

Evaluation of public's perception of scar cosmesis after thyroidectomy: results of a survey of Turkish versus South Korean individuals

Erman Alci¹, Soo Young Kim², Hyeok Jun Yun², Seda Gozener³, Murat Ozdemir⁴, Yigit Turk⁴, Hur Hassoy⁵, Yong Sang Lee², Seok-Mo Kim², Gokhan Icoz⁴, Hang-Seok Chang², Ozer Makay⁴

¹Department of General Surgery, School of Medicine, Balikesir University, Balikesir, Türkiye

²Department of Surgery, Thyroid Cancer Center, Gangnam Severance Hospital and Institute of Refractory Thyroid Cancer, Yonsei University College of Medicine, Seoul, Korea

³Department of Anatomy, Istanbul Medipol University, School of Medicine, Izmir, Türkiye

⁴Division Endocrine Surgery, Department of General Surgery, Ege University Hospital, Izmir, Türkiye

⁵Department of Public Health, School of Medicine, Ege University, Izmir, Türkiye

Purpose: Visible scars on the neck caused by thyroid surgery give rise to significant aesthetic, functional, and psychosocial problems. The objective of this study is to comparatively investigate the public perception of neck scar cosmesis in Turkish and South Korean populations.

Methods: This survey was prepared to collect participants' demographic and socioeconomic data and determine their perception of scar cosmesis on the neck and consisted of 15 questions. One thousand thirty-nine individuals who did not undergo thyroid surgery completed the survey. The P-values of <0.05 were deemed to indicate statistical significance.

Results: There were 1,039 respondents, of whom 525 (50.5%) were Turkish and 514 (49.5%) were South Korean. South Korean respondents stated that they would be significantly more uncomfortable with the thought of having a scar due to thyroid surgery, compared to the Turkish respondents (P < 0.001). The South Korean respondents stated that they would be significantly more concerned about the scar's length, thickness, and darkening color, compared to the Turkish respondents (P < 0.001 for all cases).

Conclusion: Patients' expectations, which are affected by various sociodemographic factors and cultural characteristics, are as important as the medical condition when deciding on the type of thyroid surgery. The study findings clearly indicated that the South Korean population would be significantly more uncomfortable with having a scar on the neck, compared to the Turkish population. Therefore, in selected cases, a scarless thyroidectomy approach, such as transoral endoscopic thyroidectomy, vestibular approach may be preferable for societies like South Korea.

[Ann Surg Treat Res 2023;105(3):119-125]

Key Words: Cicatrix, Thyroid gland, Thyroidectomy, Transoral thyroidectomy, Scar perception

Received June 27, 2023, Revised August 7, 2023, Accepted August 14, 2023

Corresponding Author: Ozer Makay

Division Endocrine Surgery, Department of General Surgery, Ege University Hospital, Kazımdirik, Universite Cd. No:9, 35100 Bornova/Izmir, Türkiye

Tel: +90-232-3905050, **Fax:** +90-232-3398838, **E-mail:** ozer.makay@ege.edu.tr, **ORCID:** https://orcid.org/0000-0002-6660-6748

Co-Corresponding Author: Yong Sang Lee

Thyroid Cancer Center, Gangnam Severance Hospital, Yonsei University College of Medicine, 211 Eonju-ro, Gangnam-gu, Seoul 06273, Korea

Tel: +82-2-2019-3600, **Fax:** +82-2-2123-8636, **E-mail:** medilys@yuhs.ac, **ORCID:** https://orcid.org/0000-0002-8234-8718

• Soo Young Kim's current affiliation is Department of Surgery, Ajou University School of Medicine, Suwon, Korea.

Copyright © 2023, the Korean Surgical Society

© Annals of Surgical Treatment and Research is an Open Access Journal. All articles are distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

The incidence of thyroidectomy is increasing worldwide, in parallel with an increase in surgical diseases of the thyroid. Conventional thyroidectomy performed with an incision on the neck known as the "Kocher incision" has been the gold standard in thyroid surgery. Incisions made with conventional thyroidectomy and minimally invasive approaches reportedly range from 3 cm to 8 cm, and from 1.7 to 3.3 cm, respectively [1]. Given that significant thyroidectomy complications are relatively rare, most of the attention has been focused on improving the associated aesthetic results while maintaining the efficacy and safety of the method.

