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Evaluation of Cosmetic Outcome of Running Subcuticular Sutures Over Simple Interrupted Sutures in Linear Facial Lacerations

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ABSTRACT

Background: Facial lacerations are a common cause of presentation in the Emergency Room. The technique applied to close these lacerations may influence the aesthetic outcome of the scar formed. Our research objective was to compare the two most commonly used Running Subcuticular Sutures (RSS) or Simple Interrupted Sutures (SIS) techniques in terms of the aesthetic outcome of the resulting scar.

Methods: This randomized controlled trial was conducted at Jinnah Hospital, Lahore, from January to June 2023 using a consecutive sampling technique. A total of 92 patients of both genders aged between 18 and 65 presenting in the Emergency Room with linear facial lacerations were assigned randomly to receive either RSS or SIS for closure of facial lacerations. The primary outcome was cosmetic results measured by the score on the Patient and Observer Scar Assessment Scale (POSAS) 6 weeks after treatment along with a 4-point scale score and rate of complication. The outcome statistics were analyzed using SPSS.

Results: The RSS group had a mean Patient Scar Assessment Scale (PSAS) score of 9.0 and Observer Scar Assessment Scale (OSAS) score of 10.3 while SIS had a mean PSAS score of 9.8 and OSAS score of 11.7. Statistical analysis revealed that the two groups had no significant difference in cosmetic outcome (P-values 0.31 & 0.17). The rate of complications was also similar.

Conclusion: : The study highlights that the SIS technique does not have clinical superiority over RSS in terms of scar cosmesis or risk of complication and that both techniques can be used interchangeably.

Keywords: Facial Injuries, Suturing Techniques, Oral and Maxillofacial Surgery

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INTRODUCTION

Facial injuries account for nearly 80% of all traumatic injuries[1]. The leading cause of facial trauma in most developing countries especially in our part of the world is Road Traffic Accidents (RTA) [2,3]. Such injuries may require immediate intervention ranging from simple suturing to complex facial repair surgeries. Suturing of the skin is a basic procedure in the Emergency Room (ER) and is necessary to promote early wound healing and minimize scarring. When a wound heals, it often leaves behind a permanent scar on the skin. These scars can hurt a person's mental health, confidence, and overall quality of life[4,5]. Oral & maxillofacial surgeons, as well as plastic surgeons across the world, use several suturing techniques to close facial lacerations, but the most frequently used methods are Running Subcuticular Sutures (RSS) and Simple Interrupted Sutures (SIS)[6,7]. The decision of which technique to apply mostly depends upon the personal preference of the surgeon. The aesthetic outcome of the repair is a crucial factor to consider when choosing the suturing technique, as it can impact the patient's confidence and satisfaction with the results. Although evidence in literature in the field of maxillofacial surgery is lacking, three earlier studies from other fields showed that there was no clear difference in the aesthetic outcome of wounds that were closed by using either SIS or RSS[8–10].

Furthermore, it is important to consider the presence of complications after surgery when comparing the two techniques. Infection and dehiscence are the two most commonly occurring complications of suturing facial wounds. A few studies indicated that the RSS technique was linked to more infections compared to the other, although this was not evident in other studies. There is no literature available on this subject in maxillofacial surgery.

Researchers today disagree on how to compare the two suture techniques. For example, certain medical practitioners perceive a simple interrupted suture to be a longer process, but it provides a more accurate wound closure[11]. On the other hand, some surgeons believe that continuous running stitches reduce the appearance of suture marks. Some surgeons think that interrupted sutures are better because they give greater tensile strength and therefore less chance of dehiscence. On the other hand, others contended that if the margins of the incision overlapped, interrupted sutures would cause dehiscence [12,13]. Thus, the question of which suture technique is better suited for wound suturing continues to be debated.

In recent literature, the number of comparative studies is too small to confidently recommend a single suturing technique for all kinds of facial repair which would enhance the cosmetic outcome of scars. By conducting new prospective randomized controlled trials, we should aim to fill this gap in the literature. Our research objective was to compare the two most commonly used suture techniques in terms of the aesthetic outcome of the resulting scar. We hope to gain a clearer understanding of the choice of suture technique to achieve the best cosmetic results.

METHODS

The study was a randomized controlled trial. Subjects were included from the Surgical Emergency Room of Jinnah Hospital, Lahore. The sampling technique was consecutive. To detect a significant difference of 1 point keeping a significance level of 5% with the power being 90%, using results from the study of Liu et al, the number of patients required was 94[7]. Ethical clearance was provided by the Ethical Review Board of Allama Iqbal Medical College, Lahore (Ref. No. 279/21/07/2022/S1 ERB). Before any treatment, the patients provided informed consent after being fully informed about the potential risks and benefits of the treatment.

