# A paired comparison analysis of third-party rater thyroidectomy scar preference

C RAJAKUMAR[1], P C DOYLE[1,2], M G BRANDT[3], C C MOORE[4], A NICHOLS[1], J H FRANKLIN[5], J YOO[1], K FUNG[1]

[1]*Department of Otolaryngology – Head and Neck Surgery, Schulich School of Medicine and Dentistry, Western University, London, Ontario,* [2]*Rehabilitation Sciences, Western University, London, Ontario,* [3]*Division of Facial Plastic and Reconstructive Surgery, Department of Otolaryngology – Head and Neck Surgery, University of Toronto, Ontario,* [4]*Division of Facial Plastic and Reconstructive Surgery, Department of Otolaryngology – Head and Neck Surgery, Schulich School of Medicine and Dentistry, Western University, London, Ontario, and* [5]*Department of Otolaryngology, Queen's University School of Medicine, Kingston, Ontario, Canada*

## Abstract

*Objective*: To determine the length and position of a thyroidectomy scar that is cosmetically most appealing to naïve raters.

*Methods*: Images of thyroidectomy scars were reproduced on male and female necks using digital imaging software. Surgical variables studied were scar position and length. Fifteen raters were presented with 56 scar pairings and asked to identify which was preferred cosmetically. Twenty duplicate pairings were included to assess rater reliability. Analysis of variance was used to determine preference.

*Results*: Raters preferred low, short scars, followed by high, short scars, with long scars in either position being less desirable ($p < 0.05$). Twelve of 15 raters had acceptable intra-rater and inter-rater reliability.

*Conclusion*: Naïve raters preferred low, short scars over the alternatives. High, short scars were the next most favourably rated. If other factors influencing incision choice are considered equal, surgeons should consider these preferences in scar position and length when planning their thyroidectomy approach.

**Key words:** Thyroidectomy; Thyroid Gland; Cicatrix; Minimally Invasive Surgical Procedures; Otolaryngology; Endocrine Surgical Procedures; Aesthetics

## Introduction

Thyroidectomy is a commonly performed surgical procedure. Yet a major concern related to neck surgery is the resultant scar on an exposed area of the body and its impact on the patient's appearance. The conventional approach, through an anterior cervical incision of 5 cm or more, is both safe and effective.[1,2] However, because serious complications of thyroidectomy are relatively uncommon, much attention has been directed at improving the cosmetic outcomes of this procedure while maintaining effectiveness and safety.

Over the last 15 years, there has been a considerable focus on minimally invasive endoscopic thyroidectomy techniques.[1–4] The major proposed benefit of the endoscopic approach is that it yields superior cosmetic results when compared to the open approach in select patients.[5–9] Despite this benefit, open thyroidectomy, through an anterior cervical incision, remains the predominant surgical approach in most centres.

Minimally invasive open approaches through an anterior cervical incision of 4 cm or less have been suggested as alternatives that may lead to shorter hospital stays and decreased post-operative pain, in addition to superior cosmetic results.[10–12] Enthusiasm to reduce the thyroidectomy scar has also led to the development of robotic thyroidectomy performed through a transaxillary approach. This robotic approach has been shown to have similar complication rates to the open approach, but is associated with increased operative time.[13]

Although assessments of patient satisfaction with the cosmetic acceptability of their scar length have been performed, there is a paucity of objective research on the aesthetic perceptions of thyroidectomy scars according to laypersons and on what factors may influence these perceptions. Therefore, the present study sought to determine the influence of surgical incision variables, including scar length and position, on cosmetic appeal to naïve observers of thyroidectomy scars.

## Materials and methods

### Experimental design

Photographs of normal rhytid-free necks of two 23-year-old Caucasians, one male and one female, were acquired using a digital single-lens reflex camera (Nikon, Tokyo, Japan). Adobe Photoshop software (Adobe Systems, San Jose, California, USA) was used to remove distracting features from photographs, such as nevi, shadows, clothing folds and errant hair strands. Using photographs of thyroidectomy patients' scars as reference images, reproductions of well-healed thyroidectomy scars were then recreated on the photographs of the normal necks with Adobe Photoshop.

