BMC Surgery

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Comparison of the degree of patient satisfaction between transoral thyroidectomy and open thyroidectomy: a survey-based study

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Abstract

Background Recent advances in thyroid surgery techniques have increased the number of patients undergoing transoral thyroidectomy, and many patients are concerned about post-thyroidectomy cosmetic effects. This study aimed to compare patient satisfaction after transoral versus conventional thyroidectomy.

Methods This study was conducted from August 2021 to January 2022 at Gangnam Severance Hospital (Seoul, South Korea). A total of 91 patients underwent transoral endoscopic thyroidectomy (TOET) or open thyroidectomy performed by a single surgeon. The Hospital Anxiety and Depression Scale (HADS), Pain Catastrophizing Scale (PCS), and 15-Item Quality of Recovery (QoR-15) postoperative day (POD)#-1 surveys were administered before the surgery. The QoR-15 POD#1 and #2 surveys were administered after the surgery. The Post-traumatic Stress Disorder Checklist surveys were administered on the first day of the outpatient visit after discharge. The survey results were compared to determine the differences between both groups.

Results Only the HADS-Depression survey scores differed significantly between the TOET and open thyroidectomy groups (4.22 ± 0.781 and 5.52 ± 0.84, respectively; $P = .039$). Multivariable analysis, adjusted for age and weight differences between the conventional and TOET groups, revealed no differences in any of the survey scores, including the HADS-Depression scores. Therefore, no differences were observed in the survey scores between the TOET and open thyroidectomy groups.

Conclusions The subjective postoperative stress about pain and the degree of recovery after surgery were similar between the two groups. Thus, there would be no difference in the patient's satisfaction for surgery between the two groups.

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Keywords Thyroidectomy, Surgical procedures, Operative, Natural orifice endoscopic surgery, Patient satisfaction

Background

With the recent advances in thyroid cancer surgery and the increasing number of patients with cosmetic concerns, transoral endoscopic thyroidectomy (TOET) has been gradually used worldwide [1, 2]. After the introduction of TOET in 2008 by a first report, it has become a notable surgical treatment option for papillary thyroid cancer [3].

Transoral thyroidectomy has an important role as a surgical option. Transoral thyroidectomy does not leave a scar [4]; therefore, it has a satisfactory cosmetic outcome [5]. However, whether the satisfaction of patients who have undergone transoral thyroidectomy is sufficient in comparison to that of patients who have undergone conventional thyroidectomy remains uncertain. Transoral thyroidectomy involves creation of an incision in the patient's mouth [6]; compared with conventional thyroidectomy, this procedure causes some discomfort during oral feeding. Thyroidectomy does not involve the gastrointestinal tract. Thus, the early resumption of oral feeding is possible after surgery, which is an advantage of thyroidectomy [7], compared with other surgical procedures such as gastrectomy. Evaluating the level of satisfaction of patients who underwent transoral thyroidectomy and those who underwent conventional thyroidectomy is important. Hence, this study aimed to administer surveys before and after surgery (i.e., transoral or conventional) and to compare the degree of satisfaction based on the results of the surveys.

Methods

Enrolled patients

This survey-based study was conducted in patients who underwent thyroidectomy. From August 13, 2021 to January 11, 2022, 131 patients who were diagnosed with thyroid cancer and underwent thyroidectomy by a single surgeon were enrolled in this study. Meanwhile, 31 patients who lacked survey results were excluded. Of the remaining 100 patients, 64 had undergone conventional thyroidectomy, while 36 had undergone transoral thyroidectomy. Of the 64 conventional thyroidectomy patients, 9 who underwent lateral neck dissection were excluded. Hence, 91 patients were finally included in this study. Figure 1 shows the participant selection process.

The surveys were administered before and after surgery both. The Hospital Anxiety and Depression Scale (HADS), Pain Catastrophizing Scale (PCS), and 15-Item Quality of Recovery (QoR-15) postoperative day (POD)#-1 surveys were administered before the surgery. The QoR-15 POD#1 and #2 surveys were administered after the surgery. The Post-traumatic Stress Disorder Checklist (PCL) was administered on the first day of outpatient visit after discharge.