Minimally invasive techniques mainly focus on incision size. Techniques that employ remote access are not necessarily minimally invasive. Remote access thyroidectomy, for instance, features an incision in a more invisible location of the neck [2]. Therefore, the natural orifice transluminal endoscopic technique was developed in 2008 for use in thyroidectomy via oral cavity access [3]. In addition, the transoral endoscopic thyroidectomy vestibular approach has recently been refined, yielding better results and fewer complications [4,5].

Given that thyroid gland diseases are most commonly seen among the female population and that thyroid cancer is seen in young women with prolonged survival, the appearance and recovery of the incision site have become increasingly important due to the apparent incision of the midcervical neck location during conventional thyroidectomy [6,7]. In addition, the incidence of thyroid cancer, which is more prevalent in the female population, is increasing around the world, including in Turkey and the Republic of Korea, with the highest prevalence [8].

The visible scars on the neck caused by thyroid surgery give rise to significant aesthetic, functional, and psychosocial problems. Individual patient characteristics also influence the perception of scar cosmesis. Poor aesthetic results have been shown to adversely affect patient psychology and quality of life (QOL) [9]. On the other hand, there is genuine societal concern about cervical incisions in some Asian countries, such as the Republic of Korea, where the neck is perceived as sacred [10]. In this context, the objective of this study is to comparatively investigate the public perception of neck scar cosmesis in Turkish and South Korean populations.

METHODS

Survey design

The survey in our study was developed by modifying a validated questionnaire, developed by Dunker et al. [11]. The survey, prepared to collect participants' demographic and socioeconomic data and determine their perception of scar cosmesis on the neck, consisted of 15 questions (Supplementary

Fig. 1). The first 7 questions of the survey addressed the participants' demographic and socioeconomic characteristics, whereas the remaining 8 questions addressed the participants' perceptions of scar cosmesis on the neck. Participants were provided the following answer choices for each question: (0) No, not at all; (1) A little bit; (2) Quite a bit; and (3) Yes, extremely.

The questions were developed in English and translated into Turkish and Korean. One Turkish medical doctor translated the questions into Turkish, and 2 Turkish individuals checked the translated text for clarity. Similarly, one South Korean medical doctor translated the questions into Korean, and 2 South Korean individuals checked the translated text for clarity.

Ege University Medical Research Ethics Committee and the Institutional Review Board of Gangnam Severance Hospital, Yonsei University College of Medicine (Seoul, Korea) approved the survey (No. 01.08.2019 and No. 19-7T/78).

Data collection

Surveys were distributed in person at the Thyroid Cancer Center outpatient clinic, Gangnam Severance Hospital, Seoul, Republic of Korea, and at the Endocrine Surgery outpatient clinic, Department of General Surgery, Ege University Hospital, Izmir, Turkey, to 1,039 participants. These participants were not patients and were the accompanying persons of those patients who applied for medical care at both centers. These participants did not undergo thyroid surgery or any examination related to the thyroid. Health professionals (nurse practitioners, physician assistants, and nurses) distributed questionnaires to a few randomly selected participants who had not had thyroid surgery before to fill out the questionnaire at both centers every day for 6 months. Participants who agreed to participate in the study filled out the questionnaire and handed it to the relevant healthcare professionals.

Data analysis

All surveys were included in the data analysis. Survey data were entered into an Microsoft Excel spreadsheet for further analysis of the primary demographic data. The IBM SPSS Statistics ver. 20.0 (IBM Corp.) was used for the statistical analyses. Comparisons were made using the chi-square test. The P-values of <0.05 were deemed to indicate statistical significance.

RESULTS

A comparison of the Turkish and South Korean public's demographic and socioeconomic data is shown in Table 1. There were 1,039 respondents, of whom 525 (50.5%) were Turkish and 514 (49.5%) were South Korean. The respondents' mean age was 45.2 ± 13.1 years. Of all participants aged 28 years or younger ($n = 105$), 59 (56.2%) were in the South Korean group, whereas

Table 1. Comparison of the Turkish and South Korean public's demographic and socioeconomic data