Surgical variables studied included scar position (high *vs* low) and scar length (long *vs* short). High scars and low scars were placed approximately 5 cm and 1 cm above the sternal notch, respectively. Estimated lengths of long and short scars were

5.0 cm and 2.5 cm, respectively. These lengths were chosen as previous studies have defined minimally invasive approaches as having incision lengths of 2.5–4.0 cm and conventional approaches as having incision lengths of 5.0–10.0 cm.[4,10–14] The minimum limits of these ranges were chosen for the simulated scars' lengths as it was felt that this would be a more useful comparison than the upper limits or averages of these ranges.

Four distinct anterior neck scar images were created for photographs of both male and female necks. These scars were characterised as high and long, high and short, low and long, and low and short. Among scar reproductions for each gender, the aesthetic variables controlled for included scar colour, width, thickness and the presence of rhytids. Reproductions were reviewed by a group of head and neck surgeons and deemed to be realistic. The eight reproductions are shown in Figure 1.

Fifteen raters (9 males and 6 females), aged 20 to 55 years (median = 25 years), were recruited to evaluate scar photographs. Raters specified that they were unfamiliar with surgical scars and had not undergone surgery themselves, nor did they have any close friends or relatives who had undergone head and neck surgery.

Ethics approval regarding the participants in this study was obtained from the Western University Research Ethics Board (Ethics Review number 16396E) and all participant raters provided informed consent before the experimental evaluation procedure was initiated.

Once the photographs of anterior neck scars had been prepared for observer evaluation, the entire set of stimuli was submitted to a paired comparison experimental procedure. Briefly, the paired comparison paradigm is a robust perceptual design that allows for evaluation of any given set of stimuli with the goal of determining order of preference. In the present project, a total of 56 photographic samples were assessed. This included a total of seven replications of each scar (high and long, high and short, low and long, and low and short) for both a male and female neck. From this master set of images, any given photograph was presented as one of a pair (two photographs presented together) in random fashion. In doing so, all samples were compared to all others, so that an independent forced-choice decision by the rater could be made. Thus, by having each photograph available for assessment in combination with each of the other photographs, an evaluation of preference for any given photo was generated. As per the paired comparison design, all scar stimuli were presented in two orders (A *vs* B and B *vs* A).

Fifty-six stimulus pairs were presented to raters for their judgement in a random order, representing every possible pairing and combination. Additionally, in order to evaluate the reliability of rater judgements, 20 photographic pairs were pre-selected and
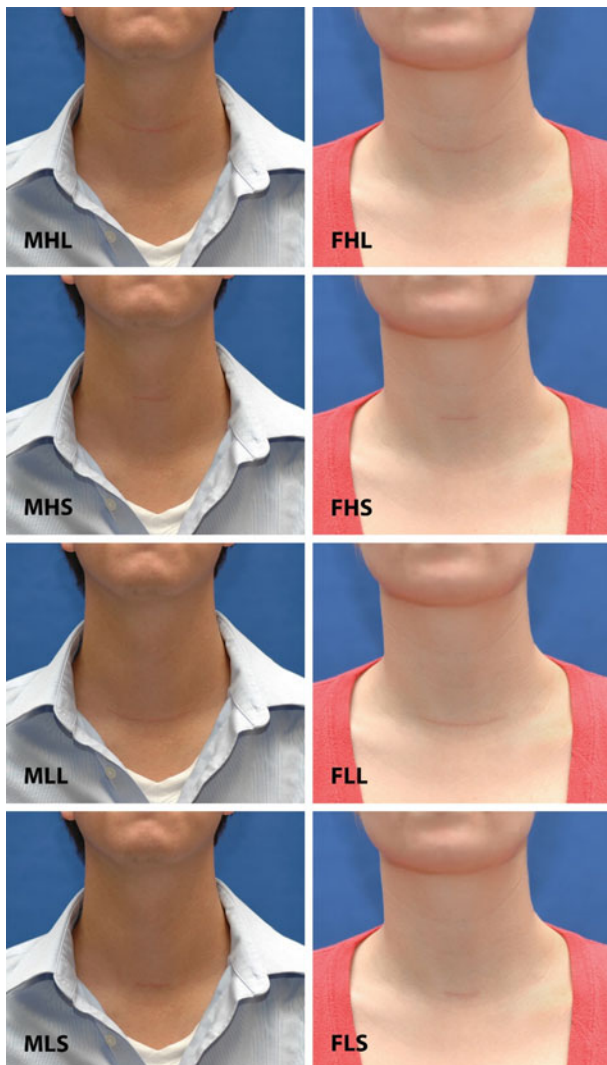


