“COMPARISON BETWEEN OCTYL-2-CYANOACRYLATE GLUE VERSUS 3-0 POLIGLECAPRONE 25 SUTURES FOR PORT SITE SKIN CLOSURE IN ASSESSING COSMETIC OUTCOME USING MODIFIED HOLLANDER COSMESIS SCALE IN ELECTIVE LAPAROSCOPIC CHOLE CYSTECTOMY AND LAPAROSCOPIC APPENDICECTOMY- A ONE YEAR HOSPITAL BASED RANDOMIZED CONTROLLED TRIAL”

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Endorsement

This is to certify that the dissertation entitled **"COMPARISON BETWEEN OCTYL-2-CYANOACRYLATE GLUE VERSUS 3-0 POLIGLECAPRONE 25 SUTURES FOR PORT SITE SKIN CLOSURE IN ASSESSING COSMETIC OUTCOME USING MODIFIED HOLLANDER COSMESIS SCALE IN ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY AND LAPAROSCOPIC APPENDICECTOMY- A ONE YEAR HOSPITAL BASED RANDOMIZED CONTROLLED TRIAL"** is a bonafide research work done by **REG NO: BH0119007**.

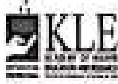
Dr. ABHIJIT S. GOGATE, MS
Professor and Head,
Department of General Surgery,
J. N. Medical College,
Belagavi

Date:
Place: Belagavi

Dr. N. S. Mahantshetti, MD
Principal,
J. N. Medical College,
Belagavi

Date:
Place: Belagavi

PLAGIARISM CERTIFICATE



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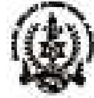

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Nehru Nagar, Belagavi- 590 010, Karnataka, INDIA

0831-2471350 0831-2470759 www.jnmc.edu principal@jnmc.edu

Ref No: MDC/PG/ Date: 16-11-2021

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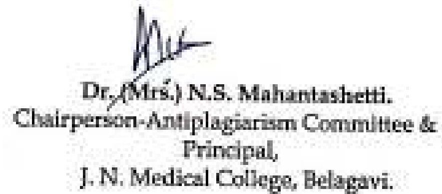

Dr. (Mrs.) N.S. Mahantashetti.
Chairperson-Antiplagiarism Committee &
Principal,
J. N. Medical College, Belagavi.

To,
Reg. No. BH0119007.
Postgraduate Student,
2019-20 Batch,
Department of General Surgery,
J. N. Medical College, Belagavi.

LIST OF ABBREVIATIONS

BMI	–	Body Mass Index
BP	–	Blood Pressure
HBsAg	–	Hepatitis B Surface Antigen
cm	–	centimetre
ECG	–	Electrocardiogram
EVD	–	External Ventricular Drain
H/O	–	History of
HIV	–	Human Immunodeficiency Virus
INR	–	International Normalized Ratio
JNMC	–	Jawaharlal Nehru Medical College
KAHER	–	KLE Academy of Higher Education and Research
KLES	–	Karnataka Lingayat Education Society
MIS	–	Minimally Invasive Surgery
mm	–	millimetre
MSS	–	The Manchester Scar Scale
POSAS	–	The Patient and Observer Scar Assessment Scale
PR	–	Pulse Rate
PT	–	Prothrombin Time
RR	–	Respiratory Rate
SBSES	–	The Stony Brook Scar Evaluation Scale
SNOSE	–	Sequentially Numbered Opaque Sealed Envelope
SSI	–	Surgical Site Infection
Temp.	–	Temperature
USA	–	United States of America
USG	–	Ultrasonography
VAS	–	Visual Analogue Score
VSS	–	The Vancouver Scale

ABSTRACT

"COMPARISON BETWEEN OCTYL-2-CYANOACRYLATE GLUE VERSUS 3-0 POLIGLECAPRONE 25 SUTURES FOR PORT SITE SKIN CLOSURE IN ASSESSING COSMETIC OUTCOME USING MODIFIED HOLLANDER COSMESIS SCALE IN ELECTIVE LAPAROSCOPIC CHOLE CYSTECTOMY AND LAPAROSCOPIC APPENDICECTOMY- A ONE YEAR HOSPITAL BASED RANDOMIZED CONTROLLED TRIAL"

INTRODUCTION: In a world of rapidly growing technology, the idea of minimally invasive surgery has been widely accepted among one and all. One of the major boons it offers to humanity is the fact that it is known as "scarless" or "keyhole" surgery, which over the years has become extremely popular, letting patients themselves feel the effect of an earlier healing process; thereby leading to a shorter hospital stay. The use of cyanoacrylates for closure has been magnanimously increasing nowadays, due to its ease of application and the fact that it is easily removable by the patient itself which thereby decreases a patient's hospital visit. As adhesives gained popularity, they began to be used in a vast group of surgical fields wherein they became the ideal choice for aesthetic skin closure.

AIMS AND OBJECTIVES: The objectives of the present study were to compare Octyl-2-cyanoacrylate with 3-0 Poliglecaprone 25 suture material for port site skin closure in elective Laparoscopic Appendectomy and Laparoscopic Cholecystectomy in terms of Cosmetic outcome, Post Operative Pain and Post Operative Infection

METHODOLOGY: This study was conducted at KLES Dr Prabhakar Kore Hospital and Medical Research Centre, Belagavi between January 2020 and December 2020. A total of sixty patients who were undergoing elective laparoscopic appendectomy or laparoscopic cholecystectomy underwent skin closure of 5mm port sites, wherein

thirty patients underwent closure with Octyl-2-cyanoacrylate adhesive and thirty patients underwent closure with 3-0 Poliglecaprone 25 in a subcuticular manner.

RESULTS: The results were similar in terms of gender and demographic distribution. Patients in the adhesive group wherein closure was done with Octyl-2-cyanoacrylate experienced a better cosmetic outcome on day seven, thirty and ninety; lesser post-operative pain at 12 hours, 24 hours and 48 hours and a higher degree of wound healing in comparison with the Patients wherein closure of 5mm port sites were done with subcuticular 3-0 Poliglecaprone 25 sutures. There was a statistical significance with a better outcome obtained among the two groups in terms of all three factors, cosmetic outcome, post-operative pain and wound healing.

CONCLUSION: All in all, the concluding factor in this study, therefore, suggests that the use of Octyl-2-cyanoacrylate has proved beneficial in comparison to using subcuticular monofilament Poliglecaprone 25 for port site skin closure in terms of an overall better aesthetic outcome, with a shorter degree of post-operative pain and moreover, a greater level of wound healing.

KEYWORDS:

Laparoscopic appendicectomy, laparoscopic cholecystectomy, port site skin closure, Octyl-2-cyanoacrylate, adhesives, Poliglecaprone 25, cosmesis, pain, wound healing.

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INTRODUCTION

In a world of rapidly growing technology, the idea of minimally invasive surgery has been widely accepted among one and all. One of the major boons it offers to humanity is the fact that it is known as "scarless" or "keyhole" surgery, which over the years has become extremely popular, letting patients themselves feel the effect of an earlier healing process; thereby leading to a shorter hospital stay.

As a surgeon in the 21st century, patient satisfaction is of prime importance, which is more so in the era of evidence based surgery. Therefore, it is imperative that a surgeon not only focuses on performance of a good surgery but also on the aesthetic outcome of the surgical scars over the skin. As a result, more and more surgeons began devising newer techniques to give an aesthetic skin closure, be it open or minimally invasive surgeries. The outcomes of each have been studied extensively worldwide. Some of these techniques have now been accepted as standard techniques for closure in major health institutes.

A General Surgeon performs the basic minimally invasive procedures of laparoscopic appendectomy and laparoscopic cholecystectomy worldwide on a daily basis, most of which end up having skin closure done with the help of suture materials, may it be absorbable or non-absorbable. However, in today's day and age, the outlook on doing the same has changed, wherein patients are well informed regarding the aesthetic outcome of each surgery and therefore, newer techniques have been devised which are both time as well as cost efficient. Various techniques of wound closure at the port site that are now being used include the use of sterile surgical tapes, lazers or the use of tissue adhesives like cyanoacrylate.

The use of cyanoacrylates for closure has been magnanimously increasing nowadays, due to its ease of application and the fact that it is easily removable by the

patient itself which thereby decreases a patients hospital visit. The first known use of these adhesives was done in the year 1959, but due to its short chain compounds being used, it ended up causing tissue toxicity and was abandoned for the next few years, until long chain monomeric compounds were devised, later known as butyl and octyl cyanoacrylates; which eventually became patient friendly.

As adhesives gained popularity, they began to be used in all fields of surgical intervention, wherein they were used for closure of lacerations of the face or extremities, in opthalmologic procedures as well as now being widely used in the department of interventional radiology for embolization of vascular bleeds. It also also gained popularity in the fields of endodontics and peridontics aside from oral and maxillary surgeries.

With all these considerations in mind, we formulated a study to compare the use of the tissue adhesive Octyl-2-cyanoacrylate to insertion of subcuticular monofilament sutures for port site skin closure for the two most common minimally invasive surgical procedures which is laparoscopic cholecystectomy and laparoscopic appendectomy.

OBJECTIVE

The objectives of the present study were to compare Octyl-2-cyanoacrylate with 3-0 Poliglecaprone 25 suture material for port site skin closure in elective Laparoscopic Appendectomy and Laparoscopic Cholecystectomy in terms of

1. Cosmetic outcome

2. Post Operative Pain

3. Post Operative Infection

REVIEW OF LITERATURE

Wound healing is described as a process wherein the body makes an attempt to rejuvenate its injured or wounded part.[1]

The human skin contains an epidermis and a dermis which remain in a constant state of equilibrium thereby creating a protective layer towards the external surface. If the protective sheath is breached, the procedure of wound healing therefore gets initiated.

Repair of wounds and Regeneration

There is a fine line between the two terms ‘repair’ and the term ‘regeneration’. the concept of injury signifies a breach in the morphology as well as in the functionality of any tissue. The term repair indicates an adaptation in terms of physiology of an organ after an injury therefore, trying to re-establish a proper continuity without forming an actual exact replacement. The term “regeneration” suggests a replacement of any tissue that is damaged or lost with an “exact” copy of it, therefore restoring its functionality and morphology. However, mammals are not capable of doing so. [2]

If a tissue is injured, the parts involved play a role in the mechanism and healing of the same. The classification of wounds is made into tidy and untidy wounds. The aim of a surgeon is to convert an untidy wound into a tidy one by eliminating any contamination as well as discarding the devitalised tissue. The process of primary repair can only occur in a tidy wound. [1]

Factors influencing healing of a wound

- Site of the wound
- Structures involved
- Mechanism of wounding
  - Incision
  - Crush
  - Crush avulsion
- Contamination (foreign bodies/bacteria)*
- Loss of tissue
- Other local factors
  - Vascular insufficiency (arterial or venous)
  - Previous radiation
  - Pressure
- Systemic factors
  - Malnutrition or vitamin and mineral deficiencies
  - Disease (e.g. diabetes mellitus)
  - Medications (e.g. steroids)
  - Immune deficiencies (e.g. chemotherapy, acquired immunodeficiency syndrome [AIDS])
  - Smoking

* In explosions, the contamination may consist of tissue such as bone from another

Table 1 : Factors Affecting Wound Healing [1]

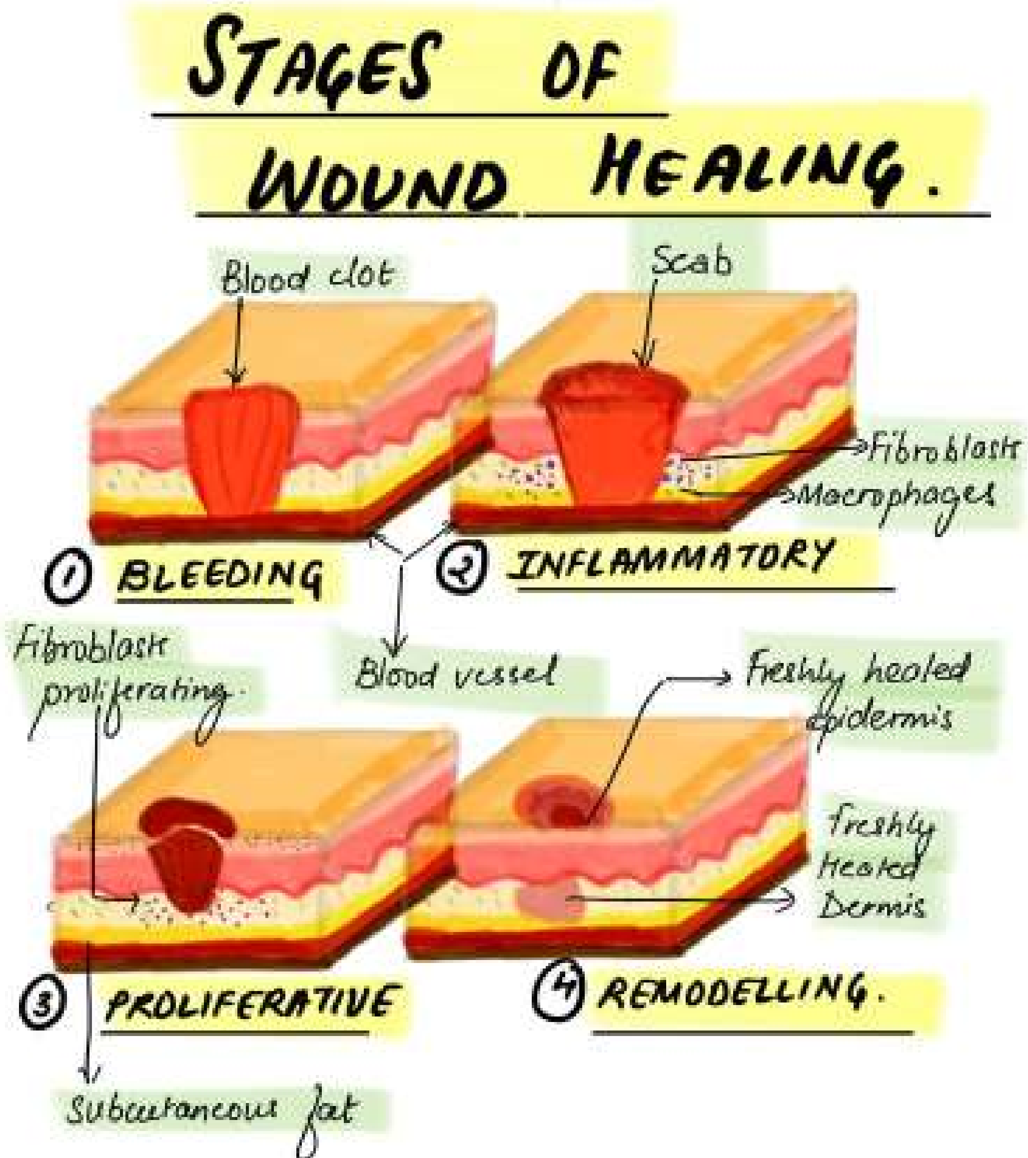
The Wound Healing Process

There is a certain type of physiological process that takes place in terms of wound healing which in further evaluated in three phases [3]