Characteristic	Turkish population ^{a)}	Korean population ^{a)}	Total ^{b)}	P-value
Age (yr)	47.1 ± 13.5	43.3 ± 12.4	45.2 ± 13.1	
≤28	46 (43.8)	59 (56.2)	105 (10.3)	0.001*
29–59	352 (47.8)	385 (52.2)	737 (72.6)	
≥60	108 (62.1)	66 (37.9)	174 (17.1)	
Sex				
Female	388 (52.8)	347 (47.2)	735 (70.7)	0.023*
Male	135 (44.7)	167 (55.3)	302 (29.1)	
I do not want to specify	2 (100)	0 (0)	2 (0.2)	
Educational status				
≤Secondary school	196 (93.8)	13 (6.2)	209 (20.2)	<0.001*
High school	176 (66.4)	89 (33.6)	265 (25.5)	
Bachelor degree	131 (26.8)	357 (73.2)	488 (47.0)	
≥Master degree	21 (27.6)	55 (72.4)	76 (7.3)	
Residence				
Metropolis	357 (53.7)	308 (46.3)	665 (64.9)	<0.001*
City	115 (43.9)	147 (56.1)	262 (25.6)	
Country/village	52 (53.1)	46 (46.9)	98 (9.5)	
Income				
<Adequate	70 (57.9)	51 (42.1)	121 (12.5)	<0.001*
Adequate	209 (36.0)	372 (64.0)	581 (60.1)	
≥Good	194 (73.2)	71 (26.8)	265 (27.4)	
Prior scar history				
Yes	275 (52.5)	249 (47.5)	524 (51.3)	0.089
No	245 (49.3)	252 (50.7)	497 (48.7)	

Values are presented as mean ± standard deviation or number (%).

^{a)}Row percentage, ^{b)}column percentage.

*P < 0.05.

108 of all 174 participants aged 60 or older (62.1%) were in the Turkish group. There was a significant difference between the groups in terms of age ($P = 0.001$) (Table 1). The female sex was predominant in both groups. Accordingly, 73.9% and 67.5% of the Turkish and South Korean groups consisted of female participants, respectively. There was also a significant difference between the 2 groups in terms of sex ($P = 0.023$). Most of the Turkish participants were high school graduates, while most of the South Korean participants were university graduates. There was no illiterate person in the South Korean group, compared to 4.0% in the Turkish group. Of the participants with only secondary school and lower education levels, 93.8% were in the Turkish group, compared to only 6.2% in the South Korean group (Table 1). In parallel, in the Turkish group, 66.4%, 26.8%, and 27.6% of the participants had high school degrees, bachelor's degrees, and "master's and higher," respectively, compared to 33.6%, 73.2%, and 72.4% in the South Korean group. Accordingly, a significant difference was found between the Turkish and South Korean groups in terms of education level in favor of the South Korean group ($P < 0.001$) (Table 1).

Occupations with the highest frequency in the Turkish and South Korean groups were homemakers (27.2%) and healthcare workers (36.8%), respectively. Most of the participants in both

the Turkish (68.0%) and South Korean (59.9%) groups lived in a metropolis. There was a significant difference between the 2 groups in terms of the type of residence ($P < 0.001$), and the residence distribution of the groups was close to each other. Most participants in both the Turkish (39.8%) and South Korean (72.4%) groups stated that they had an adequate income. There was a significant difference between the 2 groups in terms of income levels in favor of the South Korean group ($P < 0.001$).

Approximately half of the respondents, 52.4% in the Turkish group and 48.4% in the South Korean group, stated that they had a wound that left a scar as it healed. There was no significant difference between the 2 groups in terms of having had a wound that left a scar ($P = 0.089$). South Korean respondents stated that they would be significantly more uncomfortable with the thought of having a scar due to thyroid surgery, compared to the Turkish respondents ($P < 0.001$) (Supplementary Tables 1, 2). South Korean respondents stated that they would be significantly more concerned about the scar's length, thickness, and darkening color, compared to Turkish respondents ($P < 0.001$ for all cases) (Supplementary Tables 1, 2). Similarly, South Korean respondents stated that a thyroid neck scar would make them feel significantly more damaged, less attractive, and less feminine/masculine ($P < 0.001$ for all cases), compared to

Turkish respondents (Supplementary Tables 1, 2). In parallel, South Korean respondents stated that their confidence in their appearance would be significantly reduced, compared to Turkish respondents ($P < 0.001$) (Supplementary Tables 1, 2).

