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Comparative Study of the Outcome of Facial Laceration Repaired by Vicryl Rapide versus Prolene

Farman Mahmood, Asmat Ullah, Shahid Hameed Choudhary, Khurshid Alam, Umar Fayyaz Ghani, Muhammad Ali Nasir

Department of Plastic Surgery, Combined Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To study the efficacy of Vicryl Rapide versus Prolene in patients with facial lacerations in terms of cosmetic outcomes and complications.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Plastic Surgery, Combined Military Hospital, Rawalpindi, Pakistan Jul 2020 to Jun 2022.

Methodology: A total of 266 patients with facial lacerations were included in our study. Patients were divided into two Groups; one received Vicryl Rapide, while the second received Prolene. Patients were photographed at baseline and ten days post-suturing. Patients were photographed at three- and six-months for comparison of local inflammation and stitch scarring, which were calculated on a scoring system.

Results: The sample was composed of 65.8% males, with a mean age of 35.09±9.32 years. There was no difference between the two Groups with regard to pre-procedure characteristics. Inflammation scores at baseline, at three and six months, were not significantly different (p=0.766, p=0.374, and p=0.854, respectively). Similarly, scarring scores at baseline, at three and six months, were also not significantly different (p=0.066, p=0.733, and p=0.416, respectively). The total complication rate of the study was 9.4% (n=25), while complications were lower with Vicryl Rapide; the difference did not achieve statistical significance (p=0.141). Infection was the most common complication seen: 13(4.9%), followed by wound dehiscence and train tracking, with frequencies of 7(2.7%) and 6(2.3%), respectively. Differences between individual complications did not achieve statistical significance either (p=0.155, p=0.055, and p=0.409, respectively).

Conclusion: Vicryl Rapide sutures have similar outcomes in cosmesis and complications to Prolene.

Keywords: *Facial Laceration, Prolene, Vicryl Rapide.*

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INTRODUCTION

Facial trauma is a common presentation in Pakistan-based emergencies, and lacerations form a large proportion of these cases.[1] The majority of these injuries are repaired in the emergency department using standard non-absorbable sutures, such as Prolene.[2] Absorbable sutures, when applied to surgical incisions, are purported to have a similar incidence of surgical site infection and operative morbidity as non-absorbable ones while having a comparable cosmetic outcome and a reduced requirement for follow-ups.[3] Absorbable sutures have been applied to surgical incisions on the face as well as lacerations on the extremities with comparable results to non-absorbable ones,[4,5] however, it is pertinent to note two facts: 1) the nature of a traumatic laceration (which are usually rough, non-linear and contaminated) is very different from a surgical incision, and 2) the face has a more rich blood supply, which promotes rapid healing with less scar formation, and skin tension is higher in the extremities; comparisons between the two types of sutures in this setting are minimal.[6]

The model suture should be easy to tie, provoke negligible inflammation, cause minimal pain, and should have adequate strength.[7] Vicryl Rapide is an absorbable suture that has been extensively employed in the surgical wound setting for suturing, as well as for traumatic lacerations of the extremities.[8] It is a braided, coated polyglactin 910 compound, with a straight pull strength of 6.93 kgf (kilogram-force) and a knot pull strength of 3.63 kgf; the suture takes approximately five and fourteen days to lose 50% and 100% of its tensile strength, respectively, and may be ideally suited for employment in repairing facial lacerations.[9,10]

Facial lacerations are of significant concern to the patient, especially with regard to the cosmetic outcome. The selection of the appropriate suture and its adequate application can help in improving both these outcomes. Absorbable sutures such as Vicryl Rapide are purported to be associated with

Correspondence: Dr Farman Mahmood, Department of Plastic Surgery, Combined Military Hospital, Rawalpindi Pakistan

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comparable outcomes to non-absorbable ones in this regard when used for managing wounds on the extremities. However, the data for facial lacerations is lacking. The objective of this study was to compare the cosmetic outcomes of facial laceration repair with Vicryl rapide versus the standard Prolene suture, as well as to determine the frequency of complications with each suture in an effort to determine whether its usage was practical in this anatomical region or not.

METHODOLOGY

The quasi-experimental study was conducted from Jul 2020 to Jun 2022 in the Department of Plastic Surgery, Combined Military Hospital, Rawalpindi. The WHO sample size calculator was used to calculate the sample size, keeping anticipated population proportion 1 (P1) of 11.0%, and an anticipated population proportion 2 (P2) of 3.0%, which were the percentage of patients who developed surgical site infections with Vicryl rapide and Prolene, respectively, from Tejani *et al*.[11]

Inclusion Criteria: Patients of either gender, aged 18-50 years with facial wounds less than 6 cm were included.

Exclusion Criteria: Those patients who had deep lacerations, gross contamination of the wound by foreign matter, late reporting to healthcare, i.e., beyond twelve hours, polytrauma, concurrent infections/sepsis, history of diabetes mellitus, use of immunomodulatory or immunosuppressive drugs within the past one month or those who were unable to complete follow-up were excluded.