- The Inflammatory Phase

- The Fibroplastic / Proliferative Phase

- The Remodelling / Maturation Phase



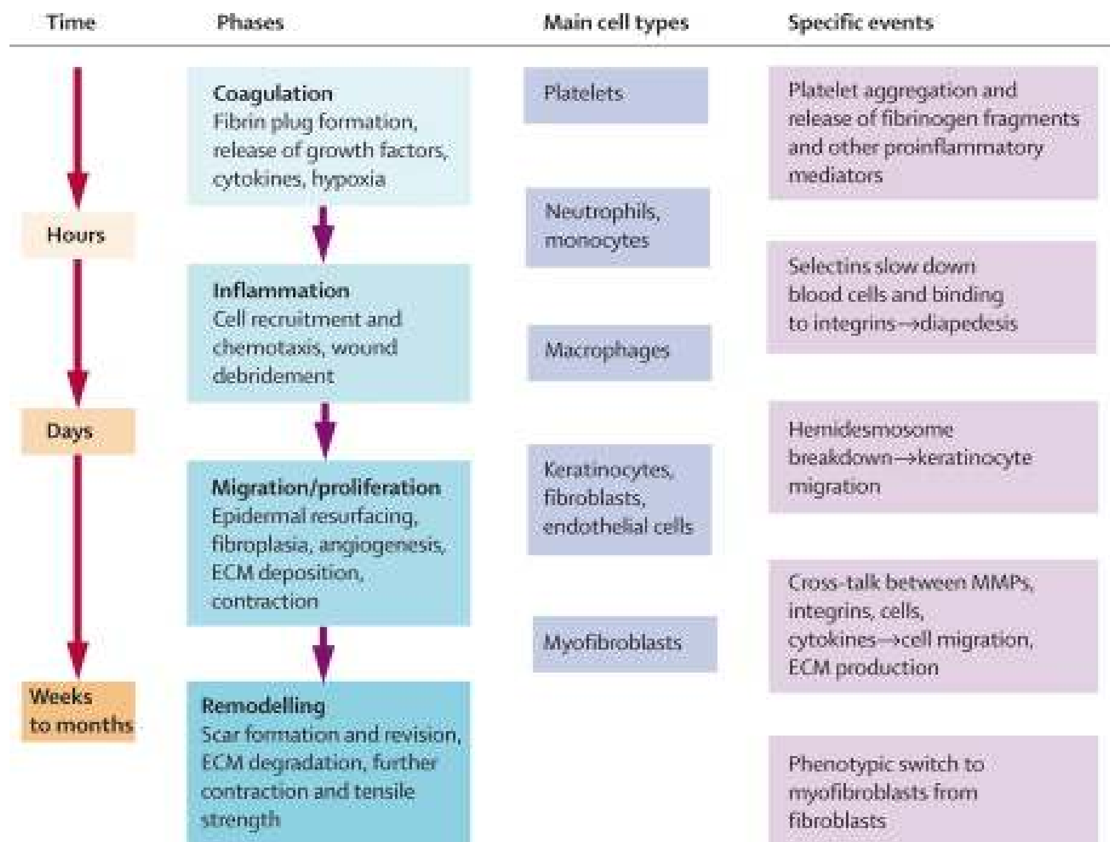
Figures 1: Stages of Wound Healing

A) The Inflammatory Phase

Upon injury to any part of the skin, there are a set of biochemical reactions that are orchesterated in order to perform the process of repair. Post injury, within a few minutes the entity of platelet aggregation begins to set in motion to form a clot made up of fibrin, which in turn is responsible for haemostasis. [4] This phase begins

as soon as the injury occurs and lasts for around 2-3 days. The platelets attach themselves to the vessel endothelial lining which is damaged, thereby causing the release of adenosine diphosphate (ADP) ; therefore causing aggregation of thrombocytes creating a plugging effect and when there is no further bleeding, cytokines get released. This further causes attraction of polymorphonuclear lymphocytes as well as macrophages; the injured tissue then releases vasoactive amines which include histamine, prostaglandins as well as serotonins thereby increasing the permeability and allowing the inflammatory cells to enter. The devitalized tissue is then eliminated by the macrophages. All in all, the main framework that is provided for structural support is done by fibrinogen which secretes fibrin. [1]

Celsus ; in the first century AD, described this phase with rubor, tumor, calor, dolor and functio laesa which stands for redness, swelling, heat, pain and loss of function. [5]



Time	Phases	Main cell types	Specific events
Hours	**Coagulation** Fibrin plug formation, release of growth factors, cytokines, hypoxia	Platelets	Platelet aggregation and release of fibrinogen fragments and other proinflammatory mediators
Days	**Inflammation** Cell recruitment and chemotaxis, wound debridement	Neutrophils, monocytes; Macrophages	Selectins slow down blood cells and binding to integrins→diapedesis
Weeks to months	**Migration/proliferation** Epidermal resurfacing, fibroplasia, angiogenesis, ECM deposition, contraction	Keratinocytes, fibroblasts, endothelial cells	Hemidesmosome breakdown→keratinocyte migration; Cross-talk between MMPs, integrins, cells, cytokines→cell migration, ECM production
	Remodelling Scar formation and revision, ECM degradation, further contraction and tensile strength	Myofibroblasts	Phenotypic switch to myofibroblasts from fibroblasts

Table 2: Phases of Wound Healing

B) Fibroplastic / Proliferative Phase

This is initiated by formation of new blood vessels, that is, angiogenesis along with the deposition of collagen, granulation tissue; with the formation of epithelialization followed by wound contraction. [6] The new blood vessels formed are made up of vascular endothelial cells; a process known as angiogenesis. [7] Fibroplasia is where granulation tissue is formed and the fibroblasts grow to produce a provisional extracellular matrix [ECM] which then releases collagen as well as fibronectin [6] this is then followed by re-epithelialization. When wound contraction occurs, the myofibroblasts begin to grow from the edge towards the centre and contract themselves; following this the excess cells undergo the process of apoptosis. This phase lasts from day three of the injury upto the third week. In the early phase,

the wound tissue is called granulation tissue; whereas in the latter phase it gains tensile strength and contains type III collagen. [1]

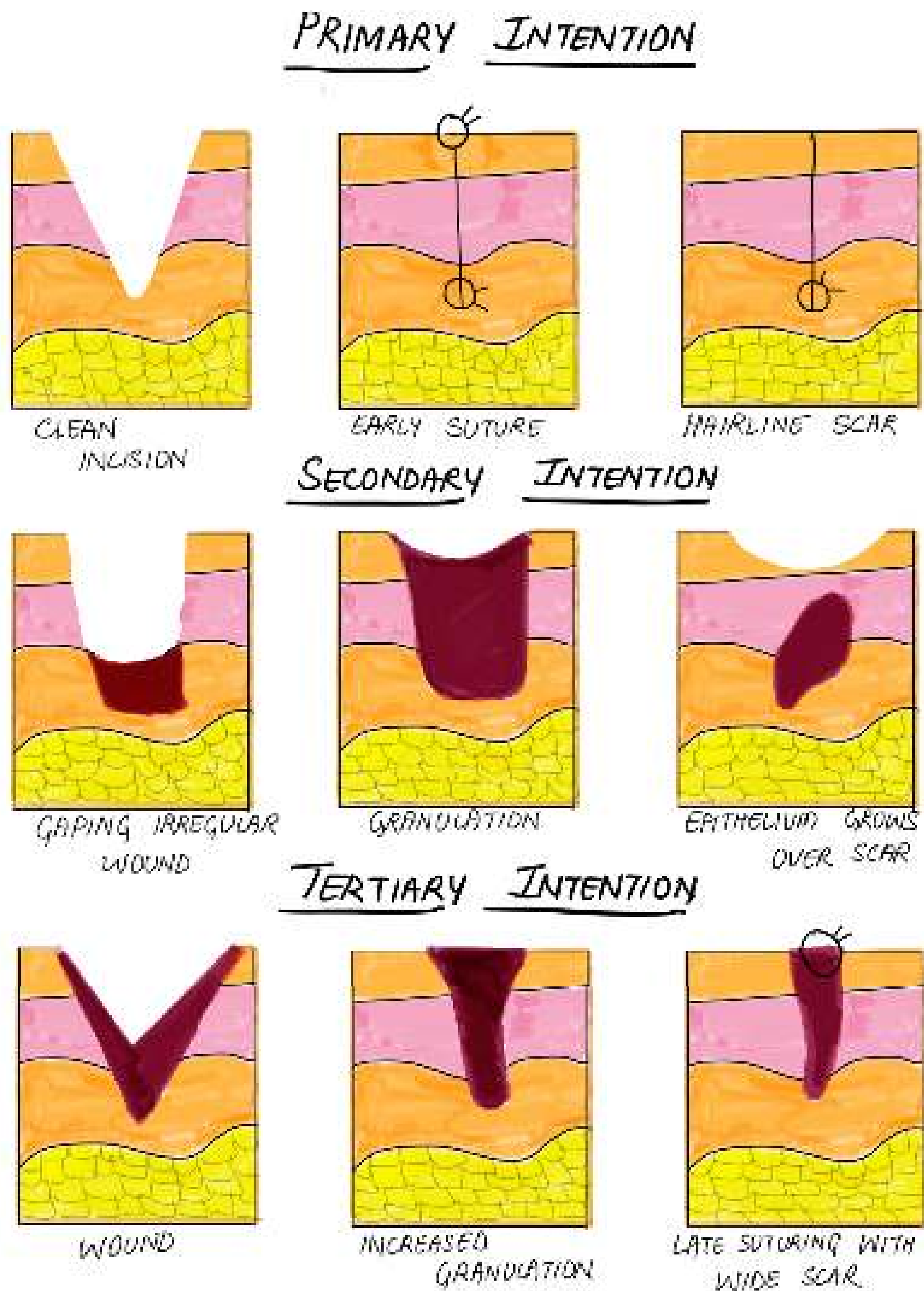
C) Maturation / Remodelling Phase

It consists of collagen maturation ; that is, type III is replaced by type I in a ratio of 4:1. the collagen fibres reallign along the tension lines and reduce the vascularity of the wound therefore amplifying wound contraction. [1] Although, this being a complex process, the fragility or susceptibility of the same to failure is also high. Secondary factors may contribute to the process of wound healing like the presence of comorbidities in patients. [8] In case there is a breach in the process, the level of healing may deviate and lead to formation of chronic wounds such as a hypertrophic scar or keloid. [6]

Local	*Systemic*
Necrotic tissue burden	Diabetes mellitus
High bacteria burden or biofilm	Anaemia
Excessive exudates	Malnutrition
High levels of metalloproteinases	Immunodeficiency
Growth factors trapping or deficiency	Immunosuppressive medications
Corrupt extracellular matrix	Age
Cellular senescense	Obesity
Tissue hypoxia	Smoking
Repeated trauma	
History of irradiation	

Table 3: Local And Systemic Factors Responsible for Wound Healing

WOUND HEALING GRADES



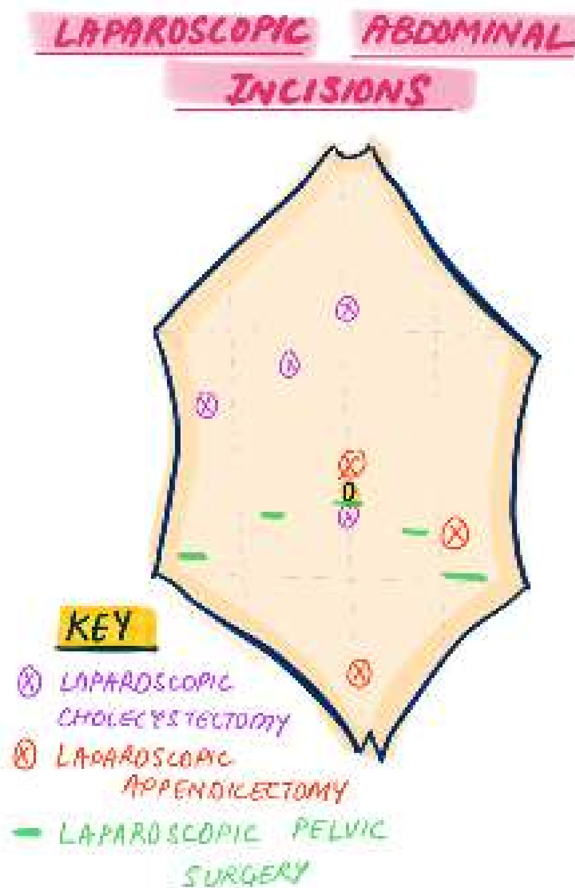
Figures 2: Healing Of Wounds by Primary, Secondary and Tertiary Intention

Classification of wound closure and healing

- Primary intention
  - Wound edges opposed
  - Normal healing
  - Minimal scar
- Secondary intention
  - Wound left open
  - Heals by granulation, contraction and epithelialisation
  - Increased inflammation and proliferation
  - Poor scar
- Tertiary intention (also called delayed primary intention)
  - Wound initially left open
  - Edges later opposed when healing conditions favourable

Table 4: Classification of Wound Healing and Closure [1]

ABDOMINAL INCISIONS AND THEIR WOUND HEALING



Figures 3: Laparoscopic Abdominal Incisions

Cutaneous Healing

As was stated in the types of wound healing, a clean and incised wound mainly heals by primary intention or first intention. Therefore, simple cutaneous incisions taken over the abdomen also heal by the same. However, large wounds over the abdomen may take a longer time to heal and may undergo the healing process by secondary intention, which may therefore lead to formation of scarring. There are a variety of mechanisms that trigger the chemical release of signals which inflect the orderly pattern of healing. The extracellular matrix [ECM] proteins, thus synthesized will play a major role in the response of the cells to the same. [5]

Complications of Cutaneous Wounds

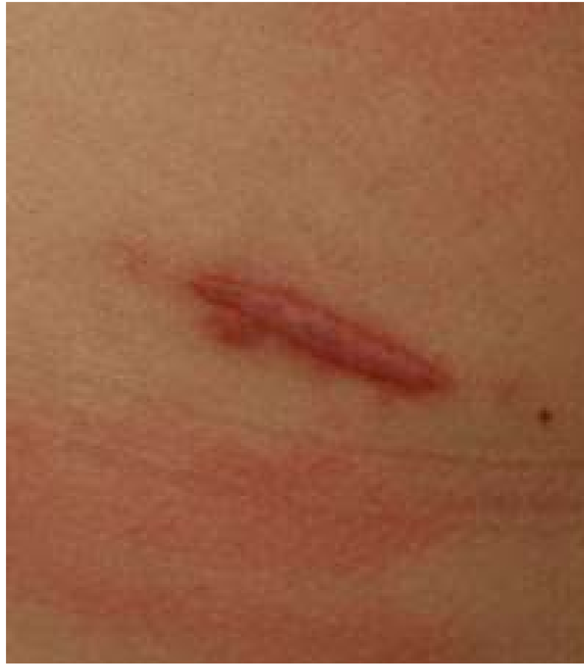
Complications are in terms of any abnormalities that may occur during the process of repair, which may lead to scar formation; further when classified can be divided into deficient, excessive and contracture of scars.[5]

A) Deficient Formation of Scar

A pale, stretched out and flat type of scar which commonly appears on tension areas is known as an atrophic scar. This type of scar can be easily traumatized because the epidermis as well as the dermis are thin. The solution to treat the same is to excise the edges and resuture it. If there is a lack of granulation tissue it may lead to dehiscence or even ulceration of the scar. Areas which lack sensations may lead to formation of non healing wounds. [5]

B) Hypertrophic Scar

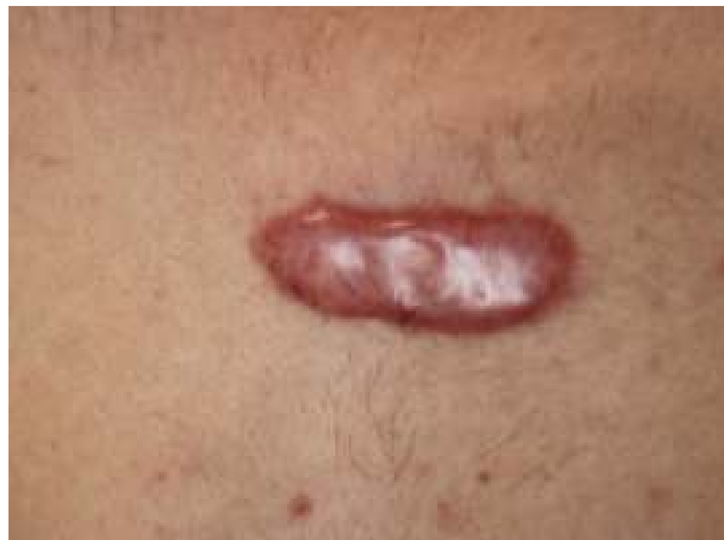
Formation of excessive scar tissue that does not extend beyond the edges of the primary wound is known as a hypertrophic scar. [1] in such cases, there is excessive production of collagen leading to formation of a raised scar. [5]



Figures 4 : Laparoscopic Hypertropic Scar

C) Keloid

Once the scar tissue multiplies and extends beyond the margins of the incision, does not reduce in size, then it is known as a keloid ; more commonly seen in the African race, although the mechanism is still a mystery. [5] A keloid does not regress over time whereas a hypertrophic scar might.



Figures 5 : Laparoscopic Keloid Scar

TABLE 1. Clinical Features of Hypertrophic Scars and Keloids	
Hypertrophic Scars	*Keloids*
Develop soon after surgery	May develop months after the trauma
Usually improve with time	Rarely improve with time
Remain within the confines of the wound	Spread outside the boundaries of the initial lesion
Occur when scars cross joints or skin creases at a right angle	Occur predominantly on the ear lobe, shoulders, sternal notch, rarely develop across joints
Improve with appropriate surgery	Are often worsened by surgery
Are of frequent incidence	Are of rare incidence
Have no association with skin color	Are associated with dark skin color

Table 5: Differences between Hypertrophic and Keloid Scars

D) Desmoids

These are rare entities, may occur due to exuberant multiplication of connective tissue and fibroblasts after an incision is taken or post trauma. Such entities are known as desmoids or aggressive fibromatosis. They lie midway between a low grade malignant tumor and benign proliferation. [5]

E) Exuberant Granulation

Excessive proliferation of granulation tissue above the level of the skin which prevents the process of re-epithelialization. [5] It can be treated by electrocoagulation or surgical excision.

