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Comparative Study of Staplers, Subcuticular Stithches, Conventional Closure of Skin in Thyroid Surgeries

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Abstract
BACKGROUND: *Any skin closure technique aims at opposing the skin edges precisely without tension for sufficient time to allow healing to take place. The ease and speed with which the skin closure is completed, the level of patient discomfort, the complication rate, and the final cosmetic result are the factors which has to be considered in making a comparison of different types of wound closure. This study aims at comparing staplers, subcuticular and conventional sutures for wound closure after thyroid surgery based on assessment of post-operative pain, cosmetic appearance and wound healing.*
MATERIALS AND METHODS: *A comparative study was carried out among 90 subjects attending department of general surgery, SVRRGGH, Tirupati over a period of 18 months. Subjects of either sex undergoing thyroidectomy will be randomized to had their wounds closed by staplers, subcuticular and conventional methods. Patients who underwent previous neck irradiation, secondary neck surgeries and with poor compliance are excluded from the study. Descriptive statistics, unpaired-t -test and chi-square test were used to analyse the results.*
RESULTS: *The mean age group of the study subjects was 48.69(24-76). The gender distribution showed a higher number of females (82) as compared to males (8). 74 patients were diagnosed with multinodular goitre, 9 patients were of colloid goitre and 7 were of thyroid neoplasms.56 patients underwent subtotal thyroidectomy, 25 patients underwent total thyroidectomy, 9 patients underwent hemithyroidectomy. Wound closure by subcuticular sutures has less post-operative pain, excellent scar appearance compared to other groups wound healing was good in all three groups.*
CONCLUSION: *The choice of materials for wound closure will depend on the surgeon's preference. However, this study does show that subcuticular sutures are more acceptable method for wound closure as compared to other two groups after thyroid surgery.*
Keywords: *Neck incisions, thyroidectomy, wound closure.*

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I. Introduction

Skin itself varies throughout the body in terms of its thickness, elasticity, speed of healing, and tendency to scar. Suture techniques that avoid suture marks such as 'railroad tracks,' especially in skin exposed in regular clothing, are generally more aesthetically pleasing to the patient. There is often more than one suitable method of wound closure, depending on various factors. In the selection of a suture a patient's health status,age,weight and comfort, and the presence or absence of infections or as important as the biomechanical properties of the suture,individual wound characteristics,[1] antomic location and surgeon's personal preference and experience in handling a suture material. In the present day scenario, people are aware of the various diseases and the modalities of treatment available from the advances in communication services; people avail treatment at a very early stage in disease and expect the best outcome in terms of disease treatment and cosmetic appearance.

II. Materials And Methods

Patients who underwent thyroid surgeries in S.V.R.R.G.G. Hospital, Tirupati, between the period of approval of the institutional ethical committee from November 2017 to May 2019 were studied.**Study Design:** Randomised Prospective study
Study Location: Department of General Surgery,S.V.R.R.G.G.H,Tirupati.
Study Duration: November 2017 to May 2019.
Sample size:90 patients.
Subjects and selection method:the study population from the patient's with thyroid swelling presented to S.V.R.R general hospital who underwent thyroidectomy between November 2017 to May 2019.patient's were divided into three groups each had 30 patient's

Group A (N= 30 patients):skin closure with subcuticular stitches.
Group B (N=30 patients):skin closure with staplers.
Group C (N=30 patients):skin closure with conventional method.

Inclusion Criteria:
All patients who underwent thyroid surgeries with age group 20 to 80 years.
Patients who are willing to participate in the study.

Exclusion Criteria
- Patients with a previous history of neck irradiation.
- Secondary neck surgeries
- Patients with poor compliance are excluded from the study.