Participants aged 28 years and under in both groups stated that they would feel significantly more uncomfortable, were they to have a scar on their neck due to thyroid surgery, compared to older participants ($P < 0.001$ for both groups) (Table 2).

Females in the South Korean group stated that they would feel significantly more uncomfortable, were they to have a scar on their neck due to thyroid surgery, compared to the males in the same group ($P < 0.001$). On the other hand, there was no significant difference between males and females in the Turkish group in terms of being uncomfortable with a thyroid surgery neck scar ($P = 0.185$) (Table 2).

In both groups, the rate of being uncomfortable with a scar on the neck due to thyroid surgery significantly increased as the participants' educational level increased ($P < 0.001$ for both groups). On the other hand, there was no significant correlation between income level and level of comfort in either of the groups ($P = 0.132$ for the Turkish group and $P = 0.414$ for the South Korean group) (Table 2).

Those living in metropolises in the South Korean group stated that they would feel significantly more uncomfortable if they

had a scar on their neck due to thyroid surgery compared to those living in cities and the country ($P = 0.042$). There was no significant correlation between the place of residence and being uncomfortable in relation to a scar in the Turkish group ($P = 0.235$) (Table 2).

DISCUSSION

The survey featured a hypothetical situation in which the participants had a scar on their necks after thyroid surgery. The survey addressed participants' perceptions of scar cosmesis after thyroidectomy based on this situation. To the best of this study's authors' knowledge, this is the first study to date to compare public perceptions of scar cosmesis after thyroidectomy between 2 different ethnicities.

There have been many changes in the techniques employed in thyroid surgery over the past decade, including minimally invasive techniques, such as video-assisted and robot-assisted thyroidectomy. These techniques, which have been very successful in countries such as the Republic of Korea, where the perception of scar cosmesis has driven these technologies, aim to reduce operation time and improve postoperative outcomes [12]. In recent years, these techniques have become widespread in many countries due to aesthetic concerns and the thought

Table 2. Pearson's chi-square test of question number 8 (Q8)

Variable	Participants who answered "yes" to Q8			
	Turkish population	P-value	Korean population	P-value
Age (yr)				
≤28	43 (93.5)	<0.001*	58 (100)	<0.001*
29–59	279 (79.5)		344 (92.2)	
≥60	61 (57.0)		50 (76.9)	
Sex				
Female	288 (74.6)	0.185	322 (95.0)	<0.001*
Male	110 (81.5)		133 (82.6)	
Educational status				
≤Secondary school	117 (60.3)	<0.001*	7 (53.8)	<0.001*
High school	148 (84.1)		76 (89.4)	
Bachelor degree	116 (88.5)		325 (92.6)	
≥Master degree	17 (81.0)		47 (92.2)	
Income				
<Adequate	51 (72.9)	0.132	43 (86.0)	0.414
Adequate	165 (78.9)		341 (91.7)	
≥Good	135 (70.3)		65 (91.5)	
Residence				
Metropolis	280 (78.4)	0.235	286 (93.2)	0.042*
City	84 (73.7)		131 (89.1)	
Country/village	34 (66.7)		38 (82.6)	

The evaluation of those who answered "yes" to the question "If you happen to have a thyroid surgery, would you feel uncomfortable because of the scar on your neck occurred by surgery?" within their groups.

Values are presented as number (%).

* $P < 0.05$.

that a smaller scar will lead to better patient satisfaction. However, only a few studies have supported this idea. As a matter of fact, some studies have reported that patients' primary concerns in the early postoperative period are surgical complications, voice changes, tissue diagnosis, the need for reoperation, and postoperative pain. It has also been reported that patients are less concerned with scar cosmesis during this early postoperative period compared to potentially life-changing conditions or diagnoses [13,14].

Conventional thyroid surgery will likely remain the standard approach for excising large thyroid glands and invasive thyroid malignancies. One of the factors that potentially affect health-related QOL after thyroidectomy is the neck scar. It has been showed that the degree of satisfaction with a neck scar improved over time after surgery and, interestingly, this improvement continued in the long term. In other words, scar cosmesis perceptions do not affect health-related QOL in the presence of primary factors [15-17].

