VICRYL .VS. VICRYL RAPIDE FOR SUBCUTICULAR CLOSURE IN ELECTIVE ABDOMINAL SURGERIES: A RANDOMISED CONTROLLED TRIAL

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DISSERTATION

Submitted to the

K.L.E University, Belgaum, Karnataka

In partial fufillment

of the requirements for the degree of

M.S

in

GENERAL SURGERY

DEPARTMENT OF SURGERY
JAWAHARLAL NEHRU MEDICAL COLLEGE
BELGAUM, KARNATAKA

MAY 2013

ENDORSEMENT BY THE H.O.D, PRINCIPAL/HEAD OF THE INSTITUTION

This is to certify that the dissertation entitled **"VICRYL .VS. VICRYL RAPIDE FOR SUBCUTICULAR CLOSURE IN ELECTIVE ABDOMINAL SURGERIES: A RANDOMISED CONTROLLED TRIAL"** is a bonafide research work done by the candidate **REG NO. BH0110009**

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ABSTRACT

Background and Objectives

All suture materials are treated as foreign bodies and elicit a reaction in the tissues. The type of response, severity and duration of response depends on the type of suture material used. The choice of suture material is based on the concept that it should provide adequate tensile strength across the wound until tissue tensile strength has adequately developed, approximation of the epithelial portion has occurred and that the suture material should be absorbed after serving its function. The present study was undertaken to show that Vicryl Rapide is more suitable than original Vicryl for subcuticular skin closure in patients undergoing elective abdominal surgeries.

Methodology

The present one year randomised controlled trial was conducted in the Department of Surgery, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum during the period December 2010 to December 2011. A total of 192 patients were randomised into 2 groups (Group I – Vicryl, Group 2 – Vicryl Rapide). The patient received either original Vicryl or Vicryl Rapide for subcuticular skin closure. Post operatively the wounds were observed and scored according to the criteria. Analysis was done using Mann Whitney U-test to test for significance between the changes in wound scores between the 3rd and 7th post operative day.

Results

The change in wound scores between day 3 and day 7 were analysed using the Mann Whitney U-test. Analysis showed a statistically significant difference in the change in the wound score between the two groups ($p = 0.000002$).

Conclusion and Interpretation

Vicryl Rapide is more suitable than original Vicryl for subcuticular skin closure in elective abdominal surgeries.

Keywords

Sutures; Vicryl; Polyglactin 910; Abdominal wound closure

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Introduction

INTRODUCTION

A suture is defined as a biomaterial device, natural or synthetic, used to approximate tissues together following separation by surgery or trauma. It can also be used to denote the method used for mechanical wound closure. Although there are other methods for mechanical wound closure such as staples, tape and adhesives, sutures are the most widely used materials in wound closure.

The goals of wound closure include: Obliteration of dead space; even distribution of tension along deep suture lines; maintenance of tensile strength across the wound until tissue tensile strength is adequate and approximation of the epithelial portion of the closure.

Criteria of an ideal suture material: Easy handling property and good knotting quality; incites minimal tissue reaction; does not support bacterial growth, adequate tensile strength, non-allergenic; no carcinogenic action; easy to sterilise; absorbed after serving its function; easily available and cheap. No ideal suture material is available till date.

All suture materials are foreign to human tissue and may elicit a tissue reaction, such as an inflammatory response, that interferes with wound healing and increases the risk of infection. The duration and severity of the tissue response depends on the type of

suture used.

Suture material may be natural or synthetic. Natural fibres cause a more intense inflammatory reaction than synthetic material. Based on absorption, there are 2 main categories of sutures: Absorbable and Non-absorbable. An absorbable suture is defined as a suture that undergoes degradation and absorption in tissues. A non-absorbable suture is a suture that maintains its tensile strength and is resistant to absorption. Depending on the number of strands, sutures may be monofilament (single strand) or multifilament (multiple strands braided together).

Absorbable suture materials have been used in many operative procedures in general surgery, gynaecology, neurosurgery, eye surgery, dermatology, orthopaedic surgery. Absorbable sutures are broken down by the process of hydrolysis and not by enzymatic digestion, hence incite less tissue reaction.

The absorbable sutures most commonly used today are the synthetic sutures: Vicryl (polyglactin 910), Vicryl Rapide (Irradiated polyglactin 910), polyglycolic acid (Dexon), polydioxanone(PDS), polytrimethylene carbonate (Maxon). Catgut is less frequently used now, but does have some specific indications. In the early stages, absorbable sutures were used for deep sutures. However, with advances in research, absorbable sutures have been advocated for percutaneous closure of wounds in adults and children.

Objectives

OBJECTIVES

Vicryl Rapide provides wound support for 10 days. Vicryl on the other hand provides wound support for 30 days. Skin closure is complete by approximately 1 week. The aim is to study Vicryl Rapide and show that Vicryl Rapide is more suitable than Vicryl for subcuticular skin closure.

Review of Literature

REVIEW OF LITERATURE

Historical aspects

The 1st detailed description of a wound suture and suture materials used in it is described by Sushruta in Sushrita Samhita, written in 500 BC. Sutures were initially made from flax, hemp, bark fibre, or hair. Around 1300 BC original skin closure strips which were made of linen strips coated with adhesive mixture of honey and flour. [1] This was described in Egyptian literature.

A popular medical journalist, Aurelius Cornelius Celsus described in his text (De Re Medicina) that sutures were of ancient origin and should be "soft and not overtwisted, so that they may be more easy on the part". In his book, he also described the use of small metal clips similar to Michel clips used today in surgery.[1]

The ancient Greek physician Claudius Galen (131-211 BCE) was the first to describe chorda or gut string as suture material. In 150 AD, Galen of Pergamum in his book titled 'De Methodo Medendi, mentions the use of catgut in surgery, but makes it clear that it was already known in ancient civilisations.

Catgut is made from the twisted intestines of herbivorous animals. It is still commonly used in surgical practice. It accounts for nearly half the usage of all sutures and ligatures used in surgical procedures. In the 18th century it was discovered that catgut

was digested and absorbed by body enzymes. [1] This was the most important characteristic of catgut.

The word catgut originated from the word ‘kitgut’. [1] The kit was an early form of a musical instrument which was similar to the violin. It was used by ancients due to its strength and easily availability.

The 1st great Arab, Rhazes, started his life as a minstrel and a storyteller. Later in life, he turned to clinical medicine. He experimented on the use of catgut for suturing the abdomen.

Avicenna was known as the prince of physicians. He made significant contributions to suture development. Through his trials he realised that traditional materials like linen, broke down quite rapidly when used in the presence of gross infection in the tissues. In his search of a more suitable material, he turned to pigs’ bristles. This led to the invention of the 1st monofilament suture.[1]

Albucasis, born in 936 AD was undoubtedly considered as the prince of surgeons. He was the first to describe a double suture, a technique still being used.

The Frenchman, Ambroise Pare (1510-1590) described a method of dry suturing for wounds on the face. This method consisted of sticking strips of plaster down on each

side of the wound and then sewing the strips together. This indirect method of wound closure was more cosmetic. He also used fine linen strips and silk for vascular ligatures.

John Hunter (1728-93) thought that sutures were undesirable, but if needed, they should be interrupted sutures. For wound closure he preferred to use bandage or sticking plaster across the wound. Based on Hunter's preference for adhesive strips to help in wound closure, Physick experimented with adhesive strips made of leather. Physick noticed that these strips were dissolved after contact with fluids discharged from the wounds. It occurred to him that ligatures would be of great benefit if they eventually dissolved in the body.[1]

Buckskin and silver wire were developed in the 18th century.

In 1867, Joseph Lister had formulated and published his work. Joseph Lister introduced the 1st catgut suture sterilised with carbolic acid in 1860.[1] Chemical modifications were effected on catgut during the 19th century. Lister's research was not limited to antisepsis. In 1869, he published an article 'Observations of Ligature of Arteries on the Antiseptic System'.

Lister was aware of Physick's work and had noticed that fragments of glass or needles that were inadvertently left in a wound did not give rise to infection. He felt that

harmful bacteria must be lodged within the interstices of the silk fibres and if they could be killed, a ligature could be left in the body. Lister made one more important contribution to the manufacture of surgical catgut. In an attempt to delay the absorption of catgut so that wound and blood vessels would have more time to heal safely, he introduced the use of chromic acid on catgut.[1] This was based on the use of chromic acid to tan leather in the leather industry.

In the early 19th century, many methods of sterilisation were used. However, for nearly half a century, iodine sterilisation discovered by Claudius in 1902 was followed as a standard method. Irradiation using cobalt 60 isotope was introduced in 1960. This allowed sutures to be sealed in the package and then sterilised [2], eliminating the dangers and difficulties of aseptic transfers. This in turn led to many improvements in packaging of suture materials.

Linen and cotton were already in common use in surgery. In the non absorbable group, silk was the next choice of suture material. Due to excellent handling properties, it gained popularity. Silk was extensively used in cardiovascular surgery. Its main proponent was Halsted [2]. These natural non absorbable sutures had some disadvantages.

Polyamide and polyester were introduced with advances in suture technology. They replaced the other non absorbable sutures in many surgical procedures. Polyester was

made available as braided, coated and non-coated varieties. Today, polyester is also available as a monofilament suture in a range of fine sizes. Monofilament polypropylene was introduced into surgical practice after carrying out further research. Polypropylene is a strong suture material. It meets many of the criteria of an ideal suture material. It is extensively used today in surgical practice and has almost entirely replaced silk, cotton and linen.

The sterilisation techniques have also improved along with advances in suture technology. Sterilisation with cobalt 60 and ethylene oxide is now the method of choice.[2]

In 1931, the 1st absorbable synthetic fibre, polyvinyl alcohol was developed. This marked the start of the era of development of synthetic absorbable sutures.[2] Later in the 1960s, it was discovered that polyglycolic acid could be processed into an absorbable suture with very favourable properties.

In 1970, the 1st suture made from polyglycolic acid was introduced into clinical practice. Subsequently, a combination of glycolide and lactide led to the development of a suture known as polyglactin 910.[2] This was also known as Vicryl (Polyglycolide-L lactide). Later this was coated to make it smooth. Dexon (PGA) also known as Polyglycolide , was also discovered in the 1970s.

In the 1980s, further research resulted in the development of Polydioxanone (PDS), Polyglactin 910 Vicryl Rapide, Vicryl Plus and Polyglecaprone 25. PDS was further improved to PDS III.

These sutures materials provide wound support for different periods - short, medium, and long term. The suture material is selected based on the rate of wound healing in the particular tissue.[2]

Suture technology and sterilisation have kept pace with the latest techniques in surgery.

The implantation of biomaterials initiates both an inflammatory reaction to injury as well as processes to induce healing. A basic consideration of the biology of wound healing is important in suture selection. The healing process occurs when there is no infection, minimal oedema and fluid discharge. The healing of wounds is a complex dynamic process that can be divided into phases.[3]

Phase I: Lag phase. It involves an inflammatory response over 1-5 days that induces an outpouring of tissue fluids into the wound, an increased blood supply and cellular and fibroblast proliferation.

Phase II: Phase of fibroplasia. From day 5 to 14. There is increased collagen formation and deposition in the wound, together with formation of fibrin and fibronectin through fibroblastic activity. Wound closure and contraction commences. The phase of fibroplasias is a time when rapid gain in wound strength takes place. Skin approximation is usually complete by the time maturation begins.

Phase III: Phase of maturation. From day 14 till wound healing is complete. This is a phase of connective tissue remodelling and moulding. There is reorganisation and maturation (cross- linking) of collagen fibres together with deposition of fibrous connective tissue, the latter resulting in scar formation.

