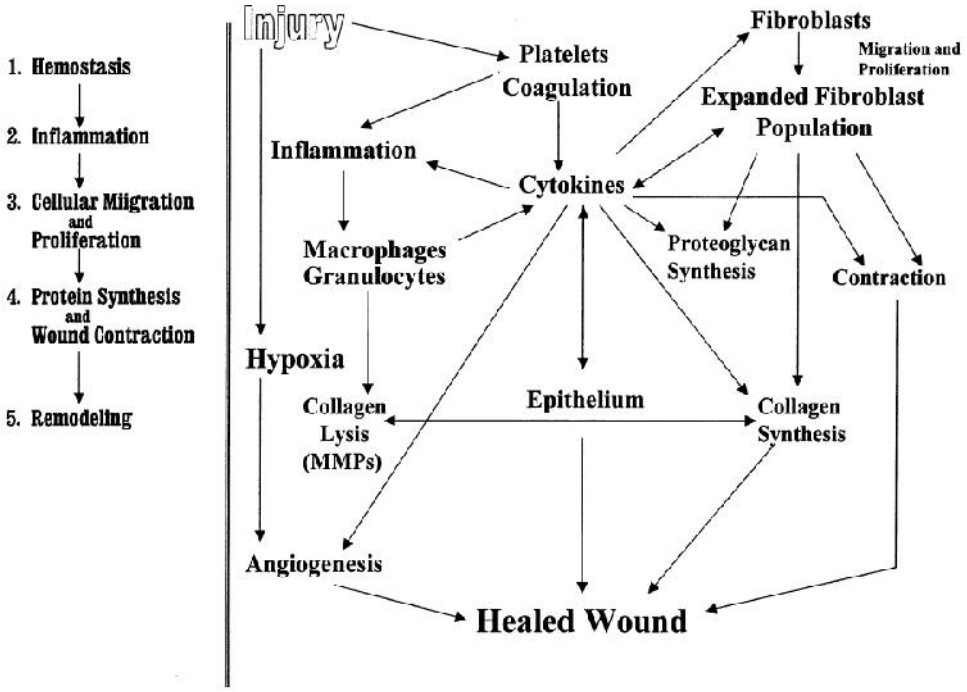


FIGURE NO.3

The coagulation cascades are composed of intrinsic and extrinsic components that are individually triggered. The intrinsic cascade is not required for normal healing, whereas the extrinsic cascade is essential. The intrinsic coagulation cascade is initiated by activation of factor XII, which occurs when blood is exposed to foreign surfaces. The more critical extrinsic coagulation cascade is initiated by exposure to a ‘‘tissue factor’’ that binds factor VII or factor VIIa. Tissue factor is found on extravascular cell surfaces and, in particular, on adventitial fibroblasts. The actions of the intrinsic and extrinsic pathways result in the production of thrombin, which catalyzes the conversion of fibrinogen to fibrin.[8]

Thrombin itself stimulates increased vascular permeability in addition to facilitating the extravascular migration of inflammatory cells. Fibrin forms the meshwork that stabilizes the platelet plug. It also becomes a key component of the provisional matrix that develops in the wound soon after injury. Fibrin becomes

coated with vitronectin derived from serum and aggregating platelets. This action facilitates the binding of fibronectins, which are produced by fibroblasts and epithelial cells. Fibronectins are the second key component of the early provisional wound matrix. The fibronectin molecule has nearly a dozen binding sites for cellular attachment. These attachment sites are essential for cellular migration along the matrix. The fibrin–fibronectin matrix also traps circulating cytokines for use in the ensuing stages of healing.

Inadequate fibrin formation is associated with impaired wound healing. This is observed in factorXIII (fibrin-stabilizing factor) deficiency, which is thought to impair cellular adhesion and chemotaxis. Any process that removes fibrin from the wound will disrupt the formation of extracellular matrix and also, consequently, will delay wound healing.[9]

INFLAMMATION:

Inflammation is characterized by the erythema, edema, heat, and pain as first described by Hunter in 1794. At the tissue level, increased vascular permeability and the sequential migration of leukocytes into the extravascular space characterize inflammation.[9]

Cellular infiltration after injury follows a characteristic, predetermined sequence. PMNs are the first infiltrating cells to enter the wound site, peaking at 24 to 48 hours. Increased vascular permeability, local prostaglandin release, and the presence of chemotactic substances, such as complement factors, interleukin-1 (IL-1), tumor necrosis factor alpha TNF-α , TGF-β, platelet factor 4, or bacterial products, all stimulate neutrophil migration.[10]

One of the primary functions of inflammation is to bring inflammatory cells to the injured area. These cells then destroy bacteria and eliminate debris from dying

cells and damaged matrix so that the repair processes can proceed .Although inflammation is often thought of as the second phase of wound healing, signs of inflammation, including erythema and heat, develop soon after injury as a result of vasodilatation. Vasodilatation follows the initial vasoconstriction that reverses 10 to 15 minutes after injury. Simultaneously, the endothelial cells lining the capillaries in the vicinity of the wound develop gaps between them, which permit the leakage of plasma from the intravascular space to the extravascular compartment. The migration of fluid into the injured area generates edema, which contributes to the sensation of pain that characterizes inflammation.[9]

Macrophages, like neutrophils, participate in wound debridement via phagocytosis and contribute to microbial stasis via oxygen radical and nitric oxide synthesis . The macrophage's most pivotal function is activation and recruitment of other cells via mediators such as cytokines and growth factors, as well as directly by cell–cell interaction and intercellular adhesion molecules. By releasing such mediators as TGF-β, vascular endothelial growth factor (VEGF), insulin-like growth factor, epithelial growth factor, and lactate, macrophages regulate cell proliferation, matrix synthesis, and angiogenesis. [10]

The transition from vasoconstriction to vasodilation is mediated by a variety of factors. Endothelial products and mast cell-derived factors such as leukotrienes, prostaglandins, and, in particular, histamine contribute to vasodilation. Kinins, released by protein-binding molecules in the plasma via activation of kallikrein, also contribute to this process.

Capillary leak is primarily mediated by the release of histamine, kinins, and prostaglandins. There is an additional influence from thrombin and the complement system. Complement factors C3a and C5a are significant contributors to capillary leak

and also act as chemoattractants for neutrophils and monocytes. Their chemotactic function is dependent on the release of TGF-b and formyl-methionylpeptides. Leukocyte migration into the wounded area is stimulated by collagen, elastin breakdown products, complement factors, and immunomodulatory factors including TGF-b, tumor necrosis factor-a (TNF-a), interleukin-1 (IL-1), PDGF, leukotriene B4, and platelet factor IV. Leukocytes adhere to endothelial cells lining the capillaries in the wounded area through an interaction of intracellular adhesion molecules on the endothelial cell membranes and integrins expressed on the cell surface of the leukocytes. This process is known as margination. Platelet factor IV and platelet activating factor then increase the expression of CD11/ CD18, an integrin on the neutrophil surface that facilitates transmigration of leukocytes through the endothelium in a process known as diapedesis. Migrating monocytes transform into macrophages as they migrate into the extravascular space in a process that is stimulated by chemotactic factors such as fibronectin, elastin derived from damaged matrix, complement components, enzymatically active thrombin, TGF-b, and serum factors[9].

All leukocytes require activation before they can perform their vital functions in the wound environment. IL-2 and INF-s derived from T lymphocytes are involved in macrophage activation. After activation, macrophages and neutrophils initiate cellular wound debridement by phagocytosing bacteria and foreign material . Both cell types have surface receptors that allow them to recognize, bind, and engulf foreign material. Macrophage binding receptors include the immunoglobulin-type adhesion molecule CD14 that binds lipopolysaccharide and the CD11b-CD18abintegrin. After binding, bacteria and debris are engulfed and digested by oxygen radicals and hydrolytic enzymes within the inflammatory cells. In addition to

phagocytosing debris, macrophages also contribute to its breakdown extracellularly by releasing matrix metalloproteinases(MMPs) such as collagenase and elastase into the wounded area.[9]

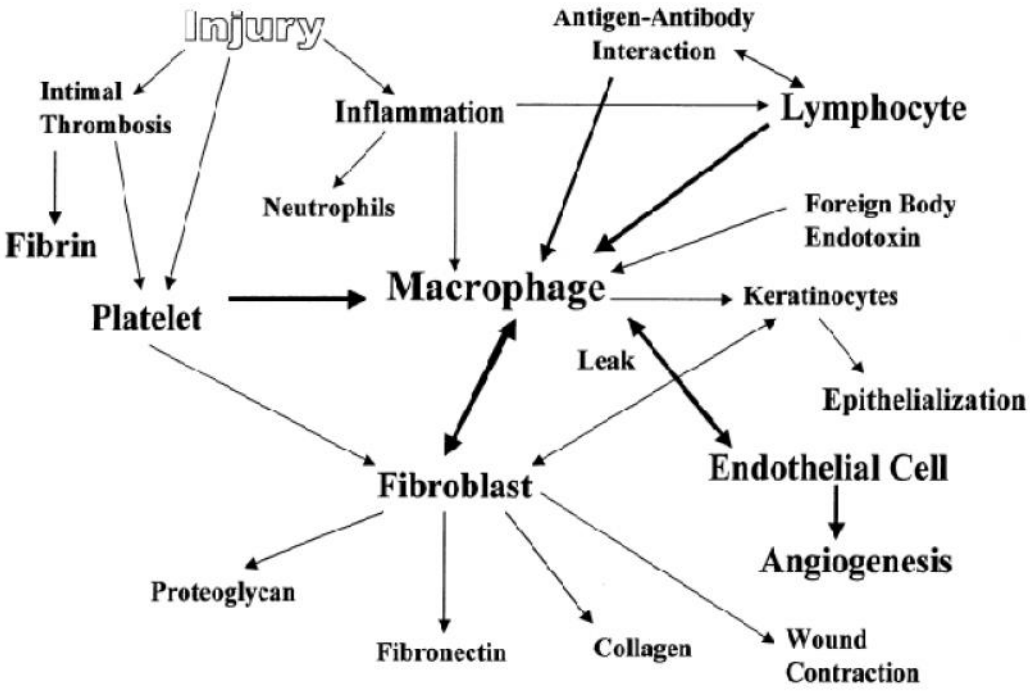


FIGURE NO. 4

The role of the macrophage is complex in this multipurpose cell is involved in many aspects of healing through the cytokines and immunomodulatory factors it produces. Macrophage-produced cytokines are involved in angiogenesis, fibroblast migration and proliferation, collagen production and possibly wound contraction. TGF β, IL-1, insulin-like growth factor-1 (IGF-1), FGF-2, and PDGF are several of the more critical macrophage- derived cytokines. TGF-βregulates its own production by macrophages in an autocrine manner. It also stimulates macrophages to secrete PDGF, FGF-2, TNF-α, and IL-1 through binding of the epidermal growth factor

receptor. Furthermore, macrophages also release nitric oxide, which may serve an antimicrobial function as well as other functions during the healing process. The inhibition of nitric oxide release has been found to impair wound healing in an in vivo mouse model. The complete role of nitric oxide in wound healing has yet to be fully delineated.[8]

Cytokines :

The wound-healing process is, in large part, regulated by the ordered production of cytokines that control gene activation responsible for cellular migration and proliferation and synthetic activities. As mentioned, platelets and macrophages are key cytokine sources, although many other cells produce them.[8]

Cellular migration and proliferation:

The initial fibrin–fibronectin matrix is heavily populated by inflammatory cells, whereas fibroblasts and endothelial cells will predominate as healing progresses. Reestablishment of the epithelial surface is also initiated within the first several days after injury, as is revascularization of the damaged area. Cytokine networks continue to be a part of the process as cytokine release contributes to fibroplasia, epithelialization, and angiogenesis. Although much is known about the signals that stimulate the predominant activities during this phase of healing, less is known about the signals that bring these activities to a controlled end. Negative feedback mechanisms that deactivate cells after they have completed their work are also essential for normal healing.[8]

Angiogenesis:

Angiogenesis is required to restore the blood flow. The wound surface is relatively ischemic and healing cannot competent until sufficient blood flow is reinstalled to allow transfer of oxygen and nutrients.[11] During angiogenesis,

endothelial sprouts derive from intact capillaries at the wound periphery. The sprouts grow through cellular migration and proliferation. The endothelial cells develop a curvature and begin to produce a lumen as the chain of endothelial cells elongates. Eventually, the endothelial sprout comes into contact with a sprout derived from a different capillary, and they interconnect generating a new capillary.[8]

Epithelization:

Epithelization begins within hours after injury with the movement of epithelial cells from the edge of the tissue across the defect, after activation of growth factors released from platelets and macrophages.[11]This process is characterized primarily by proliferation and migration of epithelial cells adjacent to the wound. The process begins within 1 day of injury and is seen as thickening of the epidermis at the wound edge. Marginal basal cells at the edge of the wound lose their firm attachment to the underlying dermis, enlarge, and begin to migrate across the surface of the provisional matrix. Fixed basal cells in a zone near the cut edge undergo a series of rapid mitotic divisions, and these cells appear to migrate by moving over one another in a leapfrog fashion until the defect is covered. Once the defect is bridged, the migrating epithelial cells lose their flattened appearance, become more columnar in shape, and increase their mitotic activity. Layering of the epithelium is re-established, and the surface layer eventually keratinizes.[10]Epidermal cells express integrin receptors that allow them to interact with extracellular matrix protein such as fibronectin. The migrating cells dissect the wound by separating the dessicated eschar from viable tissue. The migrating cells are also phagocytic and remove debris in their path.[14]

Protein synthesis and wound contraction:

Synthesis and deposition of proteins and wound contraction are the wound-healing events that begin to predominate 4 to 5 days after wounding. The quality and

quantity of matrix deposited during this phase of healing significantly influence the strength of a scar. Collagen constitutes more than 50% of the protein in scar tissue, and its production is essential to the healing process.[8]

In the process of wound contraction a full thickness wound is covered by peripheral skin that moves towards the centre of the defect. It is important to emphasize that contraction involves movement of existing tissue at the wound edge, not formation of new tissue. Contraction is mediated by fibroblast moving along collagen fibers, causing collagen fiber to move together.[11]

Remodeling:

Remodeling is the last process of wound healing begins approximately 3 weeks after injury and may persists for months to years. During remodeling, new collagen fibers are laid down and others are digested and removed. The remodeling is due to breaking down of excess collagen by collangenase, and regression in wound vascularity.[11]The remodeling process is associated with a substantial increase in wound-breaking strength. Wound strength 1 week after injury is 3% of normal dermis. After 3 weeks, when the remodeling phase begins to predominate, the wound will have only approximately 20% the strength of normal dermis. At 3 months, however, the wound will have 80% the strength of normal dermis, with the significant increase in strength resulting from the contribution of remodeling. Remodeling will continue for up to 12 months after a wound is created, although scars never regain the strength of normal dermis.[8]

MATERIALS AND METHODS

MATERIALS AND METHODS:

SOURCE OF DATA:

A prospective study of randomly selected elective abdominal surgical cases admitted in from October 2012 to Feb. 2015. The patients will be randomized using simple randomization technique into two groups. One using staples for skin closure and the other using 2 octylcyanoacrylate.

METHOD OF COLLECTION OF DATA:

A thorough clinical examination of the selected patients will be done and details of history, examination and relevant investigations will be documented. Data pertaining to the duration of surgical procedure, the postoperative wound healing and the complications will be collected from the operating surgeon. Data pertaining to the postoperative pain and wound cosmesis will be collected from the patients using the visual analogue scale for pain and the wound cosmesis score respectively. Details regarding the glue and staplers used will be obtained from the pharmaceutical companies.

INCLUSION CRITERIA:

Clean elective abdominal surgical cases where skin closure is done using staplers / adhesive glue (2-octylcyanoacrylate)

EXCLUSION CRITERIA:

- Known hypersensitivity to Cyanoacrylate or formaldehyde.
- History of contact dermatitis.
- Areas of skin exposed to body fluids such as colostomy stoma.
- Any evidence of active infection.

RESEARCH HYPOTHESIS:

2Octylcyanoacrylate tissue adhesive glue provides better cosmesis, less duration, less postoperative pain and less complication.

