Review Article

Quality of life after remote access thyroid surgery: a narrative review

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Background and Objective: The diagnosis of thyroid cancer and rate of thyroid surgery have increased worldwide over the past several decades. Given high success rates with oncologic outcomes, the focus has shifted to include optimizing quality of life (QoL). One way to approach this has been the use of remote access surgery which avoids a cervical incision, and thus may impact QoL outcomes.

Methods: We conducted a search of three scientific databases to identify reported QoL outcomes and the metrics utilized to provide this data in patients who undergo remote access thyroidectomy. Our review was limited to English articles published prior to February 1, 2022.

Key Content and Findings: Patients' perceptions of their cervical scar have a significant impact on several QoL domains including body image, self-perception, social function, and overall well-being. These effects can persist for years after surgery and are more prominent in patients under age 40. Existing literature shows that remote access approaches to thyroidectomy that avoid a cervical incision may provide improved cosmetic outcomes, body image and self-perception.

Conclusions: Cervical incisions have a negative impact on QoL in some patients. Remote access approaches may mitigate these effects and provide patients with a faster return to baseline function. Further studies utilizing metrics specific to thyroid disease and cervical incisions are needed.

Keywords: Remote access thyroidectomy; quality of life (QoL); transoral endoscopic vestibular approach

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Introduction

Over the past 30 years, the rate of thyroid surgery has shown a steady increase and is now one of the most common surgeries performed in the United States (1). This is largely due to increase in thyroid cancer diagnoses and detection of thyroid nodules in North America (2-4). Given that the mortality risk of thyroid cancer has not increased within the same time frame, the increase in incidence is attributed to greater detection with medical imaging and access to health care resulting in an overdiagnosis of thyroid cancer (2,5).

Fortunately, differentiated thyroid cancer carries an excellent prognosis, with 5-year survival in the United States >98% for all stages (6). Given this data, it is imperative to balance the low morbidity of the pathology with the potential morbidity of thyroid surgery. Although the overall surgical complication rate is as low as 5.7% in high-volume centers (7), it is important to consider that there are many factors that influence quality of life (QoL) after thyroid surgery other than the generally reported complications. Decreases in QoL may impact return to work or employment status, cause financial or psychological hardship, and even increase rates of bankruptcy (8). Given the long survivorship of thyroid cancer patients, QoL differences between this group and the general population

Table 1 The search strategy summary

Items	Specification
Date of search	February 1, 2022
Databases and other sources searched	PubMed, SCOPUS, Google Scholar
Search terms used	"thyroidectomy" OR "thyroid surgery" AND "remote access" OR "endoscopic" AND "Quality of Life" OR "outcomes" OR "complications" OR "cancer" OR "malignancy" OR "cosmesis" OR "scar"
Timeframe	Any publication date prior to February 2022
Inclusion and exclusion criteria	Included were case series, meta-analysis, and clinical studies. Articles not in the English language were excluded
Selection process	SAW conducted the initial search, and selected articles based on the inclusion and exclusion criteria. All authors then reviewed and approved the selected articles for applicability to the research topic
Any additional considerations, if applicable	Additional articles recommended by JOR and VEB

have the potential to be long-lasting. Therefore, it is critical to examine the factors that affect QoL to determine ways in which negative effects may be mitigated or eliminated. The aim of this review is to examine the published data on QoL after remote access thyroid surgery, to determine if avoidance of a cervical incision influences post-operative QoL. We present the following article in accordance with the Narrative Review reporting checklist (available at https://aot.amegroups.com/article/view/10.21037/aot-22-15/rc).

Methods

A systemic literature review was conducted to identify the published QoL outcomes in traditional and remote access thyroid surgery. Utilizing PubMed, SCOPUS and Google Scholar, the terms "thyroidectomy" or "thyroid surgery" were combined with "remote access" or "endoscopic" as well as "quality of life," "outcomes," "complications," "cosmesis," or "scar"" to identify studies published prior to February 1, 2022 (*Table 1*).