In Eastern countries, including the Republic of Korea, a different philosophy governs patients' aesthetic perceptions. Inevitably, face-reading principles affect aesthetic perceptions in these countries [18]. Patients of Asian, Afro-Caribbean, and South American ethnicities are far more likely to experience hypertrophic and keloid scarring than their Caucasian counterparts [19-21]. Moreover, the impact of ethnicity on a patient's QOL is significantly higher in those of Afro-Caribbean, Asian, or South American origin [21]. Thus, there is regional variation in the usage of remote access techniques, which are particularly popular in Asian countries. A major driving force behind minimally invasive thyroid surgery techniques is that a small incision is assumed to improve patient satisfaction. Therefore, various minimally invasive techniques have been developed to avoid neck scarring, including endoscopic and robotic thyroidectomies. Although minimally invasive techniques remarkably decrease scar length after thyroidectomy, the results concerning patients' perceptions of scar cosmesis are controversial. Some studies have shown that minimally invasive thyroidectomy is correlated with increased patient satisfaction, but shortening the length of the incision alone may not necessarily translate into good scar cosmesis perceptions [2,22-26].

The controversy surrounding incision length remains. Some studies have concluded that scar length in thyroidectomy is not associated with patient satisfaction. In one of these studies, no significant relationship has been found between patient satisfaction and either absolute or relative scar length when only female patients were considered [23,27,28]. Additionally, they reported that careful positioning of the incision by utilizing a suitable skin crease, incision symmetry, the degree of required retraction, handling of delicate soft tissue, and the choice of closure method to enhance resultant scar cosmesis

may be related to patient satisfaction. Bokor et al. [22] reported no significant difference in body image score, cosmetic score, or self-confidence score between minimally invasive surgery and conventional surgery. This finding suggests that the initiative to miniaturize scars may be unnecessary, as patient scar satisfaction appears independent of scar length. In contrast, the rate of discomfort was found to be highly correlated with scar length in this study. Accordingly, 80.9% and 91.7% of the Turkish and South Korean participants, respectively, stated that they would feel significantly more uncomfortable if they had a longer scar on their neck due to thyroid surgery.

Some studies have shown a difference in the perception of scar cosmesis between post-thyroidectomy patients and thyroid surgery-naïve patients. Patients who had never undergone thyroid surgery evaluated scars more critically than did post-thyroidectomy patients [26]. Similarly, scars were evaluated as critical by the thyroid surgery-naïve participants included in this study, regardless of their ethnicity.

In a controlled study in which images of computer-generated scars were evaluated, it was determined that all patients preferred shorter and thinner scars regardless of age, sex, or race. In the same study, non-Caucasian (African American, Hispanic, and Asian) patients rated longer, thicker scars as more critical than Caucasian patients, and at increasingly greater magnitudes as the scars lengthened and thickened [29]. It was thought that the increasingly negative perception of scars might be due to higher awareness and sensitivity to the development of hypertrophic scars and keloids in these ethnic groups [29]. Best et al. [28] reported no significant difference in midcervical scar satisfaction among thyroidectomy patients, although African American patients had greater dissatisfaction. This result was attributed to a greater tendency to develop hypertrophic scarring and keloid formation over time in the study population. They also reported that female patients might have a higher propensity to be dissatisfied and concerned with scar aesthetics than male patients. Similarly, in this study, compared to Turkish participants, South Korean participants of Asian ethnicity were significantly more uncomfortable with the length and thickness of the neck scar.

In a study conducted with nonthyroid patients in the United States on the preference between conventional thyroid surgery featuring a neck scar and transaxillary thyroidectomy featuring an axillary scar, those who preferred transaxillary thyroidectomy were found to be younger and predominantly of the female sex when compared to those who preferred conventional thyroidectomy. Additionally, those who considered the scar critical and had previous surgery preferred the transaxillary approach over conventional thyroidectomy. The study revealed that 20% of the respondents preferred the transaxillary approach, regardless of whether it was associated with a decreased chance of curing cancer [30].

Arora et al. [21] reported that patients preferred a scarless neck approach when given the option, and the preference for an axillary incision was evident. In addition, they emphasized that a cosmetic result acceptable by the clinician may not reflect the patient's perception of scar cosmesis. Therefore, they concluded that asking the patient's opinion of scars is essential to decide on what is vital and which factors influence scar cosmesis.