F) Wound Contracture

Every wound undergoes contraction during the process of wound healing. An exaggeration of the same may be known as a wound contracture; not commonly seen

in minimally invasive procedures of the abdomen but however, may lead to deformities at other sites like palms or the anterior part of the thorax. [1]

Scar Development and Maturation

A mature scar develops from an immature one over a year or more. In the beginning, an immature scar is pink, hard to touch with raised edges and often itchy. Collagen fibres which are newly formed, begin to align along the tension lines ; them being the strongest along their weaves. On maturation, the density of the fibres increases till the entire scar becomes close to acellular with minimal blood supply. [1] externally, it becomes pale and slowly becomes soft with eventual loss of itchiness. While most of the activity of maturation occurs over the first three months, the completion of the process takes about two years. Although tensile, the strength is equivalent to only about sixty percent of that of the skin.: [1]

How to Avoid Scarring?

Managing the acute wound

- Cleansing
- Exploration and diagnosis
- Debridement
- Repair of structures
- Replacement of lost tissues where indicated
- Skin cover if required
- Skin closure without tension
- All of the above with careful tissue handling and meticulous technique

Table 6 : Management of an Acute Wound [1]

It should always be noted that a patient must be informed of scar formation prior to any surgery. Scar placement must be done along the normal landmarks of the

skin or Langhan's lines in order to reduce or minimize its cosmetic outcome, failure in doing so may lead to mismatched or misaligned scars. [1]

The cosmetic outlook may be minimized with the use of monofilament suture material as they are removed earlier; that is within five days. Closure done under tension may lead to scarring, therefore adhesives or tapes may be used to strengthen the same. Use of subcuticular sutures helps to abstain from scars along the side of the wound. [1]

In ancient history, the techniques used for healing of wounds began from the East African tribes; who used "acacia thorns" whereas the South American tribes used animals like "black ants" for the same. Another fascinating part involves the use mandibles of ants to approximate the edges of wounds for it to heal. In order to do this, the body would be severed from the head and discarded while the mandible remained as a ligature. The Egyptians showed incredible mastery in wound healing techniques as well involving the use of honey (antibacterial properties as well as the use of grease to create a barrier for wound closure. [9]

If the edges of a wound are approximated properly, healing takes place by first intention. The only external appearance visible to the patient is the skin incision, therefore it is very important for any surgeon that a surgical wound heals by first intention with no post operative complications. The incision is ideal if it heals in minimum amount of time with minimal scarring and proper approximation of wound edges. Therefore, while performing the activity of wound closure, the two severed ends of the wound must be approximated until the entire process of wound healing is complete. It should be done such that the wound may be able to withstand stress with no additional mechanical support. Such may be done so with the help of staples, sutures, clips, tapes or tissue adhesives. In toto, wound closure must be cost efficient,

less time consuming with easier duplicability and give an optimal cosmetic result. All in all, the main goal of closure of skin incisions is a rapid performance time leading to an aesthetically pleasing scar. [10]

SUTURES

In 3500 BC, the first description of using suture material was recorded by the Egyptian civilization. [11] They happened to use materials like plants, tendons of animals, fibres of vegetables or even horse hair as sutures. Philip Syng Physick; wrote a study in 1806 wherein he formulated an absorbable yet sturdy suture material made purely from the skin of a buck. [12] in 1869, Lister devised the sterile sutures like silk dipped in carbolic acid), later he construed chromic catgut..[13]

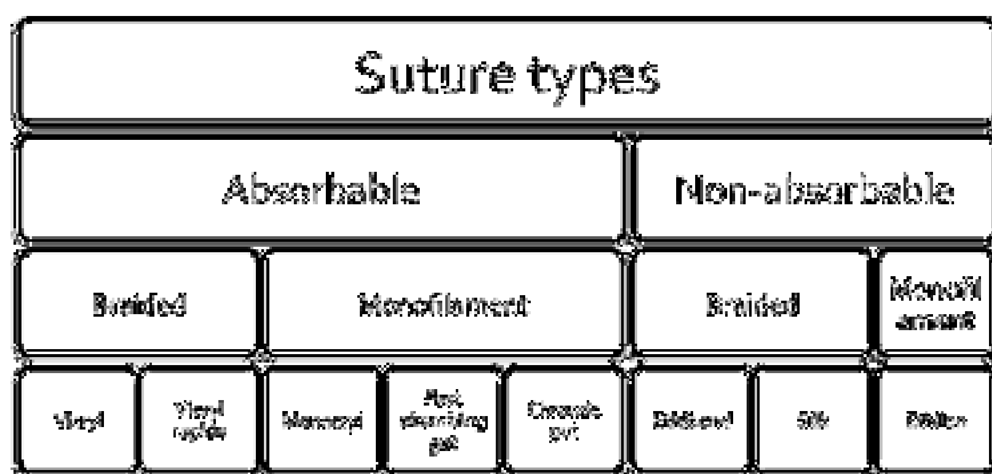
Figures 6 : Ancient Sutures used in Surgery

In terms of skin closure, it is said that the suture material must not induce any foreign body reaction, it should contain a fine caliber with a smooth surface; the material strong with an easy way to handle it. The suture material must contain a secure knotting characteristic which causes minimal injury upon insertion. [14] The

tensile strength of the suture material, the amount of infection it can cause as well as its tissue holding power and the technique of inserting the suture will help decide the type to be chosen for wound closure. While non absorbable ones are commonly used in percutaneous closure, absorbable ones may also be chosen as per the surgeons liking.[14]

Furthermore, they can be classified as monofilament and braided sutures; among which braided ones tend to cause a higher rate of infection. Therefore,with that in mind, braided sutures are commonly not used for closure of contaminated wounds as they tend to cause infection; and that is why it is more advisable to use non braided sutures. [15] The ease of use with monofilament sutures is their gliding nature and the fact that there is minimal inflammatory response of the skin. [14]

Most surgeons have a larger preferance to absorbable sutures and they need not remove the sutures; it therefore being more time efficient and patient friendly; whereas non absorbable ones require timely removal which furthers indents towards more hospital visits and is time consuming [14]



Figures 7 : Classification of Suture Materials

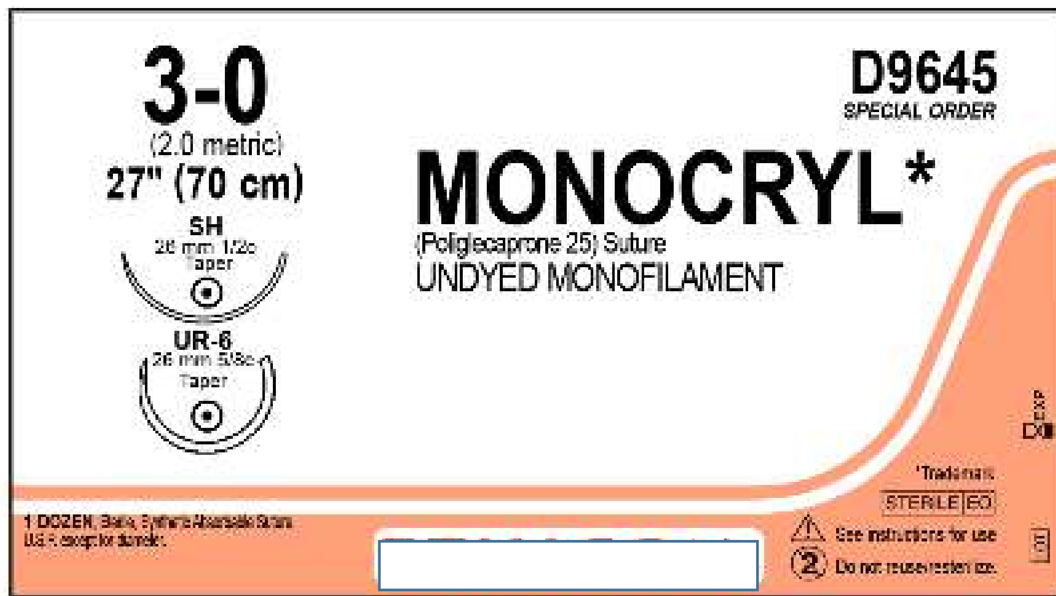
Using suture materials has been more frequent than any other material in all surgeries, however; the amount of literature available wherein comparisons have been done to review a particular suture material's quality and social attributes is minimal. With advancing technology and a thirst for greater knowledge the human race has now come up with multiple ways of managing acute wound closures such as the use of staples and adhesives; in terms of a greater quality of outcome along with the reduction of time that is normally taken in closure.

Types of Sutures

Vicryl Rapide (Ethicon)	Polyglactin 910	Synthetic	Absorbable	Multifilament	50% at 5 days 0% at 10–14 days	42 days
Monocryl (undyed) (Ethicon)	Poliglecaprone 25	Synthetic	Absorbable	Monofilament	50–60% at 7 days 0–30% at 14 days	91–119 days
Mo[illegible]yed) [illegible]icon)	Poliglecaprone 25	Synthetic	Absorbable	Monofilament	60–70% at 7 days 30–40% at 14 days	91–119 days
Vicryl (Ethicon)	Polyglactin 910	Synthetic	Absorbable	Multifilament	75% at 14 days 50% at 21 days 25% at 28 days	56–70 days
P[illegible]icon)	Polydioxanone	Synthetic	Absorbable	Monofilament	70% at 14 days 50% at 28 days 25% at 42 days	180–210 days
[illegible]hicon)	Silk	Natural	Non-absorbable	Multifilament	1 year	N/A
[illegible]icon)	316L Stainless Steel	Natural	Non-absorbable	Monofilament	Indefinite	N/A
E[illegible]hicon)	Nylon 6	Synthetic	Non-absorbable	Monofilament	20% loss per year	N/A
N[illegible]hicon)	Nylon 6	Synthetic	Non-absorbable	Multifilament	20% loss per year	N/A
Mer[illegible]icon)	Polyester/ Dacron	Synthetic	Non-absorbable	Multifilament	Indefinite	N/A
[illegible]ibond Excel (Ethicon)	Polyester/ Dacron	Synthetic	Non-absorbable	Multifilament	Indefinite	N/A
Prolene (Ethicon)	Polypropylene	Synthetic	Non-absorbable	Monofilament	Indefinite	N/A

Table 7: The Types of Available Suture Materials

Poliglecaprone



Figures 8 - Absorbable Poliglecaprone 25 material

Poliglecaprone-25 is a segmented copolymer of E-caprolactone and glycolide that is very malleable monofilament suture material. Its compatibility contributes to its great handling qualities. After two weeks, the tensile strength comes down by 30%, which then hydrolysis altogether in 90 days; while demonstrating minimal tissue reactivity, which is characterised by other substances like macrophages, giant cells, plasma cells, and fibroblasts. Having has a higher tensile strength than polyglactin 910; it is less reactive. Microbial adhesion to it was shown to be much lower than other suture materials in a recent investigation involving human patients having dentoalveolar surgery. Monocryl Plus is a triclosan-coated variant of Monocryl

Staples

Multiple devices have been used for application of staples for many years to close surgical wounds and incisions. [16] The first person to invent this device was one who was known to be a brilliant designer of surgical instruments, named Victor Fischer. [17] However, they are commonly used over the extremities and scalp. [18]

The components of staples include an inert 31GL stainless steel. The staples are made in a rectangular shape which causes minimal trauma to the tissues and aids in easy removal. However; the advantages also include time efficiency and lesser infection rates as it is cumbersome for the bacteria to migrate through the wound. It also prevents the capillaries from being damaged in the subcuticular region. [19] Staples tend to prevent eversion of the wound edges with minimal scarring and lesser of a foreign body reaction. [16]

A study conducted in the United Kingdom found that the mean rate of closure on a comparison between sutures and staples was 4.2 cm per minute and 22.5 cm per minute respectively. [21] It also stated that in case of an infection, there was no requirement for staple removal to drain the same. Another study showed that; on a comparison note, there was more post operative pain with staples. [22] Along with this, the use of staples prevents needle stick injury, which is of great importance in case of patients with unknown medical histories. [20]

All in all, the disadvantage on a comparison with suture material is that they tend to cause more post operative pain and are on the higher side in terms of cost. [22] ; whilst requiring another device for removal of the same.

Adhesive Tapes

One of the pioneers to evaluate skin closure without the use of sutures was Gillman. [23] Surgical adhesives comprise of iso-octo-acrylate and n-vinyl-pyrolidone.[24] The idealistic qualities that it must contain are that it should be non allergic without causing any irritation; with it being strictly adherant to the skin. Commonly, they are applied post removal of staples or any suture material. [25] During application, the skin must be dry with the edges approximated appropriately

resulting in strict haemostasis with minimal tension; in order to prevent any blister formation.

Using adhesives causes a suture less closure of skin, thereby preventing tension along the skin lines, more cost effective and time efficient. Studies show that, on a comparative note between sutures and tapes, at the end of a 10 day period adhesives had an equal or higher tensile strength. [26] Along with this, it prevents the formation of a "rail roading scar" [23] Marples et al.; did a study to show that tapes are resistant to infection. [27]

However, the bane is that adhesives can lose their strength with time, therefore leading to a dehiscent wound; along with difficult apposition of skin edges and eversion. [25] A study done by Gibson et al.; showed difficulty in apposition of skin edges. [28]

Tissue Adhesives [CYANOACRYLATES]

Figures 9 - Octyl-2-cyanoacrylate Tissue Adhesive

First manufactured by Ardis in 1949; however their adhesive functions were later uncovered by Coove A et al; who first tested it out clinically.[29] It is an acrylic resin which undergoes the process of polymerization on contact with water via

hydroxide ions leading to the formation of strong, long chains which cause the skin surfaces to bond together. In the presence of moisture, the glue beings to set due to the normal levels of air humidity; therefore leading to the formation of a thin skin which begins to form within seconds of contact. The neutralization reaction occurs with the help of a stabilizer, which is partially ionized water molecules over the surface; therefore causing molecular polymerization. [30]

These substances are synthetic versions of tissue adhesives; those which have been used clinically from the 1960s for wound closure. The strength of these compounds and their ability to bind to each other in presence of a wet environment was an attraction for the medical community. The earlier generation consisted of short chain carbon atoms which ended up causing a faster level of degradation, therefore forming toxic products with higher levels of carcinogenicity. After this, newer versions of these compounds became available like ethyl, methyl followed by butyl and octyl cyanoacrylates. The best tolerated from among all these has been Octyl-2-cyanoacrylate as it causes lesser tissue reactivity with a higher tensile strength. The Long chain compounds comprise of plasticizers thereby forming a flexible bond. The strength of breakage is three times more than that of butyl cyanoacrylate; whereas it is five times that of monofilament suture materials. [31]

Therefore, cyanoacrylates can be used on longer incisions as it has a stronger and more flexible bond; as it contains eight long chain carbon atoms and is therefore less toxic. All of these and more therefore lead to a more aesthetically pleasing scar with lower chances of infection.

Exothermic polymerization of 2-octylcyanoacrylate glue results in the release of a tiny amount of heat. Heat is delivered gradually and the patient's sensations to pain is minimised with the right method of putting adhesive gradually for three layers

over a wound which is completely dry; thereby allowing the process of polymerization to occur with each application. The patient may feel hot or uncomfortable if the glue is placed in such a way that huge droplets of liquid stay unspread. Extra attention must be exercised to avoid putting the glue within the wound; the adhesive should not fall into the wound because as it may polymerize almost immediately.

A Study was conducted by Aleo JJ et al.; who tried to find out the histotoxicity of cyanoacrylates by studying the tissue fluid loss in vitro; wherein he discovered that there was no significant change in outcome in terms of fluid removal among all the available varieties. [32]

Octyl-2-cyanoacrylate is a tissue adhesive which has been approved by the United States of America Food and Drug Administration for the use of skin closure.[33] Previously, the FDA had given approval of the same for it to be used as a barrier effect for microbial infection like staphylococci, pseudomonas as well as E.coli.

Multiple studies have proved the same regarding these tissue adhesives in prevention of infection. M Bookland et al.; demonstrated that a single application of these to drain wounds for EVD (External Ventricular Drain) and other exit sites suggested a higher level of protective effect from ventriculitis; as it provides a barrier for the entrance of gram positive skin flora. [34]

In 1971, Jandinski et al.; demonstrated an in vitro study comparing iso-butyl cyanoacrylate effects over four bacteria types wherein growth inhibition was proved of the same. [35]

The variety and use of tissue adhesives in the medical field has increased magnanimously for skin closure in case of minor as well as major procedures; them being used for implant fixation, embolisation and even closure of cerebrospinal leaks. [36] Nowadays, they are even being used for the closure of facial lacerations and groin wounds, in ophthalomologic surgeries as well as in laparoscopic surgeries. [37]

Research has proved that conditions such as reinforcement of colorectal anastomsis has also been beneficial with the use of Octyl-2-cyanoacrylate; as it increases the strength mechanically and thereby prevents anastomotic leakage. [38]

A study done by O Barkhat et al.; in the year 2012 showed the application of dermabond to the pancreaticojejunostomy anastomotic site; and showed lower rates of fistula formation [39]

A Study done by A. Berger showed clitoral repair using Octyl-2-cyanoacrylate of clitoral laceration; which was followed up for 8 weeks with no complications. By showing how the adhesive preserved the micro-anatomy of the organ. [40] M. Kazzi et al.; used Octyl-2-cyanoacrylate for closure of paediatric tongue lacerations. [41]
All in all, these studies therefore have signified the fact that these tissue adhesives can be used over mucosal surfaces as well.