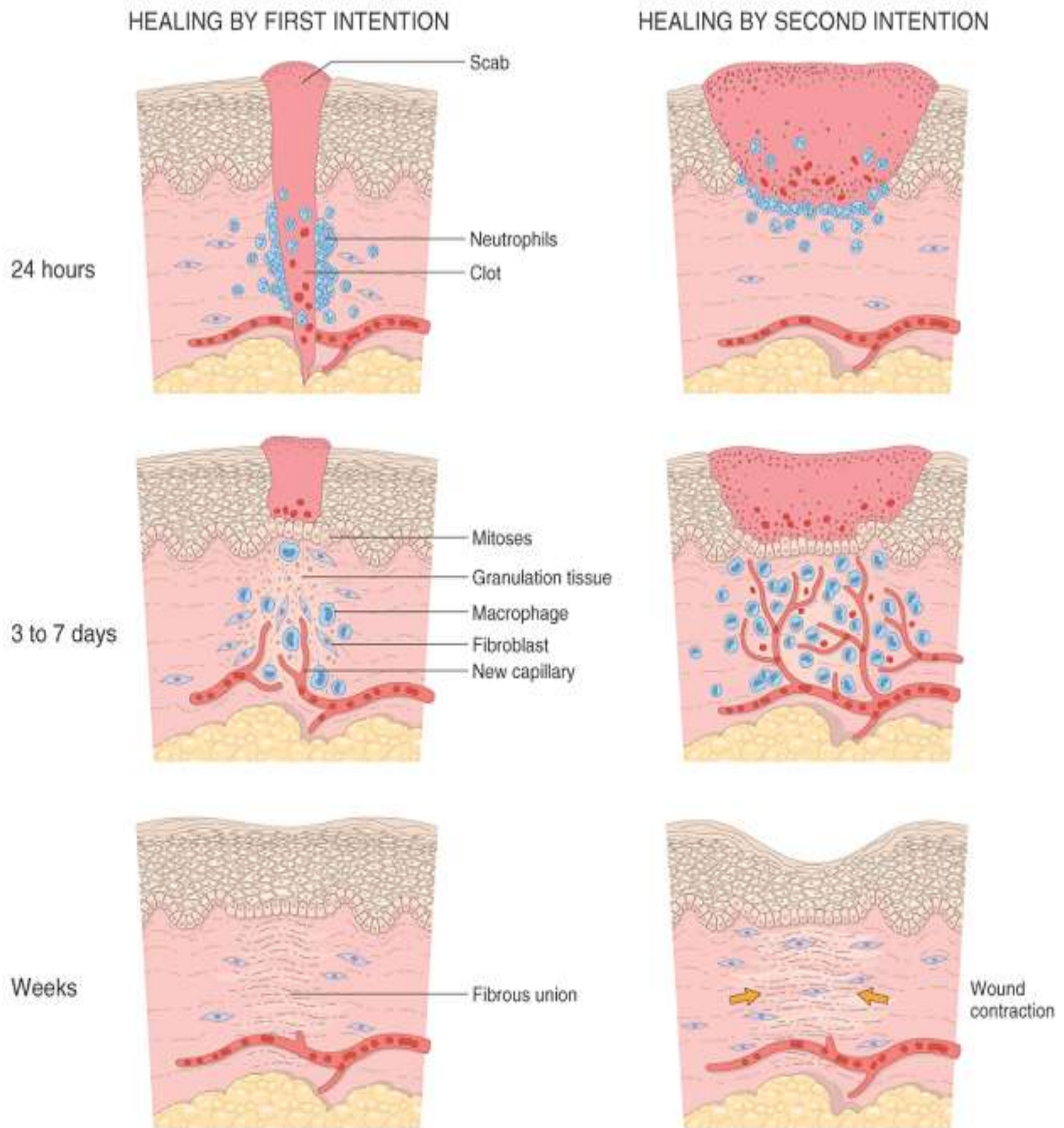


Figure 1

For skin approximation, only short term wound support is required and rapid absorption of suture material is beneficial. Skin approximation provides the strength and alignment of skin closure.[4] The time required for skin approximation after suturing is approximately 5-7 days. Subcutaneous tissue closed by suturing heals in approximately 7-14 days.[5]

The main goal of subcuticular closure is to maintain adequate tensile strength across the wound until the tissue tensile strength is adequate for wound support.[4] It is known that all suture materials are treated as foreign bodies and will elicit tissue reaction.[5]

Both the suture materials (Vicryl and Vicryl Rapide) are known to cause inflammation at the operative site in the post-operative period.[5]

The outcomes for some studies conducted using Vicryl and Vicryl Rapide (for non abdominal conditions) showed both to be equally efficacious whereas some showed one suture material to be superior to the other.[6]

Al-Qattan et al (2005) [7] conducted a study comparing the use of Vicryl and Vicryl Rapide for skin closure in paediatric patients who underwent elective surgery for trigger digit release, syndactyly and contracture release. The findings were that original Vicryl was associated with more inflammatory reaction to sutures with purulent discharge and there were no such problems in patients who received Vicryl Rapide. The difference in this case was statistically significant.

McElhinney et al (2000) [8] compared the use of Vicryl and Vicryl Rapide for subcuticular perineal closure in episiotomy wounds. The outcome of the study was that use of Vicryl Rapide resulted in smaller percentage of patients with post operative inflammation, wound infection, gaping and post operative pain. Similar results were obtained in a study conducted by Wong T et al (2002). [9]

In a study conducted by Dimitri A et al (1999) [10], comparison was made between traditional polyglactin 910 and irradiated polyglactin 910 in wound closed for intra-oral wounds (osteotomy) and skin of scalp wounds. The conclusion from the study was that irradiated polyglactin 910 (Vicryl Rapide) caused little post operative inflammation and associated with negligible pain.

Cremers et al (2007) [11] conducted a study comparing Vicryl Rapide with original Vicryl in patients undergoing apicoectomy. The conclusion of the study was that Vicryl Rapide did not yield any significant improvement in terms of post operative tissue response, wound healing, post-op pain and discomfort.

Limited studies have been conducted on use of Vicryl or Vicryl Rapide for subcuticular skin closure in elective abdominal surgeries.

CLASSIFICATION OF SUTURES

There are 3 main classifications of suture materials.[2]

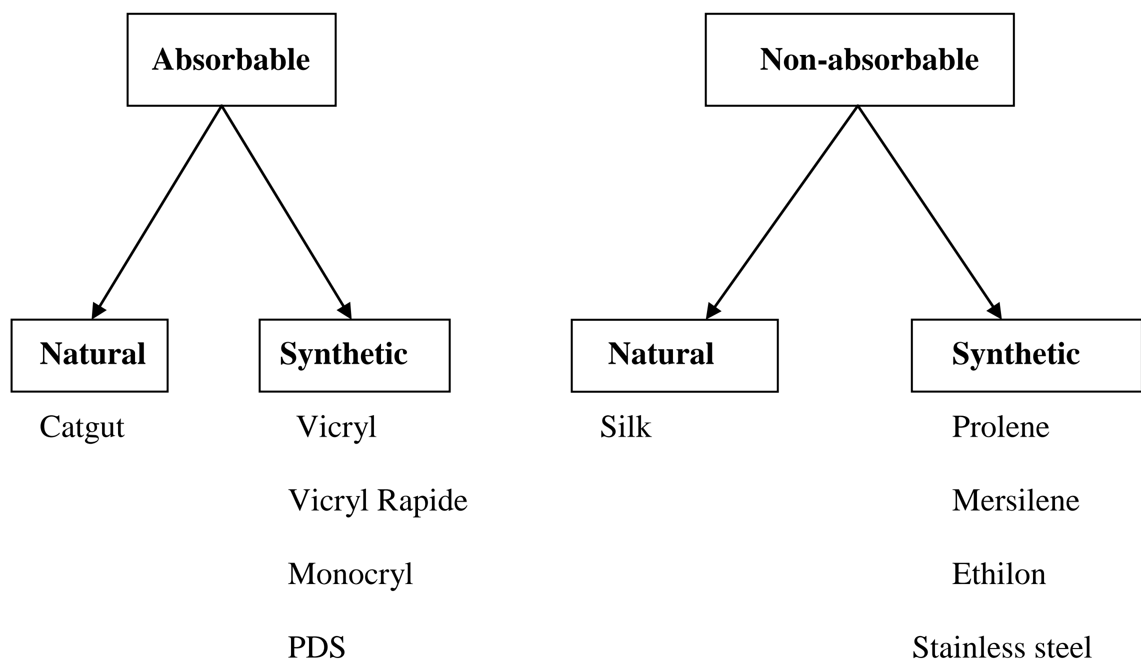
1) Based on no. of strands:

   Monofilament - Plain catgut, chromic catgut, Maxon, PDS, Monocryl, Ethilon (Nylon), Prolene (polypropylene)

   Multifilament – Vicryl (Polyglactin 910), Vicryl Rapide, Vicryl plus, Dexon (polyglycolic suture), Silk, Mersilene (Braided polyester)

2) Based on source: **Natural** or **Synthetic**

3) Based on absorption: **Absorbable** or **Non-absorbable**



COMPOSITION OF POLYGLACTIN 910

Polyglactin 910 is made up of **90% Polyglycolic acid** and **10% Lactic acid**. Both Vicryl and Vicryl Rapide have a coating of **Poly (glycolide-co-L-lactide) (Polyglactin 370)** and **calcium stearate**.[12]

The coating allows smooth passage through tissues, precise knot placement, smooth tie down, a decreased tendency to irritate the tissue and therefore minimal tissue drag.

Chemical formula:

STEPS OF SYNTHESIS OF POLYGLACTIN 910

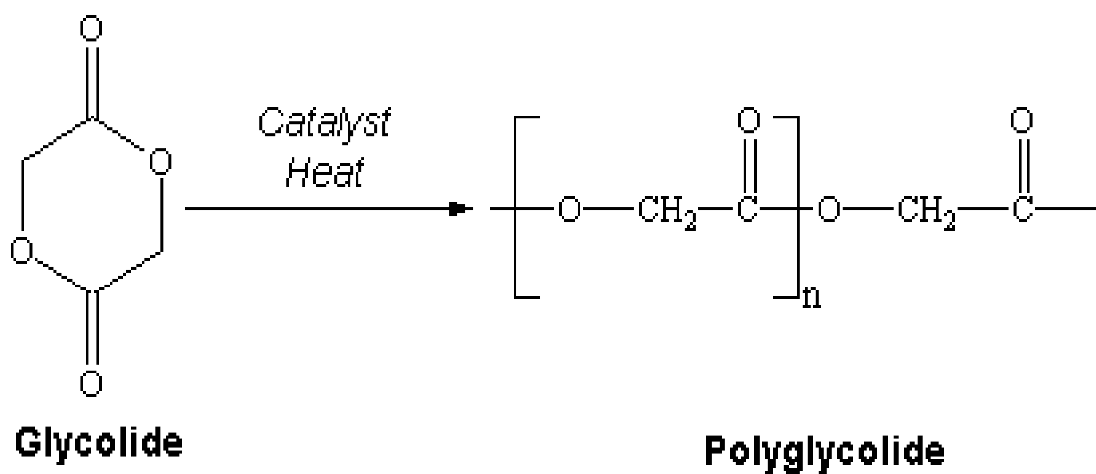


Figure 2

SYNTHESIS AND DEGRADATION OF POLYGLYCOLIDE: [12]

Ring opening polymerisation of glycolide by heating of **glycolic acid (glycolide)** in the presence of a catalyst. Polyglycolides are examples of linear aliphatic **poly (α-esters)**. They are thermoplastic polymers with hydrolytically labile aliphatic ester linkages in their backbone. The reasonably short hydrophilic aliphatic chains between ester linkages allow the macromolecule to undergo hydrolytic degradation over the time frame required for suture materials.

The absorption of water into the interior of PGA initiates hydrolytic fragmentation followed by reduction of mechanical properties. The breakdown products are α-hydroxyacids which are ultimately metabolised in human body. The factors that control the rate of hydrolysis are temperature, molecular structure, crystallinity and ester group density.

Hydrolytic degradation occurs in a step wise manner: Firstly, diffusion of water into the amorphous regions of the polymer results in cleavage of the ester bonds. After erosion of the amorphous portion, the crystalline portion is susceptible to hydrolytic attack. Upon collapse of the crystalline regions, the polymer chain dissolves. The degradation of PGA is faster than PLA. Glycolate generated during degradation is either excreted directly in urine or is oxidised to glyoxylate that gets converted to glycine, serine, and pyruvate.

PGA is a highly crystalline compound. PGA shows excellent mechanical properties due to its high crystallinity. Fibres of PGA exhibit high strength and modulus of 12.5 GPa.

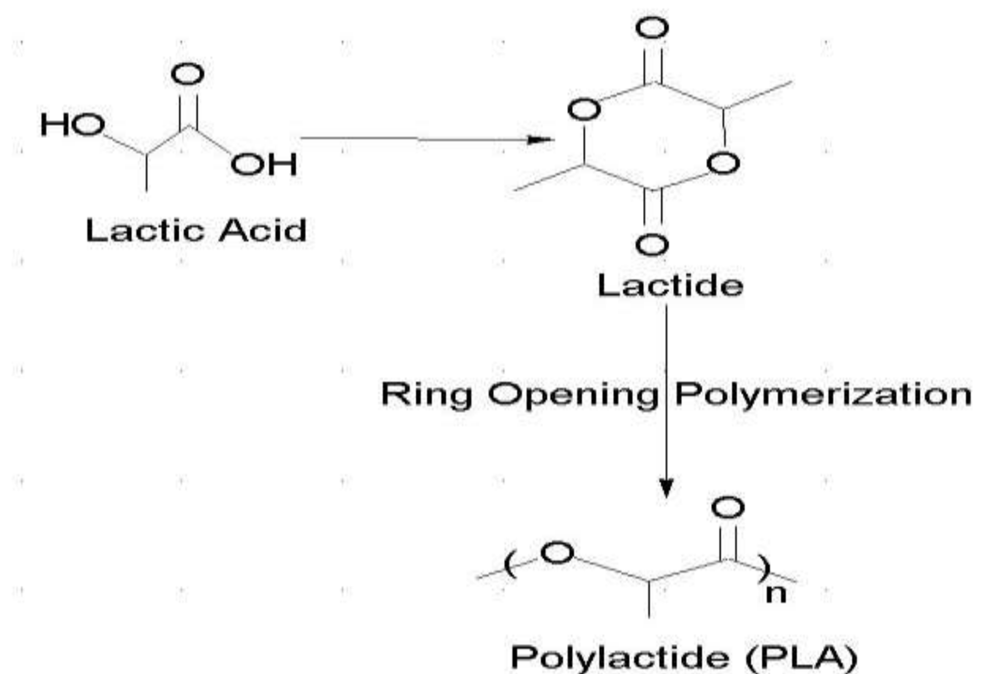


Figure 3

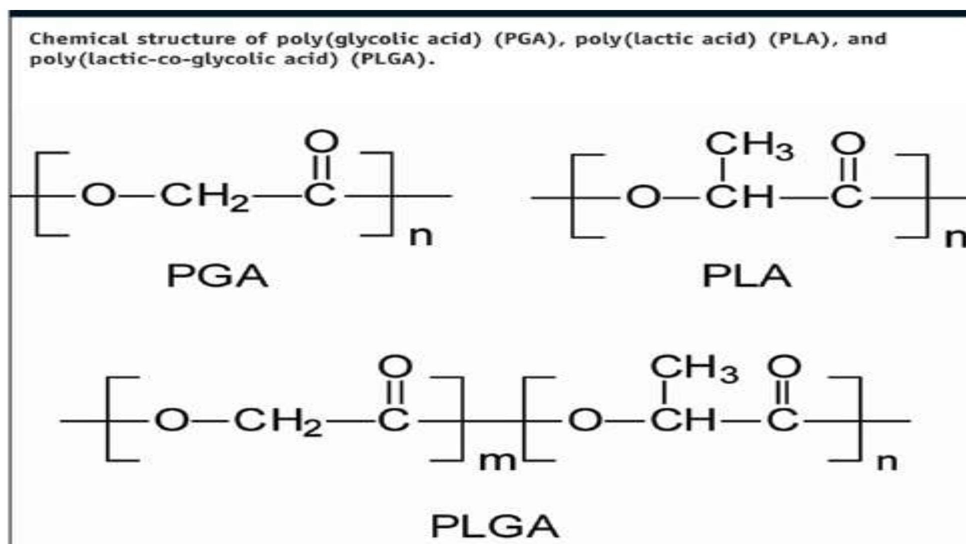
<u>SYNTHESIS AND DEGRADATION OF POLYLACTIDE:</u> [12]

Ring opening polymerisation of the cyclic diester of lactic acid, lactide. The reaction is catalysed by heat and a catalyst (**Stannous octate**).