As part of this clinical study conducted between January 2023 and June 2023, 117 patients meeting the inclusion criteria were chosen on a random basis to be treated with either SIS or RSS using a computerized lottery method. Out of the initial 117 patients, 92 patients who were enrolled in the study showed up for follow-up at 6 days and 6 weeks. 46 of these patients belonged to the SIS group, whereas the remaining 46 patients belonged to the RSS group, maintaining a ratio of 1:1 between groups. The remaining 25 patients were lost to follow-up.

Patients of both genders aged between 18 and 65 presenting in the Emergency Room with linear facial lacerations were included. Patients having injuries where either one of the two techniques was not recommended were excluded from the study. Therefore, patients who had complex facial injuries involving ears, eyelids, nose, and mucosal parts of lips were excluded. Patients with gross facial deformity or degloving injuries were excluded. Patients having a history of hypertrophic scarring or keloidal tissue formation were also excluded. Patients with a history of systemic conditions affecting wound healing, like Diabetes Mellitus, HIV/AIDS, and immunosuppressive drug intake were also excluded.

A single operator was chosen to perform the surgery on all patients. After wound washing and scrubbing the surgical site, local anaesthesia was administered. The lacerations were stitched in layers to ensure minimal tension across the wound edges. Absorbable synthetic braided material (Vicryl 3-0) was used for deep sutures to relieve tension, while nonabsorbable monofilament sutures (Prolene 5-0) were used to close the skin[14]. Adhesive closure strips were placed over the incision site, followed by a clean pressure dressing. Patients were given clear instructions to avoid getting the wound wet until the sutures were ready to be

removed to prevent any potential infection or complications. The patients were advised to take oral antibiotics for three days. The sutures were removed six days post-surgery, and adhesive strips were reapplied for another three days to reduce the chances of infection and ensure proper healing of the surgical wounds. Every patient was advised to apply a specific scar treatment gel on the scars three times a day for three months to ensure that the post-surgical scar healing was standardized for all patients.

The scars were evaluated twice during the study period; first at 6 days, then at 6 weeks. The evaluation was conducted by a researcher who was blinded to the applied technique and recorded the results using the Observer Scar Assessment Scale (OSAS), a component of the widely used POSAS, the Patient and Observer Scar Assessment Scale [15,16] (Figure I). The OSAS score was based on six parameters, as shown in Figure I. Each parameter was quantified using a scoring scale of one to ten. A score of one indicated normal skin, while a score of ten represented the worst possible scar. The patients then evaluated the appearance and condition of their scars, and their responses were recorded according to the Patient Scar Assessment Scale (PSAS), the other component of POSAS. The scores of all parameters were added together to determine the individual OSAS and PSAS scores. The resulting scores ranged from 6 to 60. A lower score indicated good healing, whereas a higher score represented pronounced scarring.

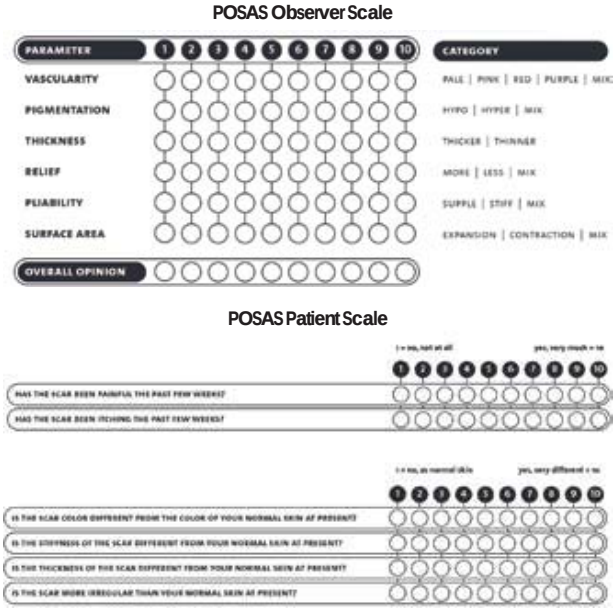

Figure I: Components of Patient and Observer Scar Assessment Scale (POSAS).

An alternative scoring scale for measuring cosmetic outcomes was also used to increase reliability. The 4-point scale, previously used in the study by Liu et al, classified scars as Excellent, Good, Fair, and Poor, based on the individual opinions of both the observer and the patient[7]. A detailed description of each classification of the 4-point scale can be seen in Figure II.