The study was based on 266 patients who gave informed consent and were chosen via non-probability consecutive sampling. All patients were thoroughly evaluated by history and clinical examination on enrollment in the study. All patients received a single stat dose of injection ceftriaxone 1g intravenously. They were subsequently assigned a treatment Group via a lottery method. Group-A received simple interrupted sutures with 6-0 Vicryl Rapide, while in Group-B, 6-0 Prolene was used. Stitching was done as a single layer by a consultant plastic surgeon with a minimum of five years post-fellowship experience, and the wound was infiltrated with 1% lidocaine with epinephrine prior to stitching.

All patients were asked to return ten days after suture application, at which time the wound was evaluated for dehiscence, train-tracking, and infection. Infection was said to be present if there was visible discharge/pus, swelling, or redness around the wound. Dehiscence was said to be present if the wound required more sutures or adhesives to be placed or healing by secondary intention was opted for. Identification of train-tracking was visual. Patients who had received suturing with Prolene underwent removal at this point.

All patients were photographed at baseline and at three- and six-months post-management using a Nikon D5300 DSLR camera equipped with a 17-35 mm lens for comparison of local inflammation and stitch scarring in the same room and under the same light. The inflammatory response and scarring were graded as shown in Table-I and Table-II, respectively.

Data was analyzed using Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows version 26, IBM Corp; Armonk, USA). Mean and SD were calculated for quantitative variables like age, length of the wound, number of sutures, inflammatory response score at baseline, three- and six months, and scarring score at baseline, three- and six months after suturing. Qualitative variables like gender, whether infection/dehiscence/train-tracking developed or not, and the total complication rate (infection plus dehiscence plus train-tracking) were recorded in terms of frequency and percentage. The chi-square test/Fischer Exact test was applied to all qualitative variables, while the independent samples *t-test*/Mann Whitney U test was applied to quantitative variables for comparison between the Groups. The *p*-value of ≤0.05 was considered significant.

RESULTS

We studied a total of 266 patients with facial lacerations; the majority of the sample was comprised of male patients: 65.8%. The population studied was relatively young, with a mean age of 35.09±9.32 years. The mean length of laceration for the entire sample was 4.01±1.39 cm. Pre-treatment patient characteristics and their comparison across both Groups are shown in Table-III; there was no statistical difference between the Groups with regard to these variables.

There was no statistical difference between the two Groups with regard to the number of sutures administered. The inflammatory response scores and scarring scores assessed at baseline as well as after three and six months showed no significant differences between the Groups. The total complication rate of the study was 25(9.4%)and while complications were lower with Vicryl Rapide, the difference did not achieve statistical significance.

Infection was the most common complication seen: 13(4.9%), followed by wound dehiscence and train tracking, with frequencies of 7(2.7%) and 6(2.3%), respectively. Differences between individual complications did not achieve statistical significance either. Results for outcomes are displayed in Table-IV.

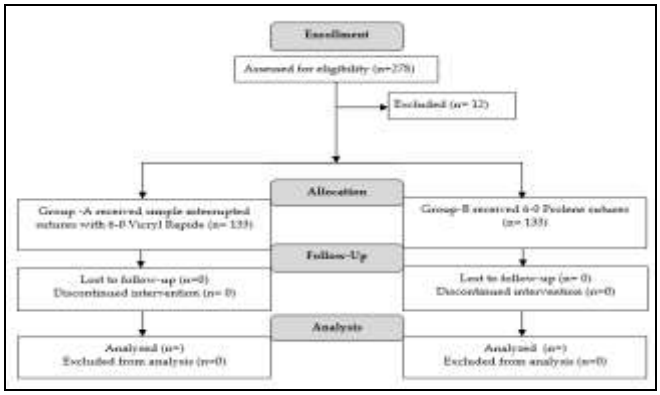

Figure-1: Patient Flow Diagram (n=266)

Table-I: Scoring of Stitch Site according to Inflammatory Response

Inflammatory Response	
Score	Finding
0	None
1	Hyperaemia
2	Hyperaemia with swelling
3	Discharge

Table-II: Scoring of Stitch Site According to Scarring

Scarring	
Score	Finding
0	None
1	Barely visible
2	Clearly visible
3	Hypertrophied

Table-III: Patient Characteristics Pre-Suturing (n=266)

Patient Characteristics	Group A (n=133)	Group B (n=133)	*p* value
Age	34.44 ± 9.12	35.74 ± 9.51	0.259
Gender			
Male	94(70.7%)	81(60.9%)	0.093
Female	39(29.3%)	52(39.1%)	
Length of Wound (cm)	3.97±1.43	4.05±1.36	0.083

Table-IV: Post-Suturing Outcomes (n=266)

Post-Suturing Outcomes	Group A (n=133)	Group B (n=133)	*p*-value
Number of Sutures	8(IQR: 4)	8(IQR: 4)	0.687
Inflammatory Response Score at Baseline	2(IQR: 3)	2(IQR: 2)	0.766
Inflammatory Response Score at Three Months	1(IQR: 2)	8(IQR: 2)	0.374
Inflammatory Response Score at Six Months	1(IQR: 1)	1(IQR: 1)	0.854
Scarring Score at Baseline	1(IQR: 2)	1(IQR: 1)	0.066