FIG. 1

Reproductions of thyroidectomy scars on the necks of a normal male (M) and a normal female (F). HL = high and long; HS = high and short; LL = low and long; LS = low and short

duplicated; these duplications allowed for determination of the consistency of observer evaluations of preference.

Each rater was presented with a pair of images shown side-by-side on a computer monitor and asked to indicate which of the photographs was preferred in relation to cosmetic appearance. When preference was given, the next pairing was subsequently presented in a random order, until all 76 comparisons were made. Raters were not permitted to return to any previously used photographic pair in order to change their judgement. Hence, once a rating was provided, the rater moved on to the next comparison.

*Outcome measures and statistical analysis*

The primary outcome measured in this study was the total number of times that each scar was selected across all pairings by each rater. The number of times selected was chosen as the primary outcome, rather than scar rank order, as rank order fails to consider the degree of difference in the perceived preference between individual scars. The effect of presentation order (A *vs* B or B *vs* A) within pairings on the primary outcome was considered a secondary outcome. Gender of the necks on which scars were reproduced could have influenced the primary outcome, and so the potential effect of gender was also considered as a secondary outcome.

Thus, the primary outcome in this study represents continuous, rather than categorical data. Because the intraclass correlation co-efficient is an appropriate measure of intra-rater reliability for continuous data, it was used to determine intra-rater reliability in this study.[15,16]

Based on the scale proposed by Landis and Koch, we considered intraclass correlation co-efficient values of 0 to represent no agreement; values of 0–0.4 represented poor to mild agreement, values of 0.4–0.6 represented moderate agreement and values of 0.6–1.0 represented good to perfect agreement.[17] To ensure robustness of study design, only those raters with good or greater reliability (intraclass correlation co-efficient of more than 0.6) were included in further analyses. Intraclass correlation co-efficient is also an appropriate test to assess inter-rater reliability when a sample of raters each evaluates the same set of targets, and, thus, intraclass correlation co-efficient was used to determine inter-rater reliability in this study.[18]

Paired *t*-tests were used to determine the significance of presentation side and subject gender on the number of times each scar was selected. One-way analysis of variance (ANOVA) was used to determine a significant difference in the primary outcome among scars. Following ANOVA, post-hoc Tukey's honest significant difference test was used to determine the relative order of preference of each scar. All statistical analyses were conducted using SPSS Statistics version 20.0 software (IBM, Armonk, New York, USA).

## Results

Assessment of intra-rater reliability demonstrated intraclass correlation co-efficients ranging from 0.650 to 0.955 in 12 of 15 raters participating in this study, which indicated good to excellent reliability. Three of 15 raters (2 males and 1 female) did not demonstrate sufficient intra-rater reliability (intraclass correlation co-efficients of 0.463, −0.116 and 0.596) and were subsequently excluded from further analyses. Inter-rater reliability of the 12 remaining raters (7 males and 5 females) was found to be very good, with an intraclass correlation co-efficient of 0.730.

Comparison of presentation side for each individual scar showed no significant difference in the number of times that each scar was selected when presented on the left or the right ($p > 0.05$). Based on this finding, the number of times each left- (A) and each right-presented (B) scar were selected was pooled for all following analyses.

Scars of similar position and size (e.g. high and long) were presented equally for both male and female necks. There was no significant difference in the number of times that each scar was selected when presented on a male or female neck ($p > 0.05$) (Table I). Unlike left and right presentations, male and female presentation was represented by distinct images. Other factors in these images that were not assessed in this study (e.g. skin tone, lighting, clothing) may have influenced rater selection, despite efforts to minimise these factors during the preparation of the photographs. Therefore, these data were not pooled.

