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## **Original Research Article**

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# Polyglactin 910 versus irradiated polyglactin 910 for subcuticular closure in elective surgeries: a randomized double-blind study

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#### **ABSTRACT**

**Background:** All suture materials are treated as foreign bodies and bring out a reaction in the tissues. The 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. this study was done to compare irradiated polyglactin 910 (Vicryl Rapide) versus polyglactin 910 (Vicryl) for subcuticular skin closure in patients of elective surgeries and to note post-operative wound inflammation, pain, dehiscence and quality of scar.

**Methods:** 60 consecutive patients undergoing elective surgeries in department of surgery SGRD hospital were taken up for the study from April 2020 to June 2020. After randomization the subjects were divided into two groups. Subcuticular skin closure at the end of surgery was done using a 3-0 polyglactin 910 in group A and 3-0 irradiated polyglactin 910 in group B with cutting needle in both groups. Postoperatively the wound was inspected on day 3, 5, 7 and again 3 weeks after surgery.

**Results:** Postoperatively the wounds were observed for the signs of inflammation and infection. Each was given a wound score according to scoring system. Statistical analysis by SPSS 17.0 software and chi-square test. Irradiated polyglactin 910 showed less inflammation, pain and dehiscence along with good quality of scar as compared to polyglactin 910 on comparison.

**Conclusions:** It was concluded that irradiated polyglactin 910 was a better choice for suture material than polyglactin 910 for subcuticular skin closure in terms of postoperative pain, wound dehiscence and quality of scar.

**Keywords:** Subcuticular skin closure, Polyglactin 910, Irradiated polyglactin 910

## **INTRODUCTION**

Surgery and sutures are inseparable. Although minimal access surgery is picking up still there are large number of situations where open surgery has to be undertaken in an elective and emergency setting. Every year several million people undergo open surgeries worldwide. Surgery inevitably results in an abdominal scar. Nowadays people of all ages give an extreme importance to the appearance of the scar in addition to pain, tenderness and itching. The appearance of a scar is

always of aesthetic importance to patients. The scar is the only reminder of surgery to patients.

The wound closure technique should be based on evidence and not only on the surgeon's preference and tradition. The skin closure methods used should be able to restore the physical integrity and function of injured tissue. There are many methods of the skin closure like sutures, staplers, tapes and adhesive compounds. There is always careful selection of suture material. Choosing

suture materials and adhering to good wound closure technique will provide good wound healing.<sup>1</sup>

A suture is defined as a biomaterial device, natural or synthetic, used to approximate tissues together following separation by surgery or trauma. It is also used to denote the method of mechanical wound closure.

The absorbable sutures most commonly used are the synthetic sutures: polyglactin 910, irradiated polyglactin 910, polyglycolic acid, polydioxanone, polytrimethylene carbonate. Catgut is less frequently used now, but it does have some specific uses. In the old times, absorbable sutures were used for deep sutures. However, with advances in research, nowadays absorbable sutures have also been used for percutaneous closure of wounds in adults and children.

Halsted, first described the subcuticular technique which is an elegant but very difficult technique. This suture technique is very valuable when a suture is to be kept in place for more than one week. The advantage of subcuticular sutures in younger patients is that skin is comparatively soft and supple, and this technique helps in good cosmetic results and also good healing.<sup>2</sup> The main aims of skin closure are good tissue approximation, ease of performance, good patient acceptability, minimal scar and good cosmetic appearance.<sup>3</sup>

There are limited studies conducted comparing the different suture materials in one suturing technique in the patients that are posted for elective surgery. This study has been designed to compare the polyglactin 910 (Vicryl) and irradiated polyglactin 910 (Rapide Vicryl) for subcuticular skin closure in elective surgeries which will further add to the knowledge of surgical fraternity.

Comparative study to evaluate Irradiated Polyglactin 910 (Vicryl Rapide) versus polyglactin 910 (Vicryl) for subcuticular skin closure in patients of elective surgeries and to note post-operative wound inflammation, pain, dehiscence and quality of scar.

In both the groups comparative study was done in terms of-Pain, wound infection, wound dehiscence, purulent discharge, quality of scar.

#### **METHODS**

An interventional randomized comparative study was conducted in the department of general surgery at Sri Guru Ram Das institute of medical sciences and research, Sri Amritsar from April 2020 to June 2020. Approval was taken from hospital ethics committee.

Informed written consent was taken from the patients. Sixty consecutive cases of elective surgeries were divided into 2 groups with 30 patients each. Patients were randomized into one of the two groups by envelope

method. Equal number of labels A (30) and B (30) were randomly placed in 60 envelopes.