The advantages of using tissue adhesives are many to compare, however among them are the fact that they are easy to use, have lower infection rates and are much more time and cost efficient. [36] A study done by Scott et al; for the closure of mammoplasty wounds with the same showed a lesser operative time than of sutures[42] Many studies have also shown that tissue adhesives are more beneficial towards those in whom chances of formation of hypertrophic or keloid scars are higher. [43]

Their use is however, contraindicated when there is any presence of infection with gangrenous changes or ulceration; commonly not recommended if there is any active bleed or oozing as well. The wounds wherein there is presence or sign of any partial thickness loss of skin or the edges of the wound are under tension; the use of tissue adhesives is contraindicated. [33]

Another contraindication is its use over areas with high moisture levels like the axilla or burn wounds. [42] In case of patients with delayed wound healing like those with diabetes mellitus or collagen diseases; its use is not recommended. [36]

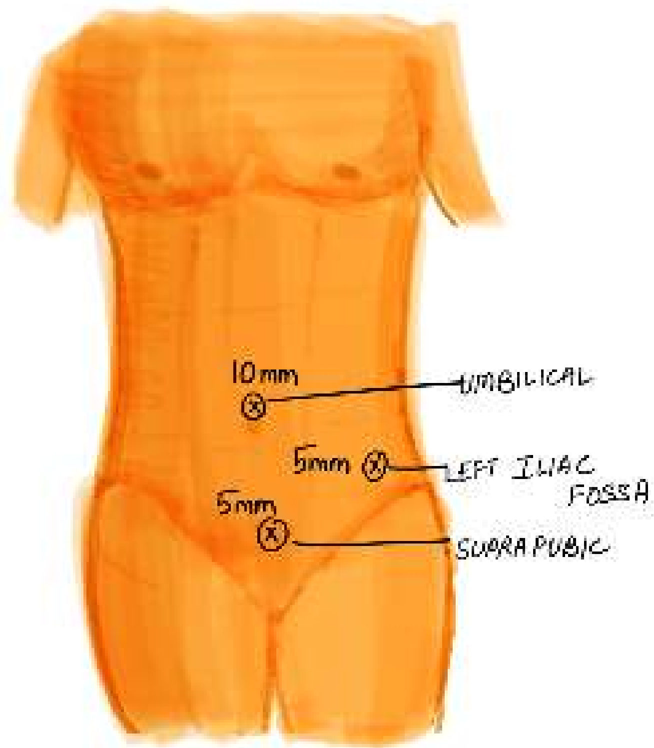
SCAR ASSESSMENT

Any surgical procedure done leaves a scar. While some heal and become almost completely invisible, others may become complicated and become aesthetically displeasing. In order to determine the same, various modalities and scales have been devised to identify the type of scars. There are objective ways of scoring which show a quantitative scar measurement; and there are subjective ways which eventually become dependent on the observer. There are multiple scoring systems available for the assesment of a scar as follows,

- The Vancouver Scar Scale (VSS)
- The Manchester Scar Scale (MSS)
- The Patient and Observer Scar Assessment Scale (POSAS)
- The Visual Analog Scale (VAS)
- The Stony Brook Scar Evaluation Scale (SBSES)
- The Modified Hollander Cosmesis Scale [44]

These consider various factors such as thickness of the scar, the height from the skin, their surface, texture and pliability. [44] Therefore, they are used to identify the quality and type of scar among any individual.

LAPAROSCOPIC SURGERY



Figures 10 - Laparoscopic Appendectomy Port Site Skin Incisions

Figures 11 - Laparoscopic Cholecystectomy Port Site Skin Incisions

Minimally invasive surgery is found to correlate with less surgical invasiveness, a shorter recovery time, and maybe better postoperative and functional outcomes. Evidence suggests that laparoscopic surgery may lead to better short-term quality-of-life outcomes for these abdominal surgical procedures. The use of the laparoscopic method for treatments like cholecystectomy, appendectomy, reflux surgery, gastric bypass surgery, ventral hernia repair, and colectomy is becoming more prevalent. For some treatments, such as cholecystectomy, the safety and practicality of a laparoscopic method have been thoroughly proven, and surgery employing a laparoscopic approach is now widely acknowledged as the preferred alternative.

The appendectomy is one of the most common abdominal surgical operations in the world. After being reported by McBurney, this surgical method has been used for over a century. Laparoscopic appendectomy has become a viable option for appendectomy because to the rapid advancement of minimally invasive surgery. Previous research has found that laparoscopic appendectomy has a number of advantages to open appendectomy, including shorter hospital stays, less problems, and improved cosmetic satisfaction. As a result, laparoscopic appendectomy, like laparoscopic cholecystectomy, is thought to be a good option for appendectomy now and in the future.

Laparoscopic cholecystectomy is now considered as the Gold Standard for Acute cholecystitis, as it provides a minimally invasive technique, shorter hospital stay and earlier time of recovery. In 1985, the first laparoscopic cholecystectomy was performed by Dr Erich Mühe in Germany. Since then, it has become accepted worldwide and is now considered a regular practice in the world of General Surgery.[45]

MATERIALS AND METHODS

Study site: This one year randomized control trial was carried out in the General Surgery Department in Belagavi at KLE's Dr Prabhakar Kore Hospital and Medical Research Centre.

Study Population: Patients who were admitted to KLE's Dr Prabhakar Kore Hospital and Medical Research Centre and underwent elective Laparoscopic Appendectomy or Laparoscopic Cholecystectomy.

Study Design: Randomized Controlled Trial

Study Period: January 2020 to December 2020

Sample Size: With a total of 60 patients, 30 were divided into two Groups, A and B. (The mean d 1 and standard deviation S 1 for group A is 3.80 and 3.163. The mean d2 and standard deviation S2 for group B is 6.23 and 4.031.

Z alpha = 1.96 at 5% alpha error

Z beta = 0.842 at 20% beta error

S is average of S 1 and S 2

d is the difference between d 1 and d 2

N = 2S 2 {z alpha +z beta} 2 /d 2

N is 30.3 participants in each group. Rounding off to 30. Substituting these values in

the formula, N= 30 and enrolment ratio is 1:1.)

Randomization Technique: Sequentially Numbered Opaque Sealed Envelopes (SNOSE)

Inclusion Criteria:

1. Patients above 18 years of age
2. Patients undergoing Elective Laparoscopic Appendectomy or Laparoscopic Cholecystectomy.

Exclusion Criteria:

1. Patients with Diabetes or Immunodeficiency
2. Those with Complications like Peritonitis or Infection.

Ethical clearance

The study was approved by the JNMC Institutional Ethics Committee on Human Subjects Research.

Informed consent

Annexure I

Methodology:

On admission, a detailed history and clinical examination was done for all the patients.

The following investigations were done for all the admitted patients to confirm their diagnosis and for a pre-operative work up:

- Routine Haemogram with viral markers
- Mini Renal Profile
- ECG
- Chest Xray
- Confirmatory Ultrasound

The patients were then divided into two groups prior to surgery for 5 mm port site skin closure (allocated by random sampling - SNOSE), as:

Group A: Skin closure with octyl-2-cyanoacrylate glue at 5mm port site

Group B: Skin closure with 3-0 Poliglecaprone 25 suture material in subcuticular manner at 5 mm port site.

PROCEDURE:

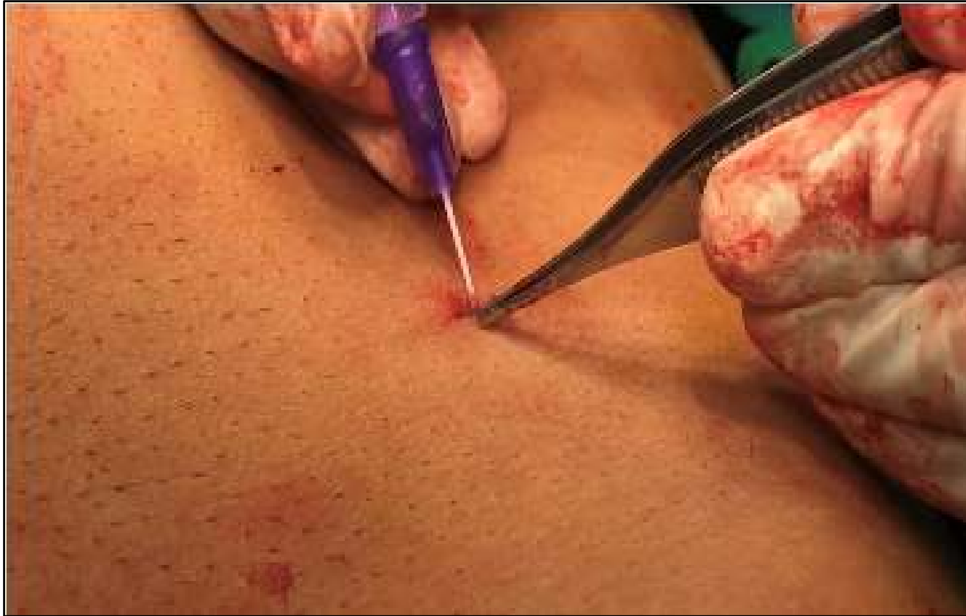
- Patients were induced with General Anaesthesia
- The surgeries were performed as per routine methods
- For Port site skin closure, one of the two given methods were applied as per randomization.

Group A-

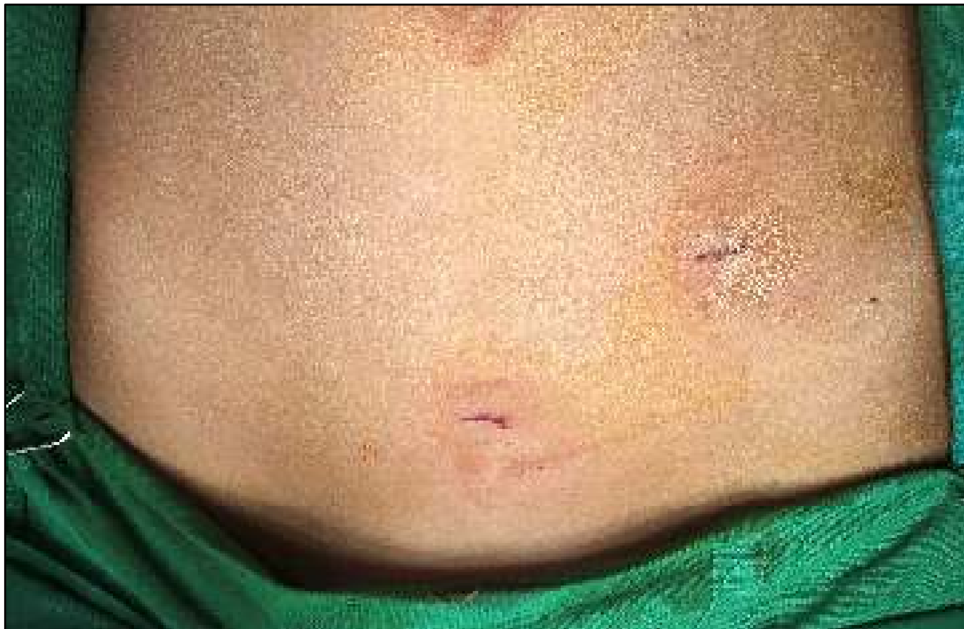
- On releasing pneumoperitoneum, the laparoscopic port sites were isolated and\ were dried using a gauze.
- These incised edges were approximated and the surface was cleaned to ensure that it remained dry.
- Octyl-2-cyanoacrylate adhesive was gradually applied over the entire surface of the 5mm incision site, by releasing it in drops; and pressure was maintained along the edges to ensure that it did not seep into the wound through the edge.
- The coated film was extended to at least 2 mm beyond either edge of wound.
- Continued support was maintained till the adhesive polymerized to form long chains which bonded together, which was observed by the transparent bioadhesive film transforming into an opaque and thicker layer.

Figures 12 - Dermabond (Octyl-2-cyanoacrylate)

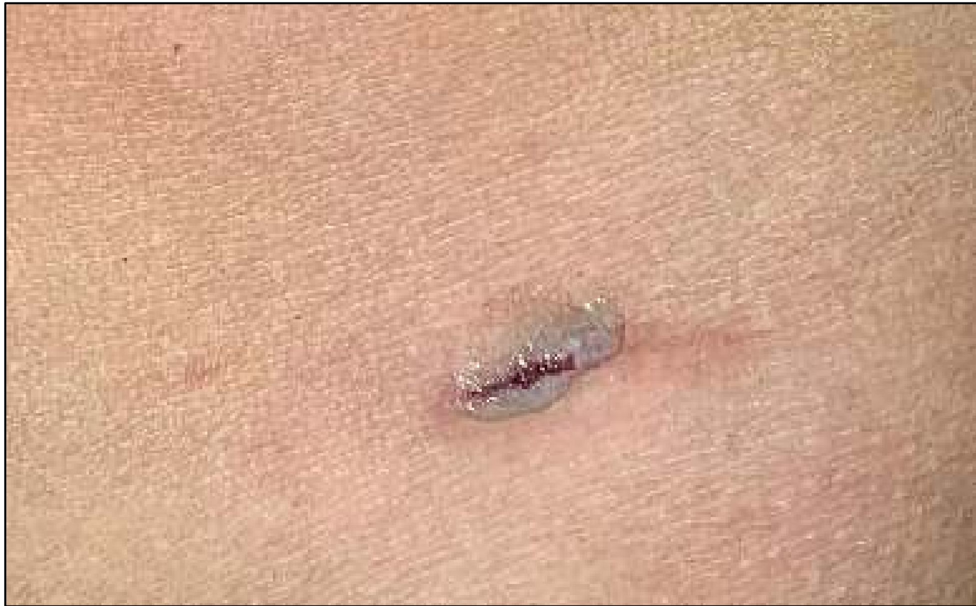
Figures 13 - Approximation of the skin edges



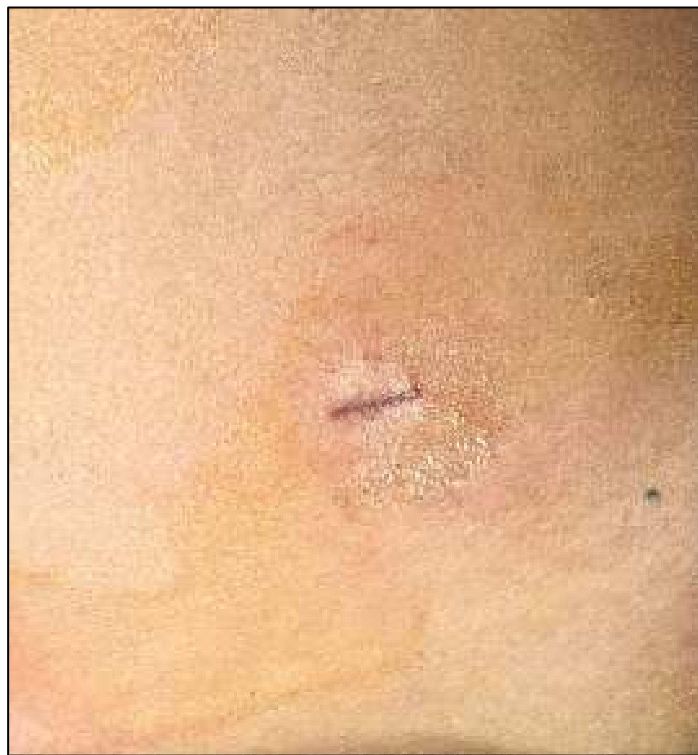
Figures 14 - Method of Application



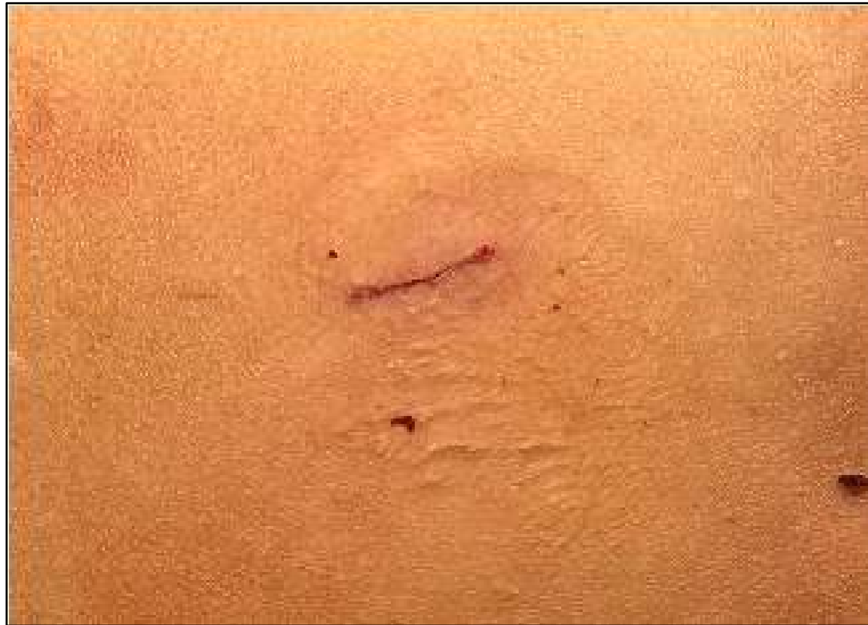
Figures 15 - Scar Appearance after Intra-Operative Appearance