STUDY DURATION : October 2012 to February 2015

SAMPLE SIZE : 320

CYANOACRYLATES :

Since 1949 skin adhesives have been applied for medical use. Cyanoacrylate, the first adhesive used for skin closure, polymerizes in contact with human tissues. Polymerization is a exothermic chemical reaction that generates heat. Depending on the intensity of this reaction it may cause pain when applied to the skin.[12]

Several other compounds from the same family of cyanoacrylate have been developed such as methylcyanoacrylate, ethycyanoacrylate. Isobutyl cyanoacrylate and butyl cyanoacrylate. Histotoxicity responsible for degree of inflammatory response, is related to the chain length of compounds. The last generation of these adhesives is octylcyanoacrylate, which results in less heat when applied, lower inflammatory reaction and relatively higher tensile strength than the previous compounds. The cyanoacrylates are safe for clinical use with no reports of adverse effects or carcinogenicity. Ideally wound closure method should be cost effective, time efficient, easy to perform, and produce optimal cosmetic result[21]

The first cyanoacrylate glues comprised short chain molecules with low breaking strength and a brittle constinency which left them prone to fracturing. Their use was restricted to low tension wounds where little tensile strength was required in the closure material and invitro studies demonstrated a low wound tensile strength. Recently, longer chain cyanoacrylates have been introduced with improved tensile

strength and more powerful adhesion of wound edges. The longer chain cyanoacrylate is a combination of monomers and plasticisers. Animal studies suggest its tensile strength to be superior to adhesive tape strips, equivalent to subcuticular suturing but inferior to skin staples, and its higher tension wounds is not recommended. This was reinforced clinically by Benard et al, who demonstrated an improved cosmetic outcome where suturing was used to close the wounds involving tissue excision resulting in higher wound tension.

Since its first use in 1996, the topical tissue adhesive has become a popular method for closing skin lesions, such as laparoscopic skin incisions and trauma induced lacerations, in areas of low tension

Although cyanoacrylates are only licensed for external use, many studies report their use in various internal situation such as repair of bronchopleural fistula, myocardial tears, mesh fixation for inguinal hernia, and adhesions of bone or cartilage. In 1986 Shendra et.al, reported that bleeding from gastric varices could be controlled by sclerotherapy using tissue adhesive agent butyl cyanoacrylate.

Contaminated laceration closed with suture materials are at increased risk of wound sepsis due to local tissue damage and adsorption of pyogenic bacteria by suture material. Further one study suggests that combination of n butyl 2 cyanoacrylate and a blue dye may be bacteriostatic for pyogenic gram positive bacteria. In contrast, Olson et al, found that Stap. Epidermis rapidly colonizes n butyl 2 cyanoacrylate, producing a biofilm of embedded bacteria.

Cyanoacrylate is applied in a thin layer over the entire wound and extending 5-10 mm beyond the wound edge. The formation of the bond produces heat that the patient can feel. Once the layer is dried (10- 30 seconds), a second layer is applied. Three to four layers are necessary, no additional bandaging is required and patient is

advised not to perform wound care at home. By 7-14 days, most of the adhesive sloughs with the epidermis, and the remainder may be removed with soap and water or petroleum jelly.

Ideal adhesive:[13]

1. Be safe for topical application.
2. Be easy to apply
3. Polymerize rapidly
4. Support the approximated skin edges and maintain skin edge eversion for maximum wound healing and acceptable cosmoses.
5. Eliminate the need for suture removal.

Directions for use:

Standard surgical practice should be followed for wound preparation before application of skin glue. Use of glue should not sacrifice satisfactory wound preparation prior to its closure. Skin around the wound should be completely dried with sterile gauze to allow direct contact of glue to the skin. It is applied as bridge over the opposing skin edges and forms a flexible seal over the wound. Proper instructions should be followed in handling the product and in its application for successful outcome. Special care to be taken to ensure the wound edges are well apposed so that no adhesive glue get between the wound edges. Dry gauze dressing may be applied only after adhesive glue is completely dried up. If a seroma or wound infection develops, the polymer film should be removed from small area of incision to allow drainage without wound dehiscence.[13]

FIGURE NO 5: Topical skin glue applying on the approximated wound

FIGURE NO 6: After applying Topical glue

Advantages of adhesive

- Maximum bonding strength
- Better acceptance by patients
- Water resistant covering
- Does not require removal of sutures, staplers

Contraindications to use of skin adhesives:

- Contaminated wounds
- Mucosal surfaces

SKIN STAPLERS:

Surgical stapling was developed in 1908 by Hulti Hammer in Austria. The original instrument was massive by today standard weighing 7.5 pounds. Modifications performed by Von Petz provided and lighter and simpler stapling device, and 1934 Fredrick of Ulm designed an instrument that resembles the modern linear stapler. The next major advances came from Russia after World War II. In 1958, Ravich, whose thorough research and development, refined the instrument to their current status and wide spread use today.

The most significant modification has been a introduction of absorbable staples when these are used in gynecological operation, morbidity related to infectious granuloma and dyspareunia has been diminished. Staples yield a satisfactory result for cutaneous wound closure.[19] Nowadays disposable skin staplers are available. Stapler use also causes considerably less damage to wound defences.

Regular staplers have a diameter of 0.53mm, a span of 5.7mm and length of 3.9mm. The staples are made from stainless steel with an inert coating. The length of

the prongs on the staple is 3.9mm, which appears sufficient to provide good penetration into the tissue, with secure fixation of the mesh.

When it is not possible to maintain at least a 5mm distance from the stapled skin to underlying bones, vessels, or internal organs, the use of staples for skin closure is contraindicated.

Instrument should not be resterilised. It may compromise the integrity of the instrument which may result in unintended injury.

FIGURE NO 7: Application of stapler to approximate the skin edges

FIGURE NO 8: Approximation of skin edges using skin staplers

ASEPSIS WOUND SCORING:

Asepsis wound scoring is used to assess the wound infection. In this study the wound is assessed on the postoperative day 3 and day 7 and after 1 month. Based on this scoring the wound is graded.

The parameters are serous discharge, erythema, purulent fluid, separation of deep tissues, isolation of bacteria, additional treatment includes pus drainage and wound debridement and stay in hospital for more than 14 days due to infection.[28]

The presence of any above sign the score is given as 1 and absence 0.

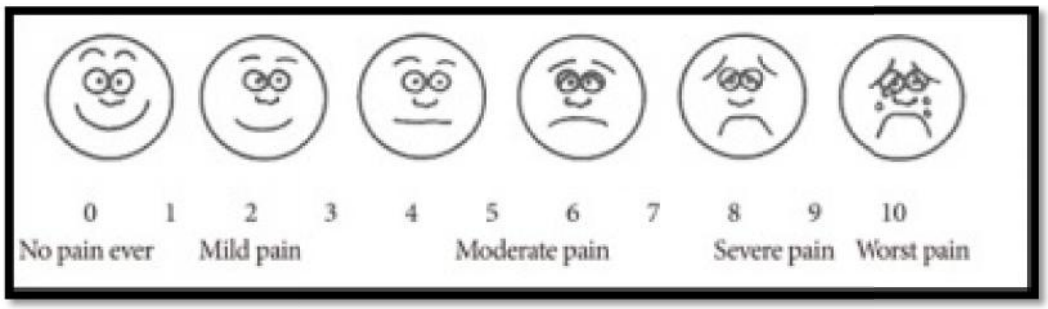
MODIFIED HOLLANDER COSMOSES SCORE:

Modified Hollander cosmoses scale is used to assess the wound cosmoses. In this study the wound is assessed on the postoperative day 3 and day 7 and after 1 month. Based on this scoring the wound is graded.[17]

Categories	Yes	No
Step off borders: Edges not on the same plane	1	0
Contour irregularities: Wrinkled skin near wound	1	0
Wound margin separation: Gap between the sides	1	0
Edge inversion: wound not properly inverted	1	0
Excessive distortion	1	0

VISUAL ANALOGUE SCORE:

Visual analogue score is used to assess the postoperative pain by facial expression. In this study the pain is assessed on postoperative day3 and day 7 and after 1 month.[22]



RESULTS

A total of 320 patients studied were recruited in the study from May 2012 to March 2015. All were clean abdominal elective surgeries. The patients were randomly included in the study in either stapler or adhesive glue group. In all recruited patient Inj. Ceftriaxone 1 gm. IV started one hour before surgery.

In adhesive group none of the patient's had local irritation of the skin or any hypersensitivity reaction. No toxicity was observed in any case belonging to adhesive group.

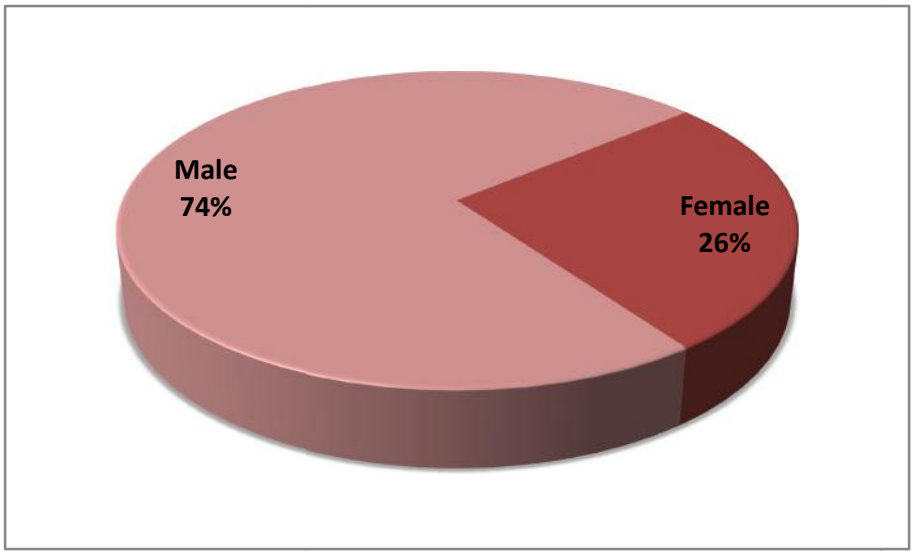
In the stapler group, the patient developed surgical site infection on the post-operative day 5. Both the groups wound assessed by using wound cosmoses score, modified Hollander score and visual analogue score which represents the cosmoses of wound and wound healing. Both the groups were assessed on the day of surgery, 3rd post-operative day, 7th post-operative day and 1 month.

TABLE NO 1: DISTRIBUTION OF PATIENTS BY SEX :

SEX	Groups			Chi-Square Test of association	
	STAPLERS	2 CYANOACRYLATE GLUE	Total	Chi-Square value	p value
Female	40	44	84	0.258	0.611
Male	120	116	236		
Total	160	160	320		

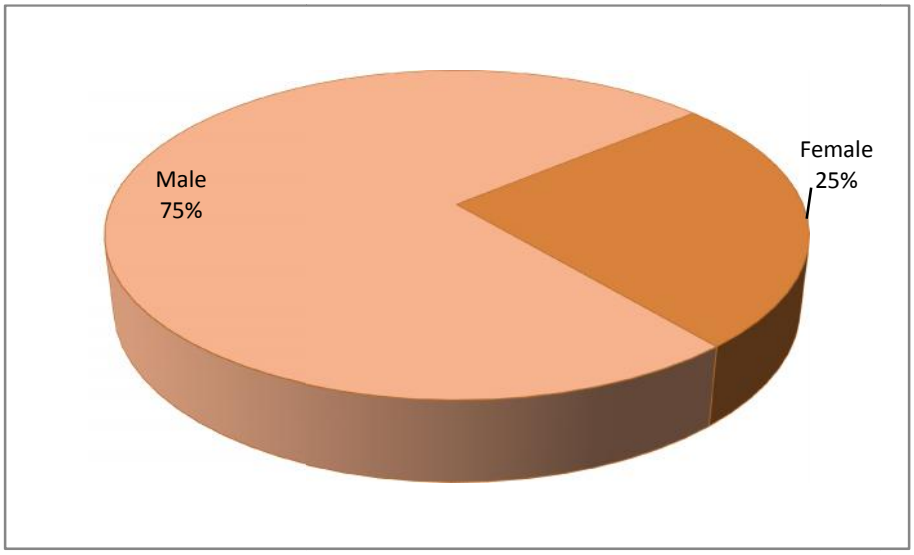
Table no 1 shows the distribution of the patients, in stapler group 120 males and 40 females and in glue group 116 were males and 44 were females.

GRAPH NO 1 : DISTRIBUTION OF PATIENTS BY SEX :



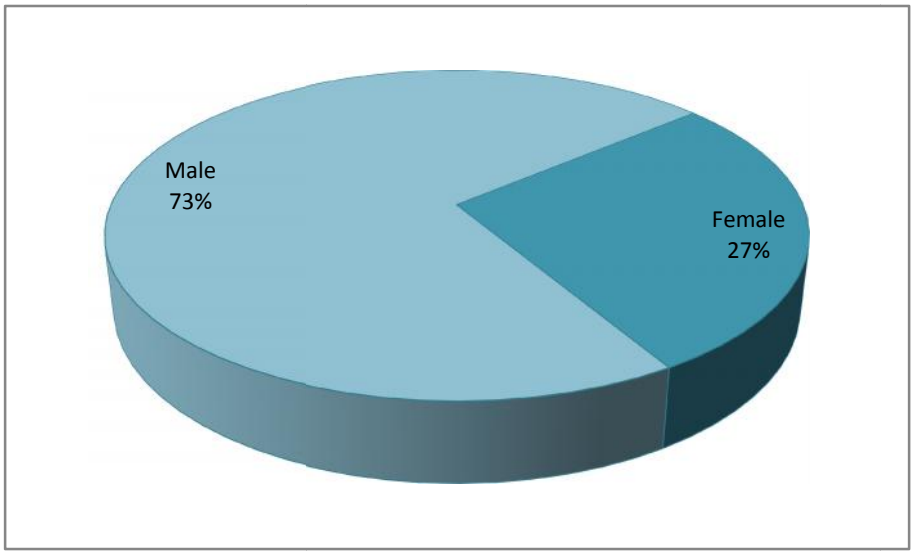
GRAPH NO 1 shows the distribution of patients of both the groups 74 % were males and 26% were females

GRAPH NO 2: DISTRIBUTION OF PATIENTS BY SEX AMONG STUDY GROUP 'STAPLERS'



GRAPH NO 2 shows among stapler group, males were 75% and females were 25 %. The male patients were higher than the female patients.

GRAPH NO 3: DISTRIBUTION OF PATIENTS BY SEX AMONG STUDY GROUP '2 CYANOACRYLATE GLUE'



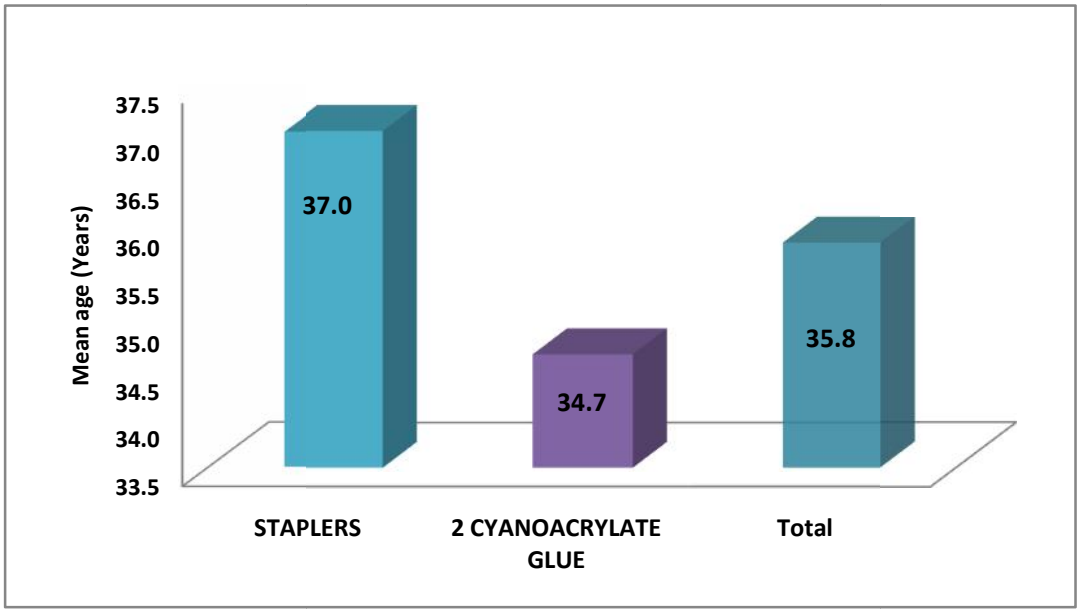
GRAPH NO 3 shows among glue, males were 73% and females were 27 %

TABLE NO 2: DISTRIBUTION OF AGE BY STUDY GROUPS :

Age					t-test for Equality of Means	
Groups	**N**	**Mean**	**SD**	**Mean Difference**	**t value**	**p value**
STAPLERS	160	37.0	13.8	2.32	1.6	0.111
CYANOACRYLATE GLUE	160	34.7	12.1			

Table no 2 shows the mean age of both the groups, the mean age among stapler group were 37 and cyanoacrylate glue were 34.7

