VOLUME-6 | ISSUE-4 | APRIL - 2017 • ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

COMPARISON OF VICRYL AND VICRYL RAPIDE IN SUBCUTICULAR SKIN CLOSURE IN ABDOMINAL SURGERIES- A PROSPECTIVE STUDY.

General Surgery

KEYWORDS: SUBCUTICULAR SKIN CLOSURE, SUTURES, VICRYL, VICRYL RAPIDE.

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ABSTRACT

Sutures are the most widely used materials in wound closure in the practice of Surgery. 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. No ideal suture material is available till date. **AIMS**- The aim was to study the suitability and advantages of Vicryl Rapide versus Vicryl for subcuticular skin closure in elective abdominal surgeries. **MATERIAL AND METHODS**- All the subjects were admitted to undergo an elective abdominal surgery. A total of 50 subjects were taken up for the Study. Patients with clean and clean- contaminated surgical wounds were included. After proper randomisation, the subjects were divided into 2 groups - Group A –The Vicryl group and Group B –The Vicryl Rapide group. Subcuticular skin closure at the end of the surgery was done using 2-0 Vicryl in group A and 2-0 Vicryl Rapide in group B with cutting needle in both groups. Post-operatively the wound was inspected on day 3, 5, 7 and again 3 weeks after surgery. **RESULTS AND CONCLUSIONS**- 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 Chi-square test and both groups were compared. 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.

INTRODUCTION

A suture is defined as a biomaterial device, natural or synthetic, used to approximate tissues together following separation by surgery or trauma. 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. Sutures are used to facilitate the process of wound healing by closing dead space within wound, supporting wounds until their tensile strength is increased and 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 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. A good 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.

No ideal suture material is available till date which meets the criteria of easy handling, good knotting quality, minimal tissue reaction, does not support bacterial growth, adequate tensile strength, non-allergenic and non-carcinogenic, easy to sterilize and absorbed after serving its function. Suture material may be natural or synthetic, 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).1 Several parameters, such as tensile strength, breaking strength, elasticity, capillarity and memory are used to describe physical characteristic of sutures.[2,3,4,5,6] 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.

The subcuticular suture was first described by Halsted in 1889 as a method of reducing wound infections and popularized by Davis a few decades later for its cosmetic appeal.[7,8] .It is a popular method of wound closure and plays an important role in cutaneous surgery. Numerous techniques for subcuticular suturing have been described in the literature, with variations in suture type and methods of suture retention, including knot-free and buried-knot variations.9,10,11,12 .The subcuticular stitch involves needle throws parallel to the long axis of the wound, as opposed to running or interrupted epidermal sutures in which the throw is perpendicular to the long axis.

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. 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.[13]

Limited comparative studies are available in literature on the use of Vicryl and Vicryl Rapide for subcuticular skin closure in elective abdominal surgeries.

TABLE-1 COMPARISON OF VICRYL AND VICRYL RAPIDE

	VICRYL (POLYGLACTON910)	VICRYL RAPIDE (IRRADIATED POLYGLACTON910
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	50% at 5 days
	40% at 3 weeks	0% at 2 weeks

Mass absorption	56-70 days	approx. 42 days
Colour	Dyed	Undyed

AIM

The aim was to study the suitability and advantages if any of Vicryl Rapide versus Vicryl for subcuticular skin closure in elective abdominal surgeries.

MATERIAL AND METHODS

The prospective comparative study was conducted on 50 patients undergoing elective abdominal surgeries in a surgical unit of a tertiary care teaching hospital in North India during January 2014 to December 2015. The patients were divided into two groups-Group A-Vicryl and Group B-Vicryl Rapide group.

Informed consent was obtained from the patient prior to inclusion in the study. Patients undergoing elective abdominal surgeries and a clean or clean-contaminated resultant surgical wound were included in the study. Randomisation was done using envelop method. The suturing was done by one surgeon and the post-operative observation was done by another surgeon in order to ensure blinding.

Details of surgical procedure:

Subcuticular skin closure at the end of the surgery was done using either 2-0 Vicryl in Group A or 2-0 Vicryl Rapide in GroupB with cutting needle.

Technique:

After the completion of elective surgery, skin closure was achieved with 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 tied to secure it. An aseptic gauze dressing was done at the end of the procedure.

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 were 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 according to the following scoring system.

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

Change in score was noted in each group between day3 and day7.

RESULTS

Both the groups were comparable in age and sex distribution of cases with no significant statistical difference between them.

Table 2-Showing diagnosis in both the groups

Diagnosis	Group A (Vicryl)		Group B (Vicryl Rapide)	
	No. of cases	%age	No. of cases	%age
Appendicitis	5	20.00	3	12.00
Cholelithiasis	9	36.00	15	60.00
Cystolithiasis	2	8.00	0	0.00
Inguinal hernia	8	32.00	7	28.00
Malrotation of small gut	1	4.00	0	0.00
Total	**25**	**100.00**	**25**	**100.00**

X^2 = 5.06; p >0.05 (Non-Significant)

COMPARISON OF GROUPS

Majority of the patients were diagnosed as Cholelithiasis in group A 9(36%) as compared to 15 (60%) in group B. Inguinal hernia was diagnosed in 8 (32%) patients in group A, 7 (14%) in group B followed by appendicitis in 5 (20%) in group A and 3 (12%) in group B patients. Malrotation of small gut and vesical calculus was only present in 1 (4%) and 2(8%) in group A. None of these two diagnosis was found in the group B patients.