The strengths of this study are that it is the first study to date to compare public perceptions of scar cosmesis after thyroidectomy between 2 different ethnicities, and it had a large sample size (n = 1,039). On the other hand, there were also some limitations to this study. First, no distinction was made in the survey as to whether thyroidectomy would be performed for benign or malignant diseases since a thyroidectomy performed for thyroid cancer might have been a factor in the perception of scar cosmesis after thyroidectomy. Second, the survey was based on a hypothetical situation and not on an actual surgical situation; that is, the participants were asked to respond to questions considering how they would feel if they had a scar on their neck due to open thyroidectomy. Third, the questions asked of the participants only addressed the thyroidectomy scenario performed with the conventional open technique and did not consider any of the minimally invasive techniques. Fourth, the survey had no internal or external validation. Lastly, neither the possibility that complications may occur after surgery nor the cost of surgery was considered in the survey.

The findings of this study can be useful in understanding the differences between different ethnicities in the perception of scar cosmesis after thyroidectomy. Patients' expectations, which are affected by various sociodemographic factors and cultural characteristics, are as important as their medical condition when deciding on the type of thyroid surgery. A better understanding of the factors affecting the perception of scar cosmesis will help increase patient satisfaction and QOL after thyroid surgery.

The study findings clearly indicated that the South Korean population would be significantly more uncomfortable if they had a scar on their neck due to thyroid surgery compared to the Turkish population. Since other factors may affect the patient's preference for scarless thyroidectomy apart from the perception of scars, no direct inference can be drawn from the study's results regarding the choice of scarless thyroidectomy

between the 2 populations. Nevertheless, in selected cases, a scarless thyroidectomy approach, such as a transoral endoscopic thyroidectomy (the vestibular approach), may be preferable for societies like South Korea.

SUPPLEMENTARY MATERIALS

Supplementary Fig. 1 and Supplementary Tables 1, 2 can be found via <https://doi.org/10.4174/astr.2023.105.3.119>.

ACKNOWLEDGEMENTS

Fund/Grant Support

None.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

ORCID iD

Erman Alci: <https://orcid.org/0000-0002-3846-7285>
 Soo Young Kim: <https://orcid.org/0000-0002-8919-3456>
 Hyeok Jun Yun: <https://orcid.org/0000-0001-6004-0782>
 Seda Gozener: <https://orcid.org/0000-0003-1651-4690>
 Murat Ozdemir: <https://orcid.org/0000-0002-4717-4337>
 Yigit Turk: <https://orcid.org/0000-0001-9755-8163>
 Hur Hassoy: <https://orcid.org/0000-0001-7180-395X>
 Yong Sang Lee: <https://orcid.org/0000-0002-8234-8718>
 Seok-Mo Kim: <https://orcid.org/0000-0001-8070-0573>
 Gokhan Icoz: <https://orcid.org/0000-0002-4039-0088>
 Hang-Seok Chang: <https://orcid.org/0000-0002-5162-103X>
 Ozer Makay: <https://orcid.org/0000-0002-6660-6748>

Author Contribution

Conceptualization: GI, OM, SMK
 Data Curation: EA, YT, SG
 Formal Analysis: HJY, MO, YSL
 Investigation: SYK, YT, SG, YSL
 Methodology, Project Administration: GI, OM, SMK
 Software: OM, HH, HSC
 Validation: HH, HSC
 Writing – Original Draft: EA, OM
 Writing – Review & Editing: All authors

REFERENCES

1. Dordea M, Aspinall SR. Short and long-term cosmesis of cervical thyroidectomy scars. *Ann R Coll Surg Engl* 2016;98:11-7.
2. Terris DJ, Seybt MW, Elchoufi M, Chin E. Cosmetic thyroid surgery: defining the essential principles. *Laryngoscope*