Methods to assess QoL

Multiple tools have been validated to quantify QoL scores, such as the SF-36 (Short Form Survey) (9), THYCA-QoL (Thyroid Cancer Quality of Life) (10), PROMIS (Patient Reported Outcome Measurement Information System) (11), and others. These instruments examine domains such as physical functioning, pain, general health, vitality, social function, emotional well-being, and mental health. Tools that are more specific to skin or cosmetic outcomes include the DLQI (Dermatology Life Quality Index) (12), BIS (Body Image Scale) (13), VSS (Vancouver Scar Scale) (14), and SCAR (Scar Cosmesis Assessment and Rating) (15).

Factors that impact QoL

One factor that holds an important influence on QoL after thyroid surgery is the preoperative diagnosis. In patients who undergo surgery for benign goiters, several studies found an improvement in post-operative QoL (16-19). Additionally, Promberger *et al.* found that those with histologically confirmed Hashimoto's thyroiditis also experienced an improvement in QoL after surgery compared to preoperative baseline (20). However, this trend is not demonstrated in thyroidectomy performed for malignancy. Despite the excellent prognosis and high long-term survival rates (21), patients treated for differentiated thyroid cancer tend to have poorer health-related QoL (HRQoL) compared to the general public (22-24) as well as those who undergo thyroid surgery for benign pathology (25). In fact, overall QoL in patients with thyroid cancer is comparable to those with malignancies conferring poorer prognoses such as colon cancer, glioma, and gynecological cancer, and worse than those with breast cancer (26,27). Depending on the tool utilized, cancer patients have been found to score lower in sleep/fatigue, role functioning, cognitive functioning, social functioning, and financial stability (22). Likewise, Lubitz *et al.* found the domains of emotional and social impacts of treatment to be the most affected in the thyroid cancer population (24).

Many studies have aimed to characterize the factors contributing to decreased QoL in thyroid cancer survivors, which have been found to include age, sex, extent of surgery, education level, and radioactive iodine therapy (28-30). Goldfarb examined factors impacting the HRQoL of young adult survivors of thyroid cancer, and found that patients aged 17–39 years had significantly more complaints related to their scar, anxiety, and overall psychological state than their older counterparts (31). Females also had poorer QoL scores, as well as more concerns regarding their scar than men (32). This is particularly applicable considering that thyroid cancer is the most common cancer in 16–33 years old (33), and that approximately 75% of all thyroid cancers occur in women (34). Likewise, a large scale study of 1,743 patients by Goswami *et al.* demonstrated that along with the previously reported factors, concerns regarding scar appearance had a significant impact on post-operative QoL in the domains of anxiety, social function, and depression (35). Moreover, 77.4% of respondents had concerns regarding their scar appearance, which was greater than the portion of patients with dysphagia, dysphonia, or hypocalcemia. The mean length of time since surgery in this cohort was 7 years, which suggests that these effects can be long standing. In contrast, other studies have found that the detriment to QoL is in fact diminished with time, with QoL scores returning to baseline anywhere from 6 months (36) to 2 years (30).

Remote access approaches

Traditionally, thyroid surgery has been performed through a cervical incision which results in a visible anterior neck scar. Given the potential patient aversion to an appreciable scar, there have been multiple surgical approaches applied an effort to move this scar to less conspicuous areas. Ohgami *et al.* first described an endoscopic thyroidectomy which utilized two peri-areolar incisions as well as a parasternal incision within the breast tissue (37). Modifications on this approach include a combination of axillary and areolar incisions, in order to avoid a parasternal scar as well as improve viewing angles (38,39). Other authors describe a solely axillary approach, in order to avoid breast incisions altogether (40). However, complications encountered in the axilla such as injury to the brachial plexus and esophagus prompted further novel techniques. The retroauricular or "facelift" approach was described in 2011 as an alternative path to the thyroid bed that could avoid challenges associated the axillary approach (41). However, this approach also involves potentially unfamiliar tissue planes and the risk of novel complications including hypesthesia in the greater auricular nerve distribution and risk of flap necrosis. Although these various methods avoid an anterior neck incision, they still require a cutaneous scar. Further efforts to eliminate visible scarring resulted in publication of a sublingual approach to the thyroid bed (42,43). In 2011, Richmon *et al.* described a transoral endoscopic thyroidectomy vestibular approach (TOETVA) which utilizes three incisions in the gingivobuccal sulcus in order to perform a truly "scarless" procedure and avoid injury to the floor of the mouth (44). Since TOETVA was first described, there have been over 2,000 cases published in the literature (45). This method has had the most rapid adoption compared to other approaches (46), possibly due to a relatively short learning curve (47), ready access to the bilateral thyroid beds, and ability to use standard laparoscopic instruments.

