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ORIGINAL ARTICLE

Running Subcuticular Sutures Versus Simple Interrupted Suture in Wound Healing of Fibroadenoma Patients: A Randomised Control Trial

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Abstract

Objectives: To compare wound healing in post-operative patients of fibroadenoma when skin closure is done with running subcuticular suture as compared to simple interrupted suture. **Methods:** This was a prospective, randomized controlled clinical trial conducted in a hospital setting. Here, the scar quality, patient comfort, time taken for wound closure and postoperative complications were compared when the incision was closed with running subcuticular suture as compared to simple interrupted suture. Data was collected on postoperative day 7 when the patient came for stitch removal using the VAS (Visual Analogue Scale) and Modified HWES (Hollander Wound Evaluation Scale) scoring systems. The data were collected and analysed by using the statistical software 'R'. The key outcome measures included VAS scores, HWES, and time. **Results:** This study included a total of 60 patients. Out of the these, 54 met the inclusion and exclusion criteria, while the remaining patients were lost in follow-up. 24 were enrolled into group A (Running Subcuticular) and 30 in group B (Simple Interrupted). The mean VAS score for Scar quality (as given by the patients) for Group A was 9.6667 and 9.1 for Group B. The mean VAS score for patient comfort was 0.125 for Group A and 0.5 for Group B. The mean HWES score for Group A was 0.66667 and for Group B was 0.73333. The mean closure time was 5.2083 minutes for Group A and 2.7333 minutes for Group B. 2 cases (8.333%) of wound dehiscence following superficial wound infection were observed in Group A and 1 case (3.333%) in Group B. **Conclusion:** The cosmetic outcome showed better results with running subcuticular sutures as compared to simple interrupted sutures. Patient comfort was more postoperatively with running subcuticular sutures. However, simple interrupted sutures appear to be more time saving. No comment could be satisfactorily made on the postoperative complications as the sample size was too small in this study.

Key Words: Wound healing, Suture techniques, Scar quality, Running subcuticular suture, simple interrupted suture

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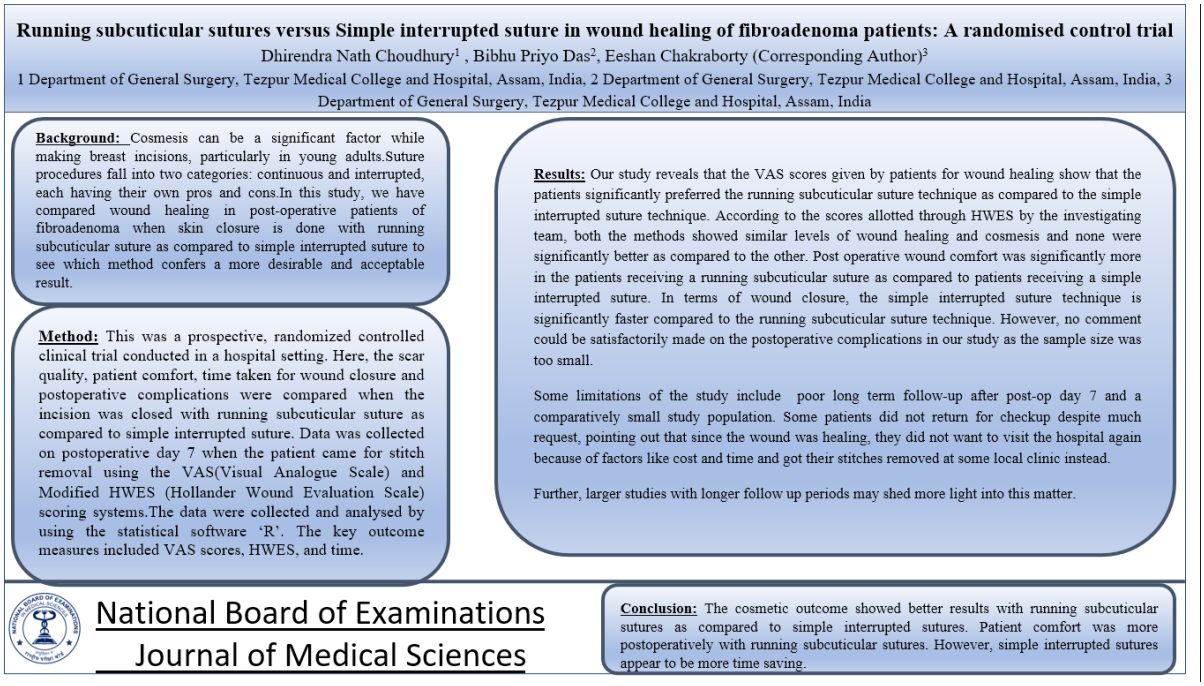
Graphical Abstract