Figures 16 - Wound appearance on Post Operative Day 7 in Group A



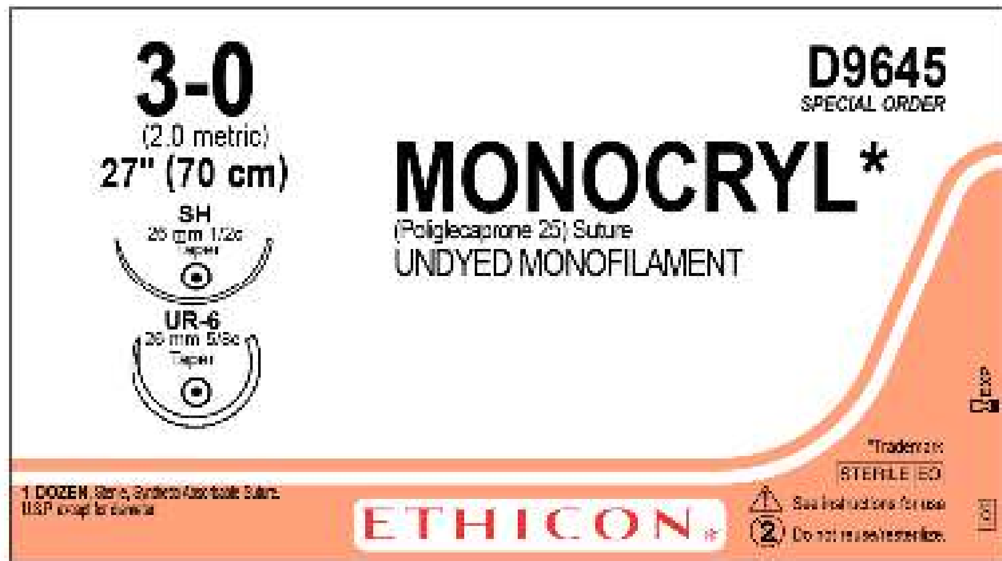
Figures 17 - Wound appearance on Post Operative day 30 in Group A



Figures 18 - Wound appearance on Post Operative day 90 in Group A

Group B-

- In Group B patients, after securing hemostasis, monofilament absorbable Poliglecaprone 25 suture material was used to place subcuticular sutures for 5 mm port site skin closure.
- Care was taken to ensure that an adequate approximation of edges was done resulting in absence of eversion of incision edges.
- Dressing was done with dry gauze for the same.
- Postoperative assessment of wound dehiscence and cosmetic outcome noted.
- Post operatively, patients received intravenous Paracetamol eighth hourly for analgesia.



Figures 19 - 3-0 Poliglecaprone 25 used for subcuticular port site skin closure

Figures 20 - Wound Appearance on Post Operative day 7 in Group B

Figures 21 - Wound Appearance on Post Operative day 30 in Group B

Figures 22 - Wound Appearance on Post Operative day 90 in Group B

Assessment:

For cosmetic outcome:

Patients port site wound was observed on day 7, 30 and 90 after the elective laparoscopic procedure was done. In this study the cosmetic outcome of the patient was assessed after elective laparoscopic Cholecystectomy/ Appendicectomy using The **Modified Hollander cosmesis Scale** which has 6 variables as step off borders, edge inversion, contour irregularities, excess inflammation, wound margin separation and good overall appearance. Wound was assigned 0 or 1 point each for the presence or absence of the following.

Incision attribute	Score if absent	Score if present
Step-off borders	0	1
Contour Irregularities	0	1
Margin Separation	0	1
Edge inversion	0	1
Excessive Distortion	0	1
Overall appearance	0 (satisfactory)	1 (unsatisfactory)
Total Hollander score	0 (best)	6 (worse)

Image 23 - Modified Hollander Cosmesis Scale

Patients were called for follow up on day 7, 30 and 90 and the incision site scar was assessed based on the **Modified Hollander cosmesis scale** and the two methods were compared based on the findings.

Minimum score obtained between the two scars was considered superior.

The patients from both the groups were assessed for post operative pain after 12 hours, 24 hours, and 48 hours, using the **Visual Analogue Scale.**

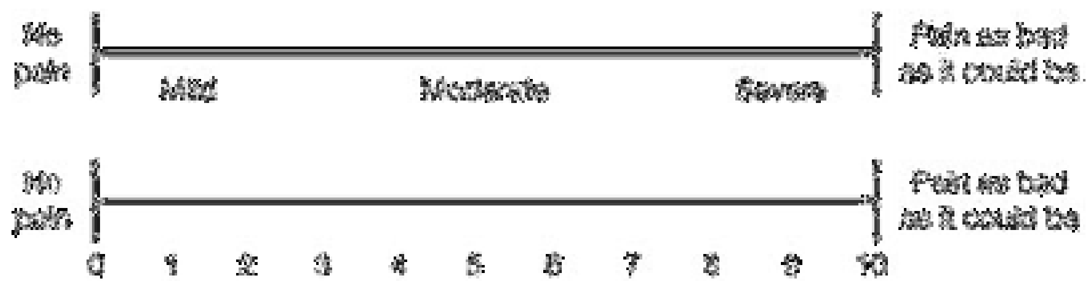


Image 24 - Pain Score

The patients in both the groups were assessed for any Surgical Site Infection after 3 days, and thereafter using the **Southampton Wound Scoring System**. (After discharge, they were asked to report to the hospital if there were any signs of surgical site infection.)

	Grade	Appearance
0	Normal healing	
I	Normal healing with mild bruising or erythema	A—some bruising
		B—considerable bruising
		C—mild erythema
II	Erythema plus other signs of inflammation	A—at one point
		B—around sutures
		C—along wound
		D—around wound
III	Clear or haemoserous discharge	A—at one point only (<2 cm)
		B—along wound (>2 cm)
		C—large volume
		D—prolonged (>3 days)
IV	Pus/purulent discharge	A—at one point only (<2 cm)
		B—along wound (>2 cm)
V	Deep or severe wound infection with or without tissue breakdown	

Image 25 - Southampton Wound Scoring

RESULTS

The total number of patients who participated in the study was 60, conducted at the Department Of General Surgery at KLE's Dr Prabhakar Kore Hospital and Medical Research Centre, Belagavi, during the time period of January 2020 to February 2021.

The allotment of the patients was done into two groups at random.

Group A: Skin closure with octyl-2-cyanoacrylate glue at 5mm port site

Group B: Skin closure with 3-0 Poliglecaprone-25 suture material in subcuticular manner at 5 mm port site.

One of the profiles studied among the patients was the Demographic profile with respect to age and gender of the patients.

The Modified Hollander Cosmesis Scale was used to delineate the cosmetic outcome on day 7, day 30 and day 90 post surgery.

The Visual Analog Scale was used to score pain from the time period of 12 hours, 24 hours and 48 hours after the surgery.

Based on the wound healing process, the Southampton Grading of wound healing was accounted for on day 3, day 5 and day 7 of the surgery.

Independent t-test; Mann-Whitney U test and Wilcoxon matched pairs tests analysed the data.

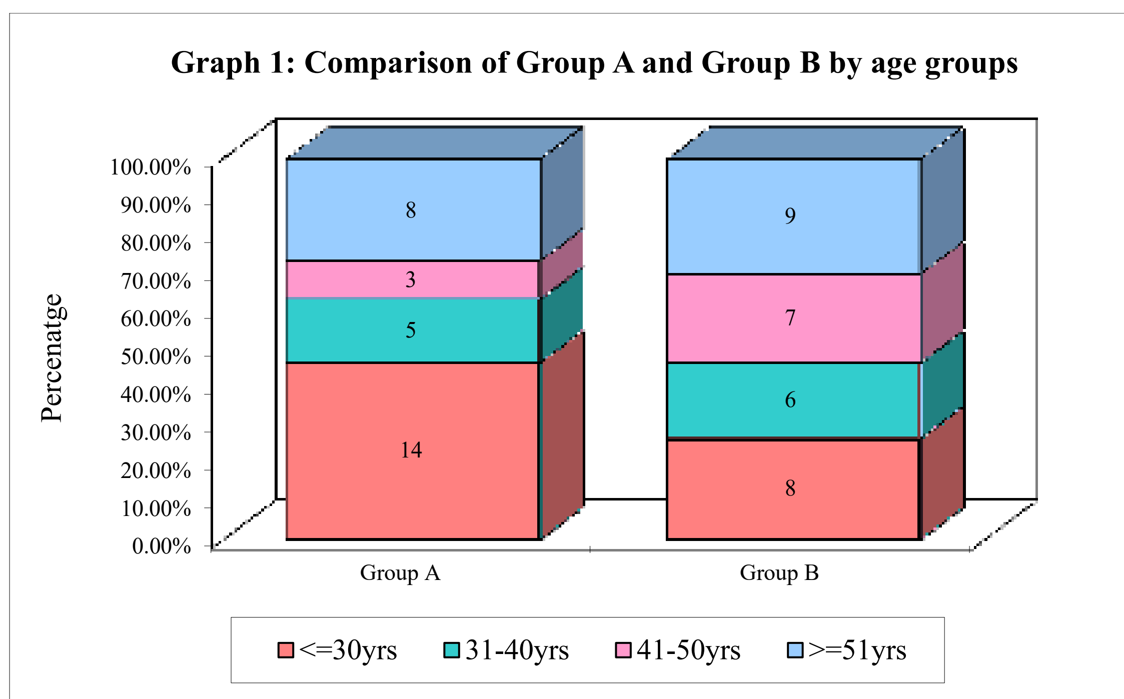
P value of <0.05 was significant.

1. Age distribution

Patients between the age groups of 18 and 60 years were included in this study. Pertaining to this study population, the mean age of patients in Group A was 37.33 years compared to that in Group B which was 41.63 years.

Table 8: Comparison of Group A and Group B by age groups

Age groups	Group A	%	Group B	%	Total	%
<=30yrs	14	46.67	8	26.67	22	36.67
31-40yrs	5	16.67	6	20.00	11	18.33
41-50yrs	3	10.00	7	23.33	10	16.67
>=51yrs	8	26.67	9	30.00	17	28.33
Total	30	100.00	30	100.00	60	100.00
Min	18.00		19.00		18.00	
Max	60.00		65.00		65.00	
Mean	37.33		41.63		39.48	
SD	13.03		13.40		13.28	
Chi-square=3.3860, p=0.3360						



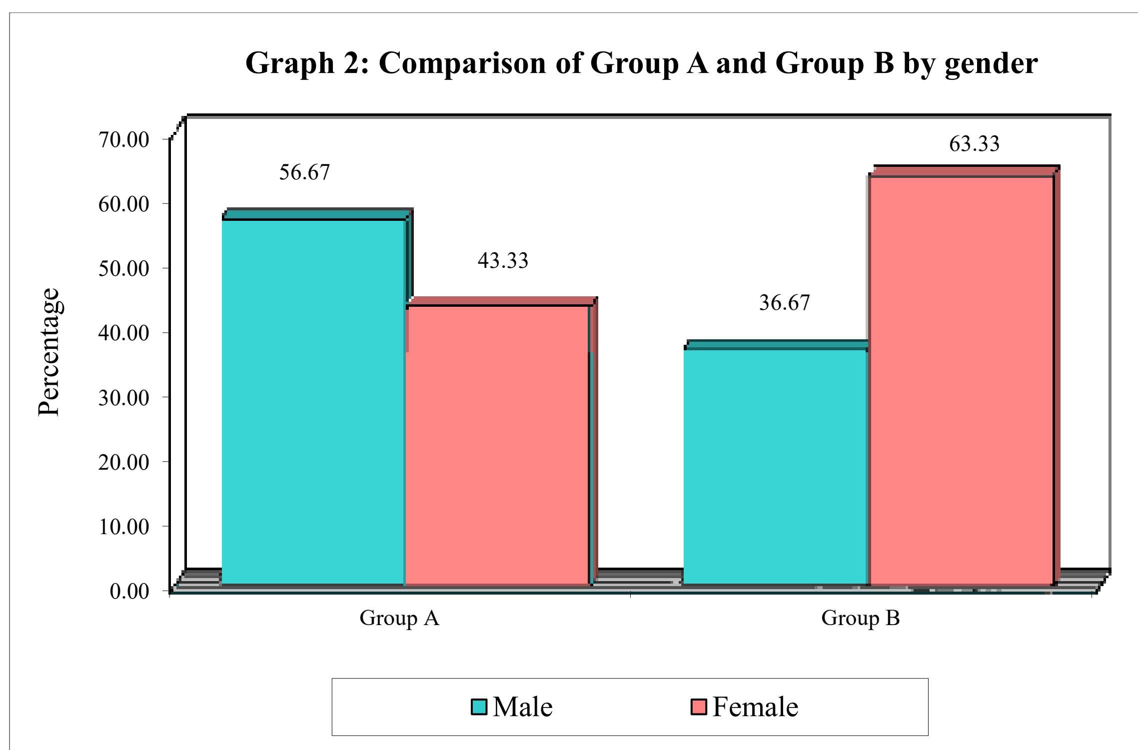
The above graph is a graphical representation of the age distribution of the study population between the two age groups.

2. Gender distribution

The following table, shows the gender distribution among the population between the two study groups

Table 9: Comparison of Group A and Group B by gender

Gender	Group A	%	Group B	%	Total	%
Male	17	56.67	11	36.67	28	46.67
Female	13	43.33	19	63.33	32	53.33
Total	30	100.00	30	100.00	60	100.00
Chi-square=2.4110, p=0.1210						



Graphical representation of the sex distribution of the study population amongst the two groups.

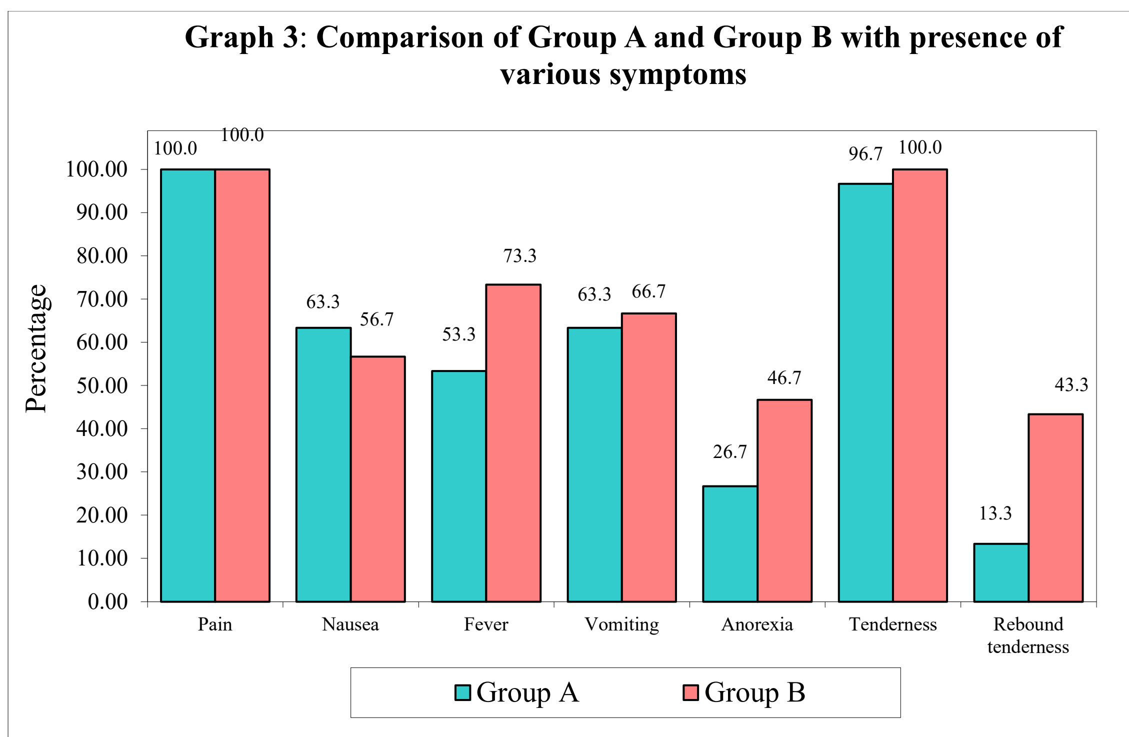
3. Clinical Symptoms

The table below represents the clinical symptoms on presentation to the hospital, on a comparison between both groups, both including symptoms representing acute appendicitis or acute cholecystitis.

