Section: General Surgery

Original Research Article

A STUDY ON EFFECTIVENESS OF THYROIDECTOMY WOUND CLOSURE WITH CYANOACRYLATE GLUE VERSUS SUB-CUTICULAR SUTURING

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ABSTRACT

Background: Surgeons have always aimed to produce less visible scars, with techniques evolving from simple sutures to advanced materials like absorbable sutures, tapes, and adhesives. Cosmetic outcomes are particularly important in thyroid surgeries, common in women aged 30-40, as these surgeries often involve anterior neck incisions. While suturing is reliable, it requires skill and time, prompting the search for easier alternatives. Octyl-cyanoacrylate adhesives have gained popularity for their diverse applications, including wound closure. This study aims to compare the efficacy of octyl-cyanoacrylate to sub-cuticular sutures in thyroidectomy skin closure to meet patients' cosmetic expectations.

Materials and Methods: 60 patients scheduled to undergo thyroidectomy were included in the study after taking a written informed consent. This prospective observational study was conducted in the Department of Surgery, over a period of 1 year.

Results: Tissue adhesive (octyl-cyanoacrylate) was found to be better in terms of time required to close the wound, cosmetic appearance of wound and less number of wound related complications.

Conclusion: The study concludes that tissue adhesives are better in wound closure during initial 1 month of post-operative period in comparison to suturing. However, over period of time, the cosmetic appearance of suturing is almost on par with tissue adhesives.

Keywords: Tissue adhesive, cyanoacrylate, thyroidectomy, neck scar, sub-cuticular sutures.

INTRODUCTION

The thyroid gland is an endocrine organ situated anteriorly in the neck. Diseases of the thyroid gland are often managed medically. However, in certain instances such as solitary nodule, tumors of thyroid gland, the mainstay of treatment involves surgical excision of the entire gland or part of it.

Surgical approach of thyroid gland conventionally used to be the collar neck incision in the anterior part of the neck which left a very conspicuous scar. This was associated with poor cosmetic appearance of neck post-operatively, especially in young – middle aged women in whom thyroid disease is most common.[1,2]

Wound healing is a dynamic process which can continue for months and years. The process of wound healing tends to leave scar tissue which is usually cosmetically displeasing. Surgeons, over the years have improved their surgical techniques to minimize scar formation.

Conventional method of thyroid surgery uses simple sutures with poor scar outcomes. Subsequently surgeons used sub-cuticular sutures which showed better scar outcomes.[3,4]

Tissue adhesives are the latest advancement in wound closure methods. It includes biological glues (gelatin based; fibrin based glues) and synthetic glues (cyanoacrylate based glue). The cyanoacrylate glues polymerize on contact with moisture in the skin. The

polymerization is an exothermic reaction, i.e. it releases heat and is painful when applied to the skin. The latest generation of cyanoacrylate is the Octyl-cyanoacrylate glue which has higher tensile strength, lesser inflammatory reaction and produces lesser pain in comparison with other synthetic glues.[5] The glue forms an adhesive layer over skin and usually requires 3-4 layers of application to join the gap.

Tissue adhesives are reportedly being used in repairing skin grafts, closing cerebrospinal fluid leaks, hemostasis, etc.[6] However, it's efficacy in having wound with minimal scarring in comparison with sub-cuticular suturing is not known.

This study aims to analyze wound closure by tissue adhesives and by sub-cuticular suturing in neck incisions post thyroidectomy in patients presenting to this tertiary care hospital.

MATERIAL AND METHODS

This prospective study was conducted over a period of 1 year, i.e from March 2023 to Feb 2024 in the Department of General Surgery. All patients aged between 18-70 years of age group, planned for thyroid surgery were included in this study. Ethical committee approval was taken prior to start of the study. All patients were informed about the study and were included in the study only after taking a written informed consent. Patients who didn't give consent for surgery or to be included in the study were excluded from the study.

60 patients scheduled for undergoing thyroid surgery were divided into 2 groups- Group A undergoing wound closure using tissue adhesive and Group B undergoing wound closure by sub-cuticular suturing. All patients underwent standard method of thyroidectomy, i.e, a horizontal skin incision was made about 2-3 cm above the sternal notch extending from one end of sternocleidomastoid muscle to the opposite side. Platysma muscle was sutured during closure for better opposition of the wound and reducing the dead space. All patients receive 1st dose of antibiotic 30min prior to the surgery for better chances of

Post operatively, examination of the wound was done on Day -3, Day -7, 1 month later and 6 months later. The wound was evaluated for presence of any erythema, infection, discharge, swelling, gaping of wound, and wound dehiscence using the Modified Hollander wound evaluation scale and South Hampton Grading scale.