Polylactides are characterised by their inherent biodegradability and biocompatibility with high mechanical strength. They have a high hydrophobic behaviour resulting in poor water uptake and a slow hydrolytic degradation rate.

Due to the chiral nature of lactic acid, several distinct forms of polylactide exist. **Poly-L-lactide** is the product resulting from polymerisation of L-lactide. Polymerisation of a racemic mixture of L and D-lactides usually leads to the synthesis of Poly-DL-lactide which is not crystalline but amorphous. Co-polymerisation of L-lactide with other co-monomers is used to modify the properties of PLA and to control its degradation behaviour suitable for the specific applications.

<u>SYNTHESIS AND DEGRADATION OF PLGA:</u> **Figure 4**



Polymerisation of polyglycolide and polylactide. The reaction is catalysed by heat and **stannous octate – Sn (Oct)$_2$.** [12]

Depending on the proportions of glycolide and lactide, different forms of PLGA can be obtained. All PLGA are amorphous.

The co-polymer undergoes degradation by **hydrolysis** of the ester bonds. The rate of degradation depends on a variety of factors: Lactide: Glycolide ratio, molecular weight, shape and structure of the matrix. The degradation products are lactic acid and glycolic acid. Both the degradation products are by-products of various metabolic pathways of the body and so cause very minimal systemic toxicity.

Resistance to hydrolytic degradation is more pronounced at either end of co-polymer composition. A co-polymer consisting of equal proportions of glycolide and lactide degrades faster than either homopolymer.

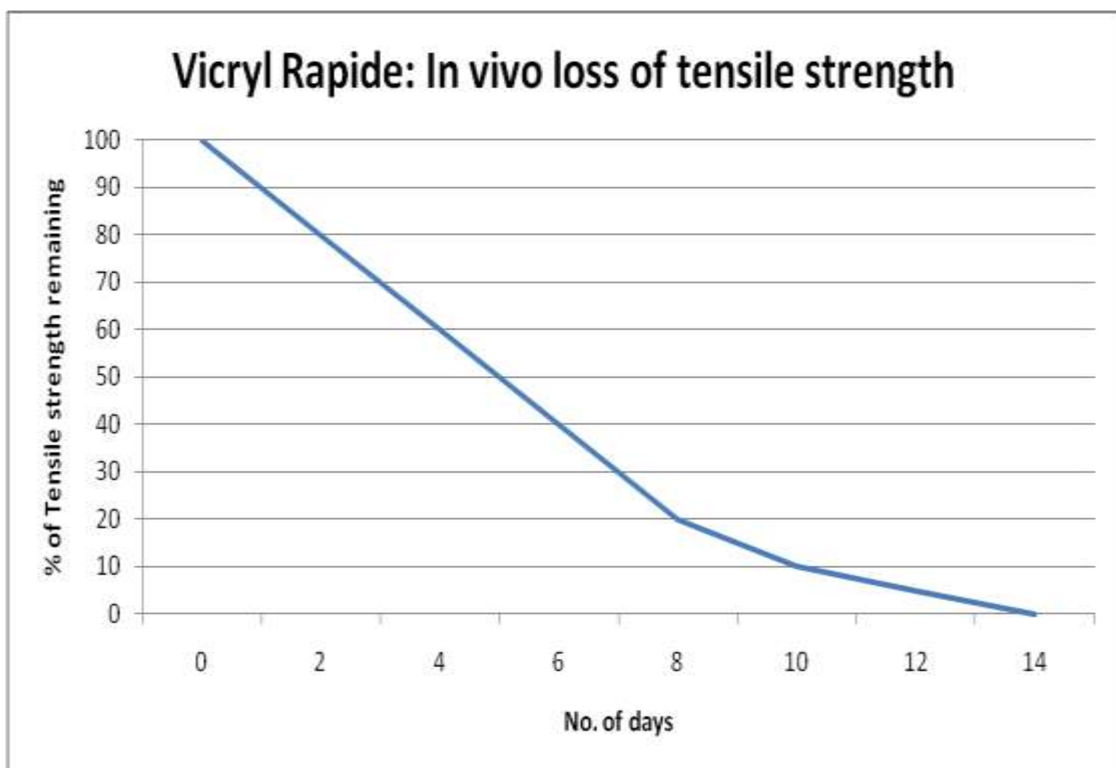
COMPARISON OF VICRYL AND VICRYL RAPIDE

	Vicryl	**Vicryl Rapide**
Source	Synthetic	Synthetic
Filaments	Multifilament	Multifilament
Absorption	Absorbable	Absorbable
Molecular weight	Higher M.W	Lower M.W compared to Vicryl
Inflammation	More	Less compared to Vicryl
Wound support	30 days	10 days
Tensile strength	65% at 2 weeks 40% at 3 weeks	50% at 5 days 0% at 2 weeks
Mass absorption	56-70 days	approx. 42 days
Colour	Dyed	Undyed

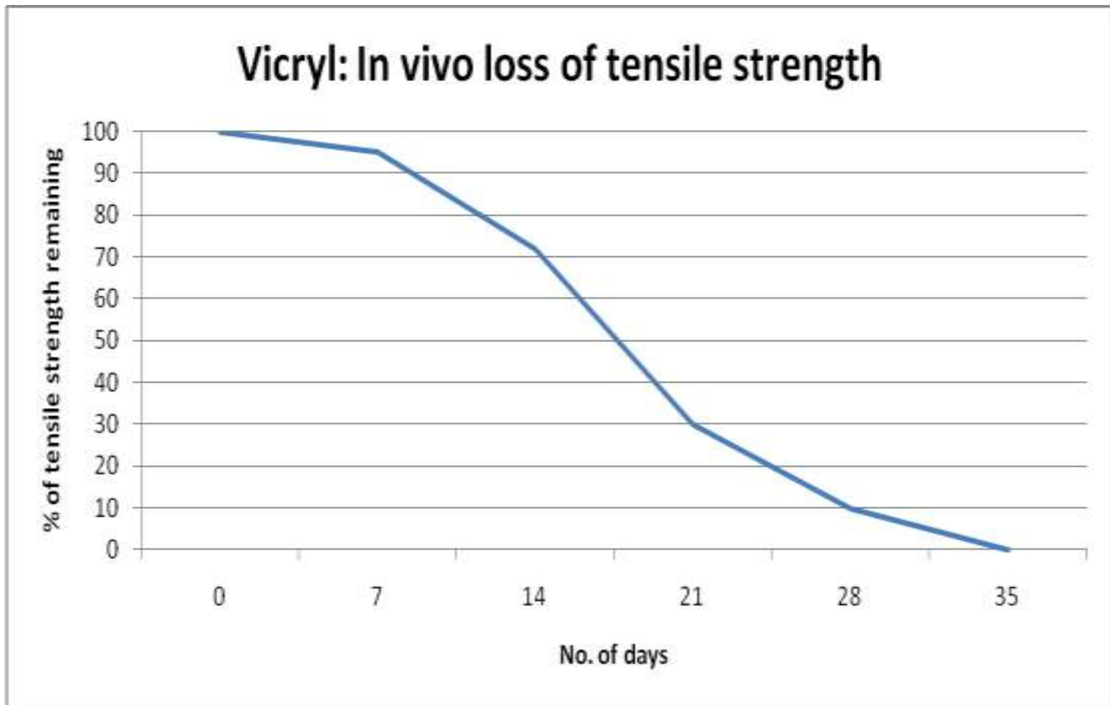
Table 1

Both Vicryl and Vicryl Rapide are coated with a 50:50 mixture of amorphous **polyglactin 370** (65:35 mole ratio of PLGA polymer) and **calcium stearate**. [12]

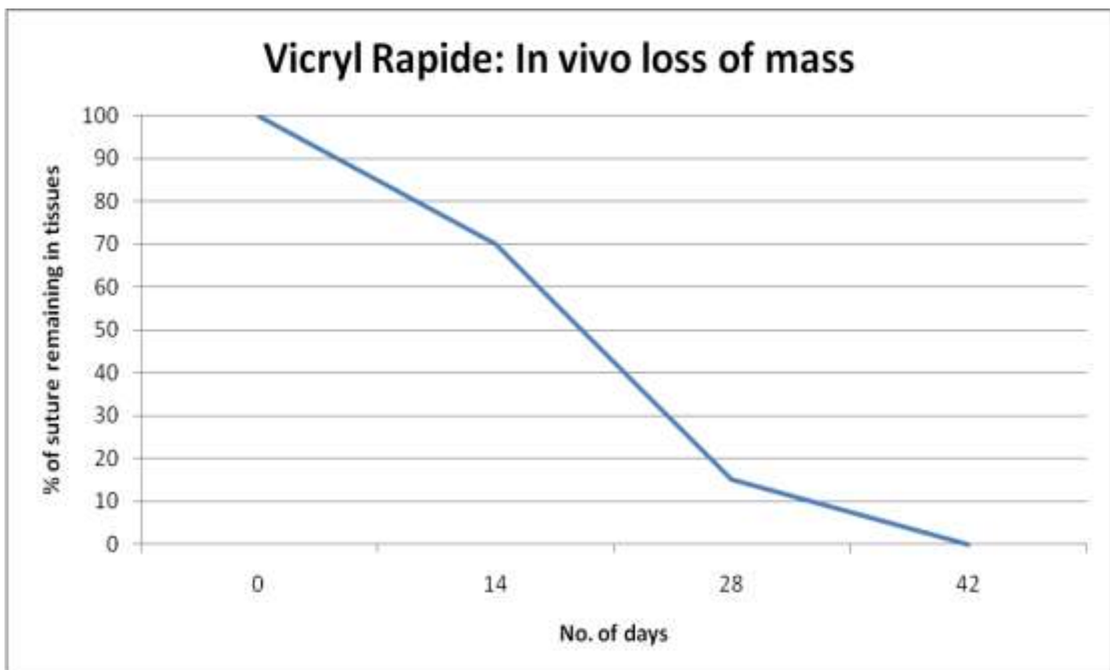
Vicryl Rapide is derived from the original Vicryl that is partially hydrolysed in a buffer solution and irradiated with gamma radiation during the manufacturing process. This exposure to gamma radiation during manufacturing alters the molecular structure and results in Vicryl Rapide having a lower molecular weight which in turn speeds up its absorption in vivo. [12]



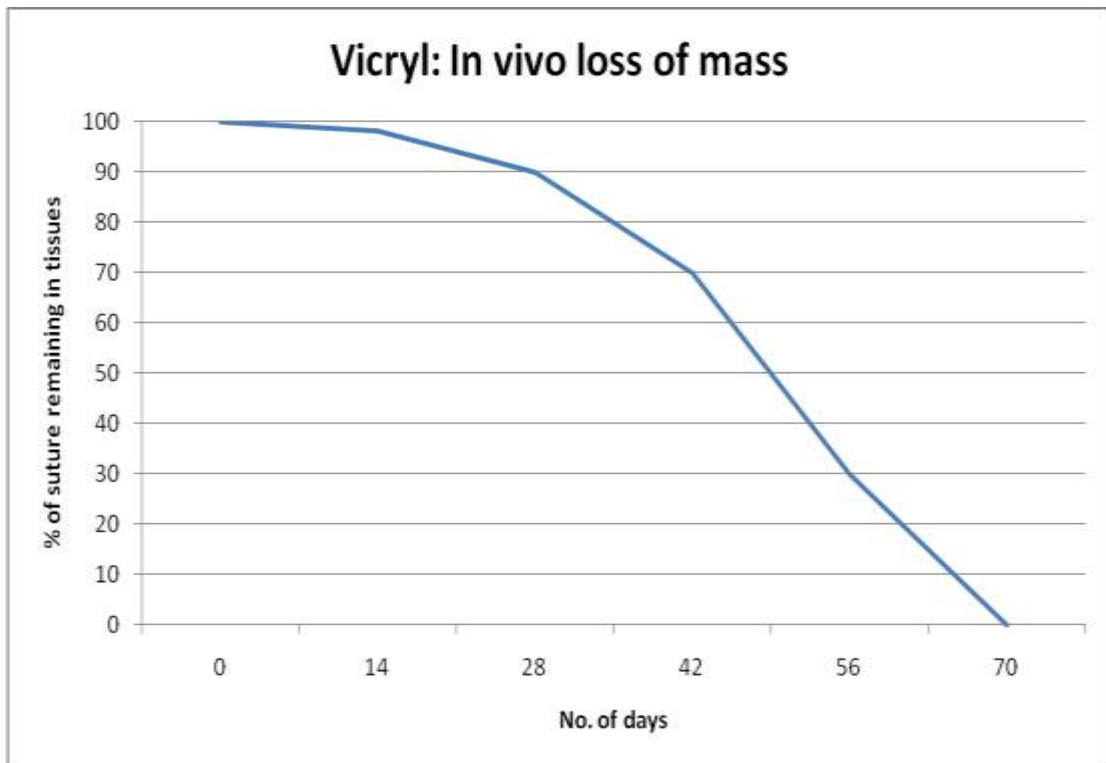
Graph 1



Graph 2



Graph 3



Graph 4

Methodology

METHODOLOGY

Source of data: Patients undergoing elective abdominal surgeries at KLES Prabhakar Kore Hospital and MRC, Belgaum.