For the eight scars evaluated, ANOVA showed a significant difference in rater selection (F (7, 88) = 30.13, $p < 0.001$). For the male neck, low and short scars were most preferred, followed by high and short scars, with low and long scars and high and long scars being the least preferred ($p < 0.05$). The difference between low and long scars and high and long scars in males approached but did not meet the a priori level of significance. For the female neck, low and short scars, and high and short scars were most preferred, followed by low and long scars, with high and long scars being the least preferred ($p < 0.05$). Again, and similar to the findings for males, the difference between low and short scars and high and short scars in females approached but did not meet significance.

## Discussion

This study demonstrated a preference for short scars when judged by naïve raters. A preference for low and short scars over high and short scars was found to be significant in males and approached significance in females. A preference for low and short scars seems intuitive; that is, shorter scars would be preferred, and scars lower on the neck may be easier to conceal and, therefore, more desirable as well.

There is minimal literature, at present, regarding the aesthetics of anterior cervical scar position in

<table>
<tr><td colspan="5" style="text-align:center">TABLE I<br>INFLUENCE OF GENDER ON SCAR PREFERENCE*</td></tr>
</table>

| Scar type | Mean number of times scar selected (SD) | | Mean difference (SD) | $p$ |
|---|---|---|---|---|
| | Male subject | Female subject | | |
| High & long | 1.42 (1.564) | 3.25 (2.989) | −1.833 (3.433) | 0.091 |
| High & short | 9.08 (2.353) | 8.67 (2.348) | 0.417 (3.777) | 0.710 |
| Low & long | 5.08 (2.503) | 4.92 (2.151) | 0.167 (3.271) | 0.863 |
| Low & short | 12.50 (1.567) | 11.08 (1.676) | 1.417 (2.575) | 0.083 |

Significance differences determined using the paired $t$-test ($n = 12$). Differences considered significant at $p < 0.05$ (two-tailed). *Based on the number of times each scar was selected as more cosmetically desirable by naïve raters. SD = standard deviation

thyroidectomy or parathyroidectomy. The only identified study postulates that positioning of the incision one finger breadth above the sternal notch in an upright patient, or two finger breadths above the sternal notch in a supine patient (because of scar migration) yields optimal cosmetic results.[19] However, that study did not aim to compare this scar position with an alternative, and cosmetic outcome was not objectively analysed. Therefore, the present study represents the only identified investigation to evaluate the influence of anterior cervical thyroidectomy scar position on perceived cosmetic acceptability.

Surgical limitations such as poor visualisation, concerns regarding the amount of retraction required to provide adequate visualisation through a small incision, the size of the thyroid or patient body habitus may make low and short incisions impractical and potentially unsafe. If this is the case, the relative preference order of the other scars would suggest that the high and short incision be considered over the alternatives. This incision location has been shown to demonstrate comparable safety to longer incisions.[10]

Regarding the cosmetic effect of scar length, there has been considerable literature published, primarily comparing minimally invasive video-assisted thyroidectomy with conventional approaches. Five meta-analyses have so far been conducted that have evaluated this comparison in the literature.[5−9] These studies collectively suggest that smaller scars yielded by minimally invasive video-assisted thyroidectomy are more cosmetically favourable than longer scars yielded by conventional thyroidectomy. To determine cosmetic favourability, the studies examined in these meta-analyses had patients rate the acceptability of their own scars on a 10-point scale, without a frame of reference to compare their own scars against. Unlike these studies, Casserly et al. used validated scar scales, the Manchester Scar Scale and the Patient and Observer Scar Assessment Scale, to compare cosmetic acceptability of scars in minimally invasive video-assisted parathyroidectomy and conventional approaches.[20] However, work by our own group has suggested that linear scar scales, such those utilised in the Manchester Scare Scale, Patient and Observer Scar Assessment Scale, and Vancouver Scar Scale, can be problematic and may not accurately rate the scar quality being assessed.[21] More specifically, some features cannot be accurately assessed through categorical scaling. In agreement with the present study's results, Casserly et al. found that the shorter scars of the minimally invasive group ($n = 29$, mean scar length = 1.7 cm) were more cosmetically favourable to longer scars in sex- and age-matched controls ($n = 31$, mean scar length = 4.3).[20]