GRAPH NO 4: DISTRIBUTION OF MEAN AGE OF PATIENTS BY STUDY GROUPS

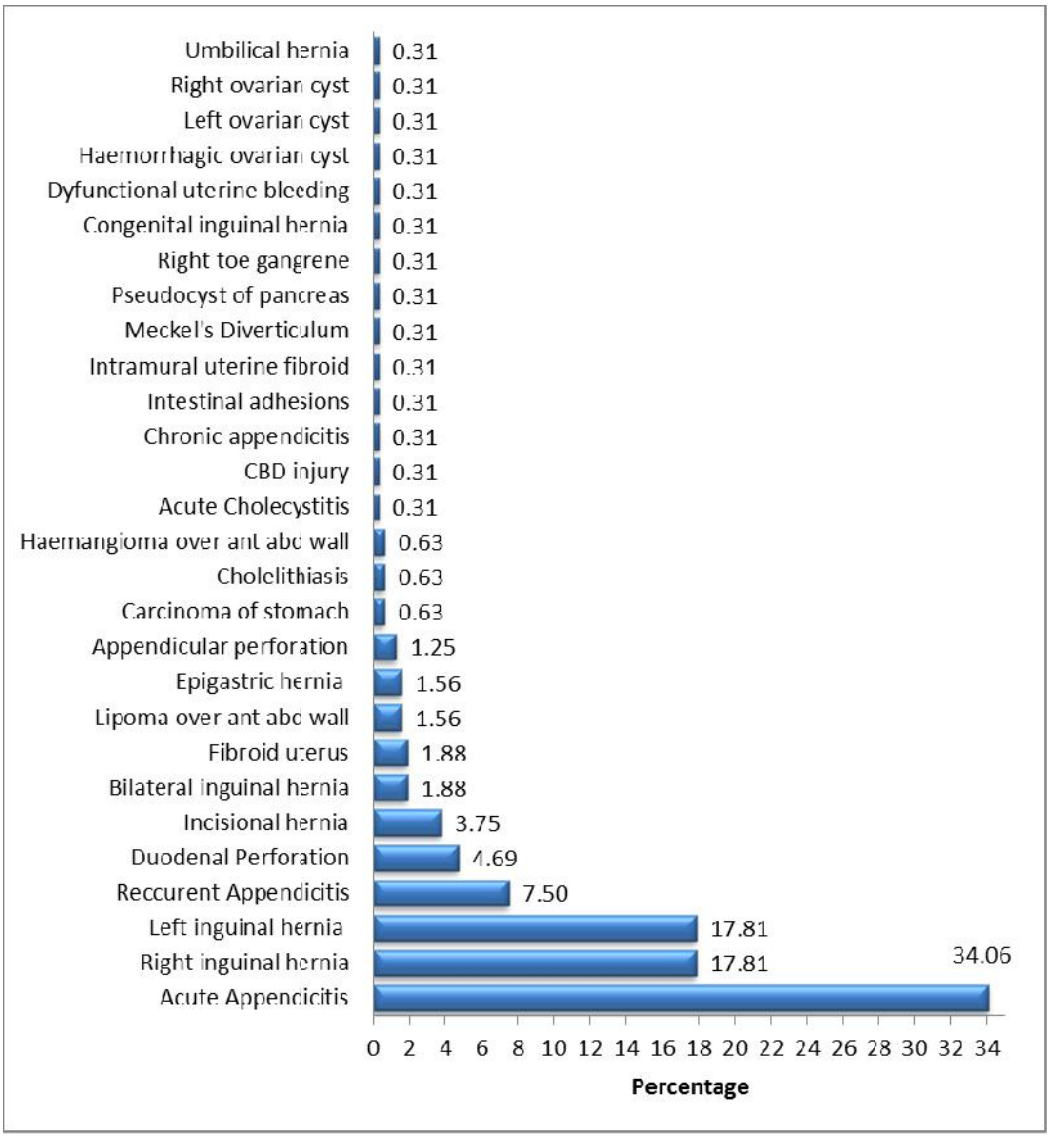


GRAPH NO. 4 shows the mean age of the patients among staplers and 2 cyanoacrylate glue.

TABLE NO 3: DIAGNOSIS DISTRIBUTION OF PATIENTS BY STUDY GROUPS :

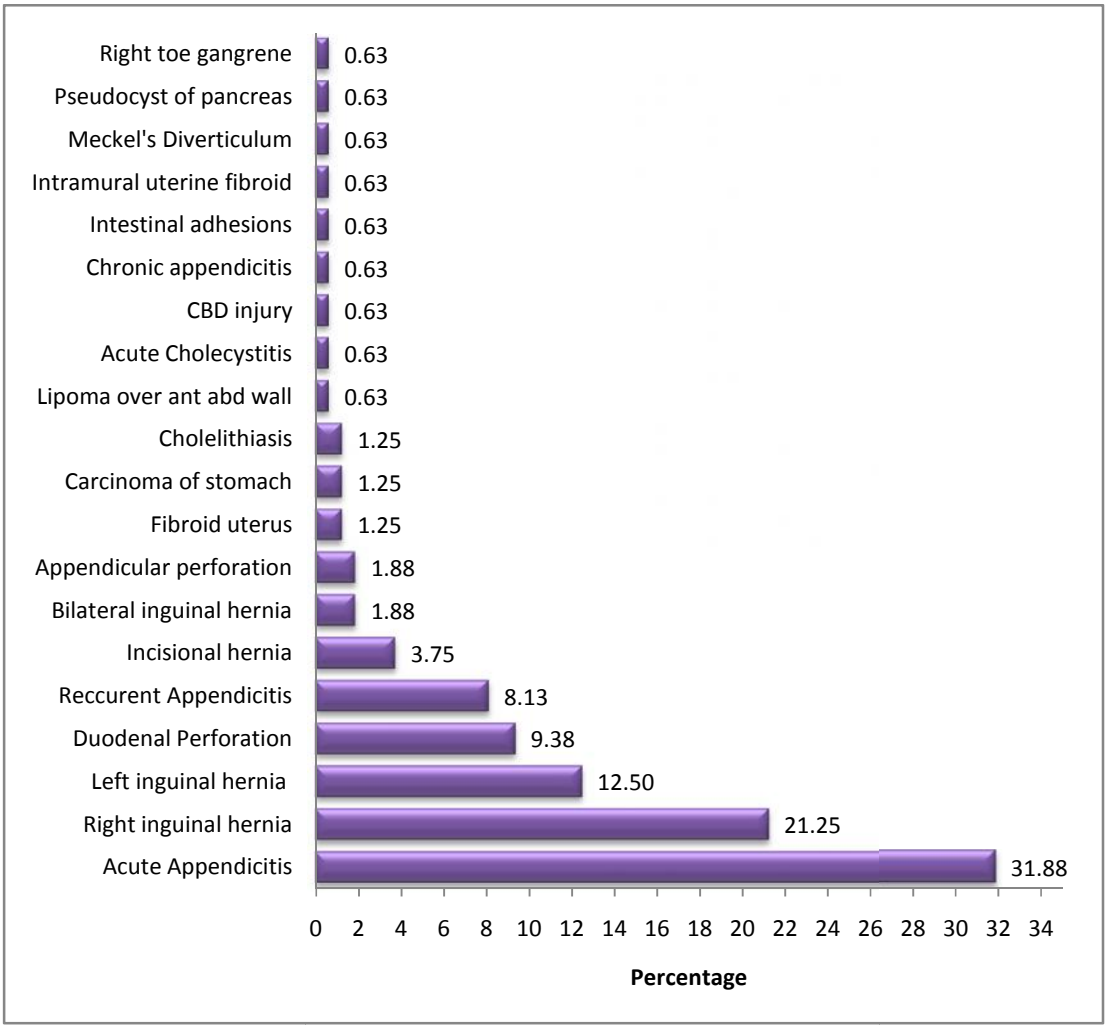
DIAGNOSIS	Groups		
	STAPLERS	2 CYANOACRYLATE GLUE	Total
Acute Appendicitis	51	58	109
Acute Cholecystitis	1	0	1
Appendicular perforation	3	1	4
Bilateral inguinal hernia	3	3	6
Carcinoma of stomach	2	0	2
CBD injury	1	0	1
Cholelithiasis	2	0	2
Chronic appendicitis	1	0	1
Congenital inguinal hernia	0	1	1
Duodenal Perforation	15	0	15
Dyfunctional uterine bleeding	0	1	1
Epigastric hernia	0	5	5
Fibroid uterus	2	4	6
Haemangioma over ant abd wall	0	2	2
Haemorrhagic ovarian cyst	0	1	1
Incisional hernia	6	6	12
Intestinal adhesions	1	0	1
Intramural uterine fibroid	1	0	1
Left inguinal hernia	20	37	57
Left ovarian cyst	0	1	1
Lipoma over ant abd wall	1	4	5
Meckel's Diverticulum	1	0	1
Pseudocyst of pancreas	1	0	1
Reccurent Appendicitis	13	11	24
Right inguinal hernia	34	23	57
Right ovarian cyst	0	1	1
Right toe gangrene	1	0	1
Umbilical hernia	0	1	1
Total	160	160	320

GRAPH NO 5: PERCENT DISTRIBUTION OF DIAGNOSIS AMONG TOTAL PATIENTS



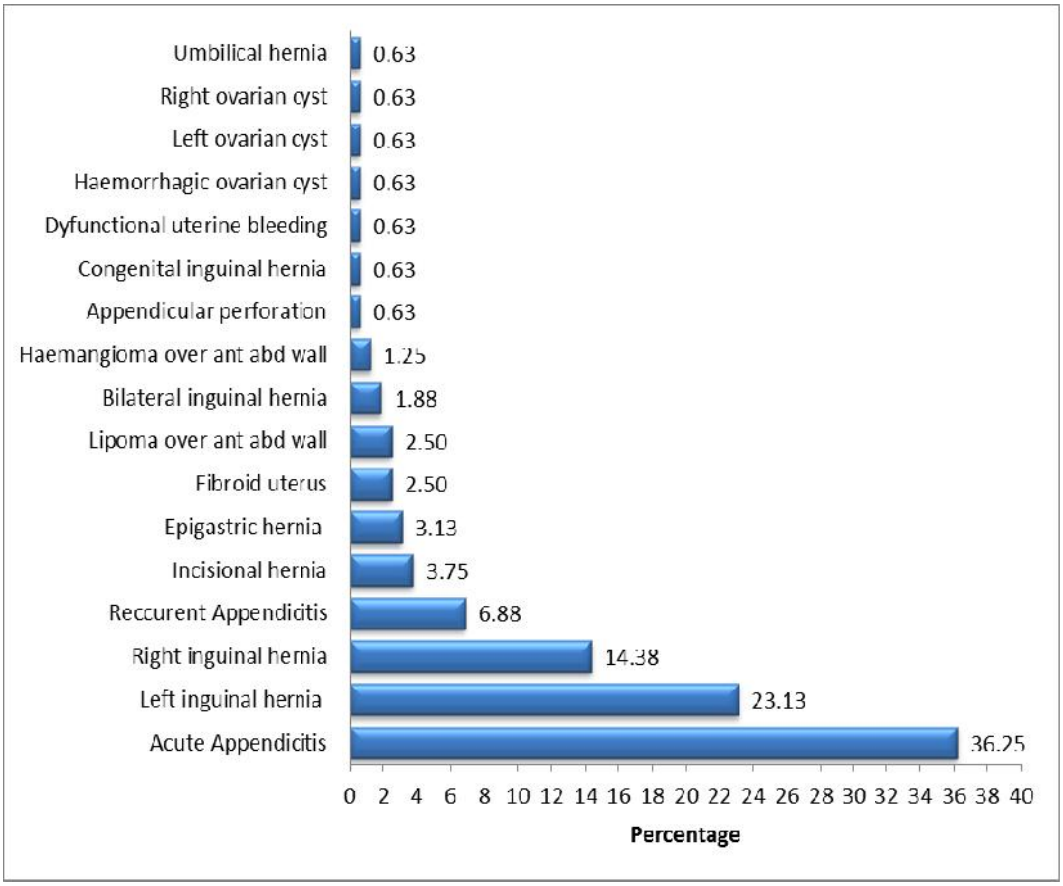
GRAPH NO 5 shows the diagnosis of patients among both the groups, the appendicitis and inguinal hernia were higher participated and then follows epigastric hernia, duodenal perforation etc.

GRAPH NO 6: PERCENT DISTRIBUTION OF DIAGNOSIS AMONG STUDY GROUP 'STAPLERS'



GRAPH NO 6 shows the diagnosis of patients among stapler group, the appendicitis and inguinal hernia were higher participated and then follows incisional hernia, duodenal perforation etc.

GRAPH NO 7: PERCENT DISTRIBUTION OF DIAGNOSIS AMONG STUDY GROUP '2 CYANOACRYLATE GLUE'

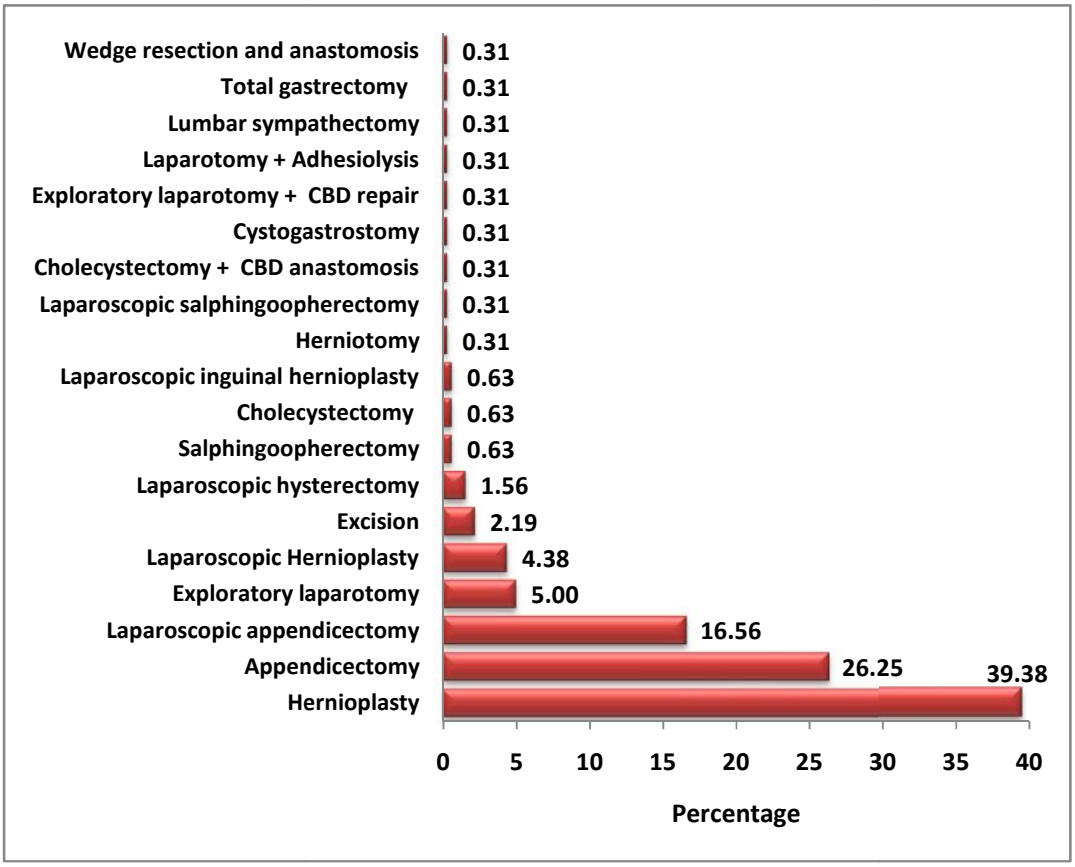


GRAPH NO 7 shows the diagnosis of patients among glue group, the appendicitis and inguinal hernia were higher participated and then follows incisional hernia, epigastric hernia etc.

