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Original research article

COMPARISON OF SURGICAL SITE INFECTION IN PATIENTS UNDERGOING SKIN CLOSURE WITH STAPLES VS. SUTURES IN CLEAN ELECTIVE SURGERIES

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Abstract: *Thyroidectomy is a common surgical procedure with various techniques for wound closure, including dermal staples and intradermal suturing. Each method has potential advantages and disadvantages, particularly in terms of wound complications, cosmetic outcomes, and postoperative pain. Understanding which technique offers better outcomes in these areas can guide surgeons in selecting the most appropriate method for skin closure after thyroidectomy.* ***Objective:*** *To compare wound complications, cosmetic outcomes, and pain scores between skin closure with dermal staples and intradermal sutures in patients undergoing thyroidectomy.* ***Methods:*** *A prospective study was conducted in the Surgical Department of Sheikh Zayed Hospital, Lahore, from August 2023 to August 2024. The study included 100 adult patients undergoing thyroidectomy for thyroid disease. The patients were randomly divided into two groups: Group A (n=50) received wound closure with dermal staples, and Group B (n=50) received intradermal suturing. Postoperative assessments were conducted at 1, 4, 12, and 24 weeks to evaluate wound complications, cosmetic outcomes, and pain scores. Cosmetic outcomes were measured using the Stony Brook Scar Evaluation Scale and Manchester Scar Scale. Pain was assessed using the Visual Analog Scale (VAS).* ***Results:*** *No surgical site infections were reported in either group. At the 24-week follow-up, cosmetic outcomes measured by the Stony Brook Scar Evaluation Scale were significantly better in Group A (4.12 ± 1.0) compared to Group B (3.32 ± 1.17) (p=0.027). Similarly, the Manchester Scar Scale score was higher in Group A (7.83 ± 1.34) than in Group B (9.20 ± 2.26) (p=0.033), indicating better cosmesis with staples. However, pain scores were significantly higher in Group A than in Group B both immediately after surgery and at the 4- and 12-week follow-ups.* ***Conclusion:*** *The use of dermal staples in thyroidectomy demonstrated better cosmetic outcomes and wound healing compared to intradermal suturing. However, patients who received staples experienced significantly more postoperative pain. While dermal stapling is a safe and effective alternative for skin closure, further studies with larger populations are necessary to corroborate these findings and guide clinical practice.*

Keywords: Pain, Sutures, Staples, Thyroidectomy, Cosmetic Outcomes, Wound Complications.

Introduction

The most common type of thyroid surgery is open thyroidectomy through cervical access point. It is important to achieve a good cosmetic outcome in this procedure as most women undergo this surgery so a visible incisional scar affects their quality of life.(1) Therefore, a good surgical technique and closure can prevent emotional stress and impair the quality of life in patients.

Wound closure significantly impacts wound healing, scarring, and aesthetic outcomes. In open thyroidectomy, wound closure is mostly done by metal clips, sutures, or adhesives.(2, 3) Buried knot sutures are frequently used in our country due to high tensile strength and low dehiscence rates. However, the results vary in different studies and it is time-consuming.(4, 5)

An alternate method of wound closure is dermal staples which are less time-consuming, have better healing and cosmetic outcomes, have less risk of infection or inflammation, and provide safety against needle stick injury. Many comparison studies have been conducted that report dermal stapling as a good alternative to intradermal suturing.(6, 7) However, no study has been conducted in patients undergoing open thyroidectomy. This study was conducted to compare wound complications, cosmesis, and pain score between skin closure with staples and sutures in patients who underwent thyroidectomy.

Methodology

A prospective study was conducted in the Surgical Department of Sheikh Zayed Hospital, Lahore from August 2023 to August 2024. A total of 100 adult patients undergoing thyroidectomy for thyroid disease were included in the study. Informed consent was provided by all patients. Patients aged with a history of any head and neck surgery, lateral neck node dissection, planned endoscopic or robotic surgery, scheduled or prior neck external radiation therapy, unsatisfactory preoperative physical examination, on immunosuppressants for 6 months or less before study, pregnant or lactating women and those with history of hypertrophic scar formation or keloids were excluded.