Duration of data collection: From December 2010 to December 2011

Study design: A randomised controlled trial

Sample size: 192 (96 subjects in each group)

2 groups: A - Vicryl B - Vicryl Rapide

Informed consent was obtained from the patient prior to inclusion in the study

Inclusion criteria: Elective clean abdominal surgeries

Exclusion criteria: Hb<10 gm%, diabetes, retroviral illness

Systemic illnesses like uraemia, jaundice, malignancy,

Chronic liver diseases, kidney diseases,

H/o steroid intake, recurrent cases.

Randomisation: Envelope method. Equal number of labels A (96) and B (96) were randomly placed in 192 envelopes. The patients were asked to pick up an envelope from the basket. The number of the participant was labelled on the envelope. The envelope was opened only at the time of surgery and the suture material according to the label code was used. The suturing was done by one surgeon and the post-operative observation was done by another person in order to ensure double blinding.

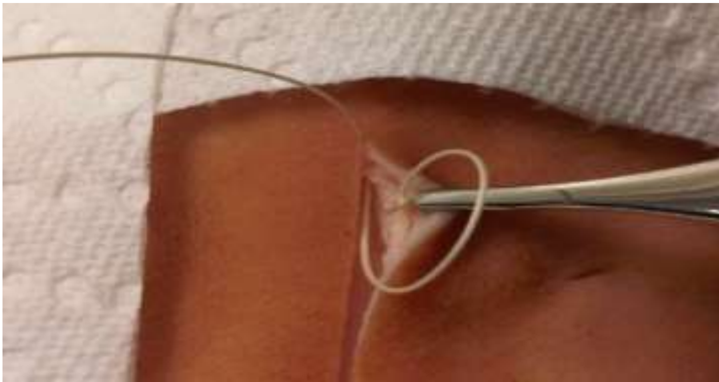
Details of surgical procedure: Subcuticular skin closure at the end of the surgery was done using either 2-0 Vicryl or 2-0 Vicryl Rapide with cutting needle.

Post-operative period: Post-operatively the wound was inspected on day 3, 5, 7 and again 3 weeks after surgery. Dressing was done using clean dry gauze. At each wound inspection, the following features are looked for: Erythema of skin, oedema, tenderness, local rise of temperature, sinus formation, purulent discharge, abscess formation and wound gaping.

The patient was discharged after wound inspection on post-operative day 7. Wound was again inspected at the end of 3 weeks.

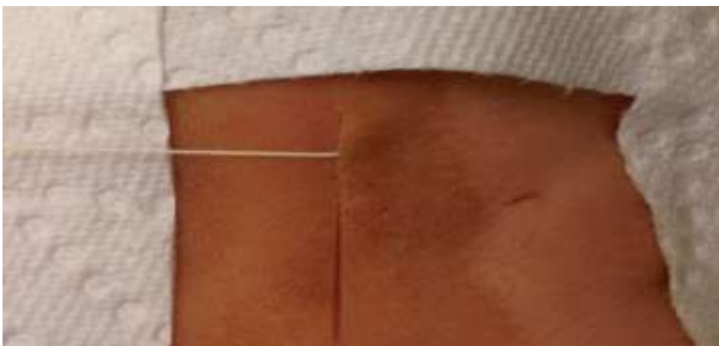
At each wound inspection, the findings were recorded on the observation chart.

SUBCUTICULAR SUTURE TECHNIQUE

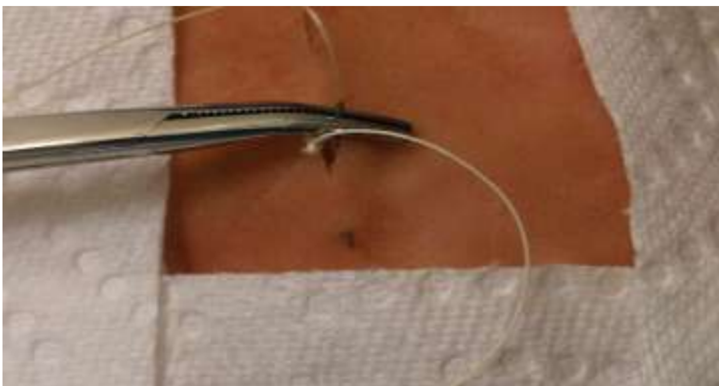


Photograph 1

The suture is secured at one end of the incised. The same plane is maintained throughout the entire length of the incised wound.



Horizontal "mirror image" bites are taken along the length of the incised wound. The suture is tightened after each pair of bites.



At the end of the incised wound a bite is taken through the adjoining skin and the suture is buried.

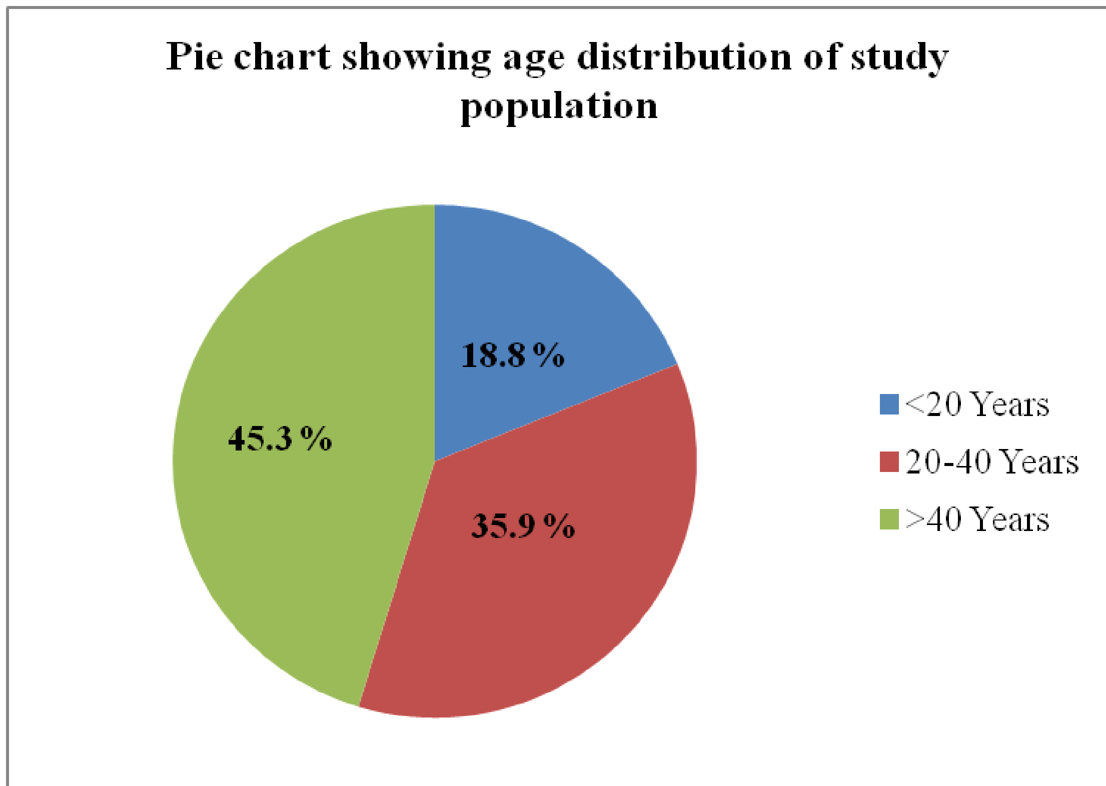
Results

RESULTS

The present one year randomised controlled trial was conducted in the Department of Surgery, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum during the year December 2010 to December 2011. Data obtained was tabulated and analysed below

Table 2. Age distribution (n = 192)

Age group	Number	Percentage
<20 Years	36	18.8
20-40 Years	69	35.9
>40 Years	87	45.3
Total	**192**	**100**

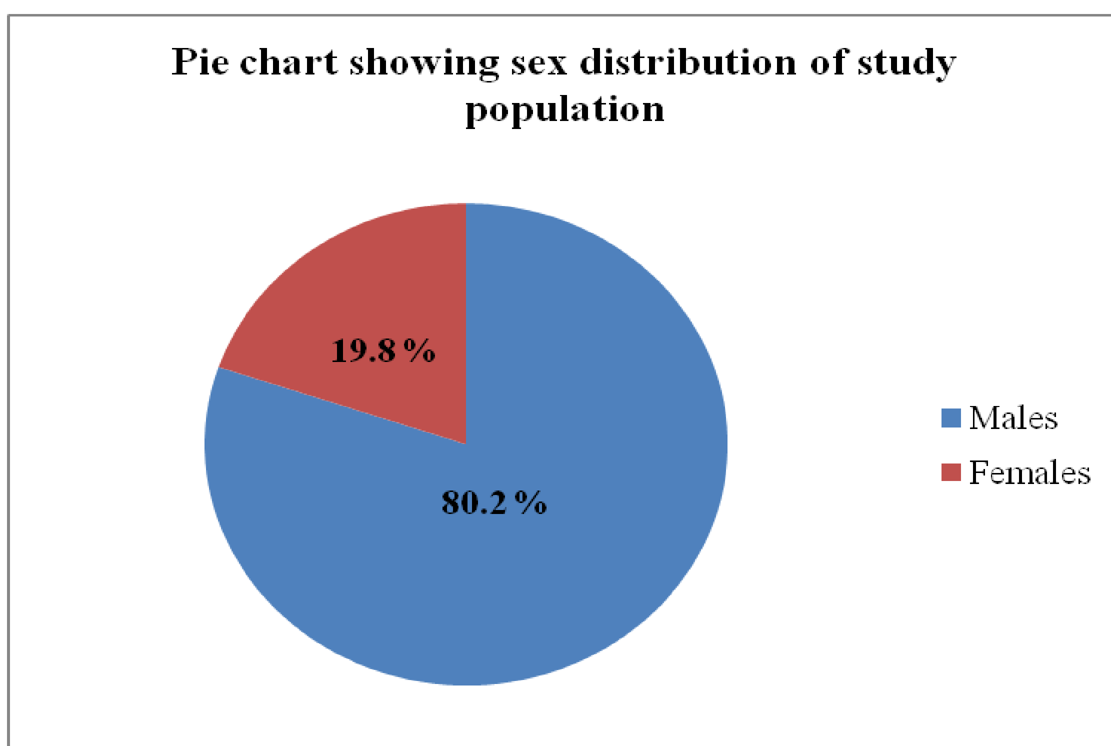


Graph 5

Graph 5 shows the age distribution of the study population. The pie chart shows that the majority were in the 20 – 40 years and 40+ years age groups. 18.8 % were in the below 20 years age group.