The patients were asked to pick up an envelope from the basket. The number of participants 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 surgeon in order to ensure double blinding.

Study groups included group A (n=30): Polyglactin 910 (Vicryl) was used for subcuticular closure in elective surgeries. In group B (n=30): Irradiated polyglactin 910 (Vicryl Rapide) was used for subcuticular closure in elective surgeries.

Inclusion criteria included written informed consent, either sex, patients scheduled for elective surgery.

Exclusion criteria excluded patients unwilling to participate/unable to understand the visual analogue scale, Patients having lacerated wounds with skin loss, all emergencies laparotomies, pregnancy (in women), current immunosuppressive therapy (more than 40 mg of a corticosteroid per day or azathioprine), chemotherapy within 2 weeks before operation, previous upper abdominal surgery, chronic obstructive pulmonary disease (COPD), morbid obesity and refusal of consent

A detailed pre-anesthetic evaluation and relevant investigations were obtained. All patients received alprazolam 0.5 mg orally and ranitidine 150 mg orally night before surgery. The whole procedure and risks involved in the procedure were fully explained to the patients and relatives. Informed written consent was taken. Preoperatively patient was introduced to the concept of visual analogue scale (VAS). All patients had undergone similar general/spinal anesthetic procedure.

## Details of surgical procedure

Subcuticular skin closure was done at the end of the surgery using either 3-0 polyglactin 910 (Vicryl) as Figure 1 or 3-0 irradiated polyglactin (Vicryl Rapide) as shown in Figure 2 with cutting needle.

#### Surgical technique

After the completion of elective surgery, skin closure was done in a subcuticular running suture technique. The suture was secured at one end of the incision. Then the same plane was maintained throughout the entire length of the incised wound, taking horizontal mirror image bites. The suture was tightened after each pair of bites. At the end of the incision a bite was taken through the adjoining skin and suture was buried to secure it. An aseptic gauze dressing was done at the end of the procedure in Figure 3.

#### Post-operative period

Following parameters were checked post-operatively: Post-operative pain assessment was based on a 0 to 10 visual analogue scale. The post-operative pain was compared in both groups on day 3<sup>rd</sup> and day 7<sup>th</sup>.



Figure 1: Original polyglactin 910 (Vicryl) sealed pack.



Figure 2: Original irradiated polyglactin 910 (Rapide Vicryl) sealed pack.

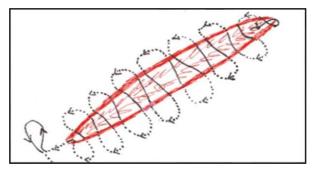


Figure 3: Subcuticular suturing technique.

Post-operatively the wound was inspected on day 3, 5, 7 and again 3 weeks after surgery. At each wound inspection, the following features are looked for: Erythema of skin, oedema, tenderness, local rise of

temperature, sinus formation, abscess formation and wound gaping. The patient was discharged after wound inspection on post-operative day 7.

At each wound inspection, the findings were recorded on observation chart according to following scoring system: 0. No features of inflammation, normal healing. 1. Redness (Erythema), 2. Redness and edema, 3. Redness, edema, tenderness and local rise of temperature, 4. Above features with sinus formation, 5. Above features and abscess formation, 6. Above features with wound gaping, 7. Quality of scar.

Change in score between day 3 and day 7 (range -6 to +6), reduction in score: 1. <50% 2. 50% or more

On follow up of the patient. Wound was again inspected at the end of 3 weeks to see the quality of scar.

The results were compiled at the end of the study and analyzed statistically. The post-operative observations were supervised by post graduate companions or senior fraternity from the same department of the same institute for the evaluation of the same.

#### Statistical analysis

Statistical analysis was done using SPSS version 17.0.to compare prevalence chi square test was used.

## **RESULTS**

The present study is the comparison of polyglactin 910 and irradiated polyglactin 910 for subcuticular closure in elective surgery. 60 consecutive patients of age group 18-70 years and of both genders were included in this study after taking informed consent from them. These patients were admitted in the department of surgery at Sri Guru Ram Das institute of medical sciences and research, Vallah, Amritsar for various surgical procedures. The following observations were made in this study.

Both the groups were comparable in age, sex distribution of cases and post-operative pain on  $3^{\rm rd}$  and  $7^{\rm th}$  day with no significant statistical difference between them.

Table 1: Diagnosis wise distribution.

