Does the Technique of Skin Closure Affect the Cosmesis of Cervical Thyroidectomy and Parathyroidectomy Scars? A Review of Literature

Sridhayan Mahalingam, MBBS, BSc, MRCS (ENT), MSc[1] Anton Alatsatianos, MBBS, BSc, MRCS (ENT)[2] Lisa Pitkin, MBBS, BSc, MSc, MRCS, FRCS (ORL-HNS)[1] Alwyn D'Souza, MBBS, FRCSEd (ORL-HNS), FRCS (Eng), PGCertMedEd, EBFPRS[3]

[1] Department of Otolaryngology, Frimley Health Foundation Trust, Frimley, Camberley, United Kingdom
[2] Queen Elizabeth University Hospital, Glasgow, United Kingdom
[3] Department of Otolaryngology, University Hospital Lewisham, London, United Kingdom

Address for correspondence Sridhayan Mahalingam, MBBS, BSc, MRCS (ENT), MSc, Department of Otolaryngology, Frimley Health Foundation Trust, Portsmouth Rd, Frimley, Camberley GU16 7UJ, United Kingdom (e-mail: smahalingam@doctors.org.uk).

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Abstract

The cosmetic outcomes following thyroid and parathyroid surgery is a priority for patients as the surgical scar is in a visible area of the body. Although some have advocated the use of minimally invasive and robotic surgery, these are not without risks and it has been suggested that the scars are not necessarily more favorable. The three most common means of skin closure include the use of subcuticular sutures, clips, and tissue adhesive (with or without deeper subcutaneous sutures) and there are no previous reviews of the published evidence. In this study, the authors compare the cosmetic outcomes through a systematic review of literature. Three studies ($n = 200$) comparing subcuticular sutures and clips suggest superior cosmetic outcomes with sutures (with statistically significant differences in the immediate postoperative period). Three studies ($n = 213$) comparing sutures and tissue adhesive show superior outcomes with sutures in the early postoperative period with no differences thereafter. Two studies ($n = 202$) comparing tissue adhesive and clips do not show that one is superior to the other and show no significant differences. Overall the data are limited; however, the evidence suggests that subcuticular sutures may offer superior cosmetic outcomes than clips and tissue adhesive in conventional thyroid and parathyroid surgery.

Keywords
- thyroidectomy
- cervicotomy
- scar

Thyroid and parathyroid surgery are common procedures with more than 16,000 operations performed last year in the United Kingdom alone, with this figure continuing to increase.[1,2] Thyroid carcinoma is a common indication for surgery and is more frequent in women than in men. The traditional anterior neck can be exposed, hence cosmesis is a priority for surgeons and patients.[3]

Recently, various surgical approaches including minimally invasive and robotic surgery have been advocated as they were thought to offer better cosmesis. However, these techniques can be significantly more expensive, often involve a longer duration of surgery, and potentially increased risk of complications, such as brachial plexus injury. Interestingly, a recent review of literature suggested that minimally invasive surgery did not offer long-term cosmetic outcomes.[4] Furthermore, it has been shown that a small incision does not necessarily result in overall patient satisfaction.[5,6]

Hence, thyroid surgery through the standard anterior neck cervicotomy approach is still practiced by the majority of thyroid surgeons.[7] However, what does vary is the way in which the skin is approximated. The commonly employed methods include the use of clips, subcuticular suture, and

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tissue adhesive. It is questionable as to whether the technique for skin closure has an impact on the cosmesis of the scar and no previous systematic reviews have been conducted in this subject.

Aim

Our aim is to review the literature to determine the optimal closure technique to enhance cosmetic outcomes for patients undergoing thyroid and parathyroid surgery through the conventional approach.

Material and Methods

A systematic review was undertaken of all published studies of thyroid and parathyroid surgery performed using the conventional anterior cervicotomy approach in accordance with preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines similar to previously described methodology.[4,8] The MEDLINE, Embase, and Cochrane databases were searched for relevant articles in the English language using the following terms: thyroid scar/wound, closure, cosmesis, suture, clips, staples, and tissue adhesive. Studies assessing minimally invasive surgery and robotic surgery were excluded.

All studies comparing scar cosmesis of two different closure techniques and making use of an assessment scale were included. Articles were reviewed to ensure no duplication of results.

Results

Sutures versus Clips

Three studies (including 200 patients) compared cosmetic outcomes in scar quality between subcuticular sutures and metal clips (►**Table 1**). All three included an assessment by the patient, surgeon, and an independent observer. None of these used a validated tool to assess cosmetic outcome. Two studies used a visual analog scale (VAS).

Selvadurai et al[9] assessed cosmetic appearance through VAS and verbal response (four options: poor, fair, good, and excellent). They found that the appearance of the wound was significantly better with subcuticular sutures than metal clips at time of discharge post surgery. At three and six months following the procedure, although there were no significant differences, VAS scores remained better with subcuticular suture. Interestingly, three patients developed hypertrophic scars (clips were used in two and subcuticular sutures in one). Furthermore, they noticed that pain experienced on removal was significantly worse with clips.