Table 3. Sex distribution

Sex	Number	Percentage
Male	154	80.2
Female	38	19.8
Total	**192**	**100**

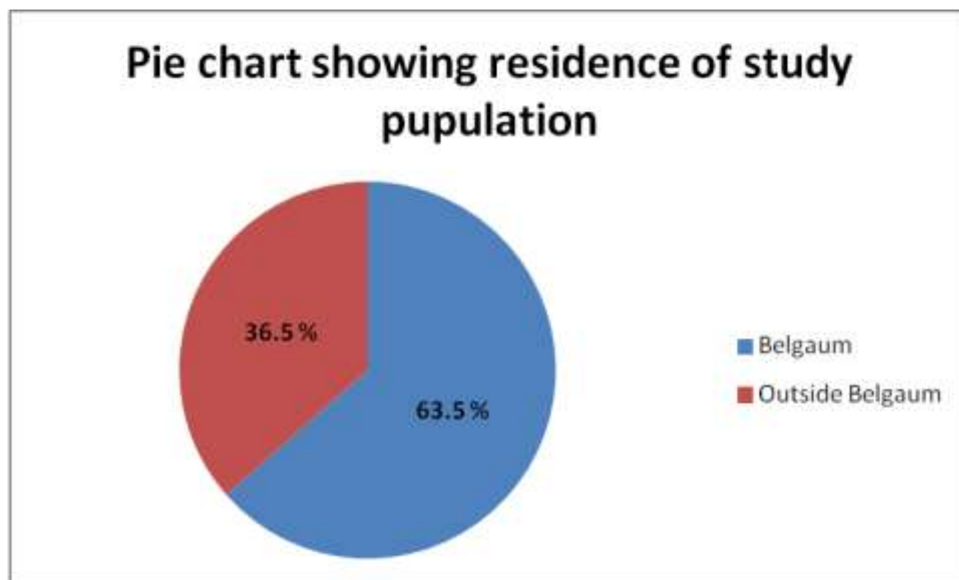


Graph 6

Graph 6 shows the sex distribution of the study population. The pie chart shows that 4/5 of the study population were males and the remaining 1/5 were females.

Table 4. Residency

Residence	Number	Percentage
Belgaum	122	63.5
Outside Belgaum	70	36.5
Total	**192**	**100**

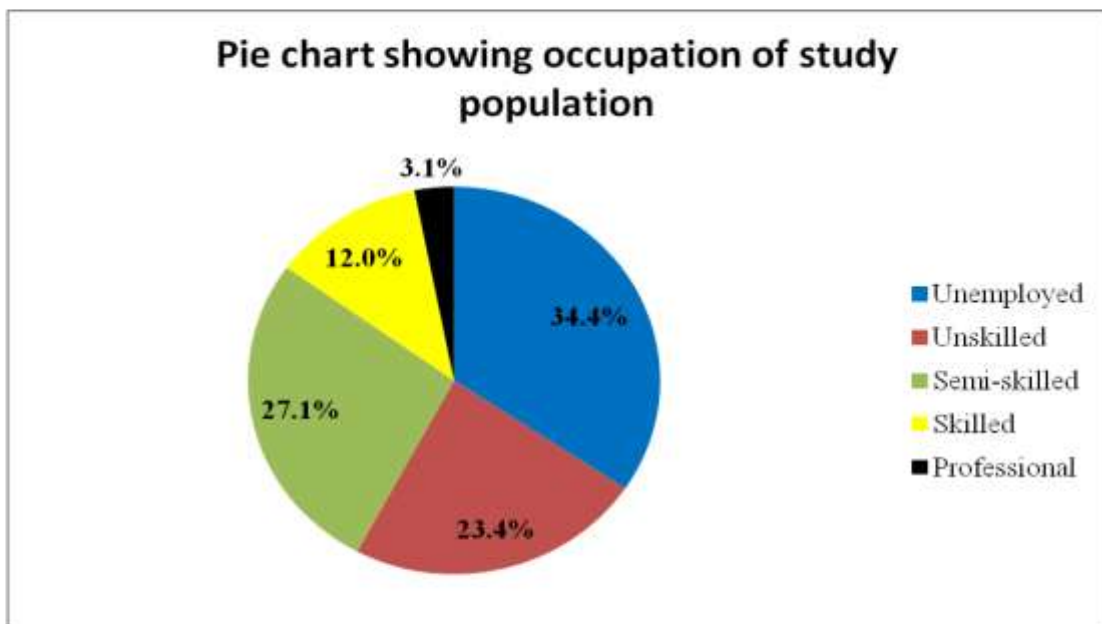


Graph 7

Graph 7 shows the residence of the study population. The bar chart shows that close to 2/3 were from belgaum and nearby areas whereas the remaining 1/3 were from other towns/cities in karnataka.

Table 5. Occupancy of study population

Occupation	Number	Percentage
Unemployed	66	34.4
Unskilled	45	23.4
Semi-skilled	52	27.1
Skilled	23	12
Professional	6	3.1
Total	**192**	**100**

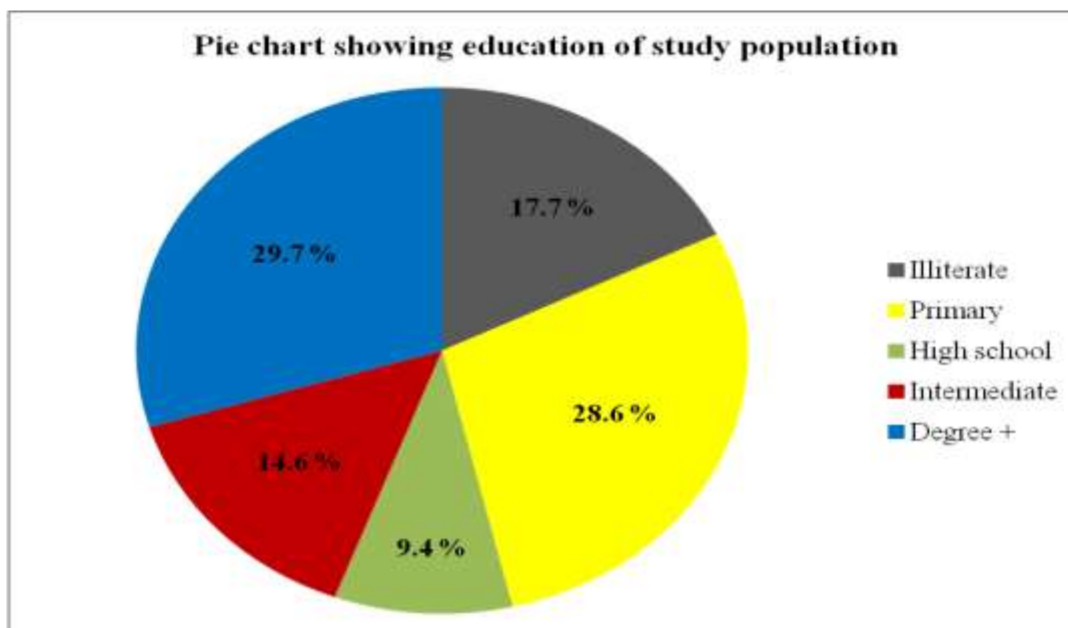


Graph 8

Graph 8 shows the occupation of the study population. The bar chart and pie chart show that majority of the study population were unemployed (just over 1/3), 23.4% were involved in unskilled labour and 27.1% in semi-skilled jobs. A small percentage (12%) were skilled workers and a very small percentage (3.1%) were in professional jobs.

Table 6. Literacy of study population

Education	Number	Percentage
Illiterate	34	17.7
Primary	55	28.6
High school	18	9.4
Intermediate	28	14.6
Degree +	57	29.7
Total	**192**	**100**

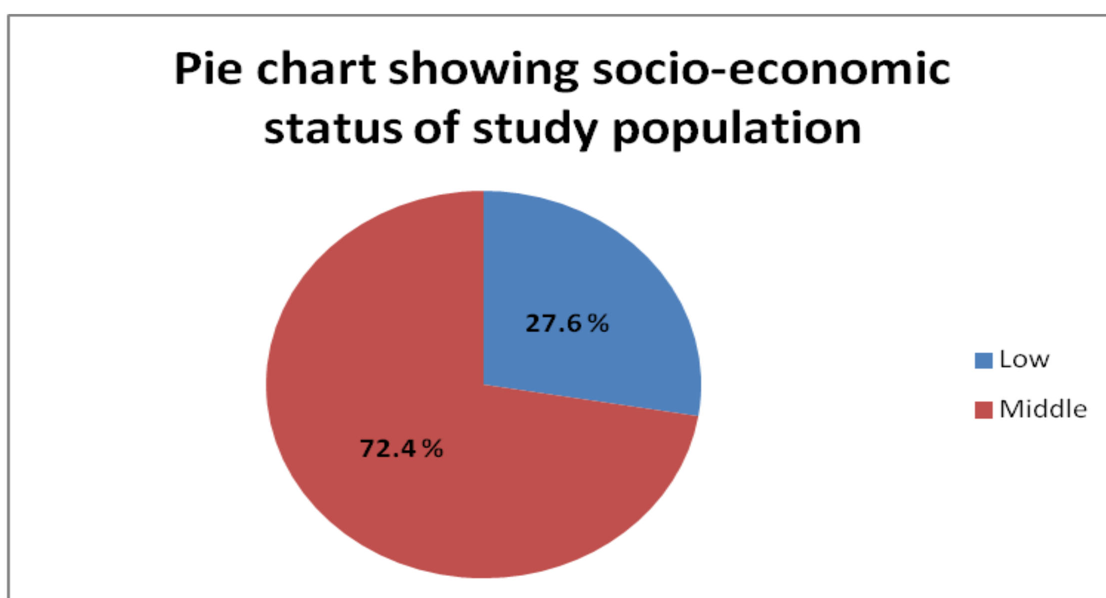


Graph 9

Graph 9 shows the education status of the study population. The pie chart show that 17.7 % of study population were illiterate. 28.6 % were educated upto primary school level. Rougly 10 % were educated upto high school level. Approximately 15% were educated upto intermediate level. Close to 30% were educated upto degree level or above.

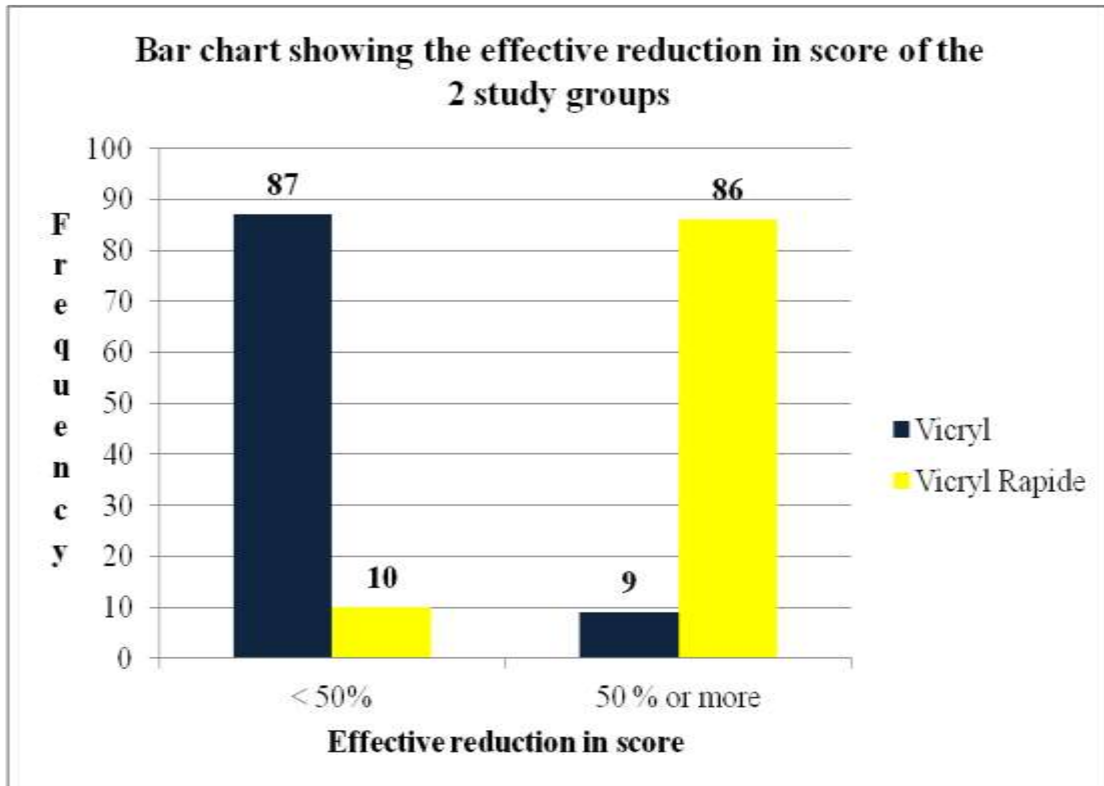
Table 7. Socio-economic status of study population

Class	Number	Percentage
Low	53	27.6
Middle	139	72.4
High	0	0
Total	**192**	**100**



Graph 10

Graph 10 shows the social class of the study population. The barchart shows that the majority (72.4%) were in the middle income group and the remaining (27.6%) were in the low income group.



Graph 11

Graph 11 shows that for the Vicryl Rapide group majority of the subjects (86/96) had a wound score reduction of 50 % or more. For the Vicryl group, 87/96 had a wound score redcution of 50% or less.

Analysis and Discussion

STATISTICAL ANALYSIS

A statistical analysis of the patients admitted for elective abdominal surgeries during the period Nov. 2010 to January 2012 at KLE Prabhakar Kore Hospital was done. Brief account of the analysis is given below.

Statistical analysis was done using the non-parametric test, Mann-Whitney U-test.

Mann-Whitney U-test

The test comprises a number of variables as defined below.