Diagnosis	Group A No. of patients	%	Group B No. of patients	%
Cholelithiasis	15	50.00	15	50.00
Epigastric hernia	1	3.33	0	0.00
Fibroadenoma	5	16.67	7	23.33
Incisional hernia	0	0.00	1	3.33
Left cervical swelling	1	3.33	0	0.00
Left duct papilloma	0	0.00	1	3.33
Left gynecomastia	0	0.00	1	3.33
Rt inguinal hernia	6	20	4	13.33
Rt inguinal swelling	1	3.33	0	0.00
Umbilical hernia	0	0.00	1	3.33

Continued.

Diagnosis	Group A No. of patients	%	Group B No. of patients	%	
Ventral hernia	1	3.33	0	0.00	
Total	30	100.00	30	100.00	
P value	$X^2=9.444$ ; df: 11; p=0.581				

**Table 2: Distribution of type of operation.** 

. Type of energian	Group A		Group B	
Type of operation	No. of patient	%	No. of patient	%
Open cholecystectomy	15	50.00	15	50.00
Lumpectomy	5	16.67	7	23.33
Lymph node excision	1	3.33	0	0.00
Onlay mesh hernioplasty	0	0.00	1	3.33
Left micro-dochectomy	0	0.00	1	3.33
Primary defect closure of umbilical hernia	1	3.33	1	3.33
Rt high inguinal orchidectomy	1	3.33	0	0.00
Subcutaneous mastectomy	0	0.00	1	3.33
Tension free mesh repair	7	23.33	4	13.33
Total	30	100.	30	100
P value	X <sup>2</sup> =6.733; df: 9;	p=0.665		

Table 3: Distribution of wound score at day 3.

Score on day 3	Group A	Group A			
Score on day 5	No. of patients	<b>%</b>	No. of patients	<b>%</b>	
0	0	0.00	1	3.33	
1	0	0.00	2	6.67	
2	5	16.67	11	36.67	
3	23	76.67	16	53.33	
4	1	3.33	0	0.00	
5	1	3.33	0	0.00	
Total	30	100.00	30	100.00	
Mean score	2.93±0.58		2.40±0.77		
P value	0.040 (significan	0.040 (significant as p<0.05)			

Table 4: Distribution of wound score at day 7.

Score on day 7	Group A	Group A		Group B		
	No. of patients	%	No. of patients	%		
0	0	0.00	1	3.33		
1	0	0.00	2	6.67		
2	5	16.67	11	36.67		
3	23	76.67	16	53.33		
4	1	3.33	0	0.00		
5	1	3.33	0	0.00		
Total	30	100.00	30	100.00		
Mean score	1.87±1.47	1.87±1.47		1.33±1.66		
P value	0.114 (non-signif	0.114 (non-significant as p>0.05)				

Table 5: Post-operative change in wound score in both groups.

Wound score	Group A No. of patients	%	Group B No. of patients	%	A vs B (P)
-4.00	0	0	1	0	1.000
-3.00	2	7	0	7	1.000
-2.00	13	43	14	43	(p>0.05) non- significant
-1.00	14	47	12	47	significant

Continued.

Wound score	Group A No. of patients	%	Group B No. of patients	0/0	A vs B (P)
2.00	1	3	3	3	
Mean ± SD	-1.46±0.89		-1.46±0.81		

**Table 6: Wound dehiscence in both the study groups.** 

Wound dehiscence	Group A		Group B		
	No. of patients	%	No. of patients	%	
Absent	23	76.67	30	100.00	
Present	7	23.33	0	0.00	
Total	30	100.00	30	100.00	
P value	$X^2=7.925$ ; df: 1; p=0.011 (significant p<0.05)				

Table 7: Post-operative quality of scar in both the study groups.

Quality of scar after 3 weeks	Group A		Group B	
	No. of patients	%	No. of patients	%
Clean healthy scar	21	70.00	30	100.00
Puckered scar	9	30.00	0	0.00
Total	30	100.00	30	100.00
P Value	$X^2$ 10.58; df: 1; p=0.011			

#### **DISCUSSION**

Sutures are used to facilitate the process of wound healing by closing dead space within the wound, supporting wounds until their tensile strength is increased and approximating edges. An ideal suture ought to retain enough tensile strength throughout wound healing, 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.