TABLE NO 4 : OPERATIVE PROCEDURE DISTRIBUTION OF PATIENTS BY STUDY GROUPS

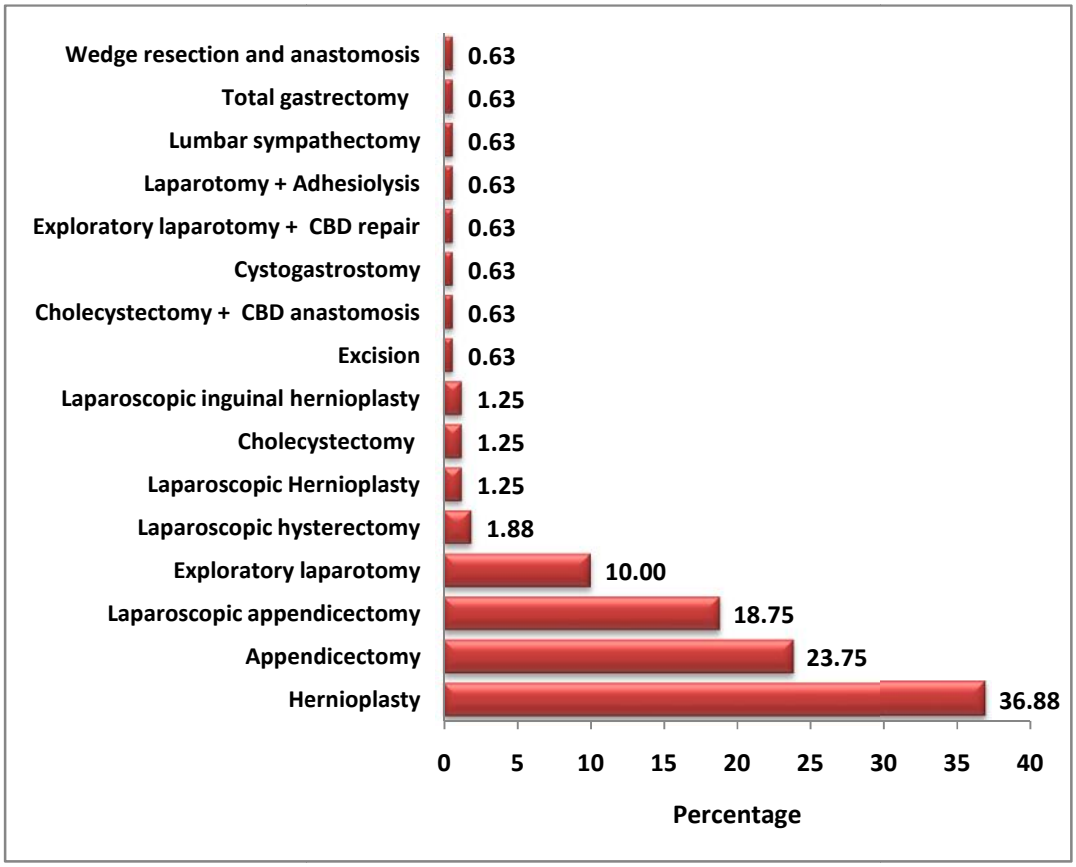
Operative procedure	Groups		
	STAPLERS	2 CYANOACRYLATE GLUE	Total
Appendicectomy	**38**	**46**	**84**
Cholecystectomy	**2**	**0**	**2**
Cholecystectomy + CBD anastomosis	1	0	1
Cystogastrostomy	1	0	1
Excision of lipoma / haemangioma	1	6	7
Exploratory laparotomy	16	0	16
Exploratory laparotomy + CBD repair	1	0	1
Hernioplasty	59	67	126
Herniotomy	0	1	1
Laparoscopic appendicectomy	30	23	53
Laparoscopic Hernioplasty	2	12	14
Laparoscopic hysterectomy	3	2	5
Laparoscopic inguinal hernioplasty	2	0	2
Laparoscopic salphingoopherectomy	0	1	1
Laparotomy + Adhesiolysis	1	0	1
Lumbar sympathectomy	1	0	1
Salphingoopherectomy	0	2	2
Total gastrectomy	1	0	1
Wedge resection and anastomosis	1	0	1
Total	160	160	320

GRAPH NO 8: PERCENT DISTRIBUTION OF OPERATIVE PROCEDURE AMONG TOTAL PATIENTS



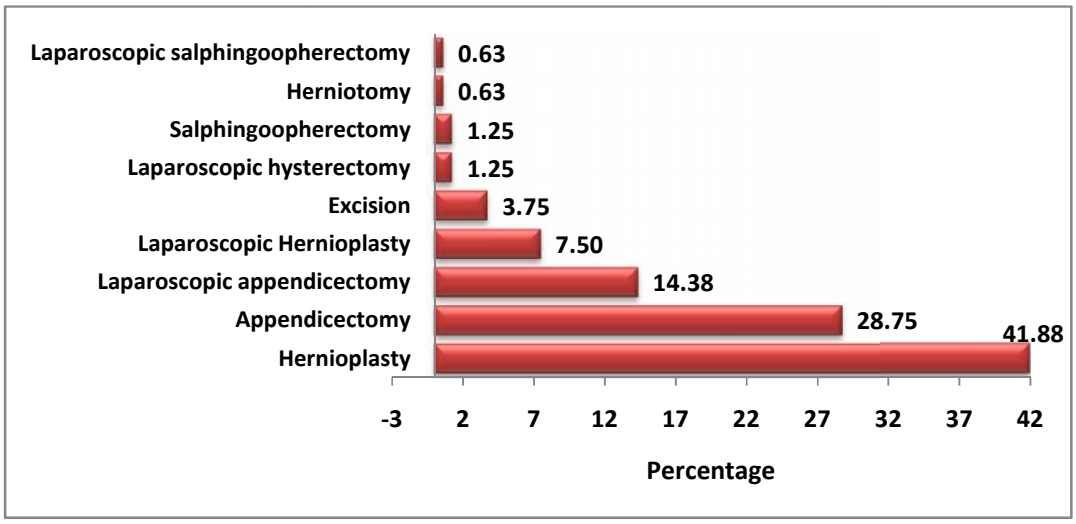
GRAPH NO 8 shows the distribution of patients according to operative procedure, 39.38 % includes hernioplasty, appendicectomy comprises 26.25 % and 0.3 % includes laparoscopic hernioplasty, cystogastrostomy and about 0.64 % includes cholecystectomy and 5 % laparotomy.

GRAPH NO 9: PERCENT DISTRIBUTION OF OPERATIVE PROCEDURE AMONG STUDY GROUP 'STAPLERS'



GRAPH NO. 9 shows the distribution of patients according to operative procedure among staplers hernioplasty comprises 36.8 %, appendicectomy includes 23.75% and laparotomy includes 10 %

GRAPH NO 10: PERCENT DISTRIBUTION OF OPERATIVE PROCEDURE AMONG STUDY GROUP '2 CYANOACRYLATE GLUE'



GRAPH NO 10 shows the distribution of operative procedures among glue group, 41.88 % comprises hernioplasty and 28.75 % comprises appendicectomy.

TABLE NO 5: DISTRIBUTION OF DURATION OF WOUND CLOSURE (MINUTES) BY STUDY GROUPS

Duration of wound healing (Minutes)					t-test for Equality of Means	
Groups	**N**	**Mean**	**Std. Deviation**	**Mean Difference**	**t value**	**p value**
STAPLERS	**160**	**93.8**	**43.1**	**37.9**	**10.7**	**0.0001**
CYANOACRYLATE GLUE	**160**	**55.8**	**12.4**			

Table no 5 shows the duration of wound healing among both studies, the p value is significant and suggest that cyanoacrylate glue is faster in closure of abdominal incision compared with that of staplers.

TABLE NO 6: DISTRIBUTION OF VISUAL ANALOGUE SCORE BY STUDY GROUPS

VAS					t-test for Equality of Means	
Groups	**N**	**Mean**	**Std. Deviation**	**Mean Difference**	**t value**	**p value**
STAPLERS	**160**	**2.9**	**1.1**	**0.3**	**2.3**	**0.021**
CYANOACRYLATE GLUE	**160**	**2.6**	**0.9**			

Table no 6 shows the visual analogue score of both studies, the p value is 0.021 which is insignificant.

TABLE NO .7 : DISTRIBUTION OF MODIFIED HOLLANDER COSMOSES SCORE BY STUDY GROUPS AT 3RD DAY

MHCS					t-test for Equality of Means	
Groups	**N**	**Mean**	**Std. Deviation**	**Mean Difference**	**t value**	**p value**
STAPLERS	**160**	**0.2**	**0.6**	**-0.1**	**-1.5**	**0.147**
CYANOACRYLATE GLUE	**160**	**0.3**	**0.7**			

Table no. 7 shows the modified Hollander cosmoses score among both the groups, the p value is 0.147

TABLE NO 8: DISTRIBUTION OF MODIFIED HOLLANDER COSMOSES SCORE BY STUDY GROUPS AT 7TH DAY

MHCS					t-test for Equality of Means	
Groups	**N**	**Mean**	**Std. Deviation**	**Mean Difference**	**t value**	**p value**
STAPLERS	**160**	**0.1**	**0.4**	**0.0**	**0.0**	**0.999**
CYANOACRYLATE GLUE	**160**	**0.1**	**0.3**			

Table no 8 shows the modified Hollander score among both the groups , the p value is insignificant.

TABLE NO 9: DISTRIBUTION OF MODIFIED HOLLANDER COSMOSES SCORE BY STUDY GROUPS AT 1 MONTH

MHCS					t-test for Equality of Means	
Groups	**N**	**Mean**	**Std. Deviation**	**Mean Difference**	**t value**	**p value**
STAPLERS	**160**	**0.1**	**0.4**	**0.1**	**1.3**	**0.183**
CYANOACRYLATE GLUE	**160**	**0.1**	**0.2**			

Table no 9 shows the Modified Hollander score at 1 month, the p value is 0.183 is insignificant.

TABLE NO 10: DISTRIBUTION OF ASEPSIS WOUND SCORE BY STUDY GROUPS AT 3RD DAY

AWS					t-test for Equality of Means	
Groups	**N**	**Mean**	**Std. Deviation**	**Mean Difference**	**t value**	**p value**
STAPLERS	**160**	**0.0**	**0.2**	**0.0**	**-1.1**	**0.251**
CYANOACRYLATE GLUE	**160**	**0.1**	**0.4**			

Table no 10 shows the asepsis wound score on 3rd day, the p value is 0.251 which is insignificant.

TABLE NO 11: DISTRIBUTION OF ASEPSIS WOUND SCORE BY STUDY GROUPS AT 7TH DAY

AWS					t-test for Equality of Means	
Groups	**N**	**Mean**	**Std. Deviation**	**Mean Difference**	**t value**	**p value**
STAPLERS	**160**	**0.0**	**0.2**	**0.0**	**-0.3**	**0.736**
CYANOACRYLATE GLUE	**160**	**0.0**	**0.2**			

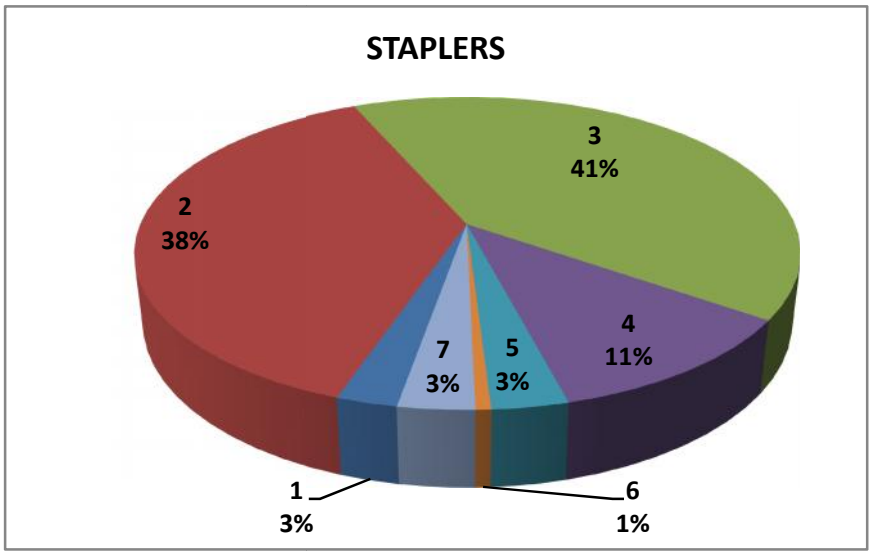
Table no 11 shows the asepsis wound score on 7 th day, the p value is 0.736 which is insignificant.

TABLE NO 12: DISTRIBUTION OF ASEPSIS WOUND SCORE BY STUDY GROUPS AT 1 MONTH

AWS					t-test for Equality of Means	
Groups	**N**	**Mean**	**Std. Deviation**	**Mean Difference**	**t value**	**p value**
STAPLERS	**160**	**0.2**	**0.4**	**0.2**	**4.4**	**0.0001**
CYANOACRYLATE GLUE	**160**	**0.0**	**0.1**			

Table no 12 shows the asepsis wound score among 2 groups, the p value is 0.0001 which is significant.

GRAPH NO 11: VISUAL ANALOGUE SCORE DISTRIBUTION OF PATIENTS BY STUDY GROUPS



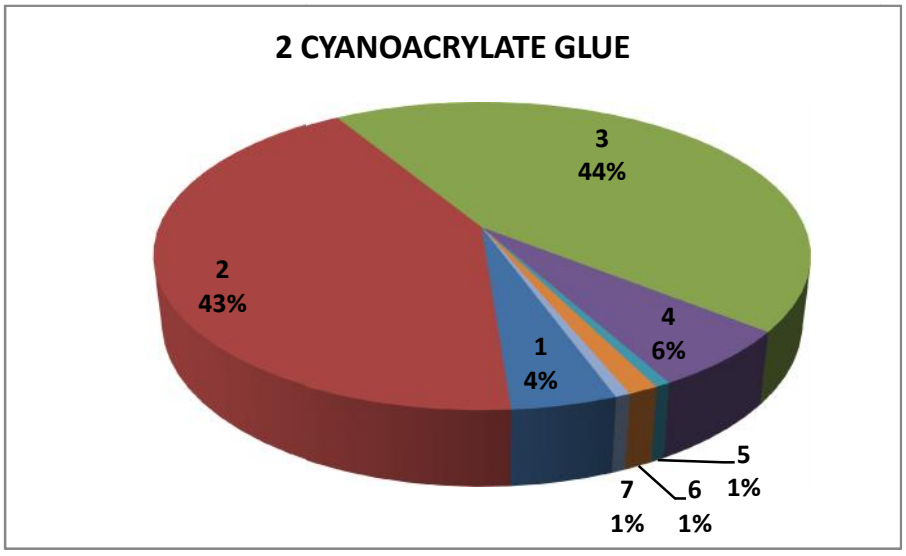


TABLE NO. 13: MODIFIED HOLLANDER COSMOSES SCORE DISTRIBUTION OF PATIENTS BY STUDY GROUPS

		Groups		
Day	MHCS value	STAPLERS	CYANOACRYLATE GLUE	Total
3rd Day	0	145	130	275
	1	4	15	19
	2	8	13	21
	3	2	2	4
	4	1	0	1
7th Day	0	147	141	288
	1	7	19	26
	2	6	0	6
1 Month	0	149	151	300
	1	5	9	14
	2	6	0	6
Total		160	160	320

TABLE 14: ASEPSIS WOUND SCORE DISTRIBUTION OF PATIENTS BY STUDY GROUPS

		Groups		
Day	AWS Value	STAPLERS	CYANOACRYLATE GLUE	Total
3rd Day	0	156	154	310
	1	3	1	4
	2	1	5	6
7th Day	0	156	155	311
	1	4	5	9
1 Month	0	139	159	298
	1	16	1	17
	2	5	0	5
Total		160	160	320

PHOTOGRAPHS

IP no. 20016

PHOTOGRAPH NO. 1 POST OPERATIVE DAY 3 OF APPENDICECTOMY

IP no. 20016

PHOTOGRAPH NO.2 POST OPERATIVE DAY 8 OF APPENDICECTOMY

PHOTOGRAPH NO.3 A CASE OF LUMBAR SYMPATHECTOMY POST OPERATIVE DAY 3

PHOTOGRAPH NO. 4 POST OPERATIVE 8 OF LUMBAR SYMPATHECTOMY

PHOTOGRAPH NO .5 RIGHT INGUINAL HERNIA, THE SKIN IS APPROXIMATED WITH 2 CYANOACRYLATE GLUE

PHOTOGRAPH NO.6 APPENDICECTOMY, THE SKIN CLOSED WITH 2 CYANOACRYLATE GLUE

PHOTOGRAPH NO. 7 HERNIOPLASTY AFTER 1 MONTH FOLLOW UP OF USING ADHESIVE GLUE

PHOTOGRAPH NO. 8 FOLLOW UP PATIENT OF LAPAROTOMY USING SKIN STAPLERS

DISCUSSION

Traditionally, needle skin suturing with suture material is commonest method of surgical wound closure that is being practiced by surgeons because of its cost effectiveness. The cost consumed by the suture material to close the surgical incision is cheaper than the one consumed by 2 cyanoacrylate glue. If we consider the cost of postoperative wound care, length of hospital stay, dressing of the suture/stapled wound adds to the cost of the procedure, it can be concluded that adhesives bring down the cost of the procedure. Nowadays, surgeons are looking for faster, comfortable and cosmetically best technique for skin closure and 2- cyanoacrylate provides faster, painless technique to close the incision. 2-cyanoacrylate provides a flexible, water resistant, sealed skin closure and also needle free method of wound closure. 2-cyanoacrylates promote a moist, wound healing environment around the wound which speeds up the rate of epithelialization. 2-cyanoacrylates provide an effective seal that sloughs off naturally over the course of five to ten days. The adhesive seal delivers the strength healed tissue at seven days in less than 3 minutes. A strong, flexible three dimensional bond makes it suitable for use in closing easily approximated long incisions. 2-cyanoacrylate provides a water proof clear dressing resulting in excellent cosmetic result and increased patient satisfaction. 2-cyanoacrylate reduces the risk of infections by eliminating the punctures that result from suturing and which may be responsible to introduce skin borne microorganisms into wound and lead to infection. Application of 2-cyanoacrylate glue requires significantly less time as compared to applying multiple sutures and longer the wound, greater the time saved. Moreover, it eliminates the trauma to the tissues caused by needles and sutures. Application of tissue adhesive is faster for the surgeon,

risk of needle prick is eliminated and high grade of satisfaction from the patient for cosmetic outcome and painless.