Introduction

One of the most basic surgical techniques is skin suturing. It promotes early healing, which is an essential part of scar development. Scars developed following wound healing have a negative impact on patients' quality of life, mental health, and interpersonal connections [1]. The proper suture and technique can prevent complications and scar hyperplasia, resulting in better cosmetic results [2].

Cosmesis can be a significant factor while making breast incisions, particularly in young adults.

Suture procedures fall into two categories: continuous and interrupted. Interrupted sutures, created from a single piece of material, allow surgeons to adjust the spacing between the two ends of the wound. Continuous sutures provide consistent tension throughout the incision.

Dehiscence and infection are two common short-term side effects of skin sutures. Scar appearance and pigmentation development have been concerns for both surgeons and patients with improvements and advances in surgical abilities. The majority of cosmetic scar evaluation result reports are based on subjective scar scores. The visual analogue scale (VAS) is a reliable and helpful instrument for evaluating differences in scar quality [3].

In addition to continuous or interrupted suture procedures, the skin layers involved and the type of suture material used may have an impact on the results. In general, interrupted sutures include all the layers of the skin, whereas running subcuticular sutures are stitched straight beneath the outer skin layer.

Currently, academicians have mixed viewpoints when comparing these two suture procedures as to which offers better wound healing and will thus be both more acceptable and desirable by the patients.

In this study, we have compared wound healing in post-operative patients of fibroadenoma when skin closure is done with running subcuticular suture as compared to simple interrupted suture in a tertiary care government hospital setting in Tezpur, Assam, India.

Aims and objectives

1. To assess scar quality from patient and surgeon perspective.
2. To assess patient comfort in the days immediately following surgery.
3. To assess the time taken to complete closure in the operating room.
4. To assess short term complications.

Materials and Methods

This was a hospital based prospective, randomised controlled clinical study done in the Department of General Surgery in Tezpur Medical College and Hospital, Tezpur, Assam involving sixty patients with fibroadenoma who were treated by surgical excision of the same. Patients who matched the set inclusion and exclusion criteria were then selected for data analysis and further study.

Inclusion criteria

Patients were eligible for enrolment if

1. They were at least 18 years of age
2. They agreed to provide written consent
3. They were in general good health
4. They were available for follow up for at least 7 days after surgery
5. The size of the fibroadenoma was <5 cm in diameter.

Exclusion criteria

Patients were excluded from the study if

1. They were pregnant
2. They were minors
3. They had some pre-existing comorbidity which may impede wound healing.
4. They were incompetent to give written consent to enroll in the study
5. They were not willing for subsequent follow ups
6. They had Giant fibroadenomas (>5 cm in diameter).

The scar quality was assessed post-operatively from both patient and surgeon's point of view along with analysis of patient comfort post operatively, time taken for wound closure and short term complications for each wound in all the patients operated for fibroadenoma in a period of six months (January 2023 to June 2023).

Wounds of these patients were closed using running subcuticular technique or simple interrupted technique using nylon (Ethilon®) 3-0 sutures. Only one suture was used in each wound in either type of suture technique.

Out of the sixty patients enrolled, fifty four patients met the inclusion and exclusion criteria within this period and were enrolled and operated for fibroadenomas. The rest were lost in follow up.

The patients were randomised by means of a method of random selection, i.e., the patient was randomly allotted a procedure by the treating team. Each half of the bilateral case was closed differently.

Local anaesthesia (10 ml of 2% Lignocaine Hydrochloride solution) was infiltrated into the wound in each patient before incision was placed. Post excision and wound closure, careful dressing with povidone iodine solution and sterile gauze

was done. Time for wound closure was meticulously measured during each of the procedures.

There was no expense borne by the patients except for some pre-operative investigations like random blood sugar and viral markers (for HIV, HBsAg and Anti-HCV) and a minor OT charge (in accordance with government rules).

Sutures were provided from the hospital at no extra cost. All patients were discharged as per standard daycare procedure protocols and given medications with written and verbal instructions regarding wound care.