The 4-point scale was used to classify scars as

- excellent (defined as no obvious scarring, atrophy, or induration and slight or no redness or change in pigmentation compared with adjacent skin),
- good (defined as no obvious scarring, atrophy, or induration or moderate redness or increase in pigmentation compared with adjacent skin),
- fair (defined as slight-to-moderate scarring, atrophy, or induration or significant redness or increase in pigmentation compared with adjacent skin) or
- poor (defined as extensive occurrence of scarring, atrophy, or induration or redness or increase in pigmentation compared with adjacent skin).

Figure II: 4-point scale used to measure the cosmetic outcome of a scar [7].

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Statistical significance between the randomized groups for categorical variables was tested by employing the chi-square test. On the other hand, for variables that were normally distributed, the t-test was applied for independent samples, whereas for continuous variables that were not normally distributed, the Mann-Whitney U test was used. These tests were applied to ensure valid and reliable results in the analysis of the data. P-value ≤0.05 was considered to be significant. The tool that we used for this analysis was SPSS version 26.

RESULTS

Demographic details of the patients can be found in Table 1. The average age of the patient population was 36.7 years (±12.5) with the youngest being 18 and oldest being 58. The male population comprised 67.4% of the total population (62/92) whereas the female population comprised 32.6% of the total population (30/92). Lacerations were most commonly found on the cheek region (37 or 40.22%). The second most common area was the forehead region (21 or 22.83%). The peri-oral region was the 3rd highest (18 or 19.57%) with the remaining being chin & neck (11 or 11.96%) and peri-ocular (5 or 5.43%). The most common cause of injury was a Road Traffic Accident (43 or 46.74%). This was followed by Interpersonal violence (16 or 17.39%) and fall from height (14 or 15.22%). The remaining causes were occupational injuries (12 or 13.04%) and others (7 or 7.61%).

The mean length of lacerations was 4.7cm (±0.59) with 42.39% (39) falling between 2cm to 4cm. 35.87% (33) had lacerations between 5cm and 7cm. Meanwhile, 11.96% (11) and 9.78% (9) had lacerations measuring between 8cm-10cm and 1cm-2cm respectively. 27 patients (29.35%) gave a positive history of smoking with varying frequencies whereas 65 patients (70.65%) did not give a history of smoking. 13 patients (14.13%) gave a positive history of alcohol consumption, while 79 patients (85.87%) had no history of alcohol consumption.

Table 1: Demographics characteristics of the patient population.

Variables		n	%
Age	18-58 years	Mean: 36.7 years	SD: ± 12.5
Gender	Male	62	67.39%
	Female	30	32.61%
Location of laceration	Cheek	37	40.22%
	Forehead	21	22.83%
	Peri-oral	18	19.57%
	Chin & Neck	11	11.96%
	Peri-ocular	5	5.43%
Cause of injury	Road Traffic Accident	43	46.74%
	Interpersonal violence	16	17.39%
	Fall from height	14	15.22%
	Occupational injury	12	13.04%
	Other	7	7.61%
Length of laceration (Mean: 4.7cm ±0.59)	up to 2cm	11	11.96%
	2-4cm	39	42.39%
	5-7cm	33	35.87%
	8-10cm	9	9.78%
History of smoking	Yes	27	29.35%
	No	65	70.65%
Alcohol Consumption	Yes	13	14.13%
	No	79	85.87%

Four patients who were initially treated with SIS appeared with wound dehiscence and received SIS sutures again. Among the patients who initially received RSS, two appeared with wound dehiscence and were subsequently treated with SIS. One example of each group with their POSAS scores is shown in Figure 1 and Figure 2.

1: Arrow showing Peri-oral laceration stitched using SIS technique with 6 weeks post-op. Overall POSAS scores at 6 weeks in this patient were: OSAS=8, PSAS=9.

Figure 2: Arrow pointing to Chin & Neck region laceration stitched using SIS technique with 6 weeks post-op. Overall POSAS scores at 6 weeks in this patient were: OSAS=9, PSAS=8.

Table 2A shows the mean overall scores after 6 days of treatment. The RSS group had a mean total PSAS of 13.1 (±5.2) and OSAS of 14.9 (±6.3). Meanwhile, the SIS group had a mean total PSAS of 14.4 (±5.9) and OSAS of 16.0 (±6.0). The study findings indicate that there were no notable differences between the SIS and RSS groups in terms of PSAS and OSAS (P-value 0.26 and 0.42 respectively). However, the cosmetic outcomes scores at the 6-week mark showed a slight improvement when compared to the scores at 6 days following the surgery. This suggests that the scars tended to improve over time.

Table 2A: Mean overall scores of PSAS and OSAS after 6 days.