Patients were divided into two groups; Group A included 50 patients in whom wound closure was done by dermal stapling and Group B included 50 patients in whom wound closure was done by intradermal suturing. A wound protector was applied in all patients and the procedure was performed by making a 5 cm skin crease incision, 1-2 cm above the supraclavicular notch. Anesthesia was administered and the patient's neck was extended in a

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supine position. The surgical site was prepped with betadine soap and chlorohexidine glucose and draped. Strap muscle fascia was assessed by low-collar incision by 15-blade. The standard procedure of thyroidectomy was performed and a closed surgical drain was placed under the skin through an extra-incisional site. Platysma muscle was closed by 4-0 Vicryl absorbable thread sutures.

In Group A, wound closure was done by placing dermal staples at a 5 mm distance by INSORB stapler, and lifting the tissue at both sides of the incision by two tooth forceps. In Group B, an undyed 6-0 Vicryl thread suture was used to make interrupted intradermal buried knots at a 5 mm distance. Aseptic dressing was applied in all patients with 3M Steri-strip adhesives for 7 days. Patients were asked to avoid UV exposure and not administer any analgesics or additional wound treatments.

Patients were followed up postoperatively at 1, 4, 12, and 24 weeks to assess wound complications, cosmetic outcomes, and pain scores. Wound complications including infection, dehiscence, hematoma, or seroma were examined and the Stony Brook Scar Evaluation Scale (SBSES) and the Manchester Scar Scale were used to score wound appearance. The range of SBSES score was from 0 (poor cosmesis) to 5 (best cosmesis). The width, height, color, suture marks, and overall appearance of the wound or scar were considered for scoring. The range of MSS scores was 5 (best cosmesis) to 18 (poor cosmesis) on five questions where color, contour, distortion, texture, and matteness vs shininess were considered for scoring. A visual analog scale was used to compare pain scores between both groups.

All data was analyzed by SPSS version 25. Descriptive analysis of categorical and continuous variables was performed. Categorical variables were compared by Fisher's exact test and Chi-square test. Continuous variables were compared by Mann-Whitney U test and independent t-tests. Data normalcy was checked by the Shapiro-Wilk test. Repeated measurements within the group and between both groups were compared by repeated measures ANOVA and Bonferroni post hoc test. A p-value less than 0.05 was taken as significant.

Results

The demographic characteristics of patients are shown in Table I. The average age was similar between both groups (51.63 ± 10.26 vs 50.21 ± 10.26 years). Patients also did not differ significantly for BMI and ASA score. The majority of patients in Group A (54%) underwent unilateral thyroidectomy and 70% of patients in Group B underwent total thyroidectomy. The majority of patients underwent bilateral central node dissection (60% vs 70%). The surgical duration in both groups was similar (107.74 ± 23.36 vs 119.89 ± 25.96 minutes). Patients did not differ with respect to clinical and pathologic outcomes as shown in Table II.

None of the patients reported any wound complications so the surgical site infection was nil. SBSES score was significantly higher at 24 weeks follow-up in group A (4.12 ± 1.0) than in group B (3.32 ± 1.17) (p=0.027). MSS score was significantly higher in group A (7.83 ± 1.34) than in group B (9.20 ± 2.26) (p=0.033) (Table III).

The average VAS score was significantly higher in group A postoperatively and at follow-up. Pain score was significantly higher in group A at week 4 (1.17 ± 0.89 vs 0.71 ± 0.99, p=0.037) and 12 (1.17 ± 1.10 vs 0.50 ± 0.69, p=0.023). However, pain score was similar at 1 week (1.72 ± 0.78 vs 1.53 ± 1.08, p=0.479) and 24 weeks (0.56 ± 0.63 vs 0.34 ± 0.51, p=0.110) (Table IV). Closure time was significantly shorter in group A (p<0.001).

Table I: Demographic features of study groups

Features	Group A	Group B	P
Average age	51.63 ± 10.26	50.21 ± 10.26	0.643
Gender			
Male	8 (16%)	10 (20%)	1.0
Female	42 (84%)	40 (80%)	
Average BMI	25.50 ± 3.76	26.67 ± 4.48	0.227
ASA score			
I	5 (10%)	18 (36%)	0.118
II	45 (90%)	32 (64%)	
Extent of thyroidectomy			
Total	23 (46%)	35 (70%)	0.136
Unilateral	27 (54%)	15 (30%)	
Central node dissection			
Unilateral	5 (10%)	3 (6%)	
Bilateral	30 (60%)	35 (70%)	
Not done	15 (30%)	12 (24%)	0.875