Data Collection

The wounds were examined by the treating team at the Surgery out-patient department on the 7th postoperative day or earlier if any complication developed. The wounds were then reviewed by the treating team and inspected thoroughly and stitches removed if the wounds healed properly.

Patients were then asked about their satisfaction regarding the scar, and the VAS Scale [4] was used to assess their opinion on scar quality, with a score from 0 to 10, where 10 represents the finest scar possible and 0 represents the worst.

Post-operative comfort including localised pain and tenderness were also assessed using the VAS score [5,6] out of 0-10, 0 denoting no pain and 10 being unbearable pain. Rescue analgesics were advised to the patients if they complained that the pain was at least above a score of 5.

The VAS score [5,6] out of 0-10 was used to quantify post-operative comfort, including localized pain and discomfort, with 0 representing no pain or discomfort and 10 indicating excruciating pain. Patients were recommended to take rescue analgesics if their pain score was at least above 5.

Physical examination and palpation were employed to establish complete healing of the wound, described as a dry wound with entirely viable tissue firmly adhered to the wound base, pinkish in color, and odorless. Clinical images were obtained at this point and a number was assigned to each photograph, which was then utilized by the investigating team at the end of data collection to randomly assess the wounds using the Modified Hollander Wound Evaluation Scale [7-10].

The modified HWES score includes six clinical criteria: step-off borders, contour irregularities, margin separation, edge inversion, excessive distortion, and overall look, with a maximum score of one for each. The total cosmetic score was calculated by summing the results for the six classified variables. A score of 0 was regarded the best, a score of 3 or lower was considered unsatisfactory, and a score of 6 was the lowest imaginable. This was done to avoid any score or observer prejudice on the part of the investigating team. The wounds were independently examined for complications, and those that were discovered were treated accordingly.

Data Analysis

The data were collected and processed using the statistical program 'R'.

The 'permutation test' was used to compare ordinal values, whereas the 'Student's t-test' was used to evaluate continuous variables. The key outcome variables were VAS scores, HWES, and time. Unless specified otherwise, statistical significance was kept at $\alpha = 0.05$.

Results

A total of 60 patients participated in this study. 54 of these patients met the inclusion and exclusion criteria and the rest were lost in follow-up. 24 wounds were enrolled into group A (Running Subcuticular) and thirty in group B (Simple Interrupted). The subjects were aged 18-29 years with an average age of 22.867 years (Table 1).

In the running subcuticular group, the mean VAS score for Scar quality (as given by the patients) was 9.6667. The mean VAS score for patient comfort was 0.125. The mean HWES score for this group (as given by the investigating team) was 0.66667.

The mean closure time was 5.2083 minutes for this group. Out of this sample size, 2 cases (8.333%) of wound dehiscence following superficial wound infection were observed.

In the simple interrupted group, the mean VAS score for Scar quality was 9.1. The mean VAS score for patient comfort was 0.5. The mean HWES score for this group (as given by the investigating team) was 0.73333.

The mean closure time was 2.7333 minutes for this group. Out of this sample size, 1 case (3.333%) of wound dehiscence was observed.

All wounds had epithelialized by the seventh day, regardless of closure method (excluding those with problems). The difficulties arose on the fifth day in three cases. All three dehisced wounds were cleansed, redressed, and left to heal with tertiary purpose, and oral antibiotics were provided (Figures 1 to 8).

Table 1. Comparison of wound outcomes using Running subcuticular and simple interrupted suture techniques

	Running Subcuticular Technique	Simple interrupted Technique
Mean VAS score for Scar Quality (0-10)	9.6667	9.1
Mean HWES score (0-6)	0.66667	0.73333
Mean VAS score for Patient Comfort (0-10)	0.125	0.5
Mean Closure Time (Mins)	5.2083	2.7333
Complications (Nos.)	2	1