Table 10: Comparison of Group A and Group B with presence of various symptoms

Symptoms	Group A	%	Group B	%	Total	%	Chi-square	p-value
Pain	30	100.00	30	100.00	60	100.00	-	-
Nausea	19	63.33	17	56.67	36	60.00	0.2780	0.5980
Fever	16	53.33	22	73.33	38	63.33	2.5840	0.1080
Vomiting	19	63.33	20	66.67	39	65.00	0.0730	0.7870
Anorexia	8	26.67	14	46.67	22	36.67	2.5840	0.1080
Tenderness	29	96.67	30	100.00	59	98.33	1.0170	0.3130
Rebound tenderness	4	13.33	13	43.33	17	28.33	6.6480	0.0100*

*p<0.05



The pictorial representation above is the graphical appearance of the clinical symptoms between the two groups.

4. Cosmetic Appearance

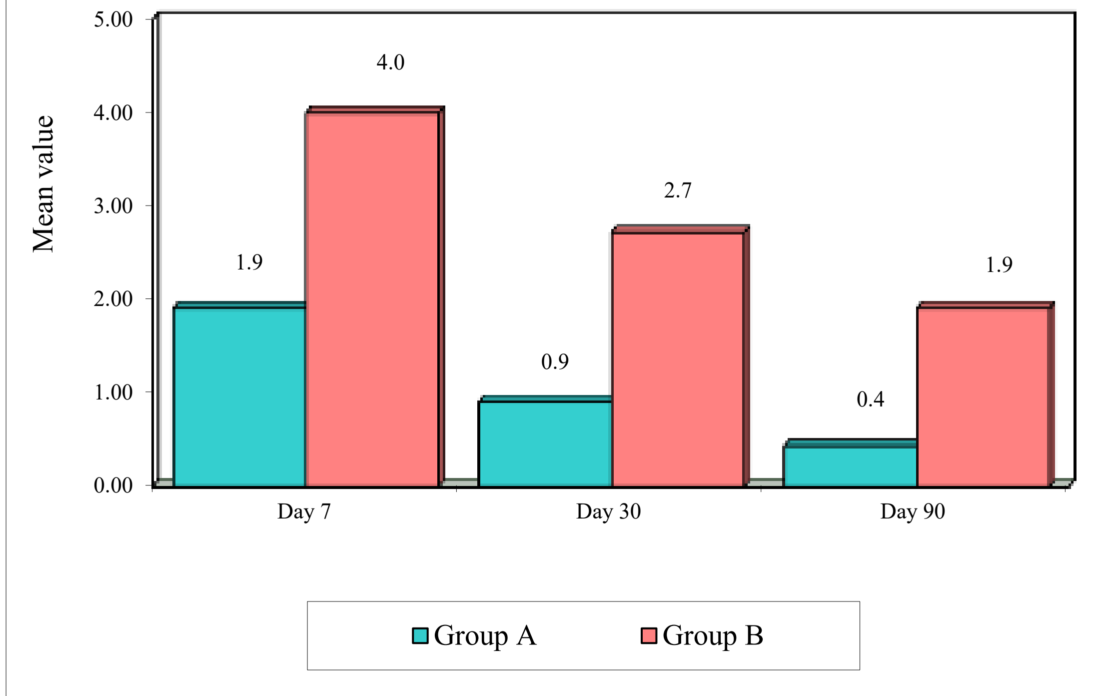
Table 11: Comparison of Group A and Group B with cosmetic appearance (Hollander Cosmesis scale) scores at day 7, day 30, day 90 time points by Mann-Whitney U test

Time points	Group A				Group B				U-value	Z-value	p-value
	Mean	SD	Median	IQR	Mean	SD	Median	IQR			
Day 7	1.90	0.88	2.00	2.00	4.00	0.69	4.00	0.50	39.50	-6.0616	0.0001*
Day 30	0.90	0.71	1.00	1.00	2.73	0.69	3.00	1.00	36.00	-6.1134	0.0001*
Day 90	0.43	0.57	0.00	1.00	1.90	0.84	2.00	1.25	77.50	-5.4998	0.0001*
Changes from Day 7 to Day 30	1.00	0.74	1.00	2.00	1.27	0.78	1.00	1.00	362.00	-1.2936	0.1958
Changes from Day 7 to Day 90	1.47	0.78	1.00	1.00	2.10	1.03	2.00	2.00	292.50	-2.3212	0.0203*
Changes from Day 30 to Day 90	0.47	0.68	0.00	1.00	0.83	0.70	1.00	1.00	317.50	-1.9615	0.0500*

$*p<0.05$ indicates significant

From the above table, there was a significant difference observed between Group A and Group B in terms of cosmetic appearance of skin closure observed on post operative day 7 (t= -6.0616), 30 (t= -6.1134) and 90 (t= -5.4998) with a 5% level of significance. Its suggests that **Group B showed a lower cosmetic appearance than Group A.** ($p<0.05$)

Graph 4: Comparison of Group A and Group B with cosmetic appearance (Hollander Cosmesis scale) scores at day 7, day 30, day 90 time points



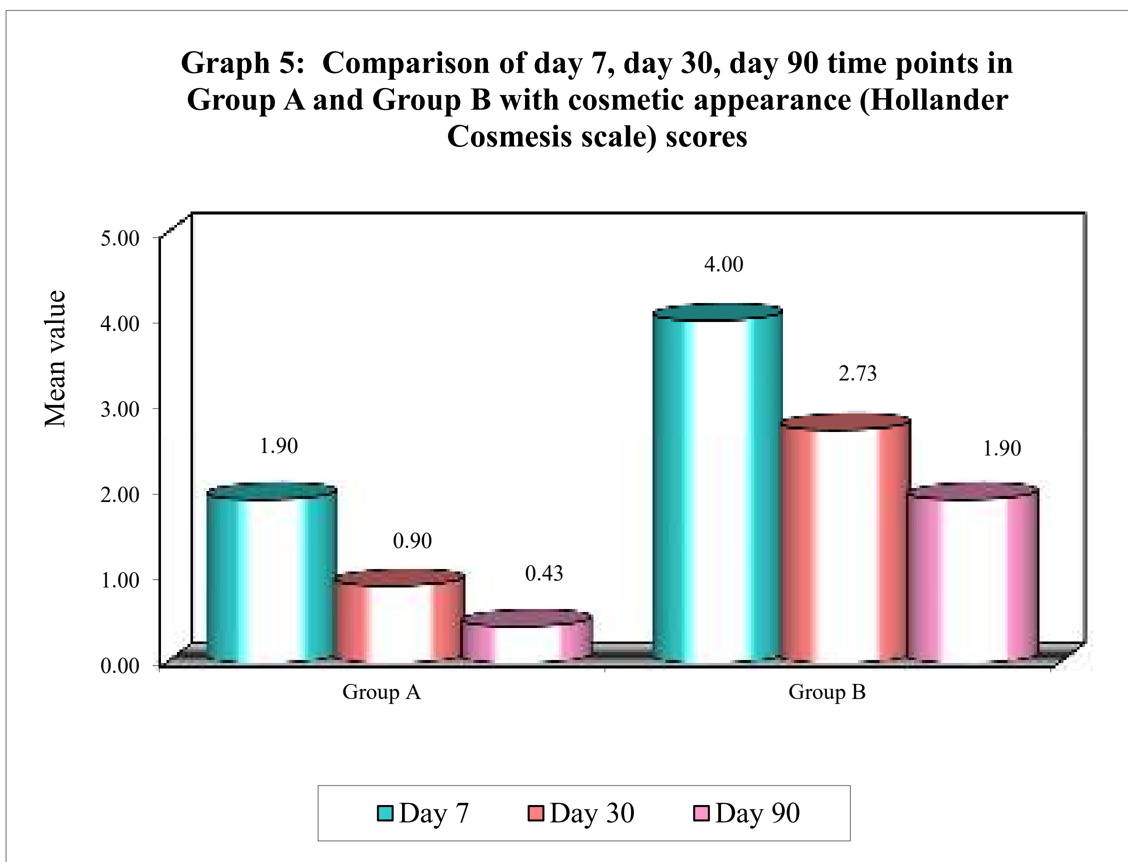
In a similar way, a significant difference was seen between Group A and Group B in terms of mean cosmetic appearance observes on days 7, 30 and 90 with a 5% significance. This indicates that **the cosmetic appearance was of a higher degree in Group A in comparison to Group B using the Modified Hollander Cosmesis scale.**

Table 12: Comparison of day 7, day 30, day 90 time points in Group A and Group B with cosmetic appearance (Modified Hollander Cosmesis scale) scores by Wilcoxon matched pairs test

Groups	Time points	Mean	SD	Mean Diff.	SD Diff.	% of effect	Z-value	p-value
Group A	Day 7	1.90	0.88					
	Day 30	0.90	0.71	1.00	0.74	52.63	4.1069	0.0001*
	Day 7	1.90	0.88					
	Day 90	0.43	0.57	1.47	0.78	77.19	4.6226	0.0001*
	Day 30	0.90	0.71					
	Day 90	0.43	0.57	0.47	0.68	51.85	2.9341	0.0033*
Group B	Day 7	4.00	0.69					
	Day 30	2.73	0.69	1.27	0.78	31.67	4.7821	0.0001*
	Day 7	4.00	0.69					
	Day 90	1.90	0.84	2.10	1.03	52.50	4.7030	0.0001*
	Day 30	2.73	0.69					
	Day 90	1.90	0.84	0.83	0.70	30.49	4.2857	0.0001*

***p<0.05**

A significant reduction of 52.63% and 77.19% in cosmetic appearance was seen between day 7 and day 30 followed by day 7 and day 90 of treatment respectively in Group A, and a significant decrease of 51.85% in cosmetic appearance from day 30 to day 90 of treatment in group A. Similarly, a reduction of 31.67% was seen between day 7 and day 30 whereas a 52.50% reduction was seen in cosmetic appearance of treatment between day 7 and day 90 respectively in Group B, a significant decrease of 30.49% was seen between day 30 to day 90 of treatment in group B. Therefore, it shows that the **cosmetic appearance was of a higher value in group A as compared to group B**.



5. **Comparison of Pain [Post Operative] by VAS scores:**

Table 13: Comparison of 12hrs, 24hrs and 48hrs time points in Group A and Group B with post operative pain (VAS) scores by Wilcoxon matched pairs test

Groups	Time points	Mean	SD	Mean Diff.	SD Diff.	% of effect	Z-value	p-value
Group A	At 12 hrs	3.57	0.90	1.60	0.72	44.86	4.5407	0.0001*
	At 24hrs	1.97	0.76					
	At 12 hrs	3.57	0.90	2.33	0.80	65.42	4.7821	0.0001*
	At 48hrs	1.23	0.43					
	At 24hrs	1.97	0.76	0.73	0.64	37.29	3.8230	0.0001*
	At 48hrs	1.23	0.43					
Group B	At 12 hrs	5.63	1.13	1.37	0.56	24.26	4.7820	0.0001*
	At 24hrs	4.27	1.08					
	At 12 hrs	5.63	1.13	2.33	1.06	41.42	4.7821	0.0001*
	At 48hrs	3.30	1.09					
	At 24hrs	4.27	1.08	0.97	0.85	22.66	4.7815	0.0001*
	At 48hrs	3.30	1.09					

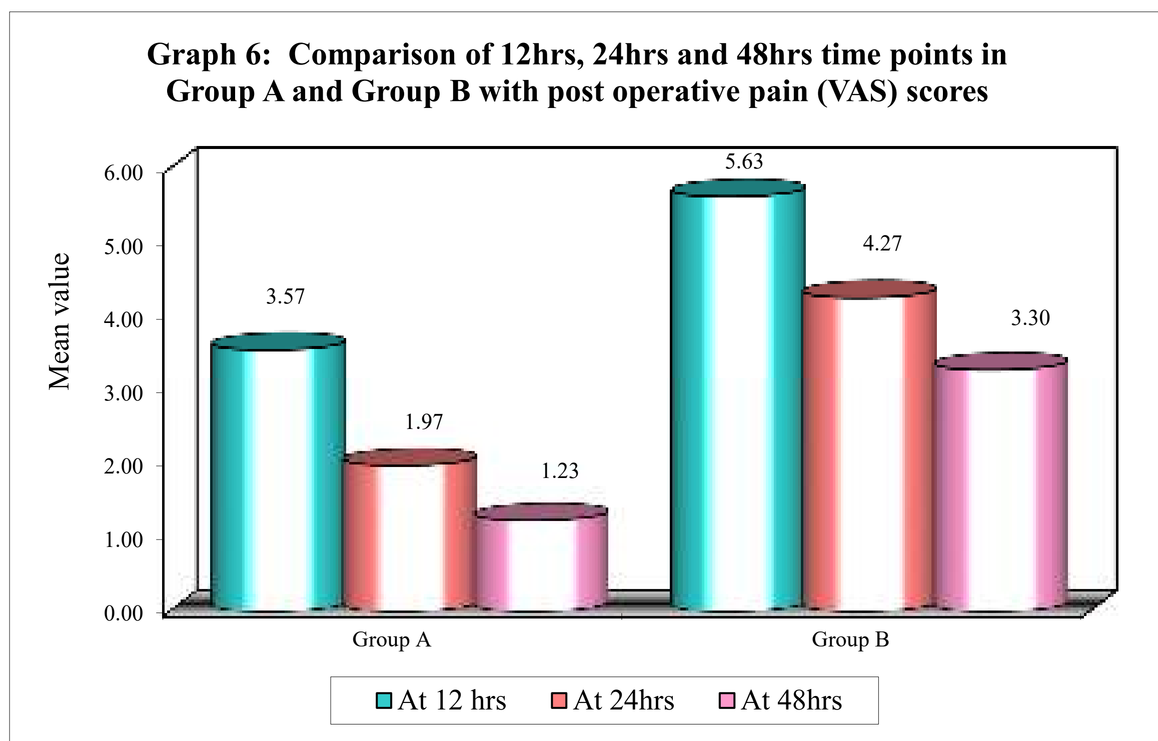
***p<0.05**

From the above results, an evidential difference was observed between Group A and Group B with respect to post operative pain scores; measured at 12 hours (t= 4.5407, p<0.05) at 5% level of significance, at 24 hours (t=4.7821, p<0.05) at 5% level of significance and at 48 hours (t=3.8230, p<0.05) at 5% level of significance in Group A. In Group B, pain scores measures at 12 hours (t=4.7820), at 24 hours (t=4.7821) and at 48 hours (t=4.7815) at 5% level of significance. This, therefore, suggests that in both groups, there was presence of a similar amount of post operative pain, however

the post operative pain significantly reduced in the first Group; that is A in comparison to that of Group B.

Similarly, the mean difference in the post operative pain scores in Group A was significantly lower than that of Group B. This suggests that the performance in reduction of pain was different at different points in both groups. ($p<0.05$)

Graph 6: Comparison of 12hrs, 24hrs and 48hrs time points in Group A and Group B with post operative pain (VAS) scores



A significant reduction of 44.86% and 65.42% in post operative pain was seen after 24 hours and 48 hours of treatment respectively in Group A, but only a significant decrease of 37.29% in post operative pain scores was seen from 24 hours to 48 hours of treatment in group A. A significant reduction of 24.26% and 41.42% post operative pain reduction was seen after 24 hours and 48 hours of treatment respectively in Group B, but only a significant decrease of 22.66% in post operative pain scores was seen from 24 hours to 48 hours of treatment in group B. It shows that, the pain reduction is higher in group A as compared to group B.