Procedure methodology: The study was estimated to include a consecutive series of 90 patients undergoing thyroidectomy who will be randomized to have their wound's closed by subcuticular sutures or staplers or conventional methods. The randomization code was generated using a table of random numbers, and the sealed envelope was opened at the end of each operation.All operations were performed by or under the direct supervision of the same consultant Standardized technique was used for Thyroid operations.Assessment of pain was done by Verbal response and Visual analog scale for three consecutive postoperative days.The assessment of cosmetic appearance was done by using a visual analog scale at the time of the 6th week.Assessment of wound healing was done after surgery.
STATISTICAL ANALYSIS: The data were entered into Microsoft Excel datasheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of frequencies and proportions. A chi-square test was used as a test of significance for qualitative data. Continuous data were represented as mean and standard deviation in the study.Independent t-test was used as a test of significance to identify the mean difference between two quantitative variables.Graphical representation of data: MS Excel and MS word was used to obtain various types of graphs such as bar diagram.p-value (probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

III. Results

Ninety patients participated in the study, out of which 30 patients had subcuticular closure, 30 had staplers, 30 had conventional closure.There were 90 patients in our study of which 30 patients had conventional closure, 30 had staplers, and 30 had subcuticular closure.

Table 1: Visual Analogue Scale for Pain Day 1

Out of 90 patients, subcuticular closure group experienced less pain compared to staplers and conventional closure on the first post-op day

			Closure Type			Total
			Staplers	Subcuticular	Conventional	
visas1	0	Count	0	2	0	2
		%	0%	6.66%	0%	2.22%
	1	Count	0	20	2	22
		%	0%	66.66%	6.66%	24.44%
	2	Count	1	8	12	21
		%	3.33%	26.66%	0.40%	23.33%
	3	Count	15	0	15	30
		%	50%	0%	50.00%	33.33%
	4	Count	14	0	1	15
		%	46.60%	0%	3.33%	16.66%
Total		Count	30	30	30	90
		%	100%	100%	100%	100%

The p-value is significant.

Chi-Square	:	16.8768
P-Value	:	0.031

Table 2: Visual Analogue Scale for Pain Day 2

Out of 90 patients, the subcuticular closure group experienced less pain compared to staplers and conventional closure on first post-op day two even though the difference was not found to be significant.

			Closure type			Total
			Staplers	**Subcuticular**	**Conventional**	
The p-value is not significant visas 2	0	Count	1	14	2	17
		%	3.33%	46.66%	6.66%	18.88%
	1	Count	20	16	14	50
		%	66.66%	53.33%	46.66%	55.55%
	2	Count	7	0	8	15
		%	23.33%	0%	26.66%	16.66%
	3	Count	2	0	6	8
		%	6.66%	0%	20.00%	8.88%
	4	Count	0	0	0	0
		%	0%	0%	0%	0%
Total		Count	30	30	30	90
		%	100%	100%	100%	100%

Chi-Square	:	34.1906
P-Value	:	<0.0001

The p-value is not significant

Table 3: Visual Analogue Scale for Pain Day 3

Out of 90 patients, the subcuticular closure group experienced less pain compared to staplers and conventional closure on first post-op day 3.

			Closure type			Total
			Staplers	**Subcuticular**	**Conventional**	
visas 3	0	Count	20	25	11	56
		%	66.66%	83.33%	36.66%	62.22%
	1	Count	9	5	15	29
		%	30%	16.66%	50%	32.22%
	2	Count	1	0	3	4
		%	3.33%	0%	10%	4.44%
	3	Count	0	0	1	1
		%	0%	0%	3.33%	1.11%
	4	Count	0	0	0	0
		%	0%	0%	0%	0%
Total		Count	30	30	30	90
		%	100%	100%	100%	100%

Chi-Square	:	16.1342
P-Value	:	0.0131

The p value is significant.

Table 4: Verbal Analogue Scale for Pain Day 1

Out of 90 patients, subcuticular closure group experienced less pain compared to staplers and conventional closure on first post-op day 1

			Closure type			Total
			Staplers	**Subcuticular**	**Conventional**	
verbas 1	0	Count	0	3	0	3
		%	0%	10%	0%	3.33%
	1	Count	1	26	18	45
		%	3.335	86.66%	60.00%	50%
	2	Count	29	1	12	42
		%	96.66%	3.33%	40.00%	50%

Total	Count	30	30	30	90
	%	1005	100%	100%	100%

Chi-Square	:	Not determined
P-Value	:	

Table 5: Verbal Analogue Scale for Pain Day 2

Out of 90 patients, the subcuticular closure group experienced less pain compared to staplers and conventional closure on first post-op day two even though the difference was not found to be significant.