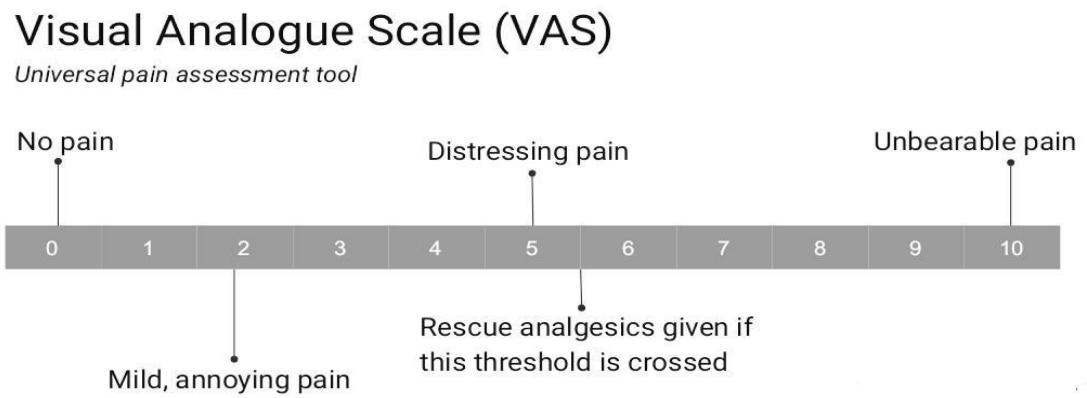


Figure 1. Visual Analogue Scale for Pain

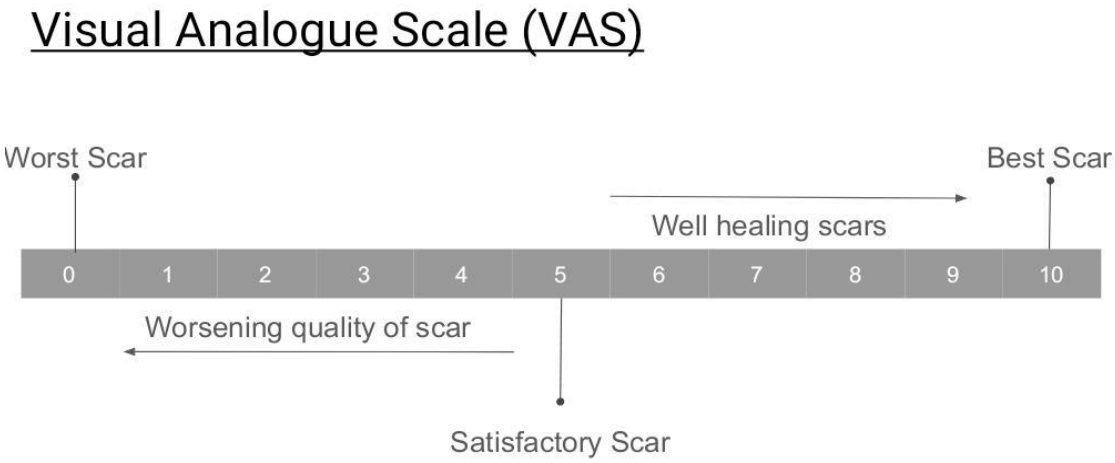


Figure 2. Visual Analogue Scale for Quality of Scar

Modified Hollander Wound Evaluation Scale(HWES)

Incision attribute	Score if absent	Score if present
Step-off borders	0	1
Contour Irregularities	0	1
Margin Separation	0	1
Edge inversion	0	1
Excessive Distortion	0	1
Overall appearance	0 (satisfactory)	1 (unsatisfactory)
Total Hollander score	**0 (best)**	**6 (worse)**

Figure 3. Modified Hollander Wound Evaluation Scale

Figure 4. Wound closed using Running Subcuticular Technique

Figure 5. Wound closed using Simple Interrupted Technique

Figure 6. Wound post-Stitch Removal on Postoperative Day 7 for Running Subcuticular suture

Figure 7. Wound post-Stitch Removal on Postoperative Day 7 for Simple Interrupted suture

Figure 8. Wound Dehiscence on Postoperative Day 5

Discussion

Both the surgeon and the patient want a cosmetically attractive scar after surgery. The scar that forms as a result of wound healing has a substantial impact on patients' mental health, personal relationships, and quality of life [1]. Cosmesis is a critical factor to consider while making breast incisions, particularly in young adults.

Our study reveals that the VAS scores given by patients for wound healing show that the patients significantly preferred the running subcuticular suture technique as compared to the simple interrupted suture technique.

According to the scores allotted through HWES by the investigating team, both the methods showed similar levels of wound healing and cosmesis and none were significantly better as compared to the other.

Post operative wound comfort was significantly more in the patients receiving a running subcuticular suture as compared to patients receiving a simple interrupted suture.