Scale	RSS	SIS	p-value
PSAS	13.1 (±5.2)	14.4 (±5.9)	0.26
OSAS	14.9 (±6.3)	16.0 (±6.9)	0.42

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Table 2B: Mean scores of individual components and overall score on PSAS and OSAS scale after 6 weeks.

Outcome	RSS (N=46)	SIS (N=46)	p-value
Patient Scar Assessment Scale			
Pain	1.1 (±0.2)	1.1 (±0.3)	0.99
Itching	1.1 (±0.2)	1.2 (±0.4)	0.17
Color	2.1 (±1.4)	2.2 (±1.7)	0.75
Pliability	1.4 (±0.8)	1.5 (±0.8)	0.55
Thickness	1.9 (±1.1)	2.3 (±1.8)	0.20
Relief	1.4 (±0.7)	1.5 (±0.6)	0.70
Overall score	9.0 (±3.6)	9.8 (±4.0)	0.31
Observer Scar Assessment Scale			
Vascularity	1.9 (±0.8)	2.1 (±1.2)	0.35
Surface Area	1.6 (±0.6)	1.9 (±1.1)	0.10
Pigmentation	1.4 (±0.4)	1.6 (±0.5)	0.35
Pliability	1.6 (±0.6)	2.0 (±1.1)	0.03
Thickness	2.1 (±1.2)	2.2 (±1.5)	0.72
Relief	1.7 (±0.6)	1.9 (±0.9)	0.21
Overall score	10.3 (±4.2)	11.7 (±5.5)	0.17

Table 2A shows the mean overall scores after 6 days of treatment. The RSS group had a mean total PSAS of 13.1 (±5.2) and OSAS of 14.9 (±6.3). Meanwhile, the SIS group had a mean total PSAS of 14.4 (±5.9) and OSAS of 16.0 (±6.0). The study findings indicate that there were no notable differences between the SIS and RSS groups in terms of PSAS and OSAS (P-value 0.26 and 0.42 respectively). However, the cosmetic outcomes scores at the 6-week mark showed a slight improvement when compared to the scores at 6 days following the surgery. This suggests that the scars tended to improve over time.

Table 3: 4-point scale scores of Patients and Observer assessment in SIS and RSS.

4-point scale score	SIS Patient Assessment	RSS Patient Assessment	SIS Observer Assessment	RSS Observer Assessment
Excellent	33 (71.73%)	28 (60.86%)	31 (67.39%)	26 (56.52%)
Good	10 (21.73%)	14 (30.43%)	8 (17.39%)	11 (23.91%)
Fair	3 (6.52%)	4 (8.69%)	7 (15.21%)	9 (19.56%)
Poor	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

On the 4-point scale, patient assessments at 6 weeks showed that 33 patients (71.73%) belonging to the SIS group rated their scars as Excellent. In comparison, 28 patients (60.86%) from the RSS group rated their scars as Excellent. Furthermore, 10 (21.73%) rated their scars as Good and 3 patients (6.52%) rated their scars as Fair in the SIS group. Meanwhile, in the RSS group, 14 patients (30.43%) rated their scars as Good and 4 patients (8.69%) rated their scars as Fair.

Observer assessments showed similar results for each group, with 31 patients (67.39%) from the SIS group having their scars rated as Excellent. Moreover, 8 patients (17.39%) had their scars rated as Good and 7 patients (15.21%) had their scars rated as Fair. Meanwhile, in the RSS group, 26 patients (56.52%) had their scars rated as Excellent, 11 patients (23.91%) had their scars rated as Good and 9 patients (19.56%) had their scars rated as Fair. These results can be visualized in Table 3. Although a higher percentage of the SIS group rated their scars as Excellent, following statistical analysis, the difference between the two groups in both patient and observer assessments was statistically insignificant.

Table 4: Complication rate of RSS and SIS.

Complication	RSS	SIS	p-value
Wound Dehiscence	2/46 (4.3%)	4/46 (8.6%)	0.40
Infection	1/46 (2.1%)	1/46 (2.1%)	1

Table 4 provides information about the frequency of wound dehiscence and infection. Both groups had one case complicated with infection. RSS had two cases of wound dehiscence while SIS had 4 such cases. The incidence of wound dehiscence appeared to be slightly higher for the SIS group as compared to the RSS group. Still, after statistical analysis, the difference appeared to be insignificant (p-value 0.40).