$\mathbf{n_1}$ = No. of patients in group 1

$\mathbf{n_2}$ = No. of patients in group 2

$$m_U = \frac{n_1 n_2}{2} = \text{Mean of U}$$

$\mathbf{R_1}$ = Sum of ranks of group 1 (V)

$\mathbf{R_2}$ = Sum of ranks of group 2 (VR)

$$U_1 = R_1 - \frac{n_1(n_1 + 1)}{2}$$

$$U_1 + U_2 = n_1 n_2$$

$$U_2 = R_2 - \frac{n_2(n_2 + 1)}{2}$$

$$z = \frac{U - m_U}{\sigma}$$

Steps of calculation (www.vassarstats.net)

1. First of all the changes in score in both the groups are listed and ranked.
2. The mean of the ranks is calculated.
3. The sum of the ranks is calculated for each group.
4. The value of U is calculated for each group using the formula given above.
5. The smallest value of U is used for calculation of significance
6. The value of the standard deviation (**σ**) of U is calculated
7. Assuming that the value of U is normally distributed, the value of **z** is calculated
8. The value of P is calulated

Change in score	V (Sum of ranks)	VR (Sum of ranks)
Sum of ranks	12906.5	5621.5
U value	965.5	8250.5
Mean of sum of ranks	134.44	58.56

Table 8

$\mathbf{m_U}$ = 4608

σ = 384.99870129651

z = -9.461070875651

Value of P = 0.000002

Value of P <0.001. Therefore the difference between the 2 groups is statistically significant. This shows that Vicryl Rapide (VR) was superior to Vicryl (V).

Critical Values of ±z				
Level of Significance for a Directional Test				
.05	**.025**	**.01**	**.005**	**.0005**
Non-Directional Test				
--	**.05**	**.02**	**.01**	**.001**
$z_{critical}$				
1.645	1.960	2.326	2.576	3.291

Discussion

Sutures are used to facilitate the process of wound healing by 1) closing dead space within wound 2) supporting wounds until their tensile strength is increased 3) approximating skin edges.

Sutures initiate a foreign body response (i.e tissue reaction). The initial tissue reaction is attributed to the injury inflicted by the passage of suture and needle and reaction to the suture material itself. The reaction of living tissue to injury or foreign bodies is called inflammation. The inflammatory response usually peaks between 2 to 7 days after implantation.

The longer a suture mass stays in the human body, the more likely it is to produce undesirable tissue reactions. An ideal suture should retain enough tensile strength during wound healing period, and its mass should be absorbed as soon as possible without overloading the metabolic capacity of surrounding tissue once the suture is no longer functional.

Prolonged inflammation due to presence of suture material leads to several complications:

1) Delayed wound healing 2) Infection

3) Softening of sutured tissue increasing the likelihood of cutting through of sutures and resulting in wound gaping.

We studied 192 patients who underwent elective abdominal surgeries during the period November 2010 to January 2012 in the department of surgery at KLE Prabhakar Kore Hospital. 96 cases were sutured with original vicryl (polyglactin 910) and the other 96 were sutured with vicryl rapide (irradiated polyglactin 910).

Serour et al (1996) [13] investigated the utility of subcuticular skin closure using original vicryl in children undergpoing emergency appendicectomy. 216 children underwent emergency appendicectomy (in v/o phlegmonous appendicitis and perforated appendix) over a 12 month period. All the patients were assessed for post-op wound complications. The overall wound infection rate was 1.8 %. In patients with perforated appendix, the wound infection rate was 5.7%. The conclusion from the study was that subcuticular skin closure with Vicryl was a favourable option as it didn’t require suture removal and more importantly was associated with minimal complications. Similarly, in our study subcuticular skin closure with original vicryl was associated with minimal post operative wound inflammation which subsided in the 1st week after surgery.

Szabo et al (2002) [14] assessed the post operative wound healing in wounds closed with Vicryl Rapide or original Vicryl in patients undergoing inguinal hernia repair. Short and middle term cosmetic results, complications in wound healing and the subjective comfort of patients were noted. The wound healing process and the cosmetic results were comparable in both groups. The conclusion of the study was that rapidly resorbing suture material (Vicryl Rapide) is a cost effective choice for closing the skin of inguinal hernia repairs. In contrast, our study showed that skin closure with Vicryl Rapide was associated with less post operative wound inflammation and lower wound scores compared to original Vicryl.

Shafath et al (2007) [15] studied the use of vicryl rapide for skin closure in patients undergoing cheiloplasty. The aim was to study wound breakdown, infection and scar formation when vicryl rapide is used for skin closure. The post-op observation was vicryl rapide was associated with minimal wound gaping/infection.

Talbot et al (2002) [16] compared the use of vicryl and vicryl rapide for skin closure in opthalmic plastic surgery. Tissue reactions to the sutures, completeness of wound healing, and number of sutures remaining were observed at first dressing, 2 weeks and 2 months. Wound healing was excellent at 2 weeks in all but one Vicryl Rapide patient whose slight wound gape was not attributable to the suture material used. No inflammatory tissue reaction attributable to the suture was seen. No visible suture marks were observed at 2 months.

Transient crusting was observed around the sutures in 9/20 (45%) and 10/20 (50%) patients with Vicryl and Vicryl Rapide, respectively. Only one suture out of 144 was removed.

The conclusion was that Vicryl and Vicryl Rapide are equally effective for skin closure. In contrast, our study showed that Vicryl Rapide was superior to Vicryl for skin closure. This was attributed to relatively more inflammation of skin caused by original Vicryl.

Tandon et al (1995) [17] studied the use of Vicryl Rapide for skin closure in 236 wounds (abdominal, scrotal and scalp wounds). The conclusion from the study was that there were no post-operative wound complications that could be attributed to the suture material and that Vicryl Rapide is ideal for wound closure where rapid absorption is desirable.

Tatsumi et al (2003) [18] conducted a study on the use of Vicryl Rapide for skin closure of infants undergoing surgery for polydactyly and syndactyly of the toes and digits. Post-operatively, wounds were assessed for short and mid-term complications i.e redness, infection, wound dehisence. At 2 weeks after surgery, suture site redness was observed in 50% of cases. No wound infection or dehisence. At 3 months and 6 months, redness was observed in 40.7% and 23.5% of cases.

The conclusion from the study was that use of Vicryl Rapide for skin closure did not cause any major complications and is a useful suture material for skin closure. In our study, in majority of subjects in the Vicryl Rapide group, wound inflammation subsided by the end of 1 week and there was no incidence of wound infection or dehisence.

Al Qattan et al (2005) [7] conducted a study comparing Vicryl Rapide (group A) and Vicryl (group B) for skin closure of the hand in children undergoing elective hand surgery (syndactyly, contracture release and trigger digit release). 60 children were randomly allocated into 2 groups. The wounds were assessed post-op at 3 and 6 weeks for wound infection, dehisence, hematoma and inflammatory reaction.

At the 3-week assessment, there were no cases of wound infection, dehiscence or haematoma in either group. However, two trigger digit cases in Group B (Vicryl) had severe but localized inflammatory reactions to the sutures. At the 6-week assessment, another case (also in Group B) of mild inflammation was found. A total of five adverse events were seen during the study period and all occurred in Group B (Vicryl). Using fisher's exact test, the difference between the two treatment groups was significant ($p = 0.03$). All the five adverse events were seen in the Vicryl treatment group and were related to the delayed absorption of the suture material and hence the prolonged presence of the sutures.

The findings of our study are similar to these findings with majority of subjects in original Vicryl group showing higher wound scores at the end of 1 week after undergoing elective abdominal surgery.

Dimitri et al (1999) [10] studied the use of irradiated polyglactin for closure of intra-oral wounds (after orthonagthic procedures – osteotomy) and skin of scalp wounds. In the group with intra-oral wounds closed with irradiated polyglactin (34 wounds) there were 2 cases of suppuration but no inflammatory reactions. In the group with scalp wounds there were no cases of suppuration or inflammation.

Results of our study are comparable to this study with only very small percentage of the post-operative wounds of subjects in the Vicryl Rapide group showing signs of inflammation at the end of 1 week. This highlights the advantageous properties of Vicryl Rapide: Fast rate of absorption and minimal inflammation to surrounding tissues.

In another study conducted by Cremers et al (2007) [11], comparison was made between Vicryl Rapide with original Vicryl in patients undergoing apicoectomy (oral surgery). 60 patients were assigned to each group. Comparison was made between the two groups in terms of post-op discomfort, pain experienced, knot security, tensile strength, predictable resorption, tissue response and wound healing. The outcomes were similar in both study groups.

The conclusion from the study was that Vicryl Rapide does not offer any significant advantage over the original Vicryl. In contrast, our study showed that wounds for which skin was closed with subcuticular Vicryl had higher wound scores at the end of the study period which highlights the the fact original Vicryl causes more inflammation of the tissues compared to the newer generation Vicryl Rapide.

Comparison of Vicryl and Vicryl Rapide has had varied outcomes with some studies showing both to be equally good whereas others showed Vicryl rapide to be the more advantageous. Limited studies are available on the use of Vicryl Rapide and Vicryl for subcuticular skin closure in elective abdominal surgeries which therefore warrants further research in this field. .

Conclusion

CONCLUSION

The conclusion from the current study is that Vicryl Rapide (Irradiated Polyglactin 910) is more suitable than original Vicryl (Original Polyglactin 910) for subcuticular skin closure in elective abdominal surgeries.

Summary

SUMMARY

The present one year randomised controlled trial was conducted in the Department of Surgery, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum during the period December 2010 to December 2011.

All the subjects were admitted to undergo an elective abdominal surgery. A total of 192 subjects were studied. The subjects were divided into 2 groups. 96 cases were sutured with original vicryl (polyglactin 910) and the other 96 were sutured with vicryl rapide (irradiated polyglactin 910).

Postoperatively the wounds were observed for signs of inflammation and infection. Each was given a wound score according to the criteria given in the scoring system. The change in the wound score was calculated for each subject. The change in scores were analysed using the Mann Whitney-U test and both groups were compared.

From the analysis, the finding was that the difference in change in scores between the two groups was statistically significant ($p = 0.000002$). A conclusion was reached that Vicryl rapide (Irradiated Polyglactin 910) was a better choice of suture material than Vicryl (Original Polyglactin 910) for subcuticular skin closure in patients undergoing elective abdominal surgeries.

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Annexure I

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

ID No.

V	C	V	R			

I, Mr/Miss/Mrs

____

Am being invited to participate in the study: Vicryl vs Vicryl Rapide for subcuticular closure in electiove abdominal surgeries – A Randomised controlled trial

This is a study done by candidate Reg. no. BH0110009, postgraduate in General Surgery, department of General Surgery, J.N Medical college, Belgaum.

This is a study to determine which of the two suture materials (Vicryl or Vicryl Rapide) is better for subcuticular closure in elective abdominal surgeries.

I understand that I have to meet certain eligibility criteria in order to participate in the study. I will be asked relevant clinical history. Based on the responses, I will be informed if I'm eligible.

My participation in the study is voluntary and I may withdraw from the study at any time. I have been assured that my decision whether to participate or not will not affect the quality of treatment received by me at this hospital at present or in the future.

It has been explained to me in my own vernacular language the procedure involved. I will undergo the elective abdominal surgery as advised by the consultant. At the end of the surgery, the subcutaneous layer will be closed with one of the two suture materials (either Vicryl or Vicryl Rapide). The incision site will be examined from post-op day 3 to day 7.

The risks and benefits have been explained to me in adequate detail. The risks include a transient local inflammatory foreign body response at the operation site. In the event of any complications in the post operative period, I have been assured that I will be treated with the best of you knowledge and availability of resources in the hospital. The main benefit is that the results of the study will help to choose the right suture material for subcuticular closure in abdominal surgeries in the future.

I have been assured that the information collected about me during the course of the study will be kept confidential to the extent permitted by law. When results of the study are published or discussed in conferences no information will be disclosed that will reveal my indentity without my prior permission.

It has been made clear to me that I will not receive any financial incentives for my participation in the study. I'm not giving up any of my legal rights by signing this form.

Statement of consent:

I volunteer and consent to participate in the study. My signature below indicates that I have read the contents of the consent form and all my questions have been answered.

Participant name: ____

Participant's signature or thumb impression: _________________________

Witness/Guardian's name: ____________________________________

Signature or thumb impression of guardian: _________________________

Investigator's name: ____

Signature of investigator: ____

Date :______________________ Place_____________________

Annexure II

ANNEXURE II – PROFORMA

DATA COLLECTION INSTRUMENT

Title: Vicryl vs Vicryl Rapide for subcuticular closure in elective abdominal surgeries
A Randomised controlled trial

ID No.

V	C	V	R			

Date of admission____________________
Date of interview____________________
Date of discharge____________________

IP No.