The study followed the American Association for Public Opinion Research guidelines. The Institutional Review Board of Gangnam Severance Hospital, Yonsei University College of Medicine (Seoul, Korea), approved this study (approval number: 3-2021-0225). The patients provided informed written consent to participate in the study.

Preoperative surveys

Hospital anxiety and depression scale

Prior to surgery, the patients are exposed to stressful conditions that trigger worries, anxiety, and depression, among others. The HADS is useful in identifying anxious and depressive states in patients with cancer [8]. The HADS was used to evaluate the patients' preoperative anxiety and depression.

Pain catastrophizing scale

The PCS is a measure of catastrophizing in the context of actual or anticipated pain [9]. The PCS measures catastrophizing as a multifaceted construct with three subscales: rumination, magnification, and helplessness. PCS was used to digitize the patients in order to identify individuals who may be more vulnerable to higher pain responses.

Postoperative surveys

15-Item quality of recovery

The quality of recovery after anesthesia is important to measure the early postoperative health status of patients. Recovery after surgery and anesthesia is a complex process associated with patient, surgical, and anesthetic characteristics, as well as the presence of any adverse sequelae. Therefore, using a reliable method to evaluate the quality of recovery after surgery is important. The QoR-15 scale has reliability and clinical acceptability in surgical patients who received general anesthesia; therefore, this scale was used in our study to measure the quality of recovery [10]. The QoR-15 survey was also administered before the surgery (i.e., POD#-1) to compare the results before and after surgery.

Post-traumatic stress disorder checklist

Post-traumatic stress disorder (PTSD) refers to stress disorders that develop after exposure to a traumatic situation. Surgery can also be a stressful event that can cause PTSD. Therefore, evaluating the degree of PTSD in a patient after surgery is important in postoperative recovery. The PCL-5 is a recently revised survey, developed after the *Diagnostic and Statistical Manual of Mental*