Skin adhesive can be used for most of the body and have been employed to close the wound ranging from 0.5cm to 20 cm in length. Advantages of skin adhesive include ease of application, absence of needles and suture removal, higher rate of patient satisfaction and disadvantage is lack of strength and cannot be used wounds in mucous membrane or any wound with evidence of active infection, skin exposed to body fluids, dermatitis, skin over areas of high dynamic tension such as hands, feet, joints and hypersensitivity to cyanoacrylate. Skin adhesive should not be used deep into skin because the polymerized material is not absorbed by the tissue and can elicit a foreign body reaction delaying the process of wound healing and resulting in adverse cosmetic outcome. In the present study reveals that the minimum age was taken 13 years and maximum age was 70 years in both the groups.

Patients were assessed for the cosmetic outcome on the 3rd and 7^{th} postoperative day and 1 month using modified Hollander cosmoses scale. Modified Hollander cosmoses scale has six variables and the presence of the each variable in the wound gets 1 score. On the postoperative day 7 the p value is 0.139 which is insignificant and after 1 month follow up the numerical difference in the favour of tissue adhesive glue p value 0.001 which is significant.

The limitation of the present study is its sample size. A randomized controlled comparative study with a much larger population may help to further substantiate the findings or further variations. The financial burden on the patient is not analyzed in this study. The patient who did not follow up after 1 month were not included in this study.

The use of 2 cyanoacrylate glue has become popular in cosmopolitan cities and surgeons are finding it more easier method to close the wound and providing better cosmoses to the patients.

SUMMARY

The present study is conducted on 320 patients to compare the efficacy of the skin staplers with adhesive glue in clean elective abdominal surgeries. Patients after screening for inclusion and exclusion criteria were randomly divided into two groups. A detailed history was taken and relevant investigations were done to rule out any focus of infection or malignancy. Patients with comorbid medical conditions, patients undergoing contaminated or emergency surgeries were excluded from the study. The nature of operation and site of incision are variable. In adhesive glue group, skin closure done with 2 cyanoacrylate glue. In skin stapler group skin is closed with staplers.

The outcome of wound was assessed on 3rdday, 7th day postoperative days and follow up after 1 month using ASEPSIS score. It is found that on the postoperative day 7 the values are statically insignificant and after follow up on 1st month . The adhesive glue have lesser wound complication compared with that of stapler.

The wound cosmoses was assessed on 3rd and 7th postoperative day using modified Hollander cosmoses scale. On 7th postoperative day the p value 0.791 which is insignificant and after follow up of one month p value 0.001 which was significant. The adhesive glue was cosmetically better compared with the stapler. In conclusion the concept of using tissue adhesive looks an attractive and a fast emerging alternate to the use of sutures and staples. Octylcyanoacrylate gives faster, comfortable and easier skin closure. So octylcyanoacrylate is effective and reliable skin closure in clean elective surgeries.

CONCLUSION

Octylcyanoacrylate provides an effective and reliable means of skin closure and yields better cosmetic results than skin staplers. The incidence of infection and wound complications are comparable in both the groups. In the 21st century the importance is given for cosmoses, the use of 2 cyanoacrylate glue in cosmopolitan cities has increased. 2 cyanoacrylate provides better cosmoses than skin staplers and sutures and need not need to come for follow up for suture/stapler removal.

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ANNEXURES

ETHICAL CLEARANCE

B.L.D.E. UNIVERSITY'S
SHRI.B.M.PATIL MEDICAL COLLEGE, BIJAPUR-586 103
INSTITUTIONAL ETHICAL COMMITTEE

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this college met on 18-10-2012 at 3-30pm to scrutinize the Synopsis of Postgraduate Students of this college from Ethical Clearance point of view. After scrutiny the following original/corrected & revised version synopsis of the Thesis has been accorded Ethical Clearance.

Title "Comparative Study of abdominal Skin closure between adhesive glue and Staples"

—x—x—

Name of P.G. student Dr. Sachin Kadlewad
Surgery

Name of Guide/Co-investigator Dr Balasaheb B Metan
Prof of Surgery

DR.TEJASWINI. VALLABHA
CHAIRMAN
INSTITUTIONAL ETHICAL COMMITTEE
BLDEU'S, SHRI.B.M.PATIL
MEDICAL COLLEGE, BIJAPUR.

Following documents were placed before E.C. for Scrutinization
1) Copy of Synopsis/Research project.
2) Copy of informed consent form
3) Any other relevant documents.

INFORMED CONSENT FORM :

TITLE OF THE PROJECT	COMPARATIVE STUDY OF ABDOMINAL SKIN CLOSURE WITH GLUE AND STAPLERS.
GUIDE	Dr. BALASAHEB B METAN (PROFESSOR)
P.G. STUDENT	Dr. SACHIN KADLEWAD

PURPOSE OF RESEARCH:

I have been informed that this study will analyse the effect of the 2 Octylcyanoacrylate tissue adhesive glue. I have also been given free choice of participation in this study.

PROCEDURE:

I am aware that in addition to routine care received I will be asked series of questions by the investigator. I have been asked to undergo the necessary investigations and treatment, which will help the investigator in this study.

RISK AND DISCOMFORTS:

I understand that I may experience some pain and discomforts during my treatment. This is mainly the result of my condition and the procedures of this study are not expected to exaggerate these feelings which are associated with the usual course of treatment.

BENEFITS:

I understand that my participation in the study will help to give better option to patients to switch over to the advanced technique.

CONFIDENTIALITY:

I understand that the medical information produced by this study will become a part of hospital records and will be subject to the confidentiality. Information of sensitive personal nature will not be part of the medical record, but will be stored in the investigations research file.

If the data are used for publication in the medical literature or for teaching purpose, no name will be used and other identifiers such as photographs will be used only with special written permission. I understand that I may see the photograph before giving the permission.

REQUEST FOR MORE INFORMATION:

I understand that I may ask more questions about the study at anytime **Dr. SACHIN KADLEWAD** at the department of surgery who will be available to answer my questions or concerns. I understand that I will be informed of any significant new findings discovered during the course of the study, which might influence my continued participation. A copy of this consent form will be given to me to keep for careful reading.

REFUSAL FOR WITHDRAWAL OF PARTICIPATION:

I understand that my participation is voluntary and that I may refuse to participate or may withdraw consent and discontinue participation in the study at any time without prejudice. I also understand that **DR. SACHIN KADLEWAD** may terminate my participation in the study after he has explained the reasons for doing so.

INJURY STATEMENT:

I understand that in the unlikely event of injury to me resulting directly from my participation in this study, if such injury were reported promptly, the appropriate treatment would be available to me. But, no further compensation would be provided

by the hospital. I understand that by my agreements to participate in this study and not waiving any of my legal rights.

I have explained to _____the purpose of the research, the procedures required and the possible risks to the best of my ability in own vernacular language

Dr. SACHIN KADLEWAD **Dr. B.B. METAN**

Date (Investigator) (Guide)

SCHEME OF CASE TAKING:

1) Name :		CASE NO	:
2) Age/sex :		IP NO	:
3) Religion	:	Date of admission	:
		Date of surgery	:
4) Occupation	:	Date of discharge	:
5) Residence	:		

6) Chief complaints:

7) History of presenting illness:

8) Past History:

9) Treatment history:

10) Personal History – Diet –

Appetite -

Bowel/Bladder -

Sleep -

Habits –

11) Family History -

12) General Physical Examination -

Built	Nourishment
Pulse ratePallor:	
Blood pressure	Respiratory rate

Temperature	Jaundice
Clubbing	Cyanosis
Edema	Lymphadenopathy

13) Other systemic examination

- Abdominal system
- Respiratory system.
- Cardiovascular system.
- Central nervous system.

14) INVESTIGATIONS UNDERGONE BY PATIENT:

Complete	blood	count
Blood urea	Urine	routine
Serum creatinine	Bleeding time	and clotting time
HIV Random	blood sugar	HBsAg

FINAL DIAGNOSIS :

Surgery:

Date:

Skin closure:

Type of material used: 2 Octylcyanoacrylate glue / Staplers

Time for skin closure:

Post operativeperiod: (1 – 7 days)

Pain at 0hrs (visual analogue score)

12 hrs

24 hrs

36 hrs

48 hrs

72 hrs

After 7 days:

Wound asepsis score: (surgical site infection)

3rd day

5th day

7th day

Wound cosmesis score:

7th day

Follow up:

At 1 month

Pain score:

Wound cosmesis score:

KEY TO MASTER CHART

1. DOA – Date of Admission
2. DOD- Date of Discharge
3. DOW- Duration of Wound Closure
4. VAS- Visual Analogue Score
5. MHCS – Modified Hollander Cosmoses Score
6. AWS – Asepsis Wound Score
7. COM- Complication

MASTER CHART GROUP - I (STAPLERS)

SL.NO	NAME	AGE	SEX	IP NO	DOA	DOD	DIAGNOSIS	OPERATIVE PROCEDURE	DOW	VAS	MHCS			AWS			COM
											3rd Day	7th Day	1 Month	3rd Day	7th Day	1 Month	
1	Ashok Kamate	29	M	19632	04/09/2012	12/09/2012	Acute Appendicitis	Appendicectomy	2 min 04 seconds	2	2	2	2	0	0	2	nil
2	Lingappagouda	44	M	19638	04/09/2012	11/09/2012	Left inguinal hernia	Hernioplasty	2 min 03 seconds	3	2	2	2	0	0	0	nil
3	Dundappa Rathod	45	M	19884	06/09/2012	14/09/2012	Acute Appendicitis	Appendicectomy	1min 03 seconds	2	0	0	0	0	0	0	nil
4	Sangappa Shettenavvar	38	M	19912	08/09/2012	17/09/2012	Right inguinal hernia	Hernioplasty	1min 40 seconds	3	0	0	0	0	0	2	nil
5	Harish Naik	50	M	19926	08/09/2012	16/09/2012	Acute Appendicitis	Appendicectomy	1min06 seconds	2	0	0	0	0	0	0	nil
6	Suresh Biradar	46	M	19932	08/09/2012	17/09/2012	Right inguinal hernia	Hernioplasty	2min 34 seconds	3	0	0	0	0	0	0	nil
7	Shaila Janawad	30	F	19946	08/09/2012	17/09/2012	Acute Appendicitis	Appendicectomy	2 min 04 seconds	3	0	0	0	0	0	0	nil
8	Pratibha Desai	30	F	19954	08/09/2012	17/09/2012	Acute Appendicitis	Appendicectomy	1min 06 seconds	2	0	0	0	0	0	1	nil
9	Ninjalingappa	55	M	19988	08/09/2012	16/09/2012	Appendicular perforation	Appendicectomy	1 min 24 seconds	4	0	0	0	0	0	0	nil
10	Yogesh Kumar	28	M	20014	09/09/2012	17/09/2012	Right inguinal hernia	Hernioplasty	2 min 32 seconds	2	0	0	0	0	0	0	nil
11	Beeranna Gouda	66	M	20016	09/09/2012	16/09/2012	Acute Appendicitis	Appendicectomy	1min 32 seconds	3	0	0	0	0	0	0	nil
12	Gurubasayya Hanchinal	27	M	20021	09/09/2012	17/09/2012	Right inguinal hernia	Hernioplasty	1 min 18 seconds	2	0	0	0	0	0	0	nil
13	Mallesh Mantur	50	M	20031	10/09/2012	16/09/2012	Appendicular perforation	Appendicectomy	1 min 58 seconds	4	0	0	0	0	0	0	nil
14	Tuljabai	53	F	20067	11/09/2012	17/09/2012	Incisional hernia	Hernioplasty	1 min 53 seconds	3	0	0	0	0	0	1	nil
15	Renuka Desai	25	F	21043	14/09/2012	22/09/2012	Acute Appendicitis	Appendicectomy	45 seconds	2	0	0	0	0	0	1	nil
16	Subhash Chavan	54	M	21096	12/09/2012	16/09/2012	Right inguinal hernia	Hernioplasty	2 min 31 seconds	3	0	0	0	0	0	0	nil
17	Rajesh Yelhatti	23	M	21102	13/09/2012	17/09/2012	Left inguinal hernia	Hernioplasty	2 min 31 seconds	3	0	0	0	0	0	0	nil
18	Kenchappagouda	26	M	21346	14/09/2012	23/09/2012	Right inguinal hernia	Hernioplasty	1 min 02 seconds	2	0	0	0	0	0	1	nil
19	Mallanagouda	30	M	21557	24/09/2012	28/10/2012	Right toe gangrene	Lumbar sympathectomy	1 min 58 seconds	2	0	0	0	0	0	0	nil
20	Arjun	42	M	24572	26/09/2012	02/10/2012	Right inguinal hernia	Hernioplasty	1 min 32 seconds	4	2	2	2	2	1	2	seroma

21	Laxman	42	M	23658	18/10/2012	27/10/2012	Left inguinal henia	Hernioplasty	1 min 32 seconds	2	1	1	1	0	0	1	nil
22	Manjunath	21	M	25456	08/11/2012	11/11/2012	Acute Appendicitis	Appendicectomy	1 min 05 seconds	3	2	1	0	0	0	0	nil
23	Mallikarjun	40	M	26817	21/11/2012	29/11/2012	Chronic appendicitis	Appendicectomy	1 min 16 seconds	3	0	0	0	0	0	0	nil
24	Chandrakant	65	M	27550	30/11/2012	04/12/2012	Acute Appendicitis	Appendicectomy	1 min 54 seconds	2	0	0	0	0	0	0	nil
25	Shrihail	14	M	30422	26/12/2012	01/01/2013	Appendicular perforation	Appendicectomy	1min 46 seconds	5	3	2	2	1	1	2	erythema
26	Mallikarjun Daddi	48	M	1910	21/01/2013	06/02/2013	Acute Cholecystitis	Cholecystectomy	2 min 47 seconds	3	2	1	1	0	0	1	nil
27	Neelappa	62	M	2130	28/01/2013	06/02/2013	Right inguinal hernia	Hernioplasty	1 min 49 seconds	3	0	0	0	0	0	0	nil
28	Mallappa	72	M	8334	24/03/2013	27/03/2013	Left inguinal henia	Hernioplasty	1 min 36 seconds	3	0	0	0	0	0	0	nil
29	Abdul Gani	40	M	8359	25/03/2013	08/04/2013	Acute Appendicitis	Appendicectomy	1min 06 seconds	2	0	0	0	0	0	0	nil
30	Sarswati	56	F	7124	28/03/2013	08/04/2013	Duodenal Perforation	Exploratory laparotomy	42 seconds	3	0	0	0	0	0	0	nil
31	Gurappa	65	M	9438	04/04/2013	25/04/2013	Duodenal Perforation	Exploratory laparotomy	4 min 30 seconds	2	0	0	0	0	0	0	nil
32	Mallayya	46	M	9916	06/04/2013	14/04/2013	Cholelithiasis	Cholecystectomy	2 min 36 seconds	3	0	0	0	0	0	0	nil
33	Basantraya	70	M	13136	20/06/2013	28/06/2013	Left inguinal henia	Hernioplasty	1 min 30 seconds	3	0	0	0	0	0	0	nil
34	Gangadhar	48	M	15377	02/07/2013	08/07/2013	Right inguinal hernia	Hernioplasty	1 min 16 seconds	2	0	0	0	0	0	0	nil
35	Basalingappa	60	M	16022	18/07/2013	27/07/2013	Left inguinal henia	Hernioplasty	1 min 16 seconds	2	0	0	0	0	0	0	nil
36	Lakappa	50	M	16711	19/07/2013	30/07/2013	Right inguinal hernia	Hernioplasty	1min 32 seconds	3	0	0	0	0	0	0	nil
37	Gouravva	50	F	16762	20/07/2013	28/07/2013	Incisional Hernia	Hernioplasty	1 min 18 seconds	4	0	0	0	0	0	0	nil
38	Chandan	41	M	17451	04/08/2013	15/08/2013	Right inguinal hernia	Hernioplasty	1 min 40 seconds	2	0	0	0	0	0	0	nil
39	Rudrappa	41	M	19036	14/08/2013	26/08/2013	CBD injury	Exploratory laparotomy + CBD repair	3 min 30 seconds	7	4	2	2	1	1	0	WS
40	Kanteppa gouda	61	M	19509	21/08/2013	08/09/2013	Right inguinal henia	Hernioplasty	1 min 19 seconds	4	2	1	1	0	0	0	nil
41	Anasab gote	28	M	21317	22/08/2013	26/08/2013	Right inguinal hernia	Hernioplasty	1 min 45 seconds	3	1	0	0	0	0	0	nil
42	Dundappa	52	M	23139	27/08/2013	02/09/2013	Right inguinal hernia	Hernioplasty	1 min 47 seconds	2	0	0	0	0	0	0	Nil