			Closure type			Total
			Staplers	Subcuticular	Conventional	
verbas 2	0	Count	2	15	3	20
		%	66.66%	50%	10%	22.22%
	1	Count	16	14	25	55
		%	53.33%	46.66%	83.33%	61.11%
	2	Count	12	1	2	15
		%	40%	3.33%	6.66%	16.66%
Total		Count	30	30	30	90
		%	100%	100%	100%	100%

Chi-Square	:	34.24545
P-Value	:	<0.0001

The p value is not significant.

Table 6: Verbal Analogue Scale for Pain Day 3

Out of 90 patients, subcuticular closure group experienced less pain compared to staplers and conventional closure on first post-op day 3.

			Closure type			Total
			Staplers	Subcuticular	Conventional	
verbas 3	0	Count	13	26	20	59
		%	43.33%	86.66%	66.66%	65.55%
	1	Count	14	4	10	28
		%	46.66%	13.33%	33.33%	31.11%
	2	Count	3	0	0	3
		%	10%	0%	0%	3.33%
Total		Count	30	30	30	90.9999
		%	100%	100%	100%	100%

Chi-Square	:	15.73366
P-Value	:	0.0034

The p value is significant.

IV. Discussion

The final cosmetic appearance of a neck wound is also of great importance to patients as the wound is likely to be permanently on view in an exposed area.One benefit of neck incisions is that the blood supply is so good that they heal very quickly. This allows sutures or clips to be removed early, and we have never experienced any problems in doing this on the 3rd postoperative morning. This is an earlier time for skin clip or suture removal than is traditional, but its success is clear from the final cosmetic appearance visual linear analog scores. Leaving skin clips for a period of 5 days produces disfiguring, cross-hatched scars, and they should certainly only be left for a maximum of 3 postoperative days. Although it was not formally assessed, the placement of a subcuticular suture probably requires more technical expertise than the placement of skin clips.

In our study, wound closure by subcuticular sutures had less postoperative pain, followed by conventional suture and staplers. In a study by Selvadurai et al. 84, Thirty-eight patients were randomized to the Metall clip group and 42 to the subcuticular suture group. The two groups were well matched for age, sex, race, the ratio of the thyroid to parathyroid surgery, thyroid and parathyroid diagnosis, degree of thyroid resection.[10] Patients in the staplers and subcuticular suture groups experienced similar degrees of pain on the first three postoperative days, and there were no statistically significant differences between the two groups using either visual analog or verbal response scales.

Wound healing, the body's response to tissue injury, is an esssential and primitive process common to all multicellular organisms,where in a principle type of cell assumes embryionic features undergoes migration, divides and then differentiates to produce an extra cellular matrix ina seemingly less than optimal or hostile environment.[9] In our study, wound healing was found to be good in all three groups without any wound discharge, gapping, necrosis of the flap due to the increased vascularity in the neck region, which favors good wound healing.In our study, cosmetic appearance after wound closure with subcuticular suture had excellent scar appearance followed by staplers and conventional suture.

In a study, Yang YL et al. 86, the patients were randomly divided into two groups as experimental and control groups of 70 patients each.[12] While doing the study, eight patients were excluded because of intraoperative findings. Therefore the study comprised of 65 patients in the experimental group, who received tissue adhesive and 67 patients in the control group, who received surgical staples for closure. The objective of this study was to compare the effectiveness and cosmetic results of tissue adhesive or surgical staples in thyroidectomy through a supraclavicular incision. In the first month after surgery, the score was significantly lower in the experimental group (range: 5–7) compared to that of the control group (range: 8–10; $P < 0.001$). But, after the third month following surgery, there was no significant difference between the two groups.

V. Conclusion

Finally, the surgeon is the one who decides the choice of the suture material. However, this study does show that,Subcuticular stitches had less pain, followed by conventional suturing and staplers. Subcuticular stitches had excellent scar appearance followed by staplers and conventional suturing.Wound healing was good in all subcuticular stitches, staplers, and conventional suturing.

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