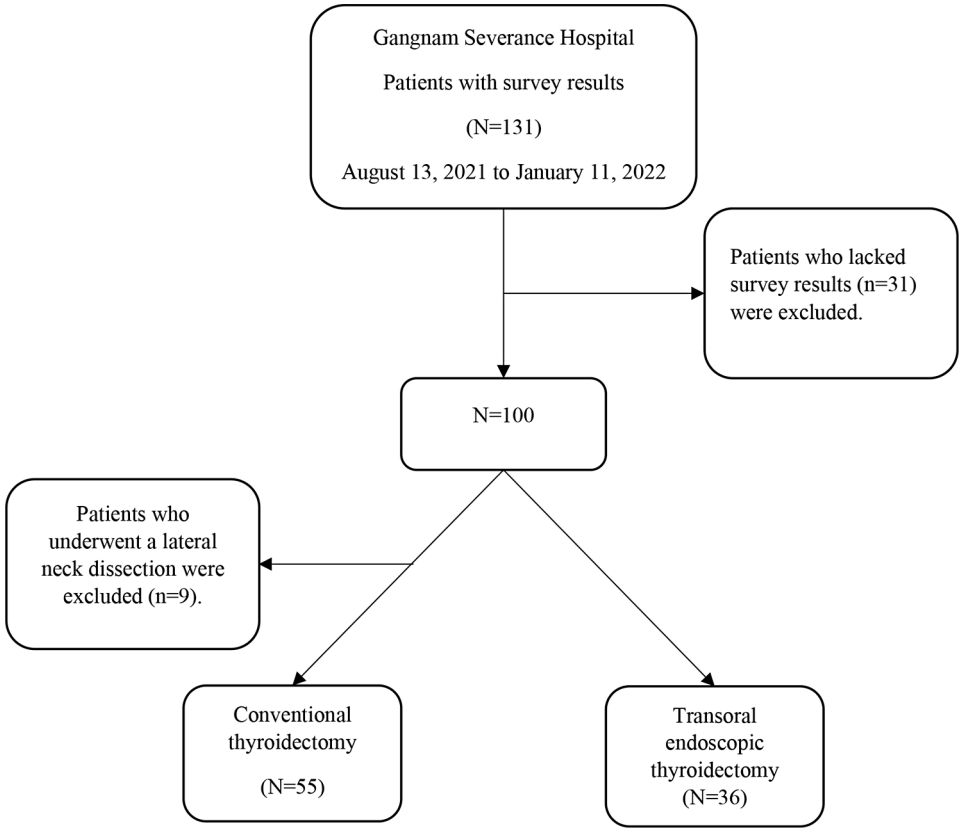

Fig. 1 Flowchart of the patient selection process

Table 1 Baseline demographic data of the conventional and transoral endoscopic thyroidectomy groups

	Conventional thyroidectomy (N = 55)	Transoral endoscopic thyroidectomy (N = 36)	p value
Age (y)	43.98 ± 1.381	36.5 ± 1.297	0.000
Height (cm)	161.007 ± 0.793	162.308 ± 0.998	0.309
Weight (kg)	64.028 ± 1.279	57.687 ± 1.105	0.000
BMI	24.681 ± 0.442	21.940 ± 0.437	0.000
ASA score	1.95 ± 0.048	1.86 ± 0.058	0.269
Extent of thyroidectomy			
Total	6 (11)	2 (6)	
Less than total	49 (89)	34 (94)	
Postoperative hospitalization period (days)	3.05 ± 0.105	3.33 ± 0.098	0.064
Op time (min)	46.10	65.13	0.000

Note The data are presented as the mean ± standard deviation or n (%)

BMI, body mass index; ASA, American Society of Anesthesiologists; Op, operation

Disorders, Fifth Edition, a new category of psychiatry, was published [11]. This survey was used to evaluate the degree of PTSD after surgery in this study.

Statistical analysis

All statistical analyses were performed using SPSS statistical software. Fisher's exact or chi-square tests were used to compare categorical variables. Student's t-test was used to compare continuous variables, which were presented as mean ± standard deviation. Multivariable analysis was used to correct the difference between the groups. Statistical significance was set at $P < .05$.

Results

Characteristics and clinical features of enrolled patients

The patients' characteristics and clinical features are presented in Table 1. The patients' age and weight were significantly different between the two groups. Of the 55 patients from the conventional thyroidectomy group, 6 underwent bilateral total thyroidectomy, while 49 underwent subtotal thyroidectomy. Of the 36 patients from the transoral thyroidectomy group, 2 underwent bilateral total thyroidectomy, while 34 underwent subtotal thyroidectomy. The postoperative hospitalization periods were 3.05 days and 3.33 days in the conventional and transoral groups, respectively.

Table 2 Survey results of the conventional and transoral endoscopic thyroidectomy groups

Survey Category	Conventional thyroidectomy (N = 55)	Transoral endoscopic thyroidectomy (N = 36)	*p* value
HADS-Anxiety	7.45 ± 0.386	7 ± 0.527	0.480
HADS-Depression	5.53 ± 0.432	4.22 ± 0.399	0.039
PCS	9.22 ± 0.922	10.5 ± 1.78	0.773
QoR POD#0	129.91 ± 2.242	126.75 ± 3.014	0.394
QoR POD#1	91.4 ± 3.653	85.03 ± 3.513	0.236
QoR POD#2	116.05 ± 3.338	110.75 ± 3.191	0.279
PCL	8.76 ± 1.05	10.28 ± 1.58	0.409

Note The data are presented as the means ± standard deviations

HADS, Hospital Anxiety and Depression Scale; PCS, Pain Catastrophizing Scale; QoR, Quality of Recovery; POD, postoperative day; PCL, Post-traumatic Stress Disorder Checklist