1. Name:____

2. Age: 1: <20 years 2: 20-40 years 3: >40 years

3. Sex: 1-Male 2-Female

4. Address: 1-Belgaum 2-Outside Belgaum

5. Occupation: 1-Unemplyoed
   2-Unskilled
   3-Semi-skilled
   4-Skilled
   5-Professional

6. Education: 1-Illiterate
   2-Primary (1st-7th std)
   3-High school (8th -10th std)
   4-Intermediate 5-Degree and above

7. Socio-economic status:
   1-Low 2-Middle 3-High

Screening

8. H/o Diabetes: 1-Yes 2-No

9. If answer to 7 is yes, current status:

   1-Under control 2-Uncontrolled

   3-Not applicable

10. On medication for diabetes: 1-Yes 2-No 3-Not applicable

11. Retroviral illness (HIV I and II): 1-Positive 2-Negative

12. H/o Hypertension? 1-Yes 2-No

13. If Yes to Q11, current status: 1-Controlled 2-Uncontrolled
    3-Not applicable

14. H/o recent intake of steroids : 1-Yes 2-No

15. If answer to 11 is yes, duration of intake:

    1. less than 6 months 2. 6 to12 months 3. >12 months

    4. Not applicable

16. H/o serious systemic illness: 1-Yes 2-No

17. If nswer to 13 is yes, which system involvement:

    1-GIT 2-Renal and genitourinary 3-Respiratory 4-Cardiac
    5-CNS 6-Immune system related 7-Others 8-Not applicable

18. Level of hemoglobin: 1: Less than 10gm% 2: 10 gm% 3: >10gm%

19. Applicant willing to give consent? 1-Yes 2-No

20. **Final result**
1-Ineligible 2-Eligible but refused 3-Eligible and participating

21. Chief complaint: 1. Abdominal pain 2. Vomiting
3. Sensation of mass/dragging sensation
4. Swelling in one abdominal quadrants
5. Loose stools
6. Fever
7. Others 8. More than 1 complaint

23.Duration of complaint: 1: <1 week 2: 1-4 weeks 3: >4 weeks

24.Received any treatment elsewhere for same complaint(s):
1-Yes 2-No

25. If yes to Q.21, Surgical or medical treatment? 1-Surgical 2-Medical
3-Not applicable

26. Outcome of treatment? 1-Not improved 2-Improved
3-Improved with recurrence of symptoms
4-Not applicable

27. Final diagnosis at current admission: 1-Hernia 2-Chronic appendicitis
3-Cholelithiasis
4-Lymph node 5. Others

28. Surgery planned: 1-Herniorraphy 2-Meshplasty 3-Appendicectomy
4-Cholecystectomy 5-Exploratory Laparotomy
5-Others

29. Received suture material A or B? 1-A 2-B

1. Score on Day 3: (0-6)

2. Score on day 7: (0-6)

3. Change in score between day 3 and 7: (-6 to +6)

4. Effective reduction in score: 1. <50% 2. 50% or more

Observation findings

	Post operative day			
Score	3	5	7	21
0				
1				
2				
3				
4				
5				
6				

Change in score between day 3 and day 7 (range -6 to +6): ________
Key:
0= No features of inflammation. Normally healing
1 = Redness (Erythema)
2 = Redness + Edema
3 = Redness + Edema + Tenderness + local rise of temperature
4 = Above features + Sinus formation + Purulent discharge
5 = Above features + Abscess formation
6 = Above features + Wound gaping

Reduction in score: 1. < 50 % 2. > 50 %

Score at end of 21 days (3 weeks)

Annexure III

ANNEXURE III – PHOTOGRAPHS

Photograph 2. Original Vicryl sealed pack

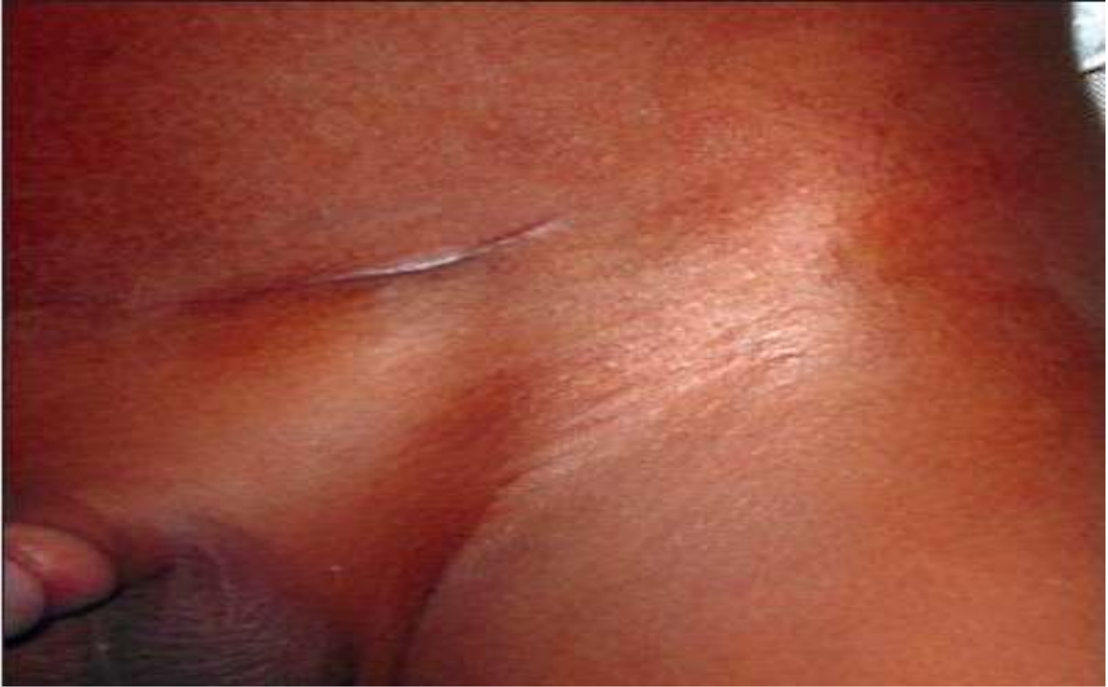
Photograph 3. Original Vicryl (Polyglactin 910)

ANNEXURE III – PHOTOGRAPHS

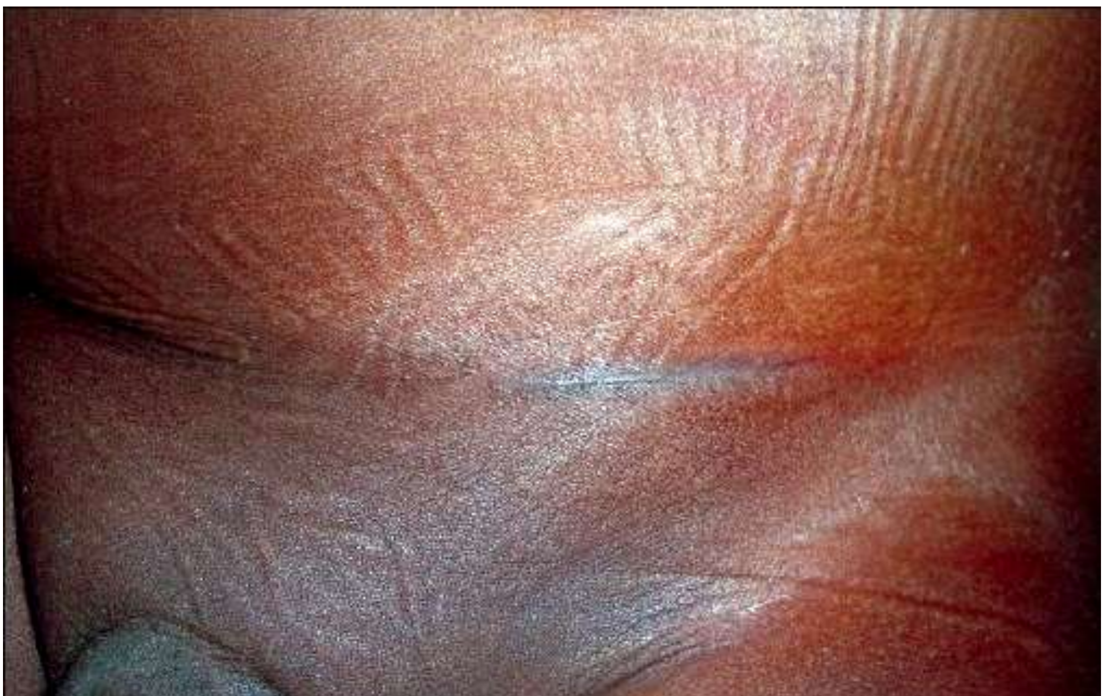
Photograph 4. Vicryl Rapide sealed pack

Photograph 5. Vicryl Rapide (Irradiated polyglactin 910)

