

SURGICAL TECHNIQUE

Randomised trial of subcuticular suture versus metal clips for wound closure after thyroid and parathyroid surgery

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A randomised trial was conducted to compare the results of neck wound closure using metal (Michel) clips or subcuticular suture. All operations were performed using a standardised technique, which included wound infiltration with 10 ml bupivacaine and adrenaline solution, no strap muscle division and the use of suction drains. All the collar incisions and wound closures were performed by the same surgeon. At the end of each operation patients were randomised to wound closure by either metal clips ($n=38$) or a continuous 3/0 prolene subcuticular suture ($n=42$). Daily postoperative pain scores and the discomfort caused by clip/suture removal were recorded. The cosmetic appearance of each wound was scored by the patient, the surgeon, and an independent observer using verbal response and linear analogue scales.

The two study groups were well matched for age, sex, indication for surgery and operation performed. There were no differences in postoperative pain scores between clips and sutures. Removal of subcuticular sutures was performed more quickly ($P<0.0001$) and caused less pain ($P<0.0001$, visual analogue scale; $P=0.0042$, verbal response scale) than the removal of clips. At the time of discharge, the cosmetic appearance scores generated by the surgeon, patient and independent observer were higher for suture closed wounds than clips. However, by 3 and 6 months follow-up there were no differences in cosmetic appearance between the two methods of closure.

Only very short-term cosmetic results are influ-

enced by the type of wound closure in thyroid and parathyroid surgery, but sutures are quicker and less painful to remove than Michel clips.

Metal clips have traditionally been used to close collar incisions in thyroid and parathyroid surgery. It has been proposed that clips cause less tissue damage (1,2), a lower incidence of wound infection (3) and can be inserted more quickly than conventional sutures (4), but the reason for their use in thyroid and parathyroid surgery would appear to be largely traditional. Although a number of studies have compared the use of clips and conventional sutures for abdominal and limb wound closure (3,5-7), there are little trial data relating to cervical incisions. This prospective randomised trial was designed to compare the efficacy of Michel clips and subcuticular polypropylene sutures in thyroid and parathyroid surgery.

Patients and methods

A consecutive series of 80 patients undergoing thyroidectomy ($n=53$) or parathyroidectomy ($n=27$) were randomised to have their wounds closed by either 12 mm Michel clips or a 3/0 polypropylene subcuticular suture. The randomisation code was generated using a table of random numbers and a sealed envelope system was used. The randomisation envelope was only opened at the end of each operation, after the platysma muscle had been closed. Patients who had previously undergone a neck exploration were excluded from the study.

All operations were performed by or under the direct supervision of the same consultant surgeon (MLN). A standardised operative technique was used for both thyroid and parathyroid operations. The skin and subcutaneous tissue was infiltrated with 10 ml 0.5% bupivacaine with adrenaline after the patient had been positioned correctly on the operating table. Collar incisions were placed halfway between the upper border of the thyroid cartilage and the sternal notch. Incisions were made taking great care to hold the scalpel at 90° to the skin so that perfect apposition of the skin edges could be achieved at the end of the operation. All incisions were made and closed by the same surgeon (MLN). The strap muscles were never divided. At the end of each operation the deep cervical space was drained using a size 8 suction drain and the muscle layers, including platysma, were closed with continuous 3/0 Vicryl® sutures. Patients randomised to the suture group had the skin closed using a continuous subcuticular 3/0 polypropylene suture which was secured at either end using nylon beads. Patients randomised to the clip group had their wounds closed with 12 mm Michel clips. 3/0 Nylon stay sutures were placed at either end and in the centre of the wound to aid the placement of skin clips which were placed at 1 cm intervals. In both groups the wound was dressed by the application of Op-site spray® and a 1 cm diameter strip of sterile gauze. The time taken to close the skin was measured using the theatre stop-clock. Wound drains were removed on the 1st or 2nd postoperative morning according to the degree of drainage, but all clips and sutures were removed on the 2nd postoperative morning. The time taken to complete suture or clip removal was recorded.

