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## Cover Page Footnote

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# Purse-String Suture for Skin Closure Following Large Thyroidectomy

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**Abstract**

**Introduction**. The number of large-sized thyroid nodules (>6 cm in diameter) is increasing. The conventional suturing technique for closure of thyroidectomies recommended for the tumor with a diameter up to 6 cm. Hence, this study aims to prove another surgical technique, purse-string stitching technique, for better esthetic results on large thyroidectomy.
**Method**. This study was a non-randomized control trial. The subjects included the patients of Cipto Mangunkusumo Hospital in 2013 to 2014 with a thyroid tumor >6 cm in diameter without any history of anterior cervical surgery and positive lymph nodes. Subjects divided into the purse-string group and the conventional group. Thyroidectomies done on all subjects then closed by the suturing technique of each group. Outcomes recorded in the follow-up sessions, including wound scar size, wrinkle existence, and subject's satisfaction level
**Results**. Purse-string technique resulted in shorter scar length compared to the conventional technique (median 35 mm vs. 94 mm, p <0.01). The other outcomes, such as the width of the scar (median 3 mm vs. 2 mm, p = 0.265), the presence of wrinkles (0 vs. 2, p = 0.480), and satisfaction level of subjects (median 9 vs. 9, p = 0.287) also assessed
**Conclusion**: The purse-string suturing technique on large thyroidectomy wound closure could be an alternative, besides the conventional suturing technique for better esthetic results.

**Keywords**: thyroid tumor, thyroidectomy, scar, purse string

## Introduction

The incidence of thyroid nodules varies from 4 to 6% of the population, in the surgical outpatient clinic at dr. Cipto Mangunkusumo General Hospital, Jakarta (CMGH), there were 260 patients with thyroid nodules in 2012. Of 31 patients, the tumor size larger than 6 cm in diameter. In 2013, the number increased to 429 patients, and 53 patients with tumor size larger than 6 cm in diameter. In addition to extended thyroidectomies required, the rising problems of long and unfavorable scars,[1,2] leading to psychologic burden and the quality of life.[1,3]

Concerned to the long and unfavorable scars, there were recommendations to proceed a conventional suturing technique following a thyroidectomy in nodule larger than 6 cm.[4] Another simple surgical closure was a purse-string stitching technique. It aimed to minimize the scars and resolve the side wrinkles. To find out the advantages, we carried out a study aimed to find out the outcome of such a technique.

## Method

The study was a single-center, prospective, non-randomized control trial study, which compared scars and wrinkles following thyroidectomy in CMGH during 2014–2015. Those with large nodules were close by purse-string technique (treatment group), and the conventional closing techniques (control). The consecutive sampling method applied in the study. Only those who agreed enrolled in the study. Those with a positive lymph node in the neck region excluded. The scars observed and compared between the two groups. The two groups of subjects include the purse-string suture group and the conventional suture group for large thyroidectomy wound closure. The scar as the dependent variable assessed three months after surgery. The length and width in millimeter (numerical scale), the wrinkles,[5-7] and subjects' satisfaction on the esthetical criteria using the Likert Scale (1 to 10).[8,9] Data subjected to analysis. The Shapiro-Wilk method used for assessment of the distribution. The Mann-Whitney test evaluated any numerical data of the scar length, scar width, and satisfaction level. Wrinkle existence data was analyzed using a Chi-Square test. This study approved by The Committee of Ethics, Faculty of Medicine, Universitas Indonesia No.792/UN2.F1/ETIK/2014.

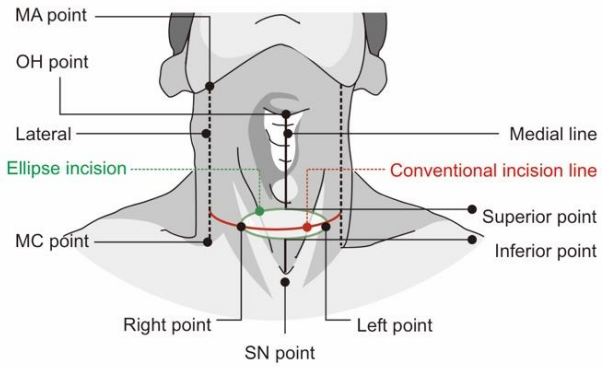


Figure 1. Proposed design and the landmark of proposed incision. MA: mandibular angle; OH: omohyoid, MC: mandible-clavicular, SN: sternal notch.