43	Shrimanth	52	M	24356	03/09/2013	08/09/2013	Right inguinal hernia	Hernioplasty	1 min 44 seconds	3	0	0	0	0	0	0	nil
44	Anand Kumbar	21	M	24830	06/09/2013	12/09/2013	Acute Appendicitis	Appendicectomy	1 min 36 seconds	2	0	0	0	0	0	0	nil
45	Sharanappa Navi	52	M	25648	10/09/2013	16/09/2013	Right inguinal hernia	Hernioplasty	42 seconds	3	0	0	0	0	0	0	nil
46	Rakesh Telaswamy	32	M	25826	12/09/2013	18/09/2013	Acute Appendicitis	Appendicectomy	1 min 20 seconds	2	0	0	0	0	0	0	erythema
47	Ganesh Kumbar	56	M	26124	16/09/2013	21/09/2013	left inguinal hernia	Hernioplasty	1 min 20 seconds	2	0	0	0	0	0	0	nil
48	Shivananda	39	M	28165	22/09/2013	28/09/2013	Right inguinal hernia	Hernioplasty	1 min 45 seconds	3	0	0	0	0	0	0	nil
49	Pratibha	30	F	29134	24/09/2013	30/09/2013	Cholelithiasis	Cholecystectomy + CBD anastomosis	3 min 40 seconds	7	0	0	0	0	0	0	nil
50	Suresh Balurgi	46	M	30014	04/10/2013	11/10/2013	Left inguinal henia	Hernioplasty	2 min 34 seconds	7	0	0	0	0	0	0	nil
51	Nagappa Madar	25	M	31248	16/10/2013	22/10/2013	Duodenal Perforation	Exploratory laparotomy	2 min 49 seconds	7	0	0	0	0	0	0	nil
52	Amogi Ukkali	25	M	31654	20/10/2013	27/10/2013	Duodenal Perforation	Exploratory laparotomy	3 min 14 seconds	7	0	0	0	0	0	0	nil
53	Jagadish	34	M	32100	02/11/2013	08/11/2013	Left inguinal henia	Hernioplasty	1 min 43 seconds	3	0	0	0	0	0	0	nil
54	Prakash	28	M	32456	12/11/2013	16/11/2013	Right inguinal hernia	Hernioplasty	1 min 48 seconds	1	0	0	0	0	0	0	nil
55	Rakesh uppin	36	M	33124	21/11/2013	27/11/2013	Acute Appendicitis	Appendicectomy	1 min 36 seconds	3	0	0	0	0	0	0	nil
56	Savita	24	F	1102	04/01/2014	09/01/2014	Incisional hernia	Hernioplasty	1 min 32 seconds	2	0	0	0	0	0	0	nil
57	Dundappa	27	M	1125	12/01/2014	17/01/2014	Right inguinal hernia	Hernioplasty	1min 32 seconds	3	0	0	0	0	0	0	nil
58	Rajshekar	28	M	1826	16/01/2014	22/01/2014	Recurrent appendicitis	Laparoscopic appendicectomy	1 min 18 seconds	2	0	0	0	0	0	0	nil
59	Ramappa	42	M	3215	24/01/2014	29/01/2014	Recurrent appendicitis	Appendicectomy	1 min 58 seconds	2	0	0	0	0	0	0	nil
60	Yogendra kumar	35	M	3689	06/02/2014	13/02/2014	Recurrent appendicitis	Appendicectomy	1 min 53 seconds	3	0	0	0	0	0	0	nil
61	Rayappa	36	M	4269	16/02/2014	21/02/2014	Bilateral inguinal hernia	Hernioplasty	1 min 29 seconds	2	0	0	0	0	0	0	nil
62	Rajchandra	28	M	6248	21/02/2014	26/02/2014	Duodenal Perforation	Exploratory laparotomy	2 min 31 seconds	3	0	0	0	0	0	0	nil
63	Muniyappa	37	M	6756	24/02/2014	29/2/14	Right inguinal hernia	Hernioplasty	2 min 02 seconds	2	0	0	0	0	0	0	nil
64	Saritha	28	F	7126	27/02/2014	03/03/2014	Acute Appendicitis	Laparoscopic appendicectomy	1 min 02 seconds	4	0	0	0	0	0	0	Erythema
65	Fakirappa	54	M	7326	04/03/2014	09/03/2014	Acute Appendicitis	Appendicectomy	1 min 58 seconds	3	0	0	0	0	0	1	nil

66	Somanath Koppal	23	M	8156	08/03/2014	12/03/2014	Left inguinal hernia	Hernioplasty	1 min 32 seconds	3	0	0	0	0	0	0	nil
67	Eshwarappa	26	M	9126	14/03/2014	19/03/2014	Right inguinal hernia	Hernioplasty	1 min 19 seconds	2	0	0	0	0	0	1	nil
68	Dondappa	30	M	9426	20/03/2014	27/03/2014	Acute Appendicitis	Laparoscopic Appendicectomy	1 min 38 seconds	3	0	0	0	0	0	0	nil
69	Raju Hitalmani	42	M	10654	03/04/2014	08/04/2014	Acute Appendicitis	Laparoscopic appendicectomy	1 min 47 seconds	2	0	0	0	0	0	1	nil
70	Ramesh Ikkati	42	M	11689	09/04/2014	16/04/2014	Acute Appendicitis	Appendicectomy	1 min 44 seconds	2	0	0	0	0	0	0	nil
71	Praveen Arakeri	21	M	11926	12/04/2014	19/04/2014	Acute Appendicitis	Appendicectomy	1 min 36 seconds	2	1	1	1	0	0	1	nil
72	Somashekar	40	M	12046	16/04/2014	23/04/2014	Left inguinal hernia	Hernioplasty	1 min 56 seconds	3	2	1	0	0	0	0	nil
73	Rudragouda	65	M	12259	26/04/2014	02/05/2014	Acute Appendicitis	Laparoscopic appendicectomy	2 min 04 seconds	1	0	0	0	0	0	1	nil
74	Roshan Patil	14	M	12474	03/05/2014	09/05/2014	Recurrent appendicitis	Appendicectomy	1 min 34 seconds	2	0	0	0	0	0	0	nil
75	Rajesh Mulimani	48	M	13024	08/05/2014	13/05/2014	Recurrent appendicitis	Appendicectomy	1 min 45 seconds	5	3	2	2	1	1	2	erythema
76	Roopa Meti	27	F	13425	13/05/2014	19/05/2014	Acute Appendicitis	Laparoscopic appendicectomy	1 min 18 seconds	4	2	1	1	0	0	1	nil
77	Rafiq Ahmed	56	M	13627	18/05/2014	23/05/2014	Duodenal Perforation	Exploratory laparotomy	1 min 58 seconds	2	0	0	0	0	0	0	nil
78	Sachin Katti	63	M	13952	24/05/2014	29/05/2014	Right inguinal hernia	Hernioplasty	1 min 53 seconds	3	0	0	0	0	0	0	nil
79	Rohan Kori	26	M	14065	29/05/2014	04/06/2014	Acute Appendicitis	Laparoscopic appendicectomy	1 min 29 seconds	3	0	0	0	0	0	0	nil
80	Somappa	30	M	14542	30/05/2014	07/06/2014	Acute Appendicitis	Appendicectomy	2 min 31 seconds	3	0	0	0	0	0	0	nil
81	Vijay Boti	59	M	14847	02/06/2014	07/06/2014	Left inguinal hernia	Hernioplasty	2 min 02 seconds	2	0	0	0	0	0	0	nil
82	Rajesh WJ	46	M	15294	04/06/2014	11/06/2014	Right inguinal hernia	Hernioplasty	1 min 02 seconds	3	0	0	0	0	0	0	nil
83	Mohammed	60	M	15651	10/06/2014	17/06/2014	Acute Appendicitis	Laparoscopic Appendicectomy	1 min 58 seconds	3	0	0	0	0	0	0	nil
84	Prajwal kammar	18	M	16214	12/06/2014	19/06/2014	Acute Appendicitis	Laparoscopic appendicectomy	1 min 32 seconds	3	0	0	0	0	0	0	nil
85	Somu Rathod	55	M	16541	14/06/2014	21/06/2014	Right inguinal hernia	Hernioplasty	1 min 34 seconds	2	0	0	0	0	0	0	nil
86	Soorappa	25	M	16721	16/06/2014	21/06/2014	Acute Appendicitis	Appendicectomy	2 min 04 seconds	3	0	0	0	0	0	0	nil
87	Awwamma	25	F	17168	27/06/2014	03/07/2014	Acute Appendicitis	Appendicectomy	1 min 30 seconds	1	0	0	0	0	0	0	Nil

88	ramappa	65	M	17428	03/07/2014	09/07/2014	Left inguinal henia	Hernioplasty	1 min 54 seconds	3	0	0	0	0	0	0	nil
89	Prasanna	28	M	17624	16/07/2014	22/07/2014	Acute Appendicitis	Appendicectomy	1min 46 seconds	2	0	0	0	0	0	0	nil
90	Roshan	25	M	18214	24/07/2014	30/07/2014	Left inguinal henia	Hernioplasty	1 min 18 seconds	3	0	0	0	0	0	0	nil
91	Ramappa	25	M	18316	28/07/2014	03/08/2014	Right inguinal hernia	Hernioplasty	1 min 58 seconds	2	0	0	0	0	0	0	nil
92	Fakirappa	34	M	18416	03/08/2014	11/08/2014	Left inguinal henia	Hernioplasty	1 min 53 seconds	2	0	0	0	0	0	0	nil
93	Lalsab	28	M	18357	06/08/2014	12/08/2014	Right inguinal hernia	Hernioplasty	1 min 29 seconds	3	0	0	0	0	0	0	nil
94	Kumar	36	M	19126	14/08/2014	21/08/2014	Acute Appendicitis	Appendicectomy	2 min 31 seconds	2	0	0	0	0	0	0	nil
95	Sandeep	24	M	20368	18/08/2014	23/08/2014	Right inguinal hernia	Hernioplasty	2 min 02 seconds	3	0	0	0	0	0	0	nil
96	Umesh Rathod	27	M	21657	21/08/2014	27/08/2014	Right inguinal hernia	Hernioplasty	1 min 02 seconds	2	0	0	0	0	0	0	nil
97	Kullappa	28	M	22346	26/08/2014	30/08/2014	Left inguinal henia	Hernioplasty	1 min 58 seconds	4	0	0	0	0	0	0	nil
98	Rukmini	27	F	23246	14/09/2014	18/09/2014	Acute Appendicitis	Appendicectomy	1 min 02 seconds	2	0	0	0	0	0	0	nil
99	Shwetha Kollur	28	F	23251	16/09/2014	20/09/2014	Acute Appendicitis	Appendicectomy	1 min 58 seconds	2	0	0	0	0	0	0	nil
100	Tejaswi	25	F	23232	15/09/2014	22/09/2014	Acute Appendicitis	Appendicectomy	1 min 32 seconds	3	0	0	0	0	0	0	nil
101	Rajshekar Uttad	42	M	23346	22/09/2014	29/09/2014	Duodenal Perforation	Exploratory laparotomy	2min 34 seconds	3	1	0	0	0	0	0	nil
102	Soumya Rathod	32	F	23428	26/09/2014	01/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	36 seconds	2	0	0	0	0	0	0	nil
103	Muniyappa	34	M	23654	26/09/2014	02/10/2014	Meckel's Diverticulum	Wedge resection and anastomosis	2 min 36 seconds	3	0	0	0	0	0	0	nil
104	Radha	31	F	24012	26/09/2014	01/10/2014	Incisional hernia	Hernioplasty	1 min 56 seconds	2	0	0	0	0	0	0	nil
105	Laxmi Kokentanr	29	F	24134	27/09/2014	02/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	38 seconds	3	0	0	0	0	0	0	nil
106	Rajshewari koppad	18	F	24186	27/09/2014	02/10/2014	Fibroid uterus	Laparospocopic Hysterectomy	40 seconds	2	0	0	0	0	0	0	erythema
107	Kumar Lalasangi	16	M	24289	27/09/2014	01/10/2014	Left inguinal hernia	Hernioplasty	53 seconds	2	0	0	0	0	0	0	nil
108	Ramappa Jagalur	39	M	24964	28/09/2014	02/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	58 seconds	3	0	0	0	0	0	0	nil
109	Fakirappa	30	M	25210	28/09/2014	01/10/2014	Right inguinal hernia	Laparoscopic Hernioplasty	48 seconds	3	0	0	0	0	0	0	nil
110	Hunamma Hessur	36	F	25327	28/09/2014	02/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	56 seconds	2	0	0	0	0	0	0	Nil

111	Lakawwa Jamanur	40	F	25614	29/09/2014	02/10/2014	Incisional hernia	Hernioplasty	1 min 42 seconds	3	0	0	0	0	0	0	nil
112	Ramappa Kannur	39	M	26132	29/09/2014	03/10/2014	Carcinoma of stomach	Exploratory laparotomy	1 min 58 seconds	2	0	0	0	0	0	0	nil
113	Shivanagouda	34	M	26201	30/09/2014	02/10/2014	Bilateral inguinal hernia	Hernioplasty	2 min 12 seconds	3	0	0	0	0	0	0	nil
114	Ramesh Kamte	30	M	26341	30/09/2014	03/10/2014	Duodenal Perforation	Exploratory laparotomy	1 min 42 seconds	6	0	0	0	0	0	0	nil
115	Jagadish Kammur	29	M	26421	30/09/2014	02/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	38 seconds	2	0	0	0	0	0	0	nil
116	Kalayani Sommnur	28	F	26789	01/10/2014	04/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	40 seconds	3	0	0	0	0	0	0	nil
117	Marriyawwa Koppad	38	F	26876	01/10/2014	05/10/2014	Acute Appendicitis	Appendicectomy	48 seconds	3	0	0	0	0	0	0	nil
118	Ramappa Sheggi	45	M	27104	02/10/2014	06/10/2014	Left inguinal hernia	Laparoscopic Hernioplasty	24 seconds	2	0	0	0	0	0	0	nil
119	Eshwar gowda	28	M	27271	03/10/2014	06/10/2014	Recurrent appendicitis	Laparoscopic appendicectomy	58 seconds	2	0	0	0	0	0	0	nil
120	Sukanya kumari	18	F	27401	03/10/2014	07/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	52 seconds	3	0	0	0	0	0	0	nil
121	Laxammawwa	36	F	27627	04/10/2014	06/10/2014	Incisional hernia	Hernioplasty	56 seconds	2	0	0	0	0	0	0	nil
122	Rekhabai	40	F	27821	04/10/2014	09/10/2014	Recurrent appendicitis	Laparoscopicappendicectomy	40 seconds	3	0	0	0	0	0	0	nil
123	Sunitha kollur	26	F	27934	05/10/2014	10/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	1 min 02 seconds	2	0	0	0	0	0	0	nil
124	Rekha Somanagouda	28	F	28104	06/10/2014	12/10/2014	Acute Appendicitis	Appendicectomy	48 seconds	4	0	0	0	0	0	0	erythema
125	Dondappa Sulagi	32	M	28265	07/10/2014	14/10/2014	Duodenal Perforation	Exploratory laparotomy	58 seconds	3	0	0	0	0	0	1	nil
126	Swati Kenchnur	24	F	28310	08/10/2014	13/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
127	Savitri kannur	14	F	28421	08/10/2014	12/10/2014	Recurrent appendicitis	Laparoscopic appendicectomy	40 seconds	2	0	0	0	0	0	1	nil
128	Rajlaxmi Rathod	19	F	28708	10/10/2014	14/10/2014	Recurrent appendicitis	Appendicectomy	53 seconds	3	0	0	0	0	0	0	nil
129	Laxmanagouda	42	M	29104	11/10/2014	15/10/2014	Recurrent appendicitis	Appendicectomy	58 seconds	2	0	0	0	0	0	1	nil
130	Devarappa	37	M	29310	11/10/2014	14/10/2014	Left inguinal hernia	Laparoscopic inguinal hernioplasty	48 seconds	2	0	0	0	0	0	0	nil
131	Dayachand Lokkur	22	M	29432	13/10/2014	17/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	42 seconds	3	0	0	0	0	0	0	nil
132	Somapa Rampure	37	M	29614	15/10/2014	19/10/2014	Right inguinal hernia	Laparoscopic inguinal hernioplasty	49 seconds	2	0	0	0	0	0	0	nil
133	Sujatha Kulkarni	16	F	30104	17/10/2014	22/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	38 seconds	2	0	0	0	0	0	0	Nil