QoL outcomes

A primary aim of remote access approaches is to mitigate the effect of a visible scar. Therefore, QoL outcomes have been measured in an effort to compare the traditional transcervical approach to various remote access approaches, utilizing the metrics and scales discussed above. A study by Lee *et al.* examined 75 patients who underwent endoscopic thyroid lobectomy [surgical methods included bilateral axillo-breast approach (BABA) and unilateral axillo-breast approach (UABA), with and without insufflation] and 233 patients who underwent a traditional cervical thyroid lobectomy (36). QoL measures were assessed using the EORTC-QLQ-C30 (European organization for Research Treatment of Thyroid Cancer core quality of life questionnaire) preoperatively and at regular intervals post operatively, up to 6 months. Although pain was greater in the endoscopic patients, these patients had significantly greater improvement in emotional and physical function in the early (1 and 3 months) post-operative period. This effect was mitigated by 6 months post-operatively, when the endoscopic and open patient groups had no significant difference in QoL scores. Similarly, Kurumety *et al.* found that although there was a significant correlation between self-perception of neck appearance and anxiety, depression, social function and fatigue, these effects return to baseline 2 years after surgery (30). However, the authors admit that populations more at risk for hypertrophic or keloid scarring were underrepresented in their study, as 95% of the study

population was Caucasian. In a more diverse population where nearly 50% of the respondents were of Asian, Afro-Caribbean or Hispanic descent, 15% had a scar-related complication including hypertrophic or keloid scarring (25). For those that did experience dissatisfaction with their scar, this factor had a significantly greater effect on their QoL than their counterparts who did not have a poor cosmetic outcome. This showcases the importance of consideration of one's patient population and their risk of scar complications relative to other races or ethnicities. Within this same study population, the patient's subjective rating of their scar appearance was significantly worse in patients with a diagnosis of cancer compared to those who underwent surgery for benign disease (25). The scar itself should not grossly differ based on the surgical pathology, and therefore this raises the possibility that a visible scar may serve as a reminder of a cancer diagnosis for these patients.

Given these findings, the impact of dermatologic and cosmetic outcomes on surgical patients' QoL should not be discounted. In one series, the impact of a cervical incision was found to be comparable to that of patients with skin conditions such as psoriasis and atopic dermatitis (48) when utilizing the Dermatology Life Quality Index (DLQI). The DLQI is a 10-question survey instrument that assesses the impact of skin lesions or disease on patients' QoL, in which the scores from each question are summed for a minimum score of 0 and a maximum score of 30. Russell *et al.* also used this survey to examine 15 patients who underwent thyroidectomy or parathyroidectomy via a remote access approach (49). DLQI scores were obtained at the patient's first post-operative visit, with median and mean scores being 3.0 and 3.9 respectively. While there was no control group of open thyroidectomy patients, the authors compared the DLQI scores to a prior study (48) where the mean score for a traditional cervical thyroidectomy was 9.02. A score from 2–5 has been quantified as a "small effect" on the patient's life, whereas a score from 6–10 shows a "moderate effect" (50). This data thus shows a substantially smaller impact of surgery on QoL for patients without a cervical incision compared to previously published data of patients with a cervical incision.

Interestingly, efforts to decrease the size of the scar have not been associated with improved patient satisfaction, suggesting that the mere presence of a scar is more impactful than the size of the scar (25,51,52). This may be due in part to visual attention being drawn towards any scar that is present, despite its size. Several studies utilizing eye-tracking technology have found that observers' visual attention was drawn away from the peripheral face and towards the neck more frequently and for longer durations in open thyroidectomy patients than patients that had a transoral endoscopic thyroidectomy, suggesting that a cervical incision is noticeable and distracting to the casual observer (53,54). This brings forth the issue of patient privacy, as a cervical incision serves as a disclosure of a person's surgical history regardless of their intent to share this information with others (55).