Iqbal et al[10] also found that satisfaction with scar quality was significantly better with subcuticular sutures than metal clips at the time of patient discharge, once again at three and six months; although no significant differences were noted, results were marginally better with subcuticular suture.

On the other hand, Guarino et al[11] detected no differences in VAS scores between subcuticular sutures and clips in a small study of 20 patients 6 months post surgery. They report that two patients in whom suture was used developed a subcutaneous hematoma.

Sutures versus Tissue adhesive

Three studies (including 213 patients) compared cosmetic outcomes between subcuticular sutures and tissue adhesive (►**Table 2**).

Consorti et al[12] used a validated measure—the patient and observer scar assessment scale (POSAS)[13]—to assess cosmetic outcomes at 6 weeks post surgery. This tool used a combination of an observer scar assessment scale (OSAS) and a patient scar assessment scale (PSAS). Their results showed that subcuticular sutures had overall more favorable outcomes on the OSAS, with significantly better vascularity, pigmentation, and relief scores. In the remaining 3 domains of the OSAS (thickness, pliability, and surface), scores were still better with sutures but with no significant differences. In the PSAS, tissue adhesive showed slightly worse cosmetic outcomes in the domains of itching, color, stiffness, and thickness, while subcuticular sutures had worse scores in

Table 1 Comparison between sutures and clips ($n = 200$)

	n	Suture	Clips	Assessment	Assessor	Time of assessment	Cosmetic results
Selvadurai et al (1997)	80	3′0 polypropylene (42)	12 mm metal (38)	VAS	Patient, surgeon, independent observer	Discharge	Suture significantly better
						3 and 6 months	No significant differences but suture outcomes better
				Verbal response		Discharge	At discharge suture significantly better
						3 and 6 months	No significant differences but suture outcomes better
Iqbal et al (2014)	100	3′0 prolene (52)	12 mm metal (48)	Satisfaction levels	Patient, surgeon, independent observer	Discharge	Suture outcomes superior
						3 and 6 months	No significant differences but suture outcomes better
Guarino et al (2014)	20	Absorbable monofilament (10)	Metal (10)	VAS	Patient, surgeon, independent assessor	6 months	No differences

Table 2 Comparison between sutures and tissue adhesive ($n = 213$)

	n	Suture	Tissue adhesive	Assessment	Assessor	Time of assessment	Cosmetic results
Consorti et al (2013)	50	3′0 polyglactin (25)	Octyl-cyanoacrylate (25)	OSAS	2 independent observers	6 weeks	Suture significantly better
				PSAS	Patient	6 weeks	No significant differences
Ciufelli et al (2014)	89	Caprosyn (47)	2-octyl-cyanoacrylate (42)	Wound registry scale	Plastic surgeon (blinded)	10 days	Suture significantly better
				SBSES		3 months	No significant difference
Rao et al (2015)	74	3′0 ethilon (38)	Octyl-cyanoacrylate (36)	SBSES	Not stated	1 and 3 weeks	No significant differences but suture marginally better

Abbreviations: OSAS, observer scar assessment scale; PSAS, patient scar assessment scale; SBSES, Stony Brook Scar Evaluation Scale.

the domains of pain and irregularity of scar; none of these differences were significant.

Ciufelli et al[14] used the 6-point wound registry scale[15] to assess cosmetic outcomes at 10 days, and the Stony Brook Scar Evaluation Scale (SBSES) at 3 months after surgery (both of which are validated tools). At 10 days, the scar quality was noted to be significantly better with subcuticular sutures. This was attributed to significant differences in the following domains: step-off of the margins, margin separation, margin eversion, and overall appearance. At 3 months, however, no statistically significant differences were detected.

Rao et al[16] also evaluated scar quality on the first and third postoperative week for appearances using the SBSES. It is unclear as to who the assessors were in this study but scar appearance was marginally better with sutures, although these differences were not statistically significant. One patient in whom tissue adhesive was used developed immediate postoperative wound dehiscence. Postoperative pain was also assessed using the VAS and was noted to be significantly worse with tissue adhesive at week 1. At week 3, although pain scores were higher with tissue adhesive, this difference was no longer significant.

It is important to note that both Consorti and Ciufelli used a deep subcutaneous suture for approximation, while with Rao this was unclear.

Tissue Adhesive versus Clips

Two studies (including 202 patients) compared cosmetic outcomes between tissue adhesive and clips (►**Table 3**).

Pronio and colleagues[17] assessed the difference between octyl-2-cyanoacrylate and skin staples in 70 patients. No subcutaneous sutures were used. Patient satisfaction was assessed using a numerical score (0–10) and through a verbal rating response. The appearance of the scar was also assessed with SBSES. Self-evaluation cosmetic scores in the early postoperative period (7 days post surgery) showed significantly better results with staples. Results at 3, 6, and 12 months did not show any statistically significant differences regarding scar appearance between the two groups. SBSES scores were overall good for both groups with no significant differences. The authors conclude that tissue adhesive has comparable outcomes to staples.