134	Hanmappa	36	M	30214	19/10/2014	23/10/2014	Left inguinal hernia	Hernioplasty	1 min 04 seconds	3	0	0	0	0	0	0	nil
135	Ramappa Pujari	34	M	30464	21/10/2014	24/10/2014	Right inguinal hernia	Hernioplasty	54 seconds	2	0	0	0	0	0	0	nil
136	Suresh Ganjihar	22	M	31132	22/10/2014	28/10/2014	Lipoma over ant abd wall	Excision	37 seconds	3	0	0	0	0	0	0	nil
137	Rajesh Nimbal	17	M	31458	22/10/2014	28/10/2014	Acute Appendicitis	Laparoscopic appendicectomy	28 seconds	3	0	0	0	0	0	0	nil
138	Laxammappa Sonad	35	M	32645	26/10/2014	02/11/2014	Duodenal Perforation	Exploratory laparotomy	1 min 32 seconds	2	0	0	0	0	0	0	nil
139	Rekha Pujari	42	F	32846	28/10/2014	04/11/2014	Fibroid uterus	Laparoscopic hysterectomy	22 seconds	3	0	0	0	0	0	0	nil
140	Sunitha Rathod	24	F	33140	02/11/2014	13/11/2014	Acute Appendicitis	Laparoscopic appendicectomy	26 seconds	2	0	0	0	0	0	0	nil
141	Sharanawwa	47	F	33280	04/11/2014	17/11/2014	Intramural uterine fibroid	Laparoscopic hysterectomy	38 seconds	2	0	0	0	0	0	0	nil
142	Sharanabasava	13	M	34111	11/11/2014	18/11/2014	Recurrent appendicitis	Laparoscopic appendicectomy	26 seconds	3	0	0	0	0	0	0	nil
143	Mutanna	19	M	33426	05/11/2014	19/11/2014	Recurrent appendicitis	Appendicectomy	42 seconds	2	0	0	0	0	0	0	nil
144	Rekha Biradar	18	F	34182	12/11/2014	21/11/2014	Recurrent appendicitis	Appendicectomy	42 seconds	3	0	0	0	0	0	0	nil
145	Chandrashekar biradar	64	M	33599	06/11/2014	18/11/2014	Bilateral inguinal hernia	Hernioplasty	54 seconds	2	0	0	0	0	0	0	nil
146	Sangappa Shettenavvar	40	M	34496	15/11/2014	22/11/2014	Duodenal Perforation	Exploratory laparotomy	2 min 12 seconds	5	0	0	0	0	0	0	nil
147	Ramappa Salve	30	M	34524	18/11/2014	26/11/2014	Right inguinal hernia	Hernioplasty	1 min 02 seconds	3	0	0	0	0	0	0	nil
148	Suma Rathod	26	F	34516	20/11/2014	28/11/2014	Acute Appendicitis	Laparoscopic appendicectomy	32 seconds	3	0	0	0	0	0	0	nil
149	Sunitha kumari	24	F	34521	21/11/2014	29/11/2014	Acute Appendicitis	Appendicectomy	54 seconds	4	0	0	0	0	0	0	nil
150	Ramappa Savanur	32	M	34532	22/11/2014	29/11/2014	Left inguinal hernia	Hernioplasty	1 min 03 seconds	4	0	0	0	0	0	0	nil
151	Somanna Koti	26	M	34536	23/11/2014	29/11/2014	Right inguinal hernia	Hernioplasty	1 min 04 seconds	4	0	0	0	0	0	0	nil
152	Rajeshwari Mutali	28	F	35423	28/11/2014	04/12/2014	Acute Appendicitis	Laparoscopic Appendicectomy	58 seconds	4	0	0	0	0	0	0	nil
153	Savitha Choudhari	37	F	36211	04/12/2014	10/12/2014	Acute Appendicitis	Laparoscopic appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
154	Somanagouda	47	M	37453	08/12/2014	14/12/2014	Duodenal Perforation	Exploratory laparotomy	1 min 34 seconds	4	0	0	0	0	0	0	nil
155	Rajshekar Patil	62	M	38124	12/12/2014	21/12/2014	Duodenal Perforation	Exploratory laparotomy	1min 40 seconds	5	0	0	0	0	0	0	nil
156	Shankrappa Sonnad	40	M	2266	21/01/2015	04/02/2015	Pseudocyst of pancreas	Cystogastrostomy	1 min 32 seconds	4	0	0	0	0	0	0	nil
157	Eshwarappa	34	M	1046	09/01/2015	17/01/2015	Duodenal Perforation	Exploratory laparotomy	1min 24 seconds	4	0	0	0	0	0	0	nil

158	Tarasingh Rathod	65	M	5974	23/02/2015	02/03/2015	Duodenal Perforation	Exploratory laparotomy	1 min 02 seconds	4	0	0	0	0	0	0	nil
159	Bangarappa Kalakeri	58	M	6069	24/02/2015	04/03/2015	Carcinoma of stomach	Total gastrectomy	1 min 58 secons	5	0	0	0	0	0	0	nil
160	Somappa Choudhari	41	M	6102	25/02/2015	06/03/2015	Acute Appendicitis	Laparoscopic appendicectomy	53 seconds	3	0	0	0	0	0	0	nil

MASTERCHART GROUP - II (2 CYANOACRYLATE GLUE)

Sl.NO	NAME	AGE	SEX	IP NO	DOA	DOD	DIAGNOSIS	OPERATIVE PROCEDURE	DOW	VAS	MHCS			ASW			COM
											3rd Day	7th Day	1st Month	3rd Day	7th Day	1st Month	
1	Arjun Rathod	42	M	22572	25/09/2012	10/04/2012	Right inguinal hernia	Hernioplasty	48 seconds	2	0	0	0	0	0	0	nil
2	Sharanappagouda	25	M	22775	10/11/2012	21/10/2012	Left inguinal henia	Hernioplasty	54 seconds	3	0	0	0	0	0	0	nil
3	Kupanna	29	M	7428	24/01/2012	06/02/2012	Acute appendicitis	Appendicectomy	1min 03 seconds	3	0	0	0	0	0	0	nil
4	Shivashankareppa	36	M	7196	14/03/2013	26/03/2013	Right inguinal hernia	Hernioplasty	56 seconds	2	0	0	0	0	0	0	nil
5	Ragavendra	36	M	7310	16/03/2013	28/03/2013	Acute appendicitis	Appendicectomy	1min 06 seconds	3	0	0	0	0	0	0	nil
6	Savitha Patil	29	M	6539	21/03/2013	29/03/2013	Acute appendicitis	Appendicectomy	48 seconds	2	0	0	0	0	0	0	nil
7	Ranganna	42	M	7134	28/03/2013	04/04/2013	Right inguinal hernia	Hernioplasty	43 seconds	3	0	0	0	0	0	0	nil
8	Harish Lokkunur	41	M	9858	04/09/2013	23/4/2013	Right inguinal hernia	Hernioplasty	1min 06 seconds	2	0	0	0	0	0	0	nil
9	Chidananand Kulkarni	23	M	10601	16/4/2013	23/4/2013	Acute appendicitis	Appendicectomy	1 min 24 seconds	3	0	0	0	0	0	0	nil
10	Kamalesh Kori	27	M	10964	19/4/2013	26/4/2013	Acute appendicitis	Appendicectomy	52 seconds	2	0	0	0	0	0	0	nil
11	Chanappa Koti	56	M	13868	12/06/2013	18/06/2013	Left inguinal henia	Hernioplasty	1min 32 seconds	1	0	0	0	0	0	0	nil
12	Shivaputrappa	63	M	14567	16/7/2013	24/7/2013	Bilateral inguinal hernia	Hernioplasty	1 min 18 seconds	2	0	0	0	0	0	0	nil
13	Ravi Jonai	26	M	22436	12/09/2013	18/09/2013	Left inguinal henia	Hernioplasty	50 seconds	2	0	0	0	0	0	0	nil
14	Prakash Rathod	30	M	16039	24/7/2013	01/08/2013	Lipoma over ant. Abd wall	Excision	54 seconds	5	2	1	0	0	0	0	nil
15	Ramanna	59	M	17621	08/04/2013	08/12/2013	Right inguinal hernia	Hernioplasty	44 seconds	2	0	0	0	0	0	0	nil
16	Iranna Domelshwar	46	M	18502	07/02/2013	07/08/2013	Right inguinal hernia	Hernioplasty	49 seconds	1	0	0	0	1	0	0	nil
17	Ballawwa	60	F	19986	25/7/2013	08/04/2013	Incisional Hernia	Laparoscopic Hernioplasty	54 seconds	4	2	1	0	2	1	1	seroma
18	Mahanada	18	F	22486	14/8/2013	20/8/2013	Acute appendicitis	Appendicectomy	1 min 02 seconds	3	0	0	0	0	0	0	nil
19	Hanamanth Kumbar	55	M	22461	14/08/2013	22/08/2013	Left inguinal henia	Hernioplasty	50 seconds	3	0	0	0	0	0	0	nil
20	Mantesh	25	M	22911	14/08/2013	24/08/2013	Left inguinal hernia	Hernioplasty	54 seconds	2	0	0	0	0	0	0	nil
21	Awwamma	25	F	23241	14/08/2013	20/08/2013	Acute appendicitis	Appendicectomy	44 seconds	3	0	0	0	0	0	0	nil
22	Siddappa	65	M	22470	21/08/2013	23/08/2013	Right inguinal hernia	Hernioplasty	52 seconds	2	0	0	0	0	0	0	nil
23	Suma Kousar	28	F	23410	21/08/2013	26/08/2013	Acute appendicitis	Appendicectomy	1min 32 seconds	4	3	1	0	0	0	0	nil
24	Yashodha	26	F	266	01/04/2014	01/12/2014	Acute appendicitis	Appendicectomy	1 min 18 seconds	7	3	1	0	2	1	0	WS
25	Rekha	32	F	281	01/06/2014	01/12/2014	Haemangioma over ant abd wall	Excision	56 seconds	3	0	0	0	0	0	0	nil
26	Sangamesh	41	M	247	01/06/2014	01/12/2014	Acute appendicitis	Appendicectomy	48 seconds	2	0	0	0	0	0	0	nil
27	Sagar Kembhavi	44	M	10964	19/4/2014	26/4/2014	Left inguinal hernia	Hernioplasty	50 seconds	6	2	1	0	0	0	0	nil
28	Jagadish Kamate	34	M	11514	22/4/2014	28/4/2014	Left inguinal henia	Hernioplasty	54 seconds	2	0	0	0	0	0	0	nil

29	Yellappa	42	M	10043	12/06/2013	18/06/2013	Right inguinal hernia	Hernioplasty	1 min 02 seconds	3	0	0	0	0	0	0	nil
30	Arun Patil	35	M	14303	12/07/2013	18/07/2013	Acute appendicitis	Appendicectomy	1 min 03 seconds	3	0	0	0	2	1	0	WS
31	Basavaraj Bikankatti	36	M	11784	15/06/2013	19/06/2013	Epigastric hernia	Hernioplasty	58 seconds	2	0	0	0	0	0	0	nil
32	Yamanavva	28	M	21756	17/08/2013	24/08/2013	Right inguinal hernia	Hernioplasty	1 min 2 seconds	3	0	0	0	0	0	0	nil
33	Somappa	37	M	21345	19/08/2013	23/08/2013	Acute appendicitis	Appendicectomy	58 seconds	2	0	0	0	0	0	0	nil
34	Renuka Patil	60	F	21865	20/08/2013	24/08/2013	Fibroid uterus	Laparoscopic Hysterectomy	1 min 18 seconds	2	0	0	0	0	0	0	nil
35	Yellawwa	52	F	22432	12/09/2013	18/09/2013	Incisional Hernia	Hernioplasty	1 min 2 seconds	2	1	1	1	0	0	0	nil
36	Bharati Patil	52	F	22135	10/09/2013	13/09/2013	Acute appendicitis	Appendicectomy	1 min 5 seconds	3	2	1	0	0	0	0	nil
37	Swati Jakanur	21	F	20043	08/09/2013	14/09/2013	Acute Appendicitis	Appendicectomy	1 min 30 seconds	1	0	0	0	0	0	0	nil
38	Jadesh Patilgouda	52	M	18543	07/09/2013	12/09/2013	Acute Appendicitis	Appendicectomy	50 seconds	2	0	0	0	0	0	0	nil
39	Arathi Kulkarni	32	F	18457	08/09/2013	12/09/2013	Fibroid uterus	Laparoscopic Hysterectomy	54 seconds	4	2	1	1	0	0	0	WS
40	Somappa	56	M	16743	27/08/2013	02/09/2013	Left inguinal henia	Hernioplasty	44 seconds	3	1	0	0	0	0	0	nil
41	Ramkumar	39	M	16548	25/08/2013	30/08/2013	Right inguinal hernia	Hernioplasty	49 seconds	2	0	0	0	0	0	0	nil
42	Rakesh	30	M	17845	26/08/2013	30/08/2013	Acute appendicitis	Appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
43	Shankar	27	M	19432	29/08/2013	01/09/2013	Left inguinal hernia	Hernioplasty	1 min 19 seconds	2	0	0	0	0	0	0	nil
44	Somanath kumar	56	M	11245	26/04/2013	30/04/2013	Epigastric hernia	Hernioplasty	50 seconds	3	0	0	0	0	0	0	nil
45	Rudrappa	63	M	13424	06/05/2013	11/05/2013	Left inguinal hernia	Hernioplasty	54 seconds	2	0	0	0	0	0	0	nil
46	Rajmohan	26	M	12234	04/05/2013	12/05/2013	Left inguinal henia	Hernioplasty	44 seconds	3	0	0	0	0	0	0	nil
47	Rajshekar	30	M	14543	08/05/2013	13/05/2013	Right inguinal hernia	Hernioplasty	1 min 24 seconds	2	0	0	0	0	0	0	nil
48	Muniyanna	59	M	14435	07/05/2013	13/05/2013	Acute appendicitis	Appendicectomy	1 min 04 seconds	3	0	0	0	0	0	0	nil
49	Porappa	46	M	14324	08/05/2013	14/05/2013	Left inguinal hernia	Hernioplasty	1min 32 seconds	3	0	0	0	0	0	0	nil
50	Kashinath	60	M	11234	27/04/2013	30/04/2013	Right inguinal hernia	Hernioplasty	1 min 18 seconds	3	0	0	0	0	0	0	nil
51	Rohan Katti	18	M	10243	26/04/2013	30/04/2013	Acute appendicitis	Appendicectomy	50 seconds	2	0	0	0	0	0	0	nil
52	Duniyappa	34	M	11378	06/05/2013	11/05/2013	Acute Appendicitis	Appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
53	Ramprakash	29	M	10035	04/05/2013	12/05/2013	Right inguinal hernia	Hernioplasty	44 seconds	4	0	0	0	0	0	0	nil
54	Raju Patil	35	M	13045	08/05/2013	13/05/2013	Left inguinal hernia	Hernioplasty	49 seconds	2	0	0	0	0	0	0	nil
55	Ramappa	36	M	12238	07/05/2013	13/05/2013	Left inguinal henia	Hernioplasty	54 seconds	4	2	1	1	0	0	0	nil
56	Takaapa	28	M	14562	08/05/2013	14/05/2013	Right inguinal hernia	Hernioplasty	1 min 02 seconds	3	1	0	0	0	0	0	nil
57	Munirchandra	37	M	19654	07/08/2013	14/08/2013	Acute appendicitis	Appendicectomy	50 seconds	2	0	0	0	0	0	0	nil
58	Karippa	28	M	13256	08/05/2013	14/05/2013	Left inguinal hernia	Hernioplasty	54 seconds	3	0	0	0	0	0	0	nil
59	Raghavendra	54	M	10065	04/05/2013	12/05/2013	Right inguinal hernia	Hernioplasty	44 seconds	2	0	0	0	0	0	0	nil