Body image is also closely related to one's self perception of health and QoL in surgical patients (56). Therefore, the Body Image Scale (BIS) is another metric used to evaluate QoL outcomes. Lee *et al.* found that patients who avoided a cervical incision had improved body image perceptions in six out of ten categories, and a higher overall BIS score at final evaluation (57). Although the patients' objective scar appearance improved (as evaluated by the Vancouver Scar Scale), they remained with lower body image scores compared to those with remote incisions. Similarly, Sethukumar *et al.* found that in their study of 123 patients with cervical incisions, high QoL scores correlated with better scar perception while negative body image correlated with a negative scar perception (52). These findings suggest that regardless of surgical outcome, patients' perceptions of their cervical scar are correlated with their overall body perception and well-being. This result is confirmed by Song *et al.*, in which patients who underwent a robotic thyroidectomy had higher cosmetic satisfaction, neck appearance, and physical competence scores than those patients who had a transcervical thyroidectomy (58). These findings are summarized in *Table 2*.

Finally, the SF-36 is a survey in which patients assess their well-being in eight dimensions of health. Wongwattana *et al.* examined the QoL outcomes for patients with Bethesda I–III nodules undergoing TOETVA and endoscopic thyroidectomy axillo-breast approach (ETABA) patients using the SF-36 (59). Although early post-operative pain scores were higher in the TOETVA group, overall post-operative QoL outcomes were equivalent between TOETVA patients and ETABA patients. Notably, there was no significant difference between pre-operative and post-operative QoL for either group. This data suggests that remote access approaches allow patients to return to the same QoL they had before surgery, at least in surgery for non-malignant nodules.

While cervical incision sparing techniques may have advantages, it is critical to recognize that remote access approaches are not indicated for all patients, nor should

Table 2 Quality of life publications

First author, year	Patient demographics	Treatment	Metric used	Findings
Arora, 2016 (25)	Male: 15.8%; female: 84.2%; age: 51.8 (mean); Caucasian: 27.5%; non-Caucasian: 40.8%	TT: 51.7%; lobectomy: 28.3%; parathyroid: 20%	VAS	(I) VAS increased with scar complications; non-Caucasian patients had higher impact on QoL; (II) impact of scar on VAS was increased in malignancy
Kurumety, 2019 (30)	Male: 12%; female: 88%; age: 51 (mean)	Surgery: 100%; RAI: 78%; Chemo: 2.3%; EBRT: 3.6%	PROMIS	(I) Perception of worse neck appearance correlated with poorer QoL scores in the domains of anxiety, social function, depression, fatigue; (II) age >45 associated with better neck appearance and higher QoL
Goldfarb, 2016 (31)	Male: 6.5%; female: 93.5%; age <40: 26.95%; Caucasian: 86.6%; college educated or greater: 69.3%; employed: 85.6%	TT: 100%; RAI: 84.8%	THYCA-QoL; SF-12v1; SF-6D	(I) Lower HRQOL was found with higher level of education, female, unemployment, and comorbid condition(s); (II) patients age <40 had significantly more complaints related to their scar, anxiety, and overall psychological state than patients >40
Goswami, 2019 (35)	Male: 11.4%; female: 88.6%; age: 51 (mean); Caucasian: 94.9%	Surgery: 98.1%; RAI: 78.4%; Chemo: 2.4%; EBRT: 3.8%	PROMIS	(I) age <45 associated with worse HRQoL in anxiety, depression, and fatigue; (II) concerns regarding scar appearance had a significant impact on QoL in the domains of anxiety, social function, and depression
Lee, 2016 (36)	OT—age: 52.1 (mean); female: 93.6%; male: 6.4%. ET—age: 42.2 (mean); female: 96%; male: 4%	Lobectomy: 100%; OT: 73.3%; ET: 23.6%	EORTC-QLQ-C30	Endoscopic patients had more rapid recovery in emotional and physical function
Lee, 2014 (57)	OT—age: 45.5 (mean). RT—age: 40.5 (mean)	TT: 100%; OT: 48.3%; RATS: 51.7%	VSS; BIS	(I) No difference in VSS score at 9 months; (II) better scar satisfaction in the RT group across time; (III) significantly better BIS scores in the RT group, persistent over time
Choi, 2014 (48)	Male: 8.2%; female: 91.8%; age <40: 67.1%; employed: 55.7%; greater than high school education: 78.4%	OT: 100%	VSS; DLQI	(I) Mean DLQI score of 9.02 (moderate impairment) with a cervical incision; (II) symptomatic scars caused greater QoL impairment; (III) no association of DLQI score with age, marital status, or employment, or VSS score
Russell, 2017 (49)	Female: 100%; age: 41.9 (mean)	Lobectomy: 85.7%; parathyroid: 14.3%; TOETVA: 57.1%; TORT: 42.9%	DLQI	Median DLQI score 3.0, corresponding to minimal effect