Serour et al investigated the utility of subcuticular skin closure using original Vicryl in children undergoing emergency appendicectomy. Similarly, in our study subcuticular closure with polyglactin 910 (Vicryl) was associated with post- operative wound inflammation with the higher mean wound score of 2.93 on day 3 which subsides in the 1st week after surgery with the mean wound score of 1.87 at day 7 as compared to irradiated polyglactin 910 (Rapide Vicryl) which had lower mean wound score of 2.40 on day 3 and declined to 1.33 on day 7.4

In an-another study by Szabo et al assessment was made regarding the post-operative wound healing in wounds closed with Vicryl Rapide or original Vicryl in patients undergoing inguinal hernia repair. Our study showed that skin closure with irradiated polyglactin 910 was associated with less post-operative wound Inflammation, lower wound scores of 1.33 at the end of 1st week and good cosmetic results with the p value of 0.011 which is statistically significant as compared to polyglactin 910 which had higher wound score of 1.87 on day 7.5

Shafath et al 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-operative observation was Vicryl Rapide was associated with minimal wound gaping/infection. Our study was the comparison between polyglactin 910 and irradiated polyglactin 910, it showed that 70 skin closure with irradiated polyglactin 910 have no wound gaping and infection as compared to polyglactin 910 which had 7 patients with wound gaping.<sup>6</sup>

Tatsumi et al reported a study on the use of Vicryl Rapide for skin closure of infants undergoing surgery for polydactyly and syndactyly of the toes and digits. In our study, in majority of the subjects in the irradiated polyglactin 910 (Vicryl Rapide) group, wound inflammation subsided by the end of the 1 week and there was no incidence of wound infection or dehiscence as compared to polyglactin 910 (Vicryl).<sup>7</sup>

Singh et al conducted a study to compare the suitability and advantages of Vicryl Rapide versus Vicryl for subcuticular skin closure in elective abdominal surgeries. Our study shows the similar results that irradiated polyglactin 910 is better than polyglactin 910 in terms of wound infection, post-operative pain and good cosmetic results.8 Another study by Cremers et al where comparison was made between Vicryl (polyglactin 910) and Rapide Vicryl (irradiated polyglactin 910) in patients undergoing apicoectomy (oral surgery). Our study showed that wounds for which skin was sutured in subcuticular fashion with polyglactin 910 (Vicryl) had higher wound scores at the end of the study period which highlights the fact polyglactin910 (Vicryl) causes more inflammation of the tissues as compared to the newer generation irradiated polyglactin 910 (Vicryl Rapide).9

Comparison of polyglactin 910 (Vicryl) and irradiated polyglactin 910 (Rapide Vicryl) has had various outcomes with some studies showing both to be equally good whereas others showed irradiated polyglactin 910 to be more superior than polyglactin 910. Limited studies are available on the use of irradiated polyglactin 910 and polyglactin 910 for subcuticular skin closure in elective surgeries which therefore warrants further research in this field.

#### Limitations

Comparison of sutures in a particular surgery and large sample size is needed.

#### **CONCLUSION**

Present study concluded that irradiated polyglactin 910 (Rapide Vicryl) was a better choice of suture material than polyglactin 910 (Vicryl) for subcuticular skin closure in patients undergoing elective surgeries. However, more studies with large number of subjects are needed for further substantiate for results.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

#### REFERENCES

- 1. Al-Mubarak L, Al-Haddab M. Cutaneous wound closure materials: an overview and update. J Cutan Aesthet Surg. 2013;6(4):178-88.
- 2. Mackenzie D. The history of sutures. Med Hist. 1973;17(2):158-68.

- 3. Kudur MH, Pai SB, Sripathi H, Prabhu S. Sutures and suturing techniques in skin closure. Indian J Dermatol Venereol Leprol. 2009;75:425-34.
- Serour F, Efrati Y, Klin B, Barr J, Gorenstein A, Vinograd I. Subcuticular skin closure as a standard approach to emergency appendectomy in children: prospective clinical trial. World J Surg. 1996;20(1):38-42.
- 5. Szabó S, István G. Skin closure in inguinal hernia repair with rapidly absorbing Polyglactin 910/370 (Vicryl-Rapide) suture material. Magy Seb. 2002;55(2):77-80.
- Shafath A, Bonanthaya K, Shetty P, Kumar P. Role of absorbable suture material (vicryl rapide 5-0) for skin closure in infants undergoing cheiloplasty. Int J Oral Maxillofac Surg. 2007;36(11):988.
- 7. Tatsumi H, Yajima H, Tomita Y. Utility of Irradiated Polyglactin 910 as a suture material for infants. Plast Reconstr Surg. 2003;46(10):1051-8.
- 8. Singh S, Sharma S, Uppal A. Comparison of vicryl and vicryl rapide in subcuticular skin closure in abdominal surgeries a prospective study. Int J Sci Res. 2017;6:4.
- Cremers RM, Gielkens PF, Bos RR, Stegenga B. A randomized clinical trial of 2 fast-resorbing suture materials. Ned Tijdschr Tandheelkd. 2007;114(3):119-25.

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