Four studies have reported results that conflict with the above-described cosmetic benefit of smaller scars.[14,22−24] Toll et al. showed no correlation between scar length and cosmetic satisfaction in 80 patients with thyroidectomy scars ranging from 1.9 cm to 13 cm.[22] Kim et al. similarly found no correlation between scar length and patient satisfaction with cosmesis in a large series of 1836 patients undergoing total or less than total thyroidectomy with a mean scar length of 5.8 cm (standard deviation = 2.2).[24] Like some of the previous investigations, applicability of these two studies is limited because they used a 10-point self-assessment scale without any frame of reference to determine cosmetic acceptability. O'Connell et al. compared scar cosmesis in patients who had undergone minimal access parathyroidectomy ($n = 11$, mean scar length = 3.4 cm) with sex- and age-matched controls who had undergone conventional parathyroidectomy or thyroidectomy ($n = 11$, mean scar length = 7.6 cm).[14] That study also used a 10-point self-assessment scale, and found a statistically significant difference of 1 point favouring the minimal access group, but the authors did not deem this result to be clinically significant. In addition to the 10-point scale, the study also used the validated Vancouver Scar Scale and Patient and Observer Scar Assessment Scale to assess scar cosmesis, and found no significant difference in scar ratings under both scales. Linos et al. similarly evaluated patient satisfaction with their scar appearance between patients undergoing minimally invasive ($n = 308$, scar length = 2.5–3 cm) and conventional ($n = 383$, scar length = 4–8 cm) parathyroidectomy and thyroidectomy.[23] Unlike previous studies, these investigators used the Patient Scar Assessment Questionnaire to quantify scar cosmesis. This scale has been specifically validated in the study of thyroidectomy scars.[25] Linos et al. also found no difference in scar cosmesis

between groups.[23] Thus, these studies demonstrate that it is not simply an accepted concept that a smaller scar is more desirable, and for that reason further study on this matter is needed.

The majority of current literature on this subject shares the common pitfall of having patients self-assess the cosmetic acceptability of their own scars. Though the preferences of our patients are extremely important, patient self-assessment is associated with potential biases. Some patients may wish to have the best scar possible, and so will see their own scars in an inappropriately favourable light. Conversely, some patients may judge their own scars more critically and see any scar, regardless of length, as being cosmetically unfavourable. These biases are overcome by one of the principal strengths of our experimental design: third-party observer-based assessment and the use of the rigorous paired comparison method of evaluation. Of the above-mentioned literature, only O'Connell et al.[14] and Casserly et al.[20] used observer-based ratings as part of their studies. Observer-based ratings have been used elsewhere to evaluate thyroidectomy scar aesthetics without making a comparison to other approaches and to compare alternative methods of skin closure.[26–28] Another potential source of error in prior studies is having raters assess scars with no frame of reference. Without a frame of reference, a rater may judge a scar to be favourable or unfavourable that they would judge differently if they were aware that other potential scars were possible. The forced-choice paired comparison paradigm can minimise this source of error. This design provides raters with a comparative frame of reference, so they can directly compare a given scar against an alternative and establish preference. Additionally, by randomising presentation order, recency and primacy effects on ratings are minimised, and the ability to systematically determine the consistency of rater preference is facilitated.

A potential weakness in our experimental design is that the scars the raters evaluated were, ultimately, simulated. Simulations were chosen over photographs of real thyroidectomy scars in order to minimise variation in scar assessment by essentially standardising the patient. While critical to the objectives of the present study, this level of experimental control may not fully reflect the degree of surgical variability. Although we deemed these photographic simulations to be acceptably realistic, they may fail to capture some of the nuances and subtleties of a real scar that may influence cosmetic acceptability. Additionally, because the patients in our stimuli were standardised, our results may not be generalisable to all thyroidectomy patients. The scars in this experiment were placed on young patients without rhytids and, therefore, we can only confidently apply our results to this population.