In terms of wound closure, the simple interrupted suture technique is significantly faster compared to the running subcuticular suture technique.

Scar appearance is essential for a variety of reasons. It can assess the level of care delivered to the patient. It is also useful to compare the outcomes of several therapies in order to determine which is more effective. As a result, our wound outcome data may be beneficial to clinicians and patients both.

Other investigations comparing wound healing after running subcuticular sutures vs basic interrupted skin sutures for wound closure have produced comparable and similar outcomes across

the scalp, wrist, abdominal wall, upper or lower extremities, face, groin area, and sacral region [11-14]. Different suturing techniques may have different impacts on the incidence of surgical site infection as concluded by other researchers [15].

Continuous sutures have the disadvantage of requiring the entire stitch to be removed if infection occurs, as opposed to interrupted sutures, which only require the removal of stitches in the appropriate area.

Participants in prior trials also experienced a few cases of superficial wound dehiscence. Overall, the two groups differed significantly, indicating that interrupted sutures were more likely to produce wound dehiscence than continuous subcutaneous sutures. Four further independent abdominal wall trials revealed a substantial difference [11,13,16,17]. But, in another study, when the wound on the face was sutured, there was no notable difference by either procedure of wound closure [14]. One probable explanation is that in surgical wounds with high tensions, such as the abdominal wall, scalp or extremities, interrupted sutures may struggle to close a defect when used under high skin stress because of increased tension at the wound borders [18,19]. The facial area has less strain, resulting in similar wound dehiscence rates between the groups. The discrepancy between the two groups could be explained by overlapping wound edges generated by interrupted sutures, which can be avoided using continuous subcuticular sutures. There are several causes that can contribute to wound dehiscence. More research is needed to support these theories.

However, no comment could be satisfactorily made on the postoperative complications in our study as the sample size was too small.

Previous research on the relationship between suture methods and cosmetic outcomes is sparse.

Cosmetic satisfaction can often be more important than functional success in treatment [20] and can influence every area of our social lives [1]. The VAS score for scar aesthetic appearance was reported in six trials by both expert assessors and patients. Continuous subcuticular sutures resulted in a better cosmetic outcome in these investigations. Only one trial indicated that disrupted suture was slightly more associated with a cosmetically superior outcome, but not statistically significant [14]. The method of skin closure is the one of the most important factors influencing the cosmetic look of a scar [21].

Suture marks are commonly related with tissue inflammation at the macro level [21] and collagen fiber degradation at the micro level [22]. Running subcuticular sutures do not comprise stitches across the epidermal layer, hence there is no punctate scarring. In simple interrupted sutures, the suture must penetrate the epidermis, which causes further inflammation. Continuous cutting and compression of soft tissue beneath normal skin might lead to increased fibrous tissue during healing and scarring. Furthermore, because individual stitches are used, determining suturing depth, width, and tensile strength can be challenging, leading in less precise epidermal alignment and a reduced cosmetic result [22]. Interrupted sutures are more prone to cause dehiscence and cross-scarring, potentially affecting the cosmetic outcome [17,23].

We accept that there are some limitations of the study, such as poor long

term follow-up after post-op day 7 and a comparatively small study population. Some patients did not return for checkup despite much request, pointing out that since the wound was healing, they did not want to visit the hospital again because of factors like cost and time and got their stitches removed at some local clinic instead.

As far as we know, at the time of writing, even though there are some comparative studies between the two suture techniques that we studied, there are no studies conducted for wound healing over the breast post fibroadenoma excision.

However, in our research, we could not come to a satisfactory conclusion about all the study parameters as our sample size was small.

Conclusion

Our study demonstrates that the cosmetic outcome is better with running subcuticular sutures as compared to simple interrupted sutures. Patient comfort is more postoperatively with running subcuticular sutures. However, simple interrupted sutures appear to be more time saving as demonstrated by our findings. However, no comment could be satisfactorily made on the postoperative complications as the sample size was too small in this study. The study had a few drawbacks including poor long-term wound assessment and a limited sample size. We may have also used more detailed and thorough scar evaluation techniques to have a better understanding and analysis of wound healing. Future trials with longer follow-up periods are necessary to fully evaluate the impact of different skin suturing procedures.

Statements and Declarations

Conflicts of interest

The authors declare that they do not have conflict of interest.

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