Statistically analysis of survey results

A comparison of the survey results is shown in Table 2. The scores of the TOET and open thyroidectomy groups were as follows: HADS-Anxiety survey, 7 ± 0.527 and 7.45 ± 0.386 ($p = .480$); HADS-Depression survey, 4.22 ± 0.399 and 5.52 ± 0.432 ($p = .039$); PCS survey, 10.5 ± 1.78 and 9.22 ± 0.922 ($p = .773$); QoR POD#0 survey, 126.75 ± 3.014 and 129.91 ± 2.242 ($p = .527$); QoR POD#1 survey, 85.03 ± 3.513 and 91.4 ± 3.653 ($p = .236$); QoR POD#2 survey, 110.75 ± 3.191 and 116.05 ± 3.338 ($p = .279$); and PCL survey, 10.89 ± 1.58 and 8.76 ± 1.05 ($p = .409$), respectively. No differences were observed in the survey scores between the transoral and conventional thyroidectomy groups, except for the HADS-Depression survey scores. Meanwhile, a significant difference was found in the HADS-Depression survey scores between the transoral and conventional thyroidectomy groups.

In the QoR-15 and PCL surveys, the scores of participants in each subcategory were obtained. We also analyzed each of the subcategories. The results are presented in Table 3. The scores on the five subcategories of the QoR-15 survey and those on the four subcategories of the PCL were not significantly different between the two groups.

A significant difference was observed in the patients' characteristics between the transoral and conventional groups. These differences possibly affected the results and caused an error in the analysis of the surveys. Thus, to prevent these statistical errors, we conducted a multivariable analysis adjusted for age and weight between the two groups. In the multivariable analysis, no difference existed in the survey scores between the transoral and conventional groups, including the HADS-Depression survey scores. The results of multivariable analysis are shown in Table 4.

Table 3 Scores on the QoR-15 and PCL subcategories of the conventional thyroidectomy and transoral endoscopic thyroidectomy groups

	Conventional thyroidectomy (N = 55)	Transoral endoscopic thyroidectomy (N = 36)	*p* value
QoR-15 Global			
Baseline (POD#0)	129.91 ± 2.242	126.75 ± 3.014	0.394
POD#1	91.4 ± 3.653	85.03 ± 3.513	0.236
POD#2	116.05 ± 3.338	110.75 ± 3.191	0.279
QoR-15 Physical comfort			
Baseline (POD#0)	44.62 ± 0.86	41.75 ± 1.309	0.059
POD#1	31.29 ± 1.490	27.64 ± 1.397	0.095
POD#2	39.93 ± 1.228	38.17 ± 1.173	0.328
QoR-15 Physical independence			
Baseline (POD#0)	19.2 ± 0.252	18.611 ± 0.427	0.240
POD#1	11.582 ± 0.746	10.694 ± 0.598	0.356
POD#2	14.582 ± 0.601	13.833 ± 0.598	0.401
QoR-15 Pain			
Baseline (POD#0)	18.2 ± 0.635	18.083 ± 0.787	0.908
POD#1	8.2 ± 0.693	9.36 ± 0.701	0.262
POD#2	13.5 ± 0.741	13.0 ± 0.725	0.641
QoR-15 Psychological support			
Baseline (POD#0)	18.455 ± 0.378	19.167 ± 0.237	0.115
POD#1	14.927 ± 0.532	13.389 ± 0.714	0.082
POD#2	16.545 ± 0.460	16.306 ± 0.532	0.738
QoR-15 Emotional status			
Baseline (POD#0)	29.4 ± 1.076	29.1 ± 1.289	0.861
POD#1	25.4 ± 1.375	23.94 ± 1.383	0.477
POD#2	31.49 ± 1.130	29.44 ± 1.313	0.247
PCL Total	8.76 ± 1.054	10.28 ± 1.582	0.409
PCL Criterion B	1.85 ± 0.337	2.36 ± 0.424	0.350
PCL Criterion C	1.582 ± 0.244	1.472 ± 0.317	0.783
PCL Criterion D	2.53 ± 0.366	2.92 ± 0.544	0.539
PCL Criterion E	2.80 ± 0.357	3.53 ± 0.529	0.240

Note The data are presented as the means ± standard deviations

QoR-15, 15-Item Quality of Recovery; POD, postoperative day; PCL, Post-traumatic Stress Disorder Checklist

Discussion

This study aimed to conduct surveys before and after transoral or conventional thyroidectomy and compare the degree of patient satisfaction, based on the results of the surveys. The incidence of postoperative stress due to pain and the degree of recovery after surgery were similar between the TOET and open thyroidectomy groups.