Postoperative pain was assessed at the end of the first 3 postoperative days by using verbal response and visual analogue scales. The verbal response scale had four options: no pain, mild pain, moderate pain, severe pain. The visual analogue scale consisted of a 100 mm line with the words 'no pain' on the left-hand side and 'worst pain imaginable' on the right-hand side. The same scales were used to assess the amount of pain associated with the removal of skin clips or sutures. At the end of the operation the length of each wound was measured and recorded to the nearest centimetre.

The cosmetic appearance of each wound was graded by the patient, the surgeon, and an independent observer (MMH). These assessments were made at the time of discharge and at clinic follow-up visits 3 and 6 months postoperatively. The patient, the surgeon, and the independent assessor were unaware of each other's grading. Verbal response and visual analogue scales were again used for this process. The verbal response scale had four options: poor, fair, good, and excellent; the linear analogue scale had the words 'worst imaginable cosmetic result' on the left-hand side and 'perfect cosmetic result' on the right-hand side.

Statistical analysis was made using the Mann-Whitney *U* test (non-parametric continuous data), the Student's *t* test (visual analogue scales) (8), and Fisher's Exact test

(verbal response scales). The study was approved by the local Ethics Committee.

Results

There were no deep cervical haematomas or wound infections. Thirty-eight patients were randomised to the Michel clip group and 42 to the subcuticular suture group. The two groups were well matched for age, sex, race, ratio of thyroid to parathyroid surgery, thyroid diagnosis, degree of thyroid resection and parathyroid diagnosis (Table I). Patients in the metal clip and subcuticular suture groups experienced similar degrees of pain on the first 3 postoperative days and there were no statistically significant differences between the two groups using either visual analogue or verbal response scales (Table II and Table III). Wound lengths and the time taken to close the wound were also similar in the two groups (Table IV). The removal of clips took much longer and was recorded as more painful than the removal of subcuticular sutures (Table IV). Cosmetic appearance data are presented in Table V and Table VI. Both the

Table I. Patient details

	Michel clip group	Suture group
No. of patients	38	42
Female/male	31/7	36/6
Mean age (SD)	51 (17)	52 (16)
Race		
Caucasion/Asian/Black	31/5/2	33/9/0
Thyroid/parathyroid operation	24/14	29/13
Thyroid diagnosis		
Solitary nodule	14	16
Multinodular goitre	8	8
Thyrotoxicosis	2	5
Thyroid resection		
Lobectomy	18	22
Subtotal	4	5
Total	2	2
Parathyroid diagnosis		
Primary	4	6
Secondary	10	7

Table II. Postoperative pain scores (visual linear analogue)

Postoperative day	Clips	Suture	<i>P</i> value*
1	37 (4) [38]	37 (4) [42]	0.71
2	27 (4) [38]	22 (3) [42]	0.35
3	22 (5) [22]	17 (3) [21]	0.65

* Student's *t* test
Results expressed as mean (SEM) visual linear analogue score (mm)
Number of patients studied in square brackets

Table III. Postoperative pain scores (verbal response)

Postoperative day	Clips	Suture	P value*
1	16/38	20/42	0.658
2	6/38	6/42	1.000
3	4/22	2/21	0.664

* Fisher's exact test

Numbers of patients with moderate or severe pain expressed as a proportion of the total number of patients assessed at that time

Table IV. Wound data

	Clips	Suture	P value
Wound length (cm)	9 (0.5)	9 (0.4)	0.79
Time taken to close wound (min)	4.5 (0.2)	4.8 (0.1)	0.19
Time to remove clips or suture(s)	204 (12)	42 (6)	0.0001
Pain experienced during removal of clips or suture (visual analogue scale—mm)	27 (4)	8 (2)	0.0001
Pain experienced during removal of clips or suture (verbal response scale)*	13/38	3/42	0.0042†