Table II: Clinical and Pathological Outcomes of Study Groups

Variables	Group A	Group B	P
Average surgery duration	107.74 ± 23.36	119.89 ± 25.96	0.118
Average total drainage	123.91 ± 39.74	134.26 ± 46.84	0.457
Postoperative day	6.10 ± 1.36	6.05 ± 0.86	0.9
Pathological outcome			
Papillary thyroid carcinoma	43 (86%)	42 (84%)	1.0
Follicular thyroid carcinoma	-	-	
Nodular hyperplasia	4 (8%)	3 (6%)	

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Follicular adenoma	1 (2%)	3 (6%)	
Malignant lymphoma	2 (4%)	2 (4%)	
Size of growth	1.01 ± 0.58	1.21 ± 1.06	0.766
T stage			
1a	44 (88%)	38 (76%)	0.325
1b	3 (6%)	-	
2	3 (6%)	12 (24%)	
N stage			
0	32 (64%)	31 (62%)	0.708
1a	18 (36%)	19 (38%)	
AJCC stage			
I	42 (84%)	44 (44%)	1.0
II	8 (16%)	66 (66%)	

Table III: Comparison of cosmesis score between study groups

Variables	Group A	Group B	P
SBSES score			
At 1 week	3.33 ± 1.52	3.50 ± 1.60	0.650
At 4 weeks	3.26 ± 1.36	3.17 ± 1.23	0.908
At 12 weeks	3.6 ± 0.81	3.65 ± 1.44	0.384
At 24 weeks	4.12 ± 1.0	3.32 ± 1.17	0.027
MSS score			
At 1 week	8.47 ± 2.15	9 ± 1.84	0.191
At 4 weeks	9 ± 1.42	9.63 ± 1.85	0.416
At 12 weeks	8.06 ± 1.48	8.98 ± 2.41	0.947
At 24 weeks	7.83 ± 1.34	9.20 ± 2.26	0.033

Table IV: Comparison of pain score between study groups

VAS score	Group A	Group B	P
At 1 week	1.72 ± 0.78	1.53 ± 1.08	0.479
At 4 weeks	1.17 ± 0.89	0.71 ± 0.99	0.037
At 12 weeks	1.17 ± 1.10	0.50 ± 0.69	0.023
At 24 weeks	0.56 ± 0.63	0.34 ± 0.51	0.110
Average	1.24 ± 1.0	0.68 ± 1.0	0.005

Discussion

This study was conducted to compare wound complications, cosmesis, and pain scores in patients undergoing thyroidectomy closed with staples vs sutures. Stapling showed fewer wound-closure times and better cosmetic outcomes, however, the pain score was higher than suturing making it a preferable method. Other studies conducted on patients undergoing clean procedures agree with these results.(8-10)

The majority of the study population was women i.e. 82% which can be due to the evidence that the incidence of thyroid cancer is 4 times more in women in Pakistan and globally.(11-13) Patients did not differ significantly for age, BMI, and ASA scores between groups.

SBSES score was similar postoperatively and at early follow-up, however, at 24 weeks, cosmesis was significantly better in the staples group (p=0.027). According to the MSS score, too, cosmesis was better in group A at 24 weeks i.e. 7.83 ± 1.34 which was the lowest score as compared to the postoperative score and other time points in follow-up (p=0.033). These findings comply with existing literature.(14, 15)

No wound complications were reported in our study in either group. This incidence is significantly lower than other studies.(16, 17) Surgical site infection is a common condition after surgery but the absence of it in our study may indicate excellent sterile field and prepping technique which reduced the risk of developing an infection. Wound closure took less time in the suture group which can be accounted for by the selection of an INSORB stapler which has been reported to show good results in terms of faster healing and reduced inflammation.(18, 19)

The average VAS score was significantly higher in group A postoperatively and at follow-up. Pain score was significantly higher in group A at week 4 (p=0.037) and 12 (p=0.023). However, pain score was similar at 1 week (p=0.479) and 24 weeks (p=0.110). These results are similar to other studies.(20, 21)

Our study has some limitations. We did not assess the long-term outcomes of both closure methods. Secondly, we did not conduct a histology assessment to assess the cause of better cosmesis with staples.

Conclusion

Dermal staples showed better cosmesis, wound, and healing outcomes however, the pain score was significantly higher than intradermal suturing. Stapling can be a safe and effective alternative in thyroidectomy patients but further studies are needed to support our results.

Declarations

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Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
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Conflict of interest

The authors declared an absence of conflict of interest.

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Concept & Design of Study

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