Transoral surgery is a thyroidectomy approach that has steadily developed over the past few centuries [2, 12, 13]. The number of transoral thyroidectomy procedures performed worldwide has increased since its introduction in the literature in 2008 [3, 14]. In 2016, endoscopic transoral thyroidotomy was performed for the first time in our hospital. In addition, the use of transoral robotic

Table 4 Multivariable analysis of the survey results, corrected for weight and age, between the two groups

Variable	*p* value	Variable (QoR-15)	*p* value
HADS		**Global**	
Anxiety	0.702	Baseline (POD#0)	0.604
Depression	0.113	POD#1	0.985
		POD#2	0.673
PCS		**Physical comfort**	
Helplessness	0.969	Baseline (POD#0)	0.207
Magnification	0.737	POD#1	0.685
Rumination	0.765	POD#2	0.950
		Physical independence	
PCL		Baseline (POD#0)	0.412
Criterion B	0.348	POD#1	0.706
Criterion C	0.787	POD#2	0.559
Criterion D	0.362	**Pain**	
Criterion E	0.228	Baseline (POD#0)	0.805
Total	0.291	POD#1	0.090
		POD#2	0.768
		Psychological support	
		Baseline (POD#0)	0.214
		POD#1	0.608
		POD#2	0.757
		Emotional status	
		Baseline (POD#0)	0.750
		POD#1	0.657
		POD#2	0.195

QoR-15, 15-Item Quality of Recovery; HADS, Hospital Anxiety and Depression Scale; POD, postoperative day; PCS, Pain Catastrophizing Scale; PCL, Post-traumatic Stress Disorder Checklist

thyroidectomy has also gradually increased [15, 16]. In 2020, transoral robotic thyroidectomy was performed for the first time at our hospital; the number of transoral robotic thyroidectomy procedures has continuously increased since then and is expected to reach approximately 200.

The characteristics of patients who underwent transoral surgery were compared with those who underwent conventional thyroidectomy. A large difference existed between the two groups in terms of age and weight. The transoral thyroidectomy group had a statistically younger age and lesser weight than the conventional group. Considering the reason for this difference, the patient group that decided to undergo transoral thyroidectomy was younger and more interested in self-management. These features could be reasons for choosing transoral thyroidectomy, which leaves relatively no scar on the skin, rather than conventional thyroidectomy [5, 17, 18].

As mentioned at above paragraph, the two groups differed in terms of age and weight. Considering that these differences between the two groups affected the survey results, an additional multivariate analysis was conducted to determine whether a difference would exist after adjusting for covariates. The survey results revealed no significant difference, even after the additional analysis. Several factors can explain these results.

First, the hospitalization period after transoral thyroidectomy was not different from that after conventional thyroidectomy [19]. The postoperative hospitalization periods were 3.05 and 3.15 days in the conventional and transoral groups, respectively. The short hospitalization period after surgery had a positive effect on the quality of life of patients after surgery [20]. Therefore, this factor could also be the reason that the survey results were not different between the two groups.

Another reason may be the early resumption of food intake after surgery in patients who underwent transoral thyroidectomy [21]. Patients who have undergone transoral thyroidectomy at our hospital resumed oral intake on the day of surgery (same as conventional thyroidectomy), unless a specific event occurred during surgery such as esophageal wall injury. The immediate resumption of food intake after surgery has a positive effect on a patient's condition. Therefore, it could be one of the reasons for the absence of differences in the survey results before and after surgery between the conventional and transoral groups.