Table 3-- Showing type of surgery undergone by each group

Operation	Group A (Vicryl)		Group B (Vicryl Rapide)	
	No. of cases	%age	No. of cases	%age
Appendicectomy	5	20.00	3	12.00
Caecopexy	1	4.00	0	0.00
Cystolithotomy	2	8.00	0	0.00
Hernioraphy	4	16.00	3	12.00
Herniotomy	4	16.00	4	16.00
Open cholecystectomy	9	36.00	15	60.00
Total	**25**	**100.00**	**25**	**100.00**

X^2 = 5.14; p >0.05 (Non-Significant)

COMPARISON OF GROUPS

Open cholecystectomy was done in 9 (36%) patients in group B as compared to 15 (60%) in group B. Appendicectomy was done in 5 (20%) in group A and 3 (12%) in group B patients followed by Herniorraphy in 4 (16%) in group A and 3 (12%) in group B, Herniotomy in 4 (16%) in group A and 4 (16%) in group B. Cystolithotomy was done in 2 (8%) in group A and Caecopexy in only 1 (4%) patient in group A.

Table 4-- Showing distribution of score of suture material at day3.

Score	Group A (Vicryl)		Group B (Vicryl Rapide)	
	No. of cases	%age	No. of cases	%age
1	3	12.00	0	0.00
2	10	40.00	8	32.00
3	12	48.00	17	68.00
Total	**25**	**100.00**	**25**	**100.00**

X^2 = 4.08; p >0.05 (Non-Significant)

COMPARISON OF GROUPS

Analysis of score on day3 revealed that score 3 was observed in 12 (48%) cases of group A and 17 (68%) of group B, followed by a score 2 in 10 (40%) cases in group A and 8 (32%) in group B. Score 1 was observed in only 3 (12%) cases in group A and no case reported score 1 in group B.

Table 5-- Showing distribution of score of suture material at day7.

Score	Group A (Vicryl)		Group B (Vicryl Rapide)	
	No. of cases	%age	No. of cases	%age
0	4	16.00	7	28.00
1	7	28.00	13	52.00
2	14	56.00	5	20.00
Total	**25**	**100.00**	**25**	**100.00**

X^2 = 6.81; p <0.05 (Significant)

VOLUME-6 | ISSUE-4 | APRIL - 2017 • ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

COMPARISON OF GROUPS

A similar analysis of score was done on Day 7. Score 2 was observed in 14 (56%) cases of group A and 5 (20%) of group B, followed by a score of 1 in 7 (28%) cases of group A and 13 (52%) of group B. Score 0 was observed in only 4 (16%) cases in group A whereas 7 (28%) cases in group B reported score 0.

Table 6--Showing effective reduction in score

Reduction in score	Group A (Vicryl)		Group B (Vicryl Rapide)	
	No. of cases	%age	No. of cases	%age
0 (<50%)	17	68.00	5	20.00
1 (>50%)	8	32.00	20	80.00
Total	25	100.00	25	100.00

X^2 = 11.68; p <0.001 (Highly-Significant)

COMPARISON OF GROUPS

A reduction score 0 (<50%) was found in 17 (68%) cases of group A as compared to 5 (20%) in group B followed by a reduction score 1in 8 (32%) cases of group A and 20 (80%) cases of group B which was found to be statistically highly significant (<0.001).

Table 7--Showing change in score

Score	Group A (Vicryl)		Group B (Vicryl Rapide)	
	No. of cases	%age	No. of cases	%age
0	7	28.00	0	0.00
1	12	48.00	7	28.00
2	6	24.00	17	68.00
3	0	0.00	1	4.00
Total	25	100.00	25	100.00

X^2 = 14.57; p <0.05 (Significant)

There was significant change in score in both the groups which was found to be statistically significant (p <0.05).

Table 8--Showing change in score

Group	Mean Reduction	+S.D.
A	38.66	33.92
B	68.00	24.01
't' value	3.52	
'p' value	<0.001 (Highly Significant)	

COMPARISON OF GROUPS

Mean effective rate in reduction was found to be 38.66 + 33.92 cases of group A and 68.00 + 24.01 of group B. Comparison of both the groups was found to be statistically highly significant (p <0.001).

DISCUSSION

Sutures are used to facilitate the process of wound healing. 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. Subcuticular skin closure using original Vicryl in children undergoing emergency appendicectomy 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. [14] Vicryl Rapide is useful for intraoral use.15 In another study assessment was made regarding the post- operative wound healing in wounds closed with Vicryl Rapide or original Vicryl in patients undergoing inguinal hernia repair. 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.[16]

A group studied the use of Vicryl Rapide for skin closure in patients undergoing cheiloplasty. It was observed that Vicryl Rapide was associated with minimal wound gaping/infection.[46] Several studies have shown vicryl Rapide to be superior in use to original vicryl for subcuticular skin closure.17,[18,19,20,21] Our findings are similar to several studies carried out earlier in which vicryl Rapide is superior in use to original vicryl for subcuticular skin closure.

Some studies have also shown no advantage of Vicryl Rapide over Vicryl and conclude both to be equally effective.[22, 23] 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 the field.

CONCLUSIONS

From the analysis, the finding was that the difference in change in scores between the two groups was statistically significant (p <0.05) and mean effective rate in reduction was found to be 38.66 + 33.92 in group A and 68.00 + 24.01 in group B. Comparison of both the groups was found to be statistically highly significant (p <0.001). 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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