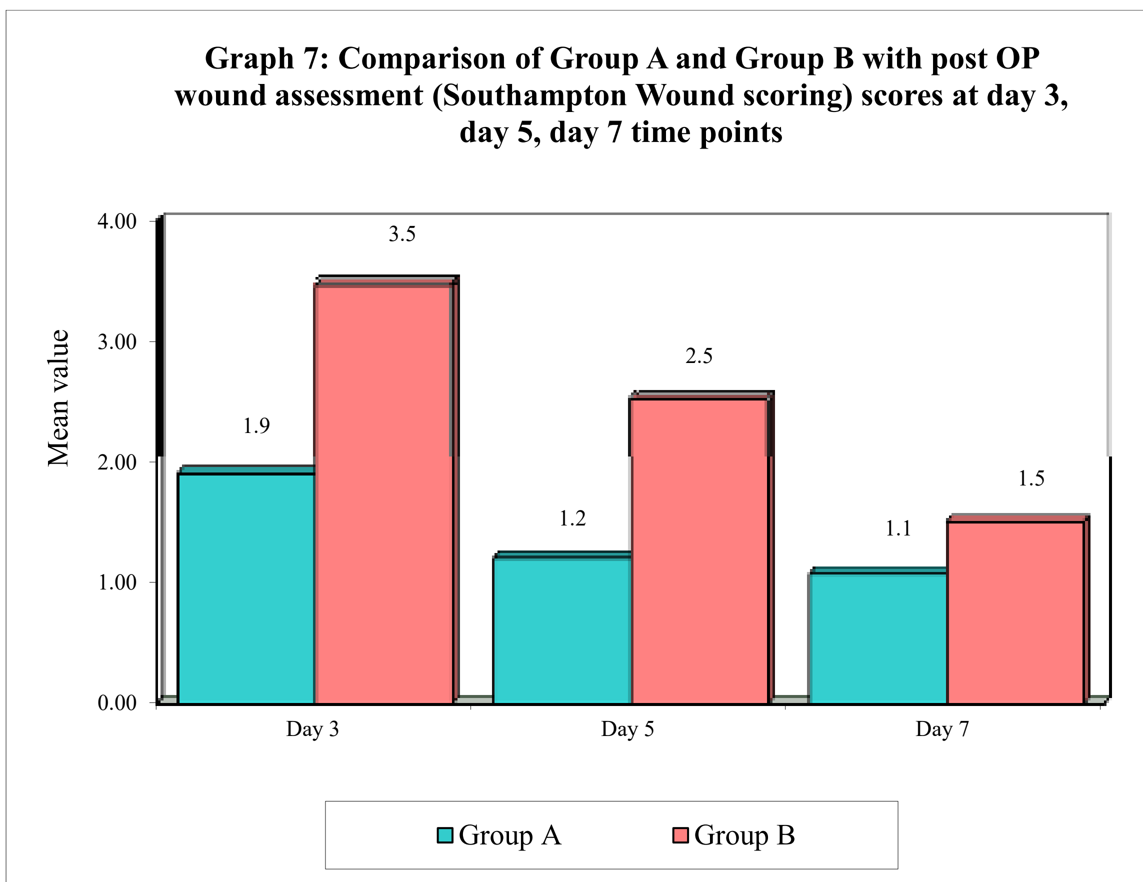
6. **Grade of Wound Healing**

Table 14: Comparison of Group A and Group B with post OP wound assessment (Southampton Wound scoring) scores at day 3, day 5, day 7 time points by Mann-Whitney U test

Time points	Group A				Group B				U-value	Z-value	p-value
	Mean	SD	Median	IQR	Mean	SD	Median	IQR			
Day 3	1.90	0.61	2.00	0.25	3.47	0.68	4.00	1.00	60.50	-5.7511	0.0001*
Day 5	1.20	0.41	1.00	0.00	2.53	0.51	3.00	1.00	42.00	-6.0247	0.0001*
Day 7	1.07	0.25	1.00	0.00	1.50	0.63	1.00	1.00	283.00	-2.4616	0.0138*
Changes from Day 3 to Day 5	0.70	0.65	1.00	1.00	0.93	0.83	1.00	2.00	382.50	-0.9906	0.3219
Changes from Day 3 to Day 7	0.83	0.65	1.00	1.00	1.97	0.81	2.00	2.00	141.00	-4.5610	0.0001*
Changes from Day 5 to Day 7	0.13	0.35	0.00	0.00	1.03	0.67	1.00	0.25	136.00	-4.6349	0.0001*

***p<0.05 indicates significant**

From the results of the above table, a significant difference was observed between Group A and Group B with respect to wound healing scores on day 3 (t= -5.7511, p<0.05), day 5 (t= -6.0247) and day 7 (t= -2.4616) at 5% level of significance. It means that wound healing had significant results in both Group A as well as Group B. However, there was a significant difference in the mean score of wound healing in Group A compared to Group B on day 3, day 5 and day 7. (p<0.05). This suggests that **the level of wound healing was more time efficient and faster in Group A as compared to Group B.**



Graph 7: Comparison of Group A and Group B with post OP wound assessment (Southampton Wound scoring) scores at day 3, day 5, day 7 time points
Mean value
4.00
3.00
2.00
1.00
0.00
1.9
3.5
1.2
2.5
1.1
1.5
Day 3
Day 5
Day 7
Group A
Group B

Table 15: Comparison of day 3, day 5, day 7 time points in Group A and Group B with post OP wound assessment (Southampton Wound scoring) scores by Wilcoxon matched pairs test

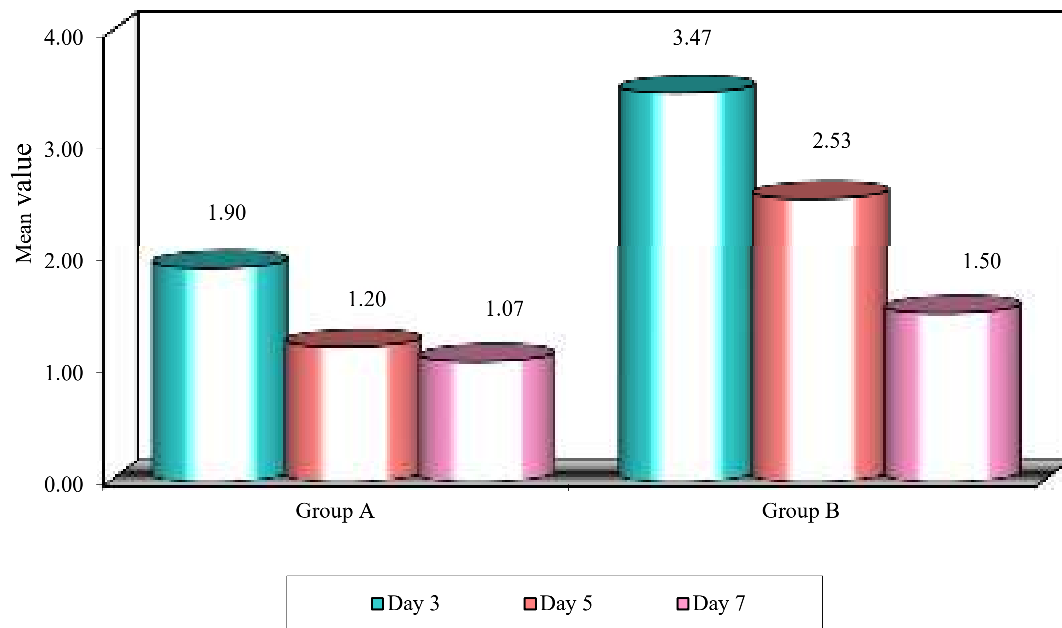
Groups	Time points	Mean	SD	Mean Diff.	SD Diff.	% of effect	Z-value	p-value
Group A	Day 3	1.90	0.61					
	Day 5	1.20	0.41	0.70	0.65	36.84	3.7236	0.0002*
	Day 3	1.90	0.61					
	Day 7	1.07	0.25	0.83	0.65	43.86	4.0145	0.0001*
	Day 5	1.20	0.41					
	Day 7	1.07	0.25	0.13	0.35	11.11	1.8257	0.0679
Group B	Day 3	3.47	0.68					
	Day 5	2.53	0.51	0.93	0.83	26.92	4.7030	0.0001*
	Day 3	3.47	0.68					
	Day 7	1.50	0.63	1.97	0.81	56.73	4.6226	0.0001*
	Day 5	2.53	0.51					
	Day 7	1.50	0.63	1.03	0.67	40.79	3.8230	0.0001*

A significant reduction of 36.84% in terms of wound healing scores was seen between day 3 and day 5, 43.85% reduction was seen between day 3 and day 7 and 11.11% reduction in wound grading was seen respectively in Group A, whereas a significant decrease of 26.92% in wound healing scores from day 3 to day 5, 56.73% from day 3 to day 7 and 40.79% from day 5 to day 7 in terms of wound healing was seen in Group B.

However, the grade of wound as per the Southampton Grading was much lower to begin with in Group A as compared to that of Group B and also showed a significant reduction in the Grade of wound formation over a period of 7 days.

Therefore, **Group A proved to have a higher level of wound healing as compared to that of Group B.**

Graph 8: Comparison of day 3, day 5, day 7 time points in Group A and Group B with post OP wound assessment (Southampton Wound scoring) scores



DISCUSSION

Laparoscopy has revolutionized modern medicine magnanimously, such that the advantages have outweighed all else. Be it diagnostic or therapeutic, key hole surgery has changed the outlook of a patient towards surgery. Although duplicability initially may have been an obstacle, the benefits have proved to be massive, the patient can completely mobilize the day after the surgery, there is little to no pain and one may even be started on oral feeds the coming day.

With the evolution of man through the years, the importance of cosmesis and appearance has developed significant value. Therefore, newer modalities have been developed for skin closure in minimally invasive cases. What started out with sutures for skin closure, has now modernised to the use of adhesives and glues for the same. However, due to the large availability of these methods, it is adjuratory to know the circumstances of usage of each material.

In 1949, the use of adhesives for skin closure came into use. However, to this day, it is not practiced on a wide scale in today’s world. Therefore, there is a massive lack of data pertaining to the effects that these adhesives have over the skin and the kind of reactions it may excite. In terms of cosmesis, it is still unclear whether the use of adhesives would have a more advantageous role as compared to normal skin sutures.

In view of the same, the current study was designed to compare octyl-2-cyanoacrylate glue versus 3-0 poliglecaprone 25 sutures for port site closure in laparoscopic appendectomy and laparoscopic cholecystectomy in terms of cosmesis, post-operative pain and infection.

The General Surgery Department in Belagavi at KLES Dr Prabhakar Kore Hospital and MRC conducted a randomized control trial through the year 2020 from

January to December. With a sample size concocting 60 patients who underwent elective laparoscopic appendectomy or cholecystectomy, skin closure was opted out for closure with octyl-2-cyanoacrylate glue in 30 patients and the remaining 30 patients underwent skin closure with 3-0 poliglecaprone 25 sutures in a subcuticular manner. Patients were bifurcated into two groups; A and B respectively, in a randomised manner using the SNOSE technique.

In our study, male preponderance was noted to be 56.67% in the first group; that is A whereas in B, the male preponderance was 36.67% with a p-value of 0.012, in comparison to Group A and B. In respect to this study, in a comparison between the age groups among both groups, 46.67% were encountered to be on the younger side (<30 years) in Group A and 26.67% of patients were found to be on the younger side (<30 years) in Group B. In terms of mean age, that in the first Group was slightly less (37.73 years) as compared to Group B (41.63 years) Therefore, the age distribution and mean age group in both Groups were comparable (p<0.3360)

This current study included all the patients presented with complaints of pain (100%). The next common complaints that patients presented with was tenderness, wherein 96.67% of those in Group A and 98.83% of those in Group B had the same complaint. In terms of specificities, patients in Group A presented with complaints of nausea (63.33%), fever (53.33%), vomiting (63.33%) and anorexia (26.67%). In Group B, the common complaints noted were fever (63.33%), vomiting (65%), anorexia (36.67%) and nausea (60%). The statistical change was quite significant (p<0.05).

Overall, the above findings suggested that the demographic characteristics as well as the clinical characteristics in the study population showed a prominent comparison among the Two Groups included, that is, A and B. (p>0.050).

Toriumi *et al*., conducted a study wherein he compared Octyl-2-Cyanoacrylate in maxillary as well as facial surgeries in terms of closure of the skin; with sutures and achieved a better cosmetic outcome in the former using the scale known as the Modified Hollander Cosmesis Scale after assessing these wound for a total of 90 days.[36]

Singer AJ et al., also conducted a similar study where tissue adhesive was compared with the use of non absorbable sutures for the repair of lacerations where they suggested that the cosmetic appearance proved to be similar in both cases, comparing 63 patients of tissue adhesives with 61 patients where suture was used.[46]

In terms of cosmetic outcome, the group where glue was used for skin closure showed a better score in comparison to the group where sutures were used for skin closure. The cosmesis was observed on post operative day 7, 30 and 90 and although initially the score was high, it gradually declined in both the experimental groups, however the score appeared to be lower in Group A, therefore indicating that the appearance of the skin was superior compared to that of Group B. As per the Hollander Cosmesis Scale, the score dropped from 3 to 1 in Group A, whereas the score lowered from 5 to 3 in Group B. The results tabulated thus indicate that as per the modified Hollander Cosmesis scale, the cosmetic outcome proved to be of a higher quality within a shorter period of time in those wherein cyanoacrylate was used compared to those wherein Poliglecaprone was used, with a statistically significant difference ($p<0.05$)

Ben Safta Y and colleagues; formulated a study to compare the usage of octyl-2-cyanoacrylate with monofilament as well as absorbable sutures for closure of skin at the port location for laparoscopic cholecystectomies showed a quicker healing rate

with the same level of complications and better cosmetic outcome using the POSAS scoring system. [47]

Another study by L.Bernard et al., showed a comparison between the cosmetic outcome for closure of excisional wounds using octyl-2-cyanoacrylate and standard sutures, suggesting a better outcome in those wounds closed with adhesives. [48]

The first trial of this kind was a randomized trial of prospective nature performed by Maartense et al., in laparoscopic port site closure wherein a comparison was done between Octyl-2-cyanoacrylate, adhesive tape made up of paper or the use of Poliglecaprone for any elective laparoscopic surgery. The results showed that the skin closure of these port sites with the use of Octyl-2-cyanoacrylate was more time efficient, although less cost effective from the above three.[49]

Sebesta et al., showed that closure with the use of Octyl-2-cyanoacrylate was more effective as well as time efficient. Although, they did not compare the outcomes in terms of cosmetic appearance. [50]

In this current study, a prominent difference was observed between glue and sutures in terms of post operative pain scores at an interval of 12 hours, the second conducted after 24 hours and the third conducted after 48 hours wherein the scores dropped down from 3 to 1 in Group A and the same dropped down from 5 to 3 in Group B. This proves that the post operative pain was more in terms of intensity in the second Group in comparison to that of the first Group ; that is pain was more in B. It also went to prove that, in both the groups, the post operative pain was higher in the earlier days of recovery and gradually reduced over time. This indicates that post operative pain is an important requirement to determine results in any surgery.

Souza et al., used octyl cyanoacrylate for closure of skin in sternal incisions for cardiac surgeries to observe the anti-microbial properties and showed a visibly lesser rate of surgical site infection. [51]

Another comparative study by M.Ando where staples were compared with Octyl 2-cyanoacrylate to compare infection rates at the incisional sites in spinal surgery; revealed a lesser evidence of infection where adhesive was used. [52]

Lastly, in terms of wound healing, in a comparison between cyanoacrylate and poliglecaprone, it proved that upon assessing the wound using the Southampton Wound Scoring system, the level of wound healing appeared to be quicker and at a lower grade in those patients where cyanoacrylate was used as opposed to those where poliglecaprone was used. On assessing the wound on day 3, there appeared to be some amount of bruising in the poliglecaprone group due to the use of pressure during closure associated with mild erythema which gradually disappeared by post operative day 7. On the other hand, the cyanoacrylate group only presented with mild erythema on post operative day 3 with minimal to no bruising, all of which disappeared by post operative day 7, thus suggesting that the quality of wound healing appeared to be better in the cyanoacrylate group.

However, in a Cochran review where a total of 630 patients were chosen for a randomised control trial found no visible difference among tissue adhesives and sutures in terms of infection, wound dehiscence and the overall satisfaction with cosmetic appearance. Along with the same, there were no signs of a visible difference between tapes in regarding infection compared to adhesives, the cosmetic appearance as per the patient as well as the patient and surgeon satisfaction. Although, a visible difference was seen by the surgeon in terms of cosmetic assessment; wherein the results were better accounted for in the tissue adhesive group. [53]

The year 2014 included a second version of the update was done with a total of 19 trials being conducted which compiled of a total of 33 studies that had a low quality proof suggesting that sutures were better in terms of wound dehiscence (95% CI 1.53 to 7.33). In terms of other aspects taken into account like infection, surgeon and patient satisfaction, the difference was minimal between tissue adhesives and sutures. Although, there was some proof of surgeons favouring the use of tape in terms of cosmetic outcome (95% CI 4.74 to 14.37). . A clinical trial compared the use of adhesives with many other methods of closure of wounds wherein it was seen that there was more satisfaction with the other methods of closure rather than the adhesives. However, the use of tissue adhesives was considered more time efficient.

These above studies however, lack the consideration of time efficiency in along with the cost effectiveness. Around the globe, multiple trials have demonstrated numerous advantages in using Octyl-2-cyanoacrylate in terms of time as well as cost.

CONCLUSION

All in all, the concluding factor in this study, therefore, suggests that the use of Octyl-2-cyanoacrylate has proved beneficial in comparison to using subcuticular monofilament Poliglecaprone 25 for port site skin closure in terms of an overall better aesthetic outcome, with a shorter degree of post operative pain and moreover, a greater level of wound healing.

Although, the application of sutures is considered a standard technique for port site skin closure, as the surgical generations evolve, a second glance is being taken towards standard techniques by adaptation of newer advances.

The study, therefore, concludes with the saying “Learn the basics but evolve with the future.”

SUMMARY

- This study was conducted in a tertiary health care centre, Dr Prabhakar Kore Hospital and Medical Research Centre in Belagavi
- Out of 60 patients involved in the study, all of which underwent either an elective Laparoscopic Appendectomy or Laparoscopic Cholecystectomy, 5mm port site skin closure was done with either Octyl-2-cyanoacrylate or subcuticular absorbable monofilament suture Poliglecaprone 25.
- Among the 60 patients, the male preponderance was 47% whereas that of female was 53%.
- There was no significance to age groups in pertainance to the study, however the patients were between 18 and 60 years of age.
- The study indicated that on an Octyl-2-cyanoacrylate is an effective method for closure of skin in terms of an aesthetic outcome of the scar, safety along with reduced post operative pain.
- The scar appearance was better cosmetically with no further complications post operatively.
- Therefore, it may be considered as a safe and effective alternative to suturing for skin closure at port sites in minimally invasive surgery.