60	Huchappa	23	M	10094	04/05/2013	12/05/2013	Acute appendicitis	Appendicectomy	52 seconds	3	0	0	0	0	0	0	nil
61	Rayabanna	26	M	11234	08/05/2013	14/05/2013	Acute Appendicitis	Appendicectomy	50 seconds	2	0	0	0	0	0	0	nil
62	Girish	30	M	19456	27/05/2013	03/06/2013	Right inguinal hernia	Hernioplasty	54 seconds	3	0	0	0	0	0	0	nil
63	Deepak	42	M	19432	26/05/2013	02/06/2013	Left inguinal henia	Hernioplasty	44 seconds	2	0	0	0	0	0	0	nil
64	Swati	42	F	13245	09/05/2013	15/05/2013	Dyfunctional uterine bleeding	Laparoscopic Hysterectomy	49 seconds	3	0	0	0	0	0	0	nil
65	Kallappa	21	M	21365	18/09/2013	23/09/2013	Left inguinal henia	Hernioplasty	54 seconds	3	0	0	0	0	0	0	nil
66	Yellappa sindgi	30	M	22319	19/09/2013	24/09/2013	Acute appendicitis	Appendicectomy	1 min 02 seconds	3	0	0	0	0	0	0	nil
67	Ramkumar solanki	27	M	20013	18/08/2013	23/08/2013	Left inguinal henia	Hernioplasty	50 seconds	2	0	0	0	0	0	0	nil
68	Rajeshwari	56	F	18567	07/08/2013	14/08/2013	Incisional Hernia	Hernioplasty	54 seconds	3	0	0	0	0	0	0	nil
69	Prajwal Patil	63	M	13478	08/05/2013	13/05/2013	Acute appendicitis	Appendicectomy	44 seconds	4	0	0	0	0	0	0	nil
70	Somanath Umadi	26	M	12765	06/05/2013	11/05/2013	Right inguinal hernia	Hernioplasty	52 seconds	2	0	0	0	0	0	0	nil
71	Suresh Ullagaddi	30	M	12753	06/05/2013	11/05/2013	Acute appendicitis	Appendicectomy	1min 32 seconds	3	1	0	0	0	0	0	nil
72	Awwakka	59	F	11897	05/05/2013	10/05/2013	Acute appendicitis	Laparoscopic Appendicectomy	1 min 18 seconds	2	0	0	0	0	0	0	nil
73	Rashmi Goni	46	F	21875	12/06/2013	17/06/2013	Acute appendicitis	Laparoscopic Appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
74	Prasanna Aralikatti	60	M	18762	24/05/2013	30/05/2013	Recurrent appendicitis	Appendicectomy	44 seconds	2	0	0	0	0	0	0	nil
75	Roshan Bhushannavar	18	M	19543	27/05/2013	03/06/2013	Acute appendicitis	Appendicectomy	49 seconds	3	0	0	0	0	0	0	nil
76	Ramappa Ukalimath	34	M	19342	27/05/2013	03/06/2013	Left inguinal henia	Hernioplasty	54 seconds	2	0	0	0	0	0	0	nil
77	Roopa Padashetti	29	F	18567	24/05/2013	29/05/2013	Acute appendicitis	Hernioplasty	1 min 02 seconds	3	0	0	0	0	0	0	nil
78	Lalsab Yenkunchi	35	M	18546	26/05/2013	30/05/2013	Acute appendicitis	Laparoscopic Appendicectomy	50 seconds	2	0	0	0	0	0	0	nil
79	Sunil Kumar	36	M	1956	13/01/2014	19/01/2014	Right inguinal hernia	Hernioplasty	54 seconds	3	0	0	0	0	0	0	nil
80	Ramappa Kuber	28	M	4887	20/01/2014	24/01/2014	Acute appendicitis	Appendicectomy	44 seconds	2	0	0	0	0	0	0	nil
81	Umesh Ronyal	37	M	6875	22/01/2014	26/01/2014	Left inguinal henia	Hernioplasty	52 seconds	3	0	0	0	0	0	0	nil
82	Rojappa	28	M	8675	24/01/2014	29/01/2014	Left inguinal henia	Hernioplasty	1min 32 seconds	2	0	0	0	0	0	0	nil
83	Amar	24	M	8676	24/01/2014	28/01/2014	Acute appendicitis	Laparoscopic Appendicectomy	1 min 18 seconds	3	0	0	0	0	0	0	nil
84	Rachappa	27	M	8678	24/01/2014	29/01/2014	Left inguinal henia	Hernioplasty	54 seconds	2	0	0	0	0	0	0	nil
85	Savitha Gennur	28	M	8854	26/01/2014	30/01/2014	Left inguinal hernia	Hernioplasty	1 min 02 seconds	3	0	0	0	0	0	0	nil
86	Kashappa	42	M	8543	25/01/2014	29/01/2014	Acute appendicitis	Laparoscopic Appendicectomy	50 seconds	3	0	0	0	0	0	0	nil
87	Siddappa	35	M	9016	04/02/2014	08/02/2014	Right inguinal hernia	Hernioplasty	54 seconds	3	0	0	0	0	0	0	nil
88	Siddanna Soukar	36	M	9143	05/02/2014	09/02/2014	Left inguinal henia	Hernioplasty	44 seconds	2	0	0	0	0	0	0	nil
89	Revati Hunnar	28	F	9167	05/02/2014	08/02/2014	Acute appendicitis	Appendicectomy	52 seconds	3	0	0	0	0	0	0	nil
90	Ramappa Shigor	37	M	9147	04/02/2014	09/02/2014	Left inguinal henia	Hernioplasty	1min 32 seconds	4	0	0	0	0	0	0	nil
91	Shankutula Kambar	24	F	9347	14/02/2014	18/02/2014	Right inguinal hernia	Hernioplasty	1 min 18 seconds	2	0	0	0	0	0	0	nil

92	Rajesh	28	M	10026	06/03/2014	12/03/2014	Acute appendicitis	Appendicectomy	1 min 29 seconds	1	0	0	0	0	0	0	nil
93	Rukamma	32	F	10074	07/03/2014	12/03/2014	Acute appendicitis	Appendicectomy	50 seconds	2	0	0	0	0	0	0	nil
94	Yeshaswini	24	F	11004	07/03/2014	14/03/2014	Acute appendicitis	Appendicectomy	54 seconds	4	2	1	1	0	0	0	nil
95	Rashmi Patil	26	F	11104	08/03/2014	14/03/2014	Left inguinal henia	Hernioplasty	44 seconds	3	1	0	0	0	0	0	nil
96	Kiran Raathod	30	M	11124	10/03/2014	13/03/2014	Left inguinal hernia	Hernioplasty	49 seconds	2	0	0	0	0	0	0	nil
97	Vikram Devannar	34	M	11130	11/03/2014	14/03/2014	Acute appendicitis	Appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
98	Rajkumar Kengi	32	M	11135	12/03/2014	17/03/2014	Right inguinal hernia	Hernioplasty	44 seconds	3	1	0	0	0	0	0	nil
99	Somappa	28	M	11154	14/03/2014	18/03/2014	Acute appendicitis	Appendicectomy	48 seconds	2	0	0	0	0	0	0	nil
100	Kumargouda	36	M	11164	16/03/2014	19/03/2014	Left inguinal hernia	Hernioplasty	54 seconds	3	0	0	0	0	0	0	nil
101	Savitha Sonnad	38	F	12486	26/03/2014	28/03/2014	Incisional Hernia	Hernioplasty	50 seconds	3	0	0	0	0	0	0	nil
102	Savitri Kulkarni	14	F	14643	14/04/2014	26/04/2014	Acute Appendicitis	Laparoscopic Appendicectomy	54 seconds	2	0	0	0	0	0	0	nil
103	Laxamavva	38	F	18754	04/05/2014	14/05/2014	Lipoma over ant. Abd wall	Excision	44 seconds	3	0	0	0	0	0	0	nil
104	Rakesh Karadi	42	M	21032	07/07/2014	14/07/2014	Left inguinal hernia	Laparoscopic Hernioplasty	52 seconds	2	0	0	0	0	0	0	nil
105	Ramappa Hugar	46	M	22013	14/07/2014	22/07/2014	Acute appendicitis	Laparoscopic Appendicectomy	50 seconds	3	0	0	0	0	0	0	nil
106	Somanath	23	M	24014	22/07/2014	27/07/2014	Reccurent Appendicitis	Appendicectomy	54 seconds	3	0	0	0	2	1	0	WS
107	Raju Munivar	22	M	25014	22/07/2014	25/07/2014	Appendicular Perforation	Appendicectomy	44 seconds	2	0	0	0	0	0	0	nil
108	Eshwar Rathod	34	M	25200	23/07/2014	27/07/2014	Epigastric hernia	Hernioplasty	49 seconds	3	0	0	0	0	0	0	nil
109	Sunil Patil	7	M	25345	23/07/2014	26/07/2014	Congenital inguinal hernia	Herniotomy	54 seconds	2	0	0	0	0	0	0	nil
110	Nikhil Gowda	16	M	25654	24/07/2014	27/07/2014	Haemangioma over ant abd wall	Excision	49 seconds	2	0	0	0	0	0	0	nil
111	Sharangouda	26	M	25900	24/07/2014	28/07/2014	Acute appendicitis	Appendicectomy	54 seconds	2	1	1	1	0	0	0	nil
112	Parashappa	24	M	25950	25/07/2014	29/07/2014	Left inguinal hernia	Laparoscopic Hernioplasty	1 min 02 seconds	3	2	1	0	0	0	0	nil
113	Laxmi Shirrati	28	F	26000	25/07/2014	31/07/2014	Acute Appendicitis	Laparoscopic Appendicectomy	50 seconds	1	0	0	0	0	0	0	nil
114	Roopa Kalyanshetti	32	F	26150	25/07/2014	31/07/2014	Reccurent Appendicitis	Appendicectomy	54 seconds	2	0	0	0	0	0	0	nil
115	Laxman Lohatti	24	M	26169	26/07/2014	01/08/2014	Reccurent Appendicitis	Appendicectomy	54 seconds	4	2	1	1	0	0	0	WS
116	Ganesh Sarda	26	M	26289	26/07/2014	02/08/2014	Lipoma over ant abd wall	Excision	44 seconds	3	1	0	0	0	0	0	nil
117	Ballawwa Kobutnnavar	30	F	26365	27/07/2014	03/08/2014	Incisional Hernia	Hernioplasty	48 seconds	2	0	0	0	0	0	0	nil
118	Savithri Sonnad	34	F	26588	27/07/2014	02/08/2014	Acute Appendicitis	Laparoscopic Appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
119	Pooja Jaganur	32	F	26699	28/07/2014	03/08/2014	Fibroid uterus	Laparoscopic Hysterectomy	50 seconds	2	0	0	0	0	0	0	nil
120	Kalavati Lathur	28	F	26820	28/07/2014	04/08/2014	Reccurent Appendicitis	Appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
121	Komal Jain	26	M	26960	30/07/2014	05/08/2014	Acute appendicitis	Appendicectomy	44 seconds	3	1	0	0	0	0	0	nil
122	Shivamma	16	F	27220	30/07/2014	04/08/2014	Acute Appendicitis	Laparoscopic Appendicectomy	52 seconds	2	0	0	0	0	0	0	nil
123	Jayalaxmi Musali	26	F	27350	31/07/2014	04/08/2014	Haemorrhagic ovarian cyst	Laparoscopic salphingoopherectomy	50 seconds	3	0	0	0	0	0	0	nil
124	Preeti Masali	24	F	27550	31/07/2014	04/08/2014	Acute Appendicitis	Laparoscopic Appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
125	Sharanawwa	28	F	27687	01/08/2014	06/08/2014	Acute Appendicitis	Laparoscopic Appendicectomy	44 seconds	2	0	0	0	0	0	0	nil
126	Darippa	32	M	27954	02/08/2014	06/08/2014	Acute appendicitis	Appendicectomy	49 seconds	6	2	1	0	0	0	0	nil
127	Ramnagouda	24	M	28063	02/08/2014	07/08/2014	Recurrent appendicitis	Laparoscopic Appendicectomy	54 seconds	2	0	0	0	0	0	0	nil
128	Deepa Kollur	26	F	28150	03/08/2014	07/08/2014	Acute Appendicitis	Laparoscopic Appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
129	Rakesh Honnar	30	M	28196	04/08/2014	08/08/2014	Left inguinal hernia	Hernioplasty	1 min 02 seconds	3	0	0	0	2	1	0	WS

130	Kumar Loki	34	M	28250	04/08/2014	09/08/2014	Left inguinal hernia	Laparoscopic Hernioplasty	50 seconds	2	0	0	0	0	0	0	nil
131	Sudeep Sonnad	24	M	28654	05/08/2014	09/08/2014	Recurrent appendicitis	Appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
132	Kamalesh Lasangi	26	M	28786	06/08/2014	12/08/2014	Left inguinal hernia	Laparoscopic Hernioplasty	44 seconds	2	0	0	0	0	0	0	nil
133	Rashigouda	30	M	28895	07/08/2014	10/08/2014	Reccurent Appendicitis	Appendicectomy	52 seconds	2	0	0	0	0	0	0	nil
134	Eshwarappa	34	M	28965	07/08/2014	11/08/2014	Umbilical hernia	Hernioplasty	1min 32 seconds	2	1	1	1	0	0	0	nil
135	Rajesham	32	M	29154	08/08/2014	14/08/2014	Epigastric hernia	Hernioplasty	1 min 18 seconds	3	2	1	0	0	0	0	nil
136	Vijay Kambhi	28	M	29265	09/08/2014	15/08/2014	Acute Appendicitis	Laparoscopic Appendicectomy	50 seconds	1	0	0	0	0	0	0	nil
137	Anil Hollepanavar	36	M	29354	09/08/2014	12/08/2014	Right inguinal hernia	Laparoscopic Hernioplasty	54 seconds	2	0	0	0	0	0	0	nil
138	Kenchappa	38	M	30654	10/08/2014	13/08/2014	Epigastric hernia	Hernioplasty	44 seconds	4	2	1	1	0	0	0	WS
139	Somanna	14	M	34234	27/12/2014	02/01/2015	Acute Appendicitis	Laparoscopic Appendicectomy	49 seconds	3	0	0	0	0	0	0	nil
140	Shekaraj Kumar	38	M	164	03/01/2015	08/01/2015	Left inguinal hernia	Hernioplasty	54 seconds	2	0	0	0	0	0	0	nil
141	Vineeth Holi	23	M	564	07/01/2015	12/01/2015	Recurrent appendicitis	Laparoscopic Appendicectomy	46 seconds	2	0	0	0	0	0	0	nil
142	Rayangouda	26	M	753	08/01/2015	14/01/2015	Left inguinal hernia	Laparoscopic Hernioplasty	54 seconds	2	1	1	1	0	0	0	nil
143	Ram Bijjargi	30	M	1053	11/01/2015	17/01/2015	Right inguinal hernia	Hernioplasty	56 seconds	3	2	1	0	0	0	0	nil
144	Rukmini	42	F	1264	12/01/2015	20/01/2015	Acute appendicitis	Appendicectomy	48 seconds	1	0	0	0	0	0	0	nil
145	Shwetha Kollur	42	F	1463	13/01/2015	20/01/2015	Fibroid uterus	Laparoscopic hysterectomy	50 seconds	2	0	0	0	0	0	0	nil
146	Tejaswi	21	F	1643	15/01/2015	21/01/2015	Acute Appendicitis	Laparoscopic Appendicectomy	54 seconds	3	1	0	0	0	0	0	nil
147	Umesh gouda	30	M	1743	16/01/2015	22/01/2015	Left inguinal hernia	Laparoscopic Hernioplasty	46 seconds	2	0	0	0	0	0	0	nil
148	Geeta Patil	27	F	1856	17/01/2015	23/01/2015	Right ovarian cyst	Salphingoopherectomy	43 seconds	3	0	0	0	0	0	0	nil
149	Chaitra Pujari	56	F	1924	20/01/2015	26/01/2015	Acute Appendicitis	Laparoscopic Appendicectomy	53 seconds	2	0	0	0	0	0	0	nil
150	Sachin Katti	63	M	1967	21/01/2015	26/01/2015	Left inguinal hernia	Hernioplasty	46 seconds	3	0	0	0	0	0	0	nil
151	Rakesh Sonnad	26	M	2071	23/01/2015	28/01/2015	Acute Appendicitis	Laparoscopic Appendicectomy	36 seconds	3	1	0	0	0	0	0	nil
152	Jagadish Kumar	30	M	2231	25/01/2015	31/01/2015	Recurrent appendicitis	Laparoscopic Appendicectomy	50 seconds	2	0	0	0	0	0	0	nil
153	Sulochana Ugar	59	F	2431	27/01/2015	02/02/2015	Incisional Hernia	Hernioplasty	54 seconds	3	0	0	0	0	0	0	nil
154	Ganesh Solakatti	46	M	2532	04/02/2015	09/02/2015	Bilateral inguinal hernia	Laparoscopic hernioplasty	44 seconds	3	1	0	0	0	0	0	nil
155	Mohan Katti	60	M	2614	07/02/2015	13/02/2015	Lipoma over ant abd wall	Excision	49 seconds	2	0	0	0	0	0	0	nil
156	Naveen Kalashetti	35	M	2746	09/02/2015	14/02/2015	Recurrent appendicitis	Appendicectomy	54 seconds	3	0	0	0	0	0	0	nil
157	Lokesh Kumar	42	M	2976	12/02/2015	19/02/2015	Bilateral inguinal hernia	Hernioplasty	43 seconds	2	0	0	0	0	0	0	nil
158	Sunitha Pujar	25	F	3106	13/02/2015	18/02/2015	Left ovarian cyst	Salphingoopherectomy	59 seconds	3	0	0	0	0	0	0	nil
159	Laxami Shettar	26	F	3174	14/02/2015	19/02/2015	Acute Appendicitis	Laparoscopic Appendicectomy	48 seconds	3	1	0	0	0	0	0	nil
160	Rekha Hossakatti	32	F	3206	16/02/2015	20/02/2015	Acute Appendicitis	Laparoscopic Appendicectomy	53 seconds	2	0	0	0	0	0	0	nil