DISCUSSION

According to our study, the patient and the observer similarly rated the cosmetic results of RSS and SIS 6 weeks following surgery. This is consistent with earlier studies that found comparable aesthetic outcomes for both methods [17–19]. Liu et al conducted a study where they compared the cosmetic results of scars following dermatologic surgery using the same scale (POSAS) and concluded that the aesthetic outcome of running subcuticular and simple interrupted sutures in dermatologic surgery involving the face was similar [8]. More recent research by Kasthurirengan et al evaluated the same parameters using an identical scale in patients undergoing maxillofacial surgeries. This study also concluded that the difference in the cosmetic outcomes of patients treated with RSS and SIS was statistically insignificant [19].

Assessing the cosmetic outcome is a demanding task because there is no universally accepted technique to measure it. In most studies, the scales used for assessments of the scar are formulated to assess the cosmetics of the healed wound objectively by an observer. We used a scale that fully incorporates the patient's perception of the cosmesis and other characteristics of the scar. The patients of our study were inclined to score their scars better than the observers, which can be seen by comparing the median overall scores of PSAS and OSAS. Furthermore, it can be seen in several earlier studies that patients tend to factor in various other aspects of the scar while performing the overall assessment of their scar [20,21]. For instance, discomfort due to pain and itching can affect the overall opinion of the patient during assessment, an aspect that is not perceivable by an observer. Therefore, it is clear that including the subject's personal opinion of their wound is vital in forming an overall opinion about a scar.

Scars are characterized by their color, which is considered a significant aspect of cosmesis. The assessment of color varies between patients and observers according to the POSAS, with patients evaluating color as a whole and observers examining pigmentation and vascularity. The Mexameter is a reliable and objective method that has previously been used to assess various aspects of color[22]. Our study found that there were no differences in color measurements between the two suture techniques, as determined by the assessment six weeks after the surgery.

Railroad track scars are permanent marks that can be observed in patients who have undergone poorly executed SIS. At times, it is the primary factor to consider for surgeons when choosing RSS over SIS. As per our study, in the SIS group, 9 patients (10%) had persistent suture marks. According to the observers, scars with railroad marks were scored inferiorly than those with no marks. However, the presence or absence of suture marks did not affect how patients scored their scars. The importance of suture marks to patients is subjective and can be influenced by their background and culture. Suture marks are often included in scar assessment scales like the SCAR scale and SBSES. However, there is still a debate about the clinical significance of these marks to patients. It is worth noting that patients

who receive SIS may still have suture marks, but the overall score of SIS and RSS was similar. It may suggest if suture marks were completely absent, SIS could result in better cosmesis.

Our research had the objective of evaluating the complications that occur after RSS and SIS surgery. Earlier studies have suggested that the infection rates following cardiac surgery are higher in cases of RSS as compared to SIS[23]. However, this finding was not true in the case of appendectomies[24]. Furthermore, there is no data available for this in maxillofacial surgery. Recent reviews suggest that using RSS can minimize the risk of superficial wound dehiscence, but the study's evidence was limited to abdominal and open-heart surgery[25,26]. According to our research, we found that our proportion of complications such as wound dehiscence and infection was lower than that of previous studies. We believe that this was due to our application of a pressure dressing for 48 hours after surgery. Existing literature shows that an occlusive dressing can promote the healing of wounds while minimizing the risk of potential complications[27]. This type of dressing creates a barrier over the wound, which keeps it moist and protects it from external irritants and infections. By providing a conducive healing environment, an occlusive dressing can accelerate the healing process and prevent scab formation. Nevertheless, by the end of the study, it became apparent that the difference in the incidence of complications between RSS and SIS was statistically insignificant.

Many limitations were observed during the study period. The patient pool was from a single centre and treated by the same operator. Furthermore, the final evaluation of the scar was done at just 6 weeks post-surgery. Finally, a single observer conducted all evaluations. For future studies, it is recommended to include patients from multiple centres and compare the treatment given by multiple doctors with varying competency levels. The patients should be followed up for a longer duration to allow complete scar healing before the final overall assessment. The assessment should be done by more than one observer to increase the reliability of the assessment.

CONCLUSION

The research highlights that the running subcuticular suture technique has no clinical superiority over the simple interrupted suture technique in terms of scar cosmesis or risk of complication when used for the repair of linear facial lacerations, therefore, both techniques can be used interchangeably without compromising on cosmetics or increasing the risk of complications.

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CONFLICT OF INTEREST

We declare that there were no conflicts of interest.

ETHICS APPROVAL

The study was approved by the Ethical Review Board of Allama Iqbal Medical College, Lahore.

PATIENT CONSENT

The consent of all patients was taken before inclusion.

AUTHOR'S CONTRIBUTIONS

MA carried out the experiments and drafted the manuscript. GZ conceived the idea and supervised the project. BI performed data analytics. SFAK and ABA contributed to the interpretation of the results. LS contributed to data collection.

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