DISCUSSION

The primary outcome measures of our study were the degree of inflammation and scarring, as measured by their respective scoring systems as shown above, and the frequency of complications that occurred with each suture. There was no statistical difference between the two Groups in terms of age, gender, length of wound, and the number of sutures used. Wound healing has a complex course that progresses from inflammation at the time of the inciting event and progresses through proliferation and culminates in remodeling of the affected area, which is a continuum without clear demarcation of phases.[12] Complications occur in each phase and usually represent the underlying pathophysiological processes that are underway in a particular phase, such as wound dehiscence in the inflammatory phase and the development of hypertrophic scars in the proliferative and remodeling phases.[13,14]

Our study showed that there was no difference in inflammatory response/ tissue reaction at baseline and three- and six-month post-application of sutures between Vicryl Rapide and Prolene (p=0.766, 0.374, and 0.854, respectively). This is a local tissue response that peaks within the first week of applying a suture, with different suture materials associated with different degrees of inflammatory responses.[15] In a comparison between Vicryl and Prolene for the development of inflammatory response in facial wounds, Parnell *et al*. reported that both sutures were associated with an incidence of the inflammatory response of 4.8%.[16] Alawode *et al*., reported that approximately one in three patients who received sutures on the face developed visible inflammatory responses, regardless of whether the suture used was absorbable or not.[17] Moreover, Tejani *et al*., reported that there was no difference in the magnitude and frequency of pain during the inflammatory phase between absorbable and non-absorbable sutures when used for facial lacerations, a conclusion that was shared by Kundra *et al*.[18] Multiple studies have suggested that the inflammatory response may not be solely attributable to the material from which a suture is made, but also to the structure of the suture; multifilament, braided sutures are postulated to have a higher chance of bacterial seeding within the weaves of the filaments, which may result in higher tissue response.[19,20]

Our study demonstrated that minimal scarring was associated with both absorbable and non-

absorbable sutures and that the difference between the Groups with regards to the magnitude was statistically insignificant at baseline, three- and six months post-treatment, (p=0.066, 0.733, and 0.416, respectively). Parnell *et al*. also noted that there was no difference between absorbable and non-absorbable sutures at six months (p>0.05).[16]

The total number of complications was 9(6.8%) with absorbable sutures and 16(12.0%) with non-absorbable sutures (p=0.141) in our study. A total of 4(3.0%) developed an infection of the suture site with absorbable sutures, while 9(6.8%) were affected with non-absorbable ones (p=0.155). Sajid *et al*.,[21] reported that there was no statistical difference between the two types of sutures in terms of the prevalence of wound infection (O=0.97; 95%CI: 0.56, 1.69; Z=0.11; p=0.92), findings that were echoed by Xu *et al*.[22]

Wound dehiscence is the opening or rupture of a wound due to increased tension across the sutures.[13] Our study demonstrated a rate of wound dehiscence of 1(0.8%) with absorbable sutures and 6(4.5%) with non-absorbable ones. While there was a marked difference between the values, the *p-value* came close to but did not attain statistical significance (p=0.055). Tejani et al. reported that wound dehiscence did not occur in any of the Groups (p>0.05).[11] Conversely, Sajid *et al*., reported that absorbable sutures were associated with a lower risk of occurrence of wound dehiscence (OR=0.12; 95%CI: 0.04, 0.39; Z=3.52; p<0.0004).[21] With a larger sample size, our study may demonstrate a statistically significant difference in this regard. Lastly, train-tracking was seen in 4(3.0%) cases with absorbable sutures. In comparison, only 2(1.5%) cases developed the complication with non-absorbable ones (p=0.409) in this study, which was overall less than what was reported by Tejani et al., who reported 6(17%) cases with absorbable sutures and 3(8%) with non-absorbable ones. However, even in that study, the difference was not statistically significant (p>0.05).

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LIMITATIONS OF STUDY

Absorbable sutures have proven to be useful in the management of facial lacerations and have proven comparable to non-absorbable sutures in terms of efficacy and complication rates. It is pertinent to note that the follow-up duration of our study was comparatively short; thus, complications occurring in the late remodeling phase, such as hypertrophic scar formation, were not adequately studied. In addition, lacerations of a limited size that could be approximated easily were included in the study; larger wounds were not, which requires further study.

CONCLUSION

Absorbable sutures can be used on facial lacerations without running the risk of compromising on wound healing and with a comparable complication rate. These sutures carry the added benefit of not requiring follow-up for removal, thus decreasing the total financial cost of healthcare. The results of this study demonstrate that absorbable sutures can be employed in the emergency department setting for the management of facial lacerations. Areas that require further research include long-term complications such as hypertrophic scar formation and chronic pain, as well as the use of different types of absorbable sutures to determine which ones are associated with a superior outcome in the emergency setting.

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Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

FM & AU: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

SHC & KA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

UFG & MAN: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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