Cosmetic appearance of the wound was assessed by Modified Hollander wound evaluation scale which is a 4- point score considering presence or absence of contour irregularities, wound margin separation, steps of borders and overall appearance of wound. Each item will be allotted either 0 (yes) or 1 (no) point and the sum will be considered. A score of 4 is considered to have the best cosmetically appearing scar and scores below 4 is suggestive of suboptimal cosmesis.

The South Hampton grading scale grades wounds based on their appearance into Grade 0 (normal healing) to Grade V (deep wound with infection. They are then categorized into – A (normal healing); B (minor complication); C (major complications) and D (major hematoma).

All data was entered into Microsoft Excel and analyzed. Continuous variables were presented as either mean or median depending on their distribution. Ordinal variables were summarized as medians. Categorical variables were represented by proportions, frequencies, or percentages. Comparisons of continuous variables utilized the unpaired t-test, while ordinal variables were assessed using the Pearson Chi-squared test.

RESULTS

60 patients underwent thyroidectomy during the study period. 30 patients were randomly allotted into Group A- tissue adhesive group and Group B – Sub-cuticular suturing group. Females were the predominant population in both groups since thyroid disease is more common in females.

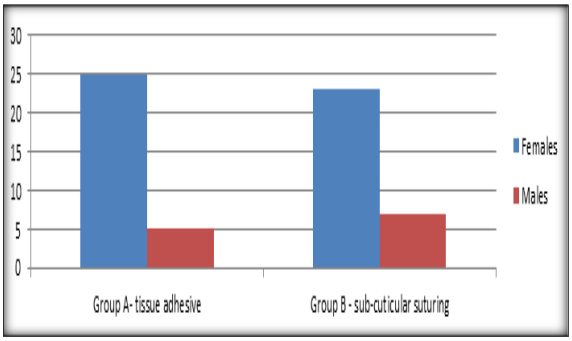

Figure 1: Gender-wise distribution

The mean age of Group A is 38.6 years and that of Group B is 39.1 years. In both the groups, most of the patients belonged to 31-50 years of age. [Table 1]

The time required for closing the wound is significantly less for tissue adhesives than for Sub-cuticular suturing. The mean duration for wound closure in group A is 2.1 min and that for Group B is 5.8 min. [Table 2]

Both groups had predominantly cosmetically excellent looking wounds on 3rd post-operative day onwards and the difference was not statistically significant. 23 out of 30 patients in Group A and 21 out of 30 patients in group B had a score of 4 on 3rd post-op day.

On 7th post-op day, 27 patients of Group A and 26 patients of Group B had score of 4. However the difference was not statistically significant.

1 month after surgery, 29 patients of Group A and 28 patients of Group B had score of 4. 6 months after surgery, all 30 patients of Group A had score of 4 and 29 patients of Group B had score of 4. The difference however was not statistically significant. [Table 3]

South Hampton scoring system was used to compare for surgical site infections between the two groups. The difference in scores was statistically significant on 3rd POD. However, it was not significant on 7th, 30th day and 6 months post-operatively. [Table 4]

Table 1: Age-wise distribution

Age (in years)	Group A (Tissue adhesive)	Group B (sub-cuticular suturing)
<20 years	2	3
21-30 years	4	5
31-40 years	8	10
41-50 years	8	6
51-60 years	4	4
>60 years	4	2

Table 2: Time required for wound closure

Time required in minutes	Group A (Tissue adhesive)	Group B (sub-cuticular suturing)	P value
< 2 minutes	22	0	< 0.001 (significant)
2-5 minutes	8	2	
>5 minutes	0	28	