ANNEXURE III – PHOTOGRAPHS

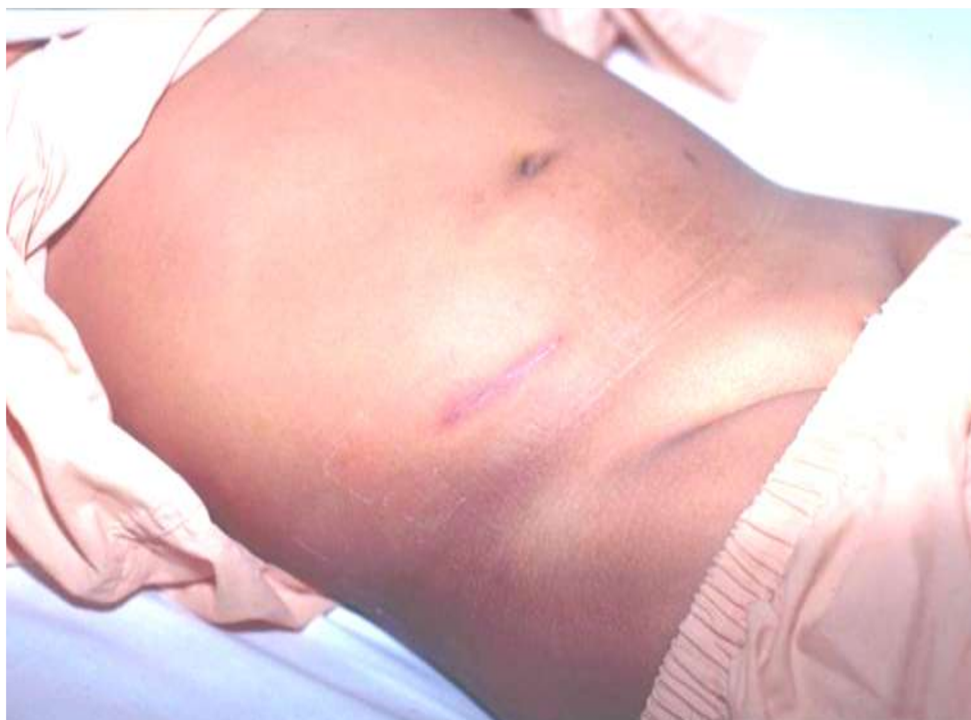


Photograph 6. Vicryl post-operative day 3

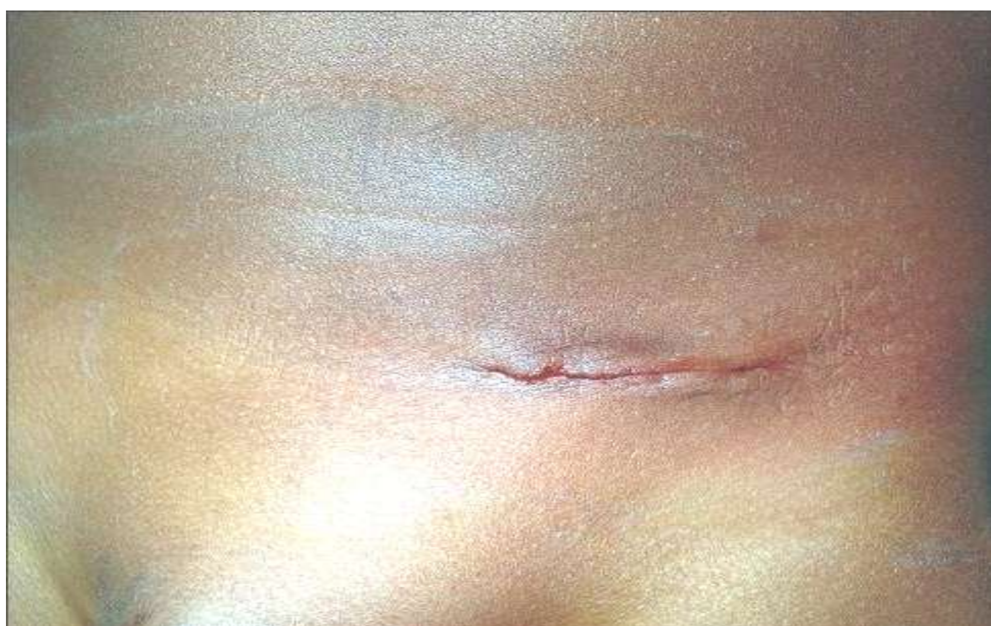


Photograph 7. Vicryl post-operative day 5

ANNEXURE III – PHOTOGRAPHS

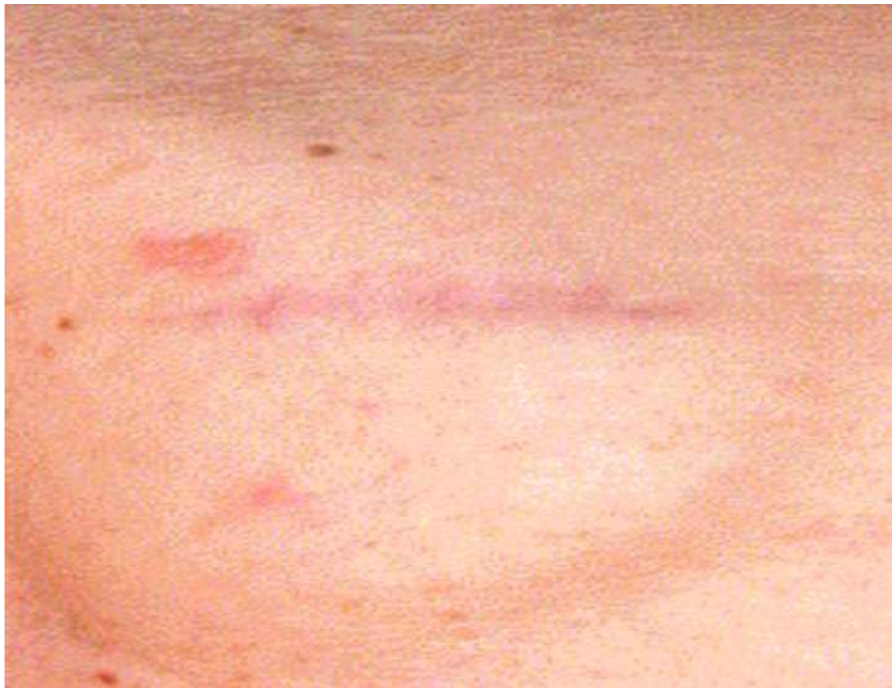


Photograph 8. Vicryl Rapide post-operative day 5

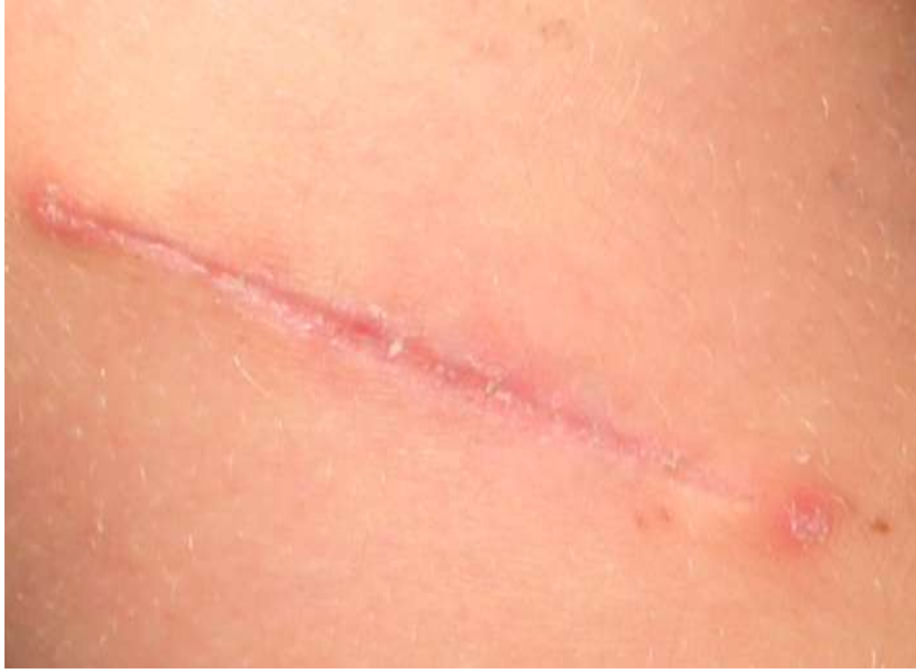


Photgraph 9. Vicryl post-operative day 3

ANNEXURE III - PHOTOGRAPHS



Photograph 10. Vicryl Rapide post-operative day 7



Photograph 11. Vicryl post-operative day 7

Annexure IV

ANNEXURE IV – MASTER CHART

Name	VCVR no.	Suture	D-3	D-7	Change
Gurubasappa	1	1	2	0	-2
Narayan	2	1	1	1	0
Appa D. K.	3	1	2	0	-2
Shankar N. P.	4	2	3	0	-3
Mustafa H.	5	2	3	0	-3
Balakrishna	6	2	2	1	-1
Mohiddinsad P.	7	1	3	0	-3
Mahavir B.	8	2	3	2	-1
Sushma M. H.	9	1	2	0	-2
Vishnu S.	10	1	1	1	0
Balappa S. B.	11	2	2	0	-2
Rajagouda P.	12	2	2	1	-1
Sandesh S.	13	1	1	1	0
Ramesh G.	14	1	1	1	0

Vishnu P.	15	1	2	0	-2
Balasab K.	16	2	2	0	-2
Jayashing P.	17	2	1	1	0
Tukaram P.	18	2	2	1	-1
Owes J.	19	1	1	0	-1
Manjunath M.	20	1	1	1	0
Shivaji K.	21	2	1	0	-1
Sushmita M.	22	2	2	0	-2
Somanna L.	23	2	1	0	-1
Gururaj B.	24	1	1	1	0
Dyaneshwar D.	25	1	2	0	-2
Khaleelahmed B.	26	2	2	0	-2
Ramesh M.	27	1	1	1	0
Shankar K.	28	1	1	1	0
Chandrakant C.	29	2	1	0	-1
Dilawarsab T.	30	2	2	0	-2

ANNEXURE IV – MASTER CHART

Name	VCVR no.	Suture	D-3	D-7	Change
Rajesab B.	31	2	1	0	-1
Basappa B.	32	2	1	0	-1
Dolma T.	33	1	1	1	0
Hanamant B.	34	1	1	1	0
Yash Bharmu S.	35	1	1	1	0
Yallappa S. G.	36	1	2	1	-1
Nagangouda D.	37	2	2	0	-2
Ansar S. S.	38	1	1	1	0
Iranna K.	39	1	1	1	0
Sunita Y.	40	2	3	0	-3
Mohan N.	41	1	1	1	0
Gangappa S. P.	42	2	1	0	-1

Neelkanth K.	43	2	1	0	-1
Bayawwa B.	44	2	1	0	-1
Amina P.	45	1	1	1	0
Moulasaheb K.	46	1	1	1	0
Shridar J. B.	47	2	1	0	-1
Mallappa T.	48	1	1	1	0
Shivaling S. P.	49	1	1	1	0
Baburao C.	50	2	2	1	-1
Rama K. S.	51	2	2	0	-2
Bharathi P.	52	2	1	1	0
Manjula S.	53	1	1	1	0
Bismilla H.	54	2	1	0	-1
Veeresh M.	55	1	1	1	0
Sameena I. M.	56	1	1	1	0
Gajanan M.	57	2	2	0	-2
Sarjerao R. P.	58	2	1	0	-1
Mallappa H.	59	1	1	1	0
Meenakshi R.N.	60	2	2	0	-2

ANNEXURE IV – MASTER CHART

Name	VCVR no.	Suture	D-3	D-7	Change
Asha R. T.	61	1	1	1	0
Basavaraj M.K.	62	2	1	0	-1
Devam B. D.	63	1	1	1	0
Paresh B. Y.	64	2	1	0	-1
Babu L. M.	65	2	1	0	-1
Krishan B. U.	66	2	2	0	-2
Patanga G. S.	67	1	1	1	0
Jayapal Y. G.	68	1	1	1	0
Benakatti B.	69	1	1	1	0
Pandurang B.N.	70	1	1	1	0
Laxman D.	71	2	2	0	-2
Dundappa T.D.	72	2	1	0	-1

Yallappa D. P.	73	2	1	0	-1
Laxmansa P.	74	2	1	0	-1
Indu B.	75	1	1	1	0
Rama G. K.	76	1	1	1	0
Deepak P.	77	2	1	1	0
Shivakumar C.	78	1	1	1	0
Iqbal S. P.	79	1	1	1	0
Prakash S. P.	80	2	1	0	-1
Laxman B. P.	81	1	1	1	0
Pooja P. R.	82	1	1	1	0
Somappa A. G.	83	1	1	1	0
Dhanapal A. S.	84	2	1	0	-1
Subhash B. K.	85	2	1	1	0
Balu R. J.	86	2	1	1	0
Nirmala K.	87	2	1	1	0
Nilesh S. D.	88	1	1	1	0
Husensab Y.N.	89	1	1	1	0
Dastageer S. K.	90	2	3	2	-1

ANNEXURE IV – MASTER CHART

Name	VCVR no.	Suture	D-3	D-7	Change
Devappa M.	91	2	1	0	-1
Yallappa M. K.	92	1	1	1	0
Rehan I. B.	93	1	2	0	-2
Hasan A. T.	94	2	1	0	-1
Chandrakant S. L.	95	2	2	0	-2
Anna Bhav Dive	96	1	1	1	0
Basangouda P.	97	1	1	1	0
Meharbanu I.	98	1	1	1	0
Satalingappa B.C.	99	1	1	1	0
Mahesh S.	100	1	1	1	0
Chandrayya V.M.	101	2	1	0	-1
Prachi L. K.	102	2	1	0	-1

Sadashiv	103	1	1	1	0
Sarojini S.J	104	2	1	1	0
Sunil S. H.	105	2	1	0	-1
Sohail A. M.	106	2	1	0	-1
Jyoti Balu B.	107	2	1	1	0
Abdul M.I Adam	108	1	1	1	0
Savita B. N.	109	1	1	1	0
Nagappa N. B.	110	2	1	0	-1
Kishore A. C.	111	2	1	0	-1
Mallikarjun P.	112	2	1	0	-1
Shashank S.	113	1	1	1	0
Veerabhadrayya G.	114	1	1	1	0
Revappa R. S.	115	1	1	1	0
Vamsi K.	116	2	1	0	-1
Renuka B. G.	117	2	1	0	-1
Vithal K. G.	118	1	1	1	0
Basanappa V. N.	119	1	1	1	0
Kallappa D. P.	120	2	1	0	-1

ANNEXURE IV – MASTER CHART

Vasudev V. B.	121	1	1	1	0
Parish B. M.	122	2	1	0	-1
Sidrai F. Kurbar	123	1	1	1	0
Babashab S. A.	124	2	1	0	-1
Malagouda B. P.	125	1	1	1	0
Kiran B. Pandit	126	1	1	1	0
Shivaputrappa N.M.	127	2	2	0	-2
Alija Sharif H.	128	2	1	0	-1
Kallappa L. K.	129	2	2	0	-2
Mahadev B.	130	1	1	1	0
Akkawwa Y. A.	131	1	1	1	0
Archana P. Giri	132	2	2	0	-2
Maruti R. Patil	133	2	2	0	-2
Veeresh V. S.	134	2	2	0	-2

Mangal S. P.	135	1	1	1	0
Laxman R. K.	136	1	1	1	0
Ramu K.	137	1	1	1	0
Ramangouda P.	138	1	1	1	0
Sangappa C. M.	139	1	1	1	0
Santran M. B.	140	2	1	0	-1
Krishnanand G. N.	141	2	1	0	-1
Vishnu M. K.	142	2	1	0	-1
Dharmappa K. N.	143	2	1	0	-1
Mahantesh B. K.	144	1	1	1	0
Surekha S. A.	145	1	1	1	0
Ningawwa K.	146	1	1	1	0
Mehboobi M. Kazi	147	1	1	1	0
Sidappa Y. S.	148	2	1	0	-1
Shanta S. M.	149	2	2	0	-2
Rudrappa N. M.	150	2	1	0	-1

ANNEXURE IV – MASTER CHART

Name	VCVR no.	Suture	D-3	D-7	Change
Satappa B. A.	151	1	1	1	0
Narayan S. G.	152	1	1	1	0
Arundati S. B.	153	2	1	0	-1
Praveen T.A. Khat	154	2	1	0	-1
Basappa B.	155	1	1	1	0
Vaijnath H.	156	1	1	1	0
Ramesh N.	157	1	1	1	0
Arjun G. Muta	158	1	1	1	0
Sidramappa K.	159	2	2	0	-2
Parappa S.	160	2	2	0	-2
Seema Iqbal	161	2	2	0	-2
Aruna A. B.	162	2	2	0	-2

Rangappa A. J.	163	2	2	0	-2
Rahul K.	164	1	1	1	0
Sunil B. T.	165	1	1	1	0
Santawwa B. T.	166	1	1	1	0
Shrushti S. H.	167	2	2	0	-2
Shyam K. K.	168	2	2	0	-2
Sampatrao M.	169	2	2	0	-2
Sanjay K.	170	2	2	0	-2
Hanamant H.	171	2	2	0	-2
Aswin L. P.	172	1	1	1	0
Shankar K. P.	173	1	1	1	0
Yallappa V. G.	174	2	2	0	-2
Prashant H.	175	1	1	1	0
Gangadhar M.	176	1	1	1	0
Ramachandra K.	177	1	1	1	0
Yallappa S. T.	178	1	1	1	0
Nagaraj K. H.	179	2	2	0	-2
Manohar B. K.	180	2	2	0	-2

ANNEXURE IV – MASTER CHART

Name	VCVR no.	Suture	D-3	D-7	Change
Nagappa B. G.	181	1	1	1	0
Vittal R. Patil	182	2	2	0	-2
Shaikh B.A. Haasan	183	1	1	1	0
Gadagayya M.H.	184	1	1	1	0
Rajaram T. D.	185	2	2	0	-2
Sanju Patil	186	2	2	0	-2
Bhimangouda P.	187	2	1	0	-1
Dattu Janku P.	188	2	1	0	-1
Prajwal R. T.	189	2	1	0	-1
Basavaraj S. Iti	190	1	1	1	0
Karishma M. S.	191	1	1	1	0
Vishwanath N. H.	192	1	1	1	0

ANNEXURE IV – KEY TO MASTER CHART

VCVR: Vicryl – Vicryl Rapide subject no.

D-3: Post-operative day 3

D-7: Post-operative day 7

Change: Difference in score between day 3 and day 7