Yang and colleagues[18] assessed differences in cosmesis between tissue adhesive containing butyl cyanoacrylate and

Table 3 Comparison between tissue adhesive and clips ($n = 202$)

	n	Tissue adhesive	Clips	Assessment	Assessor	Time of assessment	Cosmetic results
Pronio et al (2011)	70	Octyl-2-cyanoacrylate (32)	Proximate skin staples (38)	Patient satisfaction	Patient	7 days	Higher patient satisfaction with tissue adhesive
				Self-aesthetic evaluation scores	Patient	7 and 15 days; 1, 3, 6, and 12 months	Staple group showed higher percentage of excellent results
				Appearance of scar	Not stated	7 and 15 days; 1, 3, 6, and 12 months	7 days: edema around wound significantly higher with tissue adhesive 1 month: higher incidence of edema with tissue adhesive 3, 6, and 12 months: no significant differences
				SBSES	Not stated	1 and 12 months	Overall appearance in both groups good
Yang et al (2013)	132	Butyl cyanoacrylate (65)	Stainless steel (67)	Manchester scar scale	Surgeon not involved in treatment	1 and 3 months	At 1 month, tissue adhesive significantly better; at 3 months, no significant difference

stainless steel clips in a supraclavicular approach at the first 24 hours postoperatively, and the first and third month in 132 patients. All patients underwent subcutaneous suture closure with 4/0 vicryl. The Manchester Scar assessment tool and VAS were used at 1 and 3 months. In the first month, patients who were treated with adhesive had significantly better scores, while at 3 months this difference was no longer significant. Overall satisfaction levels were assessed through the VAS; in the first month patients in whom tissue adhesive was used had significantly better scores, while at 3 months this difference was no longer significant. They note that an important contributing factor for patient comfort (noncosmetic) was the ability to shower immediately. Immediate postoperative pain within the first 24 hours was noted to be significantly higher with clips.

Discussion

Long-term cosmesis is an important outcome of wound repair, especially in areas of the body where scars are readily visible. Here we have reviewed the literature to help evaluate any differences in cosmetic outcomes between various forms of skin closure after thyroid and parathyroid surgery. The outcomes of all closure techniques are generally good and differences appear to be minimal; however, some conclusions can be drawn from the data available.

Overall subcuticular sutures appear to have superior cosmetic outcomes in comparison to clips. These findings are in agreement with studies comparing the two methods of closure in other surgical specialties such as cardiothoracic surgery.[19] Subjectively, patients often find the initial appearance of clips disconcerting and they can cause crosshatched scars.[9] The data also suggests that the removal of clips can be more painful than sutures resulting in higher levels of anxiety; hence, overall sutures are preferable.

Subcuticular sutures also appear to give better cosmesis than tissue adhesive. Generally it is thought that the use of glue does not facilitate precise apposition, which is particularly important in the Head and Neck.[20] The latter does however appear to offer superior outcomes to clips in the initial postoperative period, although after a period of 1 month there is no longer a significant difference. This is in agreement with a study evaluating 72 patients who underwent minimally invasive thyroid surgery which suggested no significant differences in cosmetic outcomes between tissue adhesive and staples after 3 months; however, overall satisfaction was higher with tissue adhesive, correlating with the ability to shower due to its waterproof benefits.[21]

Interestingly, some studies have suggested that steristrips alone to approximate skin edges may have good cosmetic outcomes.[22] However, it is questionable as to whether they may have a higher risk of wound dehiscence in the initial postoperative period.

It is well known that minimizing skin tension enhances cosmesis. This can be achieved by appropriate closure of the subplatysmal layer and some surgeons may place further subcutaneous layer sutures to reduce the risk of railroad tracking. Lombardi et al, however, found no advantage in cosmesis by using an intradermal double-layer suture in comparison to a single-layer suture.[23] It is important to note, however, that in the majority of our studies in which tissue adhesive was used, an absorbable suture was used for closure of the subcutaneous layer. Not only does this extra layer of sutures relieve skin tension and the risk of wound dehiscence, but also aids in the apposition of wound edge margins, ensures adequate skin edge eversion, and prevents tissue adhesive from being deposited in the wound.[18]

There is limited data suggesting which specific sutures provide optimal cosmetic outcomes. Parell et al have suggested that the ideal suture would be a flexible monofilament with adequate tensile strength that holds knots well and absorbs in 7 to 10 days; however, no such suture material is available today.[20] They have shown that the cosmetic outcomes of absorbable and nonabsorbable sutures in the head and neck are similar.[20] Hence, absorbable sutures are preferred by many surgeons as they do not need to be removed; however, this would be dependent on surgeon preference and individual outcomes.

Conclusion

This is the first review of literature comparing cosmetic outcomes of various closure techniques in thyroid and parathyroid surgery. It is clear that the evidence is overall of limited quality with few studies using validated tools for scar assessment. Overall, the cosmesis of surgical scars are good, no matter which method is used. However, cosmesis with subcuticular sutures are more superior to other closure techniques, especially in the short-term period. Thereafter the differences become minimal but the evidence is still in favor of subcuticular sutures.

Conflict of interest
The authors declare no competing interests.

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