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ANNEXURE I. ETHICAL CLEARANCE.

[illegible]

To,
REG NO: BH0119007
PG student in Surgery,
J.N.Medical College,
BELAGAVI.

Sub: Issue of Ethical Clearance for the study.

With reference to the above, we wish to inform you that your proposed research project titled "COMPARISON BETWEEN OCTYL-2-CYANOACRYLATE GLUE VERSUS POLIGLECAPRONE 25 SUTURES FOR PORT SITE SKIN CLOSURE IN ASSESSING COSMETIC OUTCOME USING MODIFIED HOLLANDER COSMESIS SCALE IN ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY AND LAPAROSCOPIC APPENDICECTOMY – A ONE YEAR HOSPITAL BASED RANDOMIZED CONTROLLED TRIAL" is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee on Human Subjects Research.

(Dr. [illegible])
Member Secretary,
JNMC Institutional Ethics Committee on Human Subjects Research,
J.N.Medical College, Belagavi.

(Dr. [illegible])
Chairman,
JNMC Institutional Ethics Committee on Human Subjects Research,
J.N.Medical College, Belagavi.

ANNEXURE II

INFORMED CONSENT

CONSENT FOR PARTICIPATION IN RESEARCH STUDY

Mr/Mrs/Miss. ______________________________, we are requesting you to enroll yourself

in study titled "**COMPARISON BETWEEN OCTYL-2-CYANOACRYLATE GLUE VERSUS 3-0 POLIGLECAPRONE 25 SUTURES FOR PORT SITE SKIN CLOSURE IN ASSESSING COSMETIC OUTCOME USING MODIFIED HOLLANDER COSMESIS SCALE IN ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY AND LAPAROSCOPIC APPENDICECTOMY- A ONE YEAR HOSPITAL BASED RANDOMIZED CONTROLLED TRIAL**.", conducted by **REG NO: BH0119007**, Post Graduate in M.S. General Surgery under the guidance of Dr. _______________, Professor & Head, Department of General Surgery, J.N. Medical College, Belagavi under KAHER, Belagavi.

Respected Sir/Madam,

We request you to participate in our study. Your participation in the research is voluntary. Your decision to participate in the study or otherwise will not affect the relationship with KLES Prabhakar Kore Hospital. If you decide not to participate, you are free to withdraw at any time. During the study, your operative outcome will be assessed by some questions.

Purpose of the study:

This research is intended to compare the post-operative cosmetic outcome along with post operative pain and wound infection following port site skin closure using two methods in patients undergoing Elective Laparoscopic Cholecystectomy and Appendicectomy. The principal investigator of the study is **REG NO: BH0119007**, under the guidance of Dr. _____________.

Procedure Involved:

If you agree to enroll yourself in this study, your detailed history will be taken and you will be clinically examined in detail. Investigations like Hemoglobin, Total Count, Differential Count, Platelet Count, RBS, Blood Urea, Serum Creatinine, Blood Grouping, Chest X-ray, ECG, USG Abdomen and Pelvis, required for confirmation of your diagnosis and for your pre-operative work up will be done accordingly. You will be assigned to either of the two groups of port closure, i.e., Group A – Octyl-2-cyanoacrylate glue, Group B – 3-0 Poliglecaprone 25 suture material, by SNOSE [Sequentially Numbered Opaque Sealed Envelope]. You will undergo Laparoscopic Surgery under General Anesthesia. The ports will be closed with the suture material or glue allotted acoordingly.

Post operative cosmetic outcome will be assessed using Modified Hollander Cosmesis Scale on seventh post operative day, postoperative day 30 and at the end of 3 months.

Post-operative pain will be assessed using Visual Analogue Scale (VAS) and graded at 12 ,24 and 48 hours. Intensity of pain will be assessed by using 10-point VAS representing various intensity of pain from 0 (No pain) to 10 (Worst possible pain).

Post-operative Surgical Site Infection will be assessed using Southampton Scoring System.

Risks and Benefits:

There is no increased risk involved in being a part of this study and the complications are those which are normally anticipated. This study will help to estimate the incidence of a better cosmetic outcome and various surgical site complications in comparison with the two materials involved. The results derived at the end of the study will possibly benefit all similar patients admitted in this hospital and elsewhere.

Withdrawing/removal from the study:

The participant has freedom to withdraw from the study whenever he/she wishes and without any prior notice. Even if you decline to participate, there will not be any change in the line of your management or the relationship with your doctor. You will be told about all the information that affects your decision to participate in the study. The investigator may also exclude a participant from the study at any point of time.

Privacy and Confidentiality:

The only people to know that you are a research subject are members of the research team. No information about you or information provided by you during the research will be disclosed to other without your written permission except:

1. In emergency to protect your rights and welfare.
2. If required by law.

Institutional/sponsors policy:

If any unforeseen complications or injury occurs during the period of study, the participant will be given treatment within the limitations of KLES Prabhakar Kore Hospital.

Financial Incentives for participation:

The participant neither gets any financial incentives during the period of study nor will be asked to pay for this study.

Authorization to Publish Results:

When the results of the research are published, or discussed in a conference, no information will be displayed that would disclose your identity. Any information that is obtained in this study that can be associated with your identity will remain confidential.

CONSENT STATEMENT

I, Mr/Ms/Mrs. _______________________________ voluntarily agree for the participation as a subject of study. By signing this consent form, I am not giving up any of my legal rights. I may withdraw from the study anytime. I am signing the consent form after having read or been read for me in my vernacular language, including the risks and the benefits and having all my questions answered.

Subject Name : ____

Signature or Left Thumb Print of Subject : ______________________

Witness Name: ____________________ Signature: __________________

Investigators Name: ________________ Signature: __________________

Date: _______________

Place: _______________

ANNEXURE III

PROFORMA

The proposed proforma / questionnaire to be used for data collection for the study titled"**COMPARISON BETWEEN OCTYL-2-CYANOACRYLATE GLUE VERSUS 3-0 POLIGLECAPRONE 25 SUTURES FOR PORT SITE SKIN CLOSURE IN ASSESSING COSMETIC OUTCOME USING MODIFIED HOLLANDER COSMESIS SCALE IN ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY AND LAPAROSCOPIC APPENDICECTOMY- A ONE YEAR HOSPITAL BASED RANDOMIZED CONTROLLED TRIAL**" is as:

GROUP:

Name: ________________________ IP no.:

Sex:___________ Age:

Address:____________________ Religion:

Education:_____________ Date of admission:

Occupation:_______________ Date of discharge:

HISTORY

When did patient first notice the pain:

Details:

Associated features: Fever

Vomiting

Murphy's Sign

Other -

Previous history of use of antibiotics/steroids:

Past History:

Personal History:

Family History:

GENERAL PHYSICAL EXAMINATION:

Built and Nourishment:

Weight:

Pallor / Icterus / Cyanosis / Clubbing / Edema / Lymphadenopathy

Vital Signs: PR:_____ /min BP:________ mm Hg

RR:______ /min Febrile/Afebrile

SYSTEMIC EXAMINATION:

Per Abdomen examination:

Cardio Vascular System:

Respiratory System:

CLINICAL IMPRESSION:

INVESTIGATIONS:

Hb: Total Leucocyte Count: Platelet count:

Random blood sugar:

Blood Group:

Blood urea: Sr. Creatinine:

PT/INR:

Urine routine and microscopy:

HIV: HBsAg:

ECG:

Chest Xray:

USG-Abdomen and Pelvis:

OPERATION DETAILS:

Date of Surgery:

Anesthesia: General Anesthesia

Duration of Surgery:

ASSESSMENT:

GROUP:

I) ASSESSMENT OF COSMESIS USING MODIFIED HOLLANDER COSMESIS SCALE

	POST OPERATIVE DAY 7	POSTOPERATIVE DAY 30	POSTOPERATIVE DAY 90
STEP-OFF BORDERS			
CONTOUR IRREGULARITITES			
MARGIN SEPARATION			
EDGE INVERSION			
EXCESSIVE DISTORTION			
OVERALL APPEARANCE			
TOTAL HOLLANDER SCORE			

II) ASSESSMENT OF POST OPERATIVE PAIN BY VISUAL ANALOGUE SCALE (VAS):

VAS SCORE AFTER 12 HOURS :

VAS SCORE AFTER 24 HOURS :

VAS SCORE AFTER 48 HOURS :

III) ASSESSMENT OF POST OPERATIVE WOUND BY SOUTHAMPTON WOUND SCORING SYSTEM :

POST OPERATIVE DAY 3 :

POST OPERATIVE DAY 5 :

POST OPERATIVE DAY 7 :

STAFF SIGNATURE :

GROUP A

SR NO	GROUP	AGE	IP NO	SEX	PAIN Y-1/N-2	NAUSEA Y-1/N-2	FEVER Y-1/N-2	VOMITING Y-1/N-2	ANOREXIA Y-1/N-2	TENDERNESS Y-1/N-2	REBOUND TENDERNESS Y-1/N-2	POST OPERATIVE PAIN (VAS)			COSMETIC APPEARANCE (HOLLANDER COSMESIS SCALE)			POST OPERATIVE WOUND ASSESSMENT (SOUTHAMPTON WOUND SCORING)		
												AFTER 12 HOURS	AFTER 24 HOURS	AFTER 48 HOURS	POST OP DAY 7	POST OP DAY 30	POST OP DAY 90	POST OP DAY 3	POST OP DAY 5	POST OP DAY 7
1	A	21	998361	F	1	1	1	1	1	1	1	5	3	2	3	2	0	4	3	2
2	A	18	999032	M	1	1	1	2	2	1	2	4	2	1	2	1	0	4	3	3
3	A	38	100252	M	1	2	2	1	2	1	2	3	3	2	1	0	0	3	3	2
4	A	26	1005009	M	1	1	1	2	2	1	2	3	3	1	1	1	0	3	3	2
5	A	35	1005429	F	1	1	2	2	2	1	2	4	2	1	3	1	1	3	3	1
6	A	39	1013275	M	1	1	1	1	2	1	2	3	1	1	2	0	0	4	2	2
7	A	30	1015506	M	1	2	1	2	2	1	2	4	2	1	1	0	0	2	2	1
8	A	41	1020575	M	1	2	1	2	2	1	2	3	1	1	2	2	1	4	2	1
9	A	29	1024261	F	1	2	2	2	2	1	2	4	2	2	3	2	0	3	3	1
10	A	26	1024864	F	1	2	2	2	2	1	2	3	1	1	2	0	0	4	2	1
11	A	47	1026403	F	1	2	1	1	2	1	2	5	3	2	2	1	1	4	3	1
12	A	29	1005288	M	1	2	1	2	2	1	2	3	2	1	1	0	0	3	3	1
13	A	22	1013112	M	1	2	2	2	2	1	2	3	3	1	1	1	0	4	3	2
14	A	25	1021296	M	1	2	1	2	2	1	2	2	1	1	3	1	1	4	2	1
15	A	30	1023330	F	1	2	2	2	2	1	2	4	3	1	1	1	0	4	2	2
16	A	60	994417	F	1	1	2	1	1	1	1	3	1	1	4	2	1	4	2	2
17	A	53	1000808	M	1	1	1	1	2	1	1	3	2	1	2	2	0	4	3	2
18	A	42	999741	M	1	1	2	1	2	1	1	2	1	1	1	1	0	4	3	1
19	A	60	1002743	M	1	1	2	1	2	2	2	4	2	1	1	0	0	4	2	2
20	A	60	1002799	M	1	1	2	1	2	1	2	3	1	1	3	2	2	3	2	1
21	A	26	1006859	F	1	1	2	1	1	1	2	4	2	1	3	1	1	3	3	1
22	A	25	1014349	F	1	1	1	1	2	1	2	2	1	1	2	1	1	4	2	1
23	A	37	1016030	M	1	1	2	1	2	1	2	3	2	2	1	0	0	2	2	1
24	A	52	1017382	F	1	1	2	1	2	1	2	5	2	1	2	1	1	4	3	2
25	A	57	1019679	F	1	1	1	1	1	1	2	3	1	1	3	1	1	3	2	1
26	A	25	1020412	M	1	1	2	1	1	1	2	4	2	1	2	1	0	4	3	1
27	A	35	1022507	M	1	2	1	1	2	1	2	5	3	2	2	0	0	4	2	1
28	A	30	1005460	F	1	1	1	1	1	1	2	4	2	1	1	1	1	3	3	3
29	A	51	997953	M	1	1	1	1	1	1	2	5	3	2	1	0	0	2	2	1
30	A	51	1003662	F	1	1	1	1	1	1	2	4	2	1	1	1	1	3	3	2

GROUP B

SR NO	GROUP	AGE	IP NO	SEX	PAIN Y-1/N-2	NAUSEA Y-1/N-2	FEVER Y-1/N-2	VOMITING Y-1/N-2	ANOREXIA Y-1/N-2	TENDERNESS Y-1/N-2	REBOUND TENDERNESS Y-1/N-2	POST OPERATIVE PAIN (VAS)			COSMETIC APPEARANCE (HOLLANDER COSMESIS SCALE)			POST OP WOUND ASSESSMENT (SOUTHAMPTON WOUND SCORING)		
												AFTER 12 HOURS	AFTER 24 HOURS	AFTER 48 HOURS	POST OP DAY 7	POST OP DAY 30	POST OP DAY 90	POST OP DAY 3	POST OP DAY 5	POST OP DAY 7
1	B	31	1024597	F	1	2	1	2	2	1	2	7	5	4	4	3	3	3	2	1
2	B	48	1002498	M	1	2	1	2	2	1	1	6	5	3	5	4	2	1	1	1
3	B	60	995438	F	1	2	1	1	2	1	1	7	5	4	4	4	3	2	1	1
4	B	30	997262	F	1	2	1	2	2	1	2	6	4	4	4	3	1	2	1	1
5	B	23	1001526	M	1	1	1	2	2	1	2	5	4	4	3	2	1	1	1	1
6	B	51	1002737	M	1	2	1	1	1	1	2	4	2	2	3	3	2	3	1	1
7	B	65	1004235	F	1	2	1	2	1	1	2	7	4	3	3	3	2	2	2	1
8	B	57	1004186	F	1	2	1	1	1	1	1	7	5	4	4	4	3	2	2	1
9	B	26	1005525	F	1	2	1	1	1	1	1	6	5	3	3	2	2	1	1	1
10	B	60	1010832	F	1	2	1	2	2	1	1	4	3	3	4	2	2	2	1	1
11	B	20	1025270	M	1	2	1	2	1	1	2	5	4	4	3	2	1	2	2	1
12	B	35	997400	M	1	2	1	1	1	1	1	6	5	3	4	2	1	2	1	1
13	B	28	997431	F	1	1	1	2	1	1	1	5	4	4	5	3	2	3	1	1
14	B	54	999204	M	1	2	1	2	1	1	2	4	3	2	4	2	2	2	1	1
15	B	30	1001192	M	1	2	1	2	2	1	1	5	3	1	3	3	2	2	1	1
16	B	55	1006277	M	1	1	2	1	2	1	2	4	3	3	5	3	1	2	2	2
17	B	55	1006348	F	1	1	1	1	2	1	2	5	4	4	4	2	1	1	1	1
18	B	45	1007667	F	1	1	1	1	2	1	1	3	2	2	4	3	3	2	1	1
19	B	24	1011815	M	1	1	1	1	1	1	2	5	4	2	5	3	2	2	1	1
20	B	39	1014451	M	1	1	2	1	2	1	1	6	4	3	4	2	2	2	1	1
21	B	35	1005497	F	1	1	2	1	1	1	2	7	6	4	5	3	3	2	1	1
22	B	45	1018106	F	1	1	1	1	1	1	1	7	6	6	4	3	3	2	1	1
23	B	45	1018719	F	1	1	2	1	1	1	2	6	5	3	4	3	1	2	2	2
24	B	47	997939	F	1	1	2	1	2	1	1	6	4	2	5	3	1	2	1	1
25	B	58	1025416	F	1	1	2	1	2	1	2	7	6	5	4	2	2	1	1	1
26	B	34	1015894	F	1	1	1	1	2	1	2	5	4	3	3	2	1	2	1	1
27	B	47	1026816	F	1	1	1	1	2	1	2	6	5	5	4	4	4	3	1	1
28	B	33	1002389	F	1	1	2	1	2	1	2	5	4	3	4	2	1	2	1	1
29	B	50	1002590	F	1	1	2	1	1	1	1	7	6	4	5	3	2	1	1	1
30	B	19	1015673	M	1	1	1	1	1	1	2	6	4	2	4	2	1	1	1	1