Table 3: comparison of wound appearance on POD -3 using Modified Holland scale

Modified Hollander scale		Group A (Tissue adhesive)	Group B (sub-cuticular suturing)	P value
3RD POD	Score 1	1	2	0.247 (not significant)
	Score 2	2	3	
	Score 3	4	4	
	Score 4	23	21	
7th POD	Score 1	0	1	0.54 (not significant)
	Score 2	1	1	
	Score 3	2	2	
	Score 4	27	26	
1 month post-operatively	Score 1	0	0	0.345 (not significant)
	Score 2	0	0	
	Score 3	1	2	
	Score 4	29	28	
6 months post-operatively	Score 1	0	0	0.264 (not significant)
	Score 2	0	0	
	Score 3	0	1	
	Score 4	30	29	

Table 4: Comparison of South – Hampton score for surgical site infections between Group A and Group B

South Hampton Score		Group A (Tissue adhesive)	Group B (sub-cuticular suturing)	P value
3rd POD	1a	4	5	0.002 (significant)
	1c	3	4	
	2b	0	3	
7th POD	1a	1	3	0.062 (not significant)
	1c	1	2	
	2b	0	1	
1 month post-operatively	1a	0	0	0 (not significant)
	1c	0	0	
	2b	0	0	
6 months post-operatively	1a	0	0	0 (not significant)
	1c	0	0	
	2b	0	0	

DISCUSSION

Tissue adhesives are the latest feather added into the cap of suturing materials which offer a cosmetically appealing scar with minimal post-operative complications and shorter duration required to close the wound. The efficacy of tissue adhesives when compared to sub-cuticular suturing in thyroidectomy has been very scarcely reported, hence this study was taken up. 60 patients who had been scheduled for thyroidectomy were divided randomly into 2 groups – Group A (tissue adhesives) and Group B (sub-cuticular suturing) consisting of 30 patients each.

In present study, the cosmetic appearance of the wound was evaluated by modified Hollander scale and the South Hampton scale was used for assessing post-operative wound complications. Majority of the patients of Group A had a score of 4 on 3rd OPD, 7th POD, 30th POD and 6 months post-operatively when compared to Group B, however the difference was not statistically significant.

Tissue adhesives offer an option of being water-proof when compared to closure by sutures. Group A had significantly fewer wound complications compared to Group B according to South Hampton scoring system.

Wound closure using Octyl-cyanoacrylate has been associated with relatively lesser pain when compared to suturing. Chamariya et al,[6] compared closure of episiotomy wound with tissue adhesives versus suturing and found that tissue adhesives are relatively lesser painful.

Amin et al,[7] compared thyroidectomy wound closure using tissue adhesives versus staples. They evaluated the level of pain using Visual Analog Scale and found that tissues adhesives are lesser painful. Consorti et al,[8] assessed the scars formed by tissue adhesives versus suturing using the Patient and Observer Scar Assessment scale and found tissue adhesives being superior to suturing. Multiple others have also observed the superiority of tissue adhesive over sutures.[9-11] However, Dumville et al,[12] observed suturing superior to tissue adhesives in prevention of wound dehiscence. It is a fact that even though tissue adhesives are superior cosmetically, but the platysma needs to be sutured to secure the integrity of layers of tissues in neck.

The time required to close the wound depends upon the length of incision and several other factors. However, in present study, only thyroid surgeries were considered and the time taken to close wound was significantly less in Group A (tissue adhesives).

According to modified Hollander scale, there was no significant difference observed between the cosmetic appearance of scars on 3rd POD, 7th POD, 30th POD and 6 months post-surgery. The wound related complications were less in patients of Group A when compared to Group B, however it was not significant. Cost-effectiveness between tissue adhesives and suturing is almost the same. Tissue adhesives although are expensive, but do not require any wound dressing or suture removal.

CONCLUSION

Tissue adhesives are a novel and efficient wound closure technique, especially valued for its cosmetic benefits. It shows better outcomes than sutures in the early postoperative days but offers comparable cosmetic results to sub-cuticular sutures over a six-month follow-up. The cost of Octyl-cyanoacrylate (OCA) is similar to that of sub-cuticular suture, maintaining the cost-effectiveness of the procedure. OCA also has water-sealing properties, reducing the risk of surgical site infections. In resource-constrained settings like India, OCA is advantageous as it negates the need for suture removal and frequent hospital visits and requires less skill compared to sub-cuticular suturing. Given the small sample size of 60 in this study, further large-scale research from various institutions with longer follow-ups is recommended.

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Conflicts of Interest: No conflicts of interest are declared in this study.

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