Table 2 (*continued*)

Table 2 (*continued*)

First author, year	Patient demographics	Treatment	Metric used	Findings
Sethukumar, 2017 (52)	Female: 87.0%; male: 13.0%; age: 64 (mean)	RATS: 55.3%; OT: 44.7%	MSS; BDDQ; EQ-5D	(I) Poor body image and poor QoL associated with poor scar perception; (II) no relationship between age or scar length on scar perception; (III) patients rated scars worse than physicians
Song, 2014 (58)	OT—female: 80.6%; male: 19.4%; age <45: 29.9%; greater than high school education: 71.6%; employed: 50.7%. RT—female: 86.4%; male: 13.6%; age <45: 54.5%; greater than high school education: 81.8%; employed: 56.8%	RATS: 39.6%; TT: 88.1%; RAI: 67.2%; OT: 60.4%; TT: 84.1%; RAI: 70.5%	UW-QOL; QOL-TV	(I) RT patients had higher satisfaction with neck appearance, cosmetic and physical competence scores; (II) HRQoL between groups was similar
Wongwattana, 2021 (59)	TOETVA—female: 100%; age: 39.3 (mean). ETABA—female: 100%; age: 43.4 (mean)	TOETVA: 50%; ETABA: 50%	VAS; SF-36	(I) No difference in VAS scores at 90 days; (II) no difference in SF-36 pre- or post-surgery

BDDQ, Body Dysmorphic Disorder Questionnaire; BIS, Body Image Scale; Chemo, chemotherapy; DLQI, Dermatology Life Quality Index; EBRT, external beam radiation therapy; EORTC-QLQ-C30, European organization for Research Treatment of Thyroid Cancer Core; ET, endoscopic thyroidectomy; ETABA, Endoscopic Thyroidectomy Axillo-Breast Approach; MSS, Manchester Scar Scale; OT, open thyroidectomy; PROMIS, Patient Reported Outcomes Measurement Information System; QoL, quality of life; QOL-TV, Quality of Life-Thyroid Version; RAI, radioactive iodine; RATS, Robotic-Assisted Transaxillary Thyroidectomy; RT, robotic thyroidectomy; SF, Short Form survey; TT, total thyroidectomy; TOETVA, Transoral Endoscopic Thyroidectomy Vestibular Approach; TORT, Transoral Robotic Thyroidectomy; UW-QOL, University of Washington Quality of Life; VAS, Visual Analogue Scale; VSS, Vancouver Scar Scale.

they be performed by surgeons who have not undergone extensive preparation. This preparation includes ensuring high thyroid volume, familiarity with existing literature, operative team/administration preparation, familiarity with the procedure, real-time observation of cases, cadaver dissection, and preceptor available for initial cases (60). Strict patient selection should be employed in accordance with published guidelines (49,61-65), particularly in cases of malignancy (45,66,67).

It should also be noted that many studies utilize generalized QoL questionnaires that are not specific thyroid cancer or thyroid surgery. The THYCA-QoL and QoL-TV (Quality of Life-Thyroid Version) were developed for this purpose and provide questions unique to thyroid cancer. Therefore, studies utilizing these metrics may provide stronger evidence towards conclusions regarding thyroid cancer survivors. Similar to QoL instruments, cosmetic or dermatologic scales such as the DLQI and BIS are not specific to scars and therefore may not consistently be generalizable to all patients. While studies utilizing the VAS, VSS, or SCAR metrics may offer more specific QoL data, these scales are not specific for cervical incisions. This variation in metrics utilized and non-specificity of the scales produces difficulty in drawing reliable and generalizable conclusions across an already limited QoL data field.

Conclusions

Despite excellent surgical outcomes, many thyroidectomy patients suffer from decreased post-operative QoL measures. This outcome is