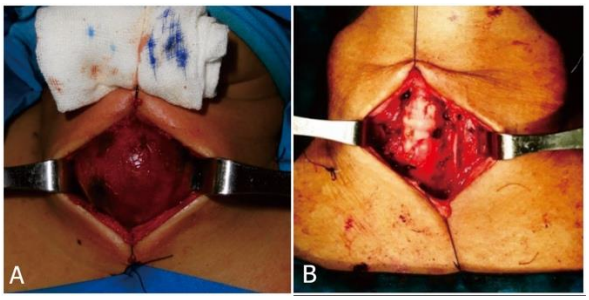


Figure 2. Clinical presentation of incision. A before thyroidectomy, and B. After thyroidectomy.

## Results

Thirty subjects enrolled in the study and followed-up for three months, only twenty-six subjects with complete the follow up. These consist of thirteen people were for each group, consisting of 3 males and 23

females.

Table 1 showed the subjects' characteristics, including age, gender, the diameter of the mass, type of surgery carried out, and histopathological data in both groups. The total thyroidectomy was the greatest number of surgeries preceded in 21 subjects (80.77%). The most histopathology type was adenomatous Struma with papillary carcinoma focus follicular variants with or without tall cell, which found in 16 subjects (61.54%) in both groups. Four subjects (15.38%) were with papillary carcinoma follicular variant with or without tall cell, meanwhile, six subjects (23.08%) were benign.

Table 1. Characteristics of subjects

| Characteristic | Purse string | Conventional |
|---|---|---|
| Age, mean (SD), year | 49.23 (15.023) | 46,23 (10.933) |
| Gender, n (%) | | |
| Male | 1 (7.7) | 2 (15.4) |
| Female | 12 (92.3) | 11 (86.4) |
| Diameter, mean (SD), mm | 13,04 (4.52) | 10,96 (4.22) |
| Type of surgery, n (%) | | |
| Total thyroidectomy | 11 (86.4) | 10 (76.9) |
| Sub-total thyroidectomy | 0 (0.0) | 1 (7.7) |
| Isthmectomy | 2 (15.4) | 2 (15.4) |
| Histopathology | 2 (15.38) | 4 (30.77) |
| Benign, n (%) | | |
| SA with Papillary Ca Follicular variants (+ tall cell), n (%)-male | 9 (69.23) | 7 (53.85) |
| Papillary Ca Follicular variant (+ tall cell) | 2 (15.38) | 2 (15.38) |

Note: SD: Standard Deviation; SA: Adenomatous struma; Ca: Carcinoma

The outcomes noted in the follow up presented in Table 2. There was a difference in surgical scars, including length and width measurements. The median scar length was 35 mm (16-51 mm) in the purse-string suture group and 94 mm (81-135 mm) in the conventional suture group ($p < 0.001$). Meanwhile, the median scar width was 3 mm (1- 8 mm) in the purse-string suture group and 2 mm (1-4 mm) in the conventional suture group ($p = 0.265$).

Table 2. Scar assessment

| Variable | Purse string | Conventional | p |
|---|---|---|---|
| Scar length, median (IQR), mm | 35 (16-51) | 94 (81-135) | <0.001* |
| Scar width, median (IQR), mm | 3 (1-8) | 2 (1-4) | 0.265* |
| Wrinkle, n (%) | | | |
| Yes | 0 (0.0) | 2 (15.4) | 0.480** |
| No | 13 (100.0) | 11 (84.6) | |
| Satisfaction, median (IQR), score | 9 (8-9) | 9 (8-10) | 0.287* |

Note: SD, Standard Deviation; IQR, Interquartile range
*Mann-Whitney Test, **Chi-square Test

The median scar length and width between the two groups illustrated in in figure 3. The scars of purse-string suture results intraoperatively and postoperatively are presented on figure 4.

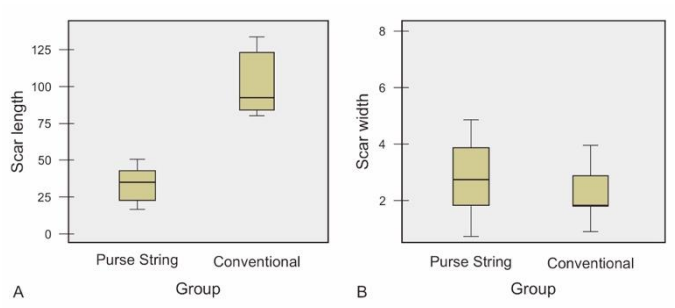


Figure 3.Whisker box plots showing the median scar length and width between purse string and conventional groups.