Despite these limitations, the use of simulated scars through photo-manipulation and the experimental forced-choice paired comparison paradigm represents a powerful, novel tool to evaluate scar position and length. This design could also be applied in future experiments to evaluate other aspects of surgical scars that may influence aesthetics, such as thickness or colour. Recent work from our group has identified scar appearance to be a major area of pre-operative patient concern.[29] Thus, further, more comprehensive study of the determinants of cosmetic acceptability of thyroidectomy scars is warranted.

- **Thyroidectomy is a common surgical procedure**
- **A major patient concern is the cosmetic impact of a thyroidectomy scar on an exposed area of the body**
- **Layperson raters assessed digitally created scars on standardised photographs of necks to determine the most cosmetically favourable scar position and length**
- **Raters preferred low and short thyroidectomy scars in the rhytid-free necks of young patients over the alternatives**
- **High and short scars were preferred over long scars in either position**

In conclusion, our data indicate that naïve raters preferred low and short thyroidectomy scars in the rhytid-free necks of young patients over the alternatives. If low and short scars are not practical, in light of technical and safety concerns, high and short scars are preferred over long scars in either position. Through the use of simulated scar images and the paired comparison paradigm, this study isolates scar length and position as the only variables influencing scar preference in our raters. The level of experimental control provided in this study offers valuable data towards the objective of identifying the cosmetic consequences of thyroid surgery. Therefore, if other factors influencing incision site are considered equal, surgeons should consider these preferences in scar position and length when planning their thyroidectomy approach in this population of patients.

## Acknowledgements

## References

1 Miccoli P, Berti P, Raffaelli M, Materazzi G, Baldacci S, Rossi G. Comparison between minimally invasive video-assisted thyroidectomy and conventional thyroidectomy: a prospective randomized study. *Surgery* 2001;**130**:1039–43
2 Bellantone R, Lombardi CP, Bossola M, Boscherini M, De Crea C, Alesina PF et al. Video-assisted vs conventional thyroid lobectomy: a randomized trial. *Arch Surg* 2002;**137**:301–5
3 Ikeda Y, Takami H, Sasaki Y, Takayama J, Niimi M, Kan S. Clinical benefits in endoscopic thyroidectomy by the axillary approach. *J Am Coll Surg* 2003;**196**:189–95

4 Perigli G, Cortesini C, Qirici E, Boni D, Cianchi F. Clinical benefits of minimally invasive techniques in thyroid surgery. *World J Surg* 2008;**32**:45–50

5 Sgourakis G, Sotiropoulos GC, Neuhauser M, Musholt TJ, Karaliotas C, Lang H. Comparison between minimally invasive video-assisted thyroidectomy and conventional thyroidectomy: is there any evidence-based information? *Thyroid* 2008;**18**:721–7

6 Chen XD, Peng B, Gong RX, Wang L, Liao B, Li CL. Endoscopic thyroidectomy: an evidence-based research on feasibility, safety and clinical effectiveness. *Chin Med J (Engl)* 2008;**121**:2088–94

7 Radford PD, Ferguson MS, Magill JC, Karthikesalingham AP, Alusi G. Meta-analysis of minimally invasive video-assisted thyroidectomy. *Laryngoscope* 2011;**121**:1675–81

8 Liu J, Song T, Xu M. Minimally invasive video-assisted versus conventional open thyroidectomy: a systematic review of available data. *Surg Today* 2012;**42**:848–56

9 Pisanu A, Podda M, Reccia I, Porceddu G, Uccheddu A. Systematic review with meta-analysis of prospective randomized trials comparing minimally invasive video-assisted thyroidectomy (MIVAT) and conventional thyroidectomy (CT). *Langenbecks Arch Surg* 2013;**398**:1057–68

10 Park CS, Chung WY, Chang HS. Minimally invasive open thyroidectomy. *Surg Today* 2001;**31**:665–9

11 Rafferty M, Miller I, Timon C. Minimal incision for open thyroidectomy. *Otolaryngol Head Neck Surg* 2006;**135**:295–8

12 Henry JF. Minimally invasive thyroid and parathyroid surgery is not a question of length of the incision. *Langenbecks Arch Surg* 2008;**393**:621–6