The absence of a drainage bag after transoral thyroidectomy could be another reason [22]. In transoral thyroidectomy, a postoperative drainage bag is not necessary as it does not prevent hematoma [23], and the volume of postoperative drainage at the surgical site is extremely low. If a drainage bag is inserted after surgery, the patients may feel uncomfortable when moving around. Meanwhile, the absence of a drainage bag after surgery may allow the patients to move freely. Therefore, this factor possibly contributed to the positive results of the survey in the transoral thyroidectomy group.

Lastly, the duration of transoral thyroidectomy and conventional thyroidectomy was not significantly different. A statistically valid difference in the operation time existed between the two groups. The average time of transoral thyroidectomy was 65.13 min, which was longer than that of conventional thyroidectomy (46.10 min). The transoral thyroidectomy operation time was longer than that of conventional thyroidectomy because of the time required to create a flap inside the mouth through the incision. Thus, the time of performing thyroidectomy may be similar between the groups. Based on this factor, the substantive surgical time of both groups may be similar. This may have led to the similar degree of postoperative pain in both groups [24] and may be the reason for the similarity of the survey results between the transoral and conventional thyroidectomy groups.

We conducted a matching analysis to adjust for the differences in age and weight between the two groups. The results were the same as those of the multivariable analysis, although the number of patients who were matched

was extremely small. Therefore, we excluded these results in this study.

Our study has some limitations. First, it was a retrospective study and conducted at a single institution with a single surgeon. Thus, the results of our study cannot be generalized. Furthermore, the number of included patients was relatively small, and it was not a randomized trial study. Hence, further study with a larger number of randomized patients is needed.

In conclusion, this single-center study found no difference in the pre- and postoperative survey results between the transoral thyroidectomy and conventional thyroidectomy groups. Several reasons may explain these results. First, the hospitalization period after transoral thyroidectomy was not different from that after conventional thyroidectomy. Second, the immediate resumption of food intake after surgery is possible in patients who undergo transoral thyroidectomy. This factor can also be one of the reasons why a drainage bag is not required after transoral thyroidectomy. Finally, the duration of transoral thyroidectomy was not significantly different from that of conventional thyroidectomy. All things considered, the incidence of postoperative stress due to pain and the degree of recovery that the patients experience after surgery were similar between the transoral endoscopic thyroidectomy and open thyroidectomy groups. Therefore, when operator and patient tries to choose transoral thyroidectomy for the cosmetical effect, they will be no hesitation about the postoperative pain.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12893-024-02751-2.

Supplementary Material 1

Supplementary Material 2

Supplementary Material 3

Supplementary Material 4

Acknowledgements
We would like to thank Editage (www.editage.com) for English language editing.

Author contributions
Conceptualization: S.M.K.; Data curation: J.S.L, J.Y.B.; Formal analysis: J.S.L, J.Y.B, J.Y.O.; Investigation: J.S.L, J.Y.B, J.Y.O.; Methodology: S.M.K, Y.S.; Project administration: J.S.L, S.M.K.; Resources: J.S.L, J.Y.B.; Software: J.S.L, J.Y.B, J.Y.O.; Supervision: S.M.K, Y.S.; Validation: S.M.K.; Visualization: J.S.L, J.S.L.; Writing – original draft: J.S.L.; Writing – review & editing: J.S.L, S.M.K.; Approval of final manuscript: all authors.

Funding
The study did not receive any funding.

Data availability
The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This study was approved by the Institutional Review Board (IRB) of Gangnam Severance Hospital, Yonsei University College of Medicine (IRB protocol: 3-2021-0225). Given the retrospective nature of the study, the requirement for patient approval or informed consent was waived by the IRB. This study was conducted in accordance with Declaration of Helsinki.

Consent for publication
Given the retrospective nature of the study, the requirement for patient approval or informed consent was waived by the IRB.

Competing interests
The authors declare no competing interests.

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Received: 9 July 2024 / Accepted: 27 December 2024
Published online: 20 February 2025

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