- 2007;117:1168-72.
3. Witzel K, von Rahden BH, Kaminski C, Stein HJ. Transoral access for endoscopic thyroid resection. *Surg Endosc* 2008;22:1871-5.
 4. Anuwong A. Transoral endoscopic thyroidectomy vestibular approach: a series of the first 60 human cases. *World J Surg* 2016;40:491-7.
 5. Anuwong A, Ketwong K, Jitpratoom P, Sasanakietkul T, Duh QY. Safety and outcomes of the transoral endoscopic thyroidectomy vestibular approach. *JAMA Surg* 2018;153:21-7.
 6. Ward EM, Sherman RL, Henley SJ, Jemal A, Siegel DA, Feuer EJ, et al. Annual report to the nation on the status of cancer, featuring cancer in men and women age 20-49 years. *J Natl Cancer Inst* 2019;111:1279-97.
 7. Cabanillas ME, McFadden DG, Durante C. Thyroid cancer. *Lancet* 2016;388:2783-95.
 8. Lortet-Tieulent J, Franceschi S, Dal Maso L, Vaccarella S. Thyroid cancer "epidemic" also occurs in low- and middle-income countries. *Int J Cancer* 2019;144:2082-7.
 9. Koh YW, Kim JW, Lee SW, Choi EC. Endoscopic thyroidectomy via a unilateral axillo-breast approach without gas insufflation for unilateral benign thyroid lesions. *Surg Endosc* 2009;23:2053-60.
 10. Thompson GB. Commentary on: a prospective comparison of patient body image after robotic thyroidectomy and conventional open thyroidectomy in patients with papillary thyroid carcinoma. *Surgery* 2014;156:128-9.
 11. Dunker MS, Stiggelbout AM, van Hogezaand RA, Ringers J, Griffioen G, Bemelman WA. Cosmesis and body image after laparoscopic-assisted and open ileocolic resection for Crohn's disease. *Surg Endosc* 1998;12:1334-40.
 12. Lee KE, Rao J, Youn YK. Endoscopic thyroidectomy with the da Vinci robot system using the bilateral axillary breast approach (BABA) technique: our initial experience. *Surg Laparosc Endosc Percutan Tech* 2009;19:e71-5.
 13. Abdul-Sater L, Henry M, Majdan A, Mijovic T, Franklin JH, Brandt MG, et al. What are thyroidectomy patients really concerned about? *Otolaryngol Head Neck Surg* 2011;144:685-90.
 14. Bucher P, Pugin F, Ostermann S, Ris F, Chilcott M, Morel P. Population perception of surgical safety and body image trauma: a plea for scarless surgery? *Surg Endosc* 2011;25:408-15.
 15. Kurumety SK, Helenowski IB, Goswami S, Peipert BJ, Yount SE, Sturgeon C. Post-thyroidectomy neck appearance and impact on quality of life in thyroid cancer survivors. *Surgery* 2019;165:1217-21.
 16. 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.
 17. Linos D, Christodoulou S, Kitsou V, Karachaliou A, Ntelis S, Petralias A. Health-related quality of life and cosmesis after thyroidectomy: long-term outcomes. *World J Surg* 2020;44:134-41.
 18. Wong FT, Soo G, Ng WP, van Hasselt CA, Tong MC. Implications of Chinese face reading on the aesthetic sense. *Arch Facial Plast Surg* 2010;12:218-21.
 19. Tolley N, Arora A, Palazzo F, Garas G, Dhawan R, Cox J, et al. Robotic-assisted parathyroidectomy: a feasibility study. *Otolaryngol Head Neck Surg* 2011;144:859-66.
 20. Juckett G, Hartman-Adams H. Management of keloids and hypertrophic scars. *Am Fam Physician* 2009;80:253-60.
 21. Arora A, Swords C, Garas G, Chaidas K, Prichard A, Budge J, et al. The perception of scar cosmesis following thyroid and parathyroid surgery: a prospective cohort study. *Int J Surg* 2016;25:38-43.
 22. Bokor T, Kiffner E, Kotrikova B, Billmann F. Cosmesis and body image after minimally invasive or open thyroid surgery. *World J Surg* 2012;36:1279-85.
 23. 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.
 24. 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.
 25. 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.
 26. 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.
 27. 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.
 28. Best AR, Shipchandler TZ, Cordes SR. Midcervical scar satisfaction in thyroidectomy patients. *Laryngoscope* 2017;127:1247-52.
 29. Chaung K, Duke WS, Oh SJ, Behr A, Waller JL, Daniel J, et al. Aesthetics in thyroid surgery: the patient perspective. *Otolaryngol Head Neck Surg* 2017;157:409-15.
 30. Coorough NE, Schneider DF, Rosen MW, Sippel RS, Chen H, Schwarze ML, et al. A survey of preferences regarding surgical approach to thyroid surgery. *World J Surg* 2014;38:696-703.