* Number of patients with moderate or severe pain gradings expressed as a proportion of the total number of patients assessed at the time

† Fisher's exact test

Values are mean (SEM)

Table V. Cosmetic appearance of wound (visual linear analogue)

	Clips	Suture	P value*
At discharge			
Patient	53 (5)	72 (3)	0.0002
Surgeon	57 (2)	70 (2)	0.0001
Independent observer	62 (3)	74 (2)	0.0012
3 months after operation			
Patient	79 (4)	83 (4)	0.52
Surgeon	72 (4)	75 (4)	0.49
Independent observer	76 (4)	78 (3)	0.69
6 months after operation			
Patient	80 (5)	82 (5)	0.28
Surgeon	70 (6)	82 (5)	0.12
Independent observer	74 (6)	84 (4)	0.18

* Student's *t* test

Results expressed as mean (SEM) visual linear analogue score (mm)

visual analogue and verbal response scoring systems show that at the time of discharge, the patient, the surgeon, and the independent observer all agreed that the cosmetic result of wounds closed by subcuticular suture was superior to that associated with Michel clip closure. However, at 3 and 6 months postoperative follow-up, there were no differences in the grading of cosmetic appearances between the two methods of closure. In addition, there were no improvements in cosmetic appearance between 3 and 6 months postoperatively in any of the groups studied. Hypertrophic scars developed

Table VI. Cosmetic appearance of wound (verbal response)

	Clips	Suture	P value*
At discharge			
Patient	22/38	35/42	0.015
Surgeon	18/38	32/42	0.011
Independent observer	24/38	36/42	0.037
3 months after operation			
Patient	29/36	35/41	0.762
Surgeon	24/36	32/41	0.311
Independent observer	31/36	34/41	0.726
6 months after operation			
Patient	30/35	36/40	0.726
Surgeon	25/35	34/40	0.171
Independent observer	31/35	35/40	1.000

* Fisher's exact test

Number of patients with good or excellent gradings expressed as a proportion of the total number of patients assessed at the time

in two patients in the metal clip group and one in the suture group.

Discussion

The aim of any skin closure technique is to precisely oppose the skin edges without tension for sufficient time to allow healing to take place. The factors which have to be considered in making a comparison of different types of wound closure are: the complication rate, the ease and speed with which the skin closure is completed, the level of patient discomfort and the final cosmetic result.

Many of these factors become especially significant when considering cervical collar incisions. In our experience, patients are more worried about having an incision made in their neck than they would be for almost any other region of the body. 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. 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 2nd 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 analogue scores which are over 80 in both groups at 6 months. 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. It might be expected that clips are quicker to use than sutures, but in this study there were no differences in the time taken to close wounds using these two methods. This may be related to our method of carefully placing three stay sutures in the wound so that this can be held up in two

sections for the accurate placement of Michel clips. A subcuticular suture is removed much more quickly than skin clips and this may prove to be an important advantage in the rare case of a deep cervical haematoma causing airways obstruction. Moreover, we found that the removal of skin clips caused patients more discomfort than the removal of a subcuticular suture; this may be related to the length of time required.

Although subcuticular sutures produced a superior cosmetic result at the time of discharge, there were no differences in the final cosmetic outcome when comparing Michel clips with sutures. The early difference is likely to be owing to the heaped up appearance of a wound which has been closed with clips in comparison with the flatter appearance of a sutured wound. Wound closure by Michel clips is cheaper (8 clips @ 6.8p each = 54.4p per wound) than a 3/0 prolene subcuticular suture (£1.48) and this factor could be used as an argument for closure using clips. The saving is, however, relatively small.

In the final analysis, the choice of wound closure materials will depend on the surgeon's preference. However, this study does show that subcuticular sutures can be removed more quickly and cause less discomfort than removal of metal clips. We believe that these advantages are enough to tilt the balance in favour of subcuticular sutures.

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