13 Kandil E, Hammad AY, Walvekar RR, Hu T, Masoodi H, Mohamed SE *et al*. Robotic thyroidectomy versus nonrobotic approaches: a meta-analysis examining surgical outcomes. *Surg Innov* 2016;**23**:317–25

14 O'Connell DA, Diamond C, Seikaly H, Harris JR. Objective and subjective scar aesthetics in minimal access vs conventional access parathyroidectomy and thyroidectomy surgical procedures: a paired cohort study. *Arch Otolaryngol Head Neck Surg* 2008;**134**:85–93

15 Bartko JG. The intraclass correlation coefficient as a measure of reliability. *Psychol Rep* 1966;**19**:3–11

16 Gwet KL. Intrarater reliability. In: D'Agostino RB, Sullivan L, Massaro J, eds. *Wiley Encyclopedia of Clinical Trials*. Hoboken, NJ: John Wiley and Sons, 2008;473–85

17 Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics* 1977;**33**:159–74

18 Shrout PE, Fleiss JL. Intraclass correlations: uses in assessing rater reliability. *Psychol Bull* 1979;**86**:420–8

19 Jancewicz S, Sidhu S, Jalaludin B, Campbell P. Optimal position for a cervical collar incision: a prospective study. *ANZ J Surg* 2002;**72**:15–17

20 Casserly P, Kirby R, Timon C. Outcome measures and scar aesthetics in minimally invasive video-assisted parathyroidectomy. *Arch Otolaryngol Head Neck Surg* 2010;**136**:260–4

21 Brandt MG, Moore CC, Micomonaco D, Fung K, Franklin JH, Yoo J *et al*. A prospective randomized evaluation of scar assessment measures. *Laryngoscope* 2009;**119**:841–5

22 Toll EC, Loizou P, Davis CR, Porter GC, Pothier DD. Scars and satisfaction: do smaller scars improve patient-reported outcome? *Eur Arch Otorhinolaryngol* 2012;**269**:309–13

23 Linos D, Economopoulos KP, Kiriakopoulos A, Linos E, Petralias A. Scar perceptions after thyroid and parathyroid surgery: comparison of minimal and conventional approaches. *Surgery* 2013;**153**:400–7

24 Kim SM, Chun KW, Chang HJ, Kim BW, Lee YS, Chang HS *et al*. Reducing neck incision length during thyroid surgery does not improve satisfaction in patients. *Eur Arch Otorhinolaryngol* 2015;**272**:2433–8

25 Economopoulos KP, Petralias A, Linos E, Linos D. Psychometric evaluation of patient scar assessment questionnaire following thyroid and parathyroid surgery. *Thyroid* 2012;**22**:145–50

26 Sahm M, Schwarz B, Schmidt S, Pross M, Lippert H. Long-term cosmetic results after minimally invasive video-assisted thyroidectomy. *Surg Endosc* 2011;**25**:3202–8

27 Ridgway DM, Mahmood F, Moore L, Bramley D, Moore PJ. A blinded, randomised, controlled trial of stapled versus tissue glue closure of neck surgery incisions. *Ann R Coll Surg Engl* 2007;**89**:242–6

28 Consorti F, Mancuso R, Piccolo A, Pretore E, Antonaci A. Quality of scar after total thyroidectomy: a single blinded randomized trial comparing octyl-cyanoacrylate and subcuticular absorbable suture. *ISRN Surg* 2013;**2013**:270953

29 Brandt MG, Franklin JH, Osborn HA, Fung K, Yoo J, Doyle PC. The Western Surgical Concern Inventory-Thyroid: development and initial validation. *Otolaryngol Head Neck Surg* 2012;**147**:227–32

Address for correspondence:
Dr Kevin Fung,
Department of Otolaryngology – Head and Neck Surgery,
Room B3-427,
Victoria Hospital,
800 Commissioners Road East,
London,
Ontario,
Canada N6A 5W9

Fax: +1 519 685 8567
E-mail: kevin.fung@lhsc.on.ca

Dr K Fung takes responsibility for the integrity of the content of the paper
Competing interests: None declared