The wrinkles found in two subjects (15.38%) of the conventional suture group. In the perspective of subjects' satisfaction on the esthetic findings in both groups, there was no difference between the purse-string suture group with the satisfaction rate of 9 (8-9, Likert scale) and the conventional suture group with the satisfaction rate of 9 (8-10, Likert scale).[5,6]

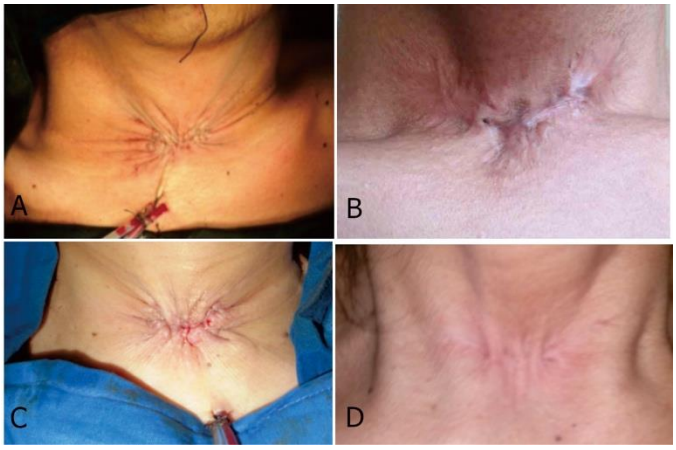


Figure 4. The scars in purse string method. The wrinkles obvious in 3-4 weeks (ABC) postoperatively, and found its final with better esthetic result (D).

## Discussion

We found a significant difference in the length of the scars of surgical wounds, whereas, in terms of the width of the scars and wrinkles, it

was not statistically significant. However, the level of satisfaction was no difference significantly.

The average age and gender profile between the two groups were similar based on the characteristics data. However, this did not describe the actual incidence at that age. Besides, to slow-growing tumor growth, it is associated with delayed presenting patients in our center, with a large mass. Hence, a thyroid nodule of >6cm in diameter, there is an increasing need for such a closure technique. The increment of patients with large nodules is contradictory to previous literature, where the majority of patients had <2cm nodules (T1) constantly in years.8 Despite the scar length difference in this study, it turned out that the average length is longer than the average length in previous studies. Large thyroidectomies resulted in a 6-8 cm long scar.[8,9] However, the average scar width in this study cannot be compared with other studies, as no studies focused on the width.

The study finding showed that a closure technique with the purse-string stitching simple and showed better esthetical scars. With the addition of 1 or 2 interrupted subcuticular stitches to provide a straight line. There were no wrinkles found in the purse-string suture group, even though the scars wider than the scar results in the conventional suture group. Another advantage was a shorter time. The duration between both techniques showed an hour difference.[10,11]

In general, although not included in the study assessment, it was suggested that a more prominent thyroid nodule mass with a smaller base was more comfortable to be applied with this purse-string suturing technique—this associated with the dissection to freeing up a relatively mobile nodule. However, more elucidation required. However, the authors would also highlight the potential weakness of the purse-string technique. It is relatively more complicated in terms of controlling bleeding that occurs in narrower access sites from the more limited surgical incisions.[8]

The average satisfaction rate in this study was higher than the previous study that previously published. The satisfaction level depends on education level, tumor size, and histopathological results in the form of malignanc.[5,9] However, the authors did not find any statistically significant difference in satisfaction rate between two groups, although the purse-string technique results in a shorter length of the scar and no wrinkle observed. The authors realized that this study still has limitations. The difference between scar and wrinkles could also be caused by differences in the surgeon skills and differences in the use of surgical tools.[5,9,12] Nevertheless, these factors were not analyzed in this study.

## Conclusion

The purse-string suture technique significantly resulted in a shorter length of the wound scar of large thyroidectomy. Therefore, the purse-string suture technique on large thyroidectomy wound closure could be an option other than the conventional suturing technique for better esthetic results.

## Disclosure

The authors declared no conflict of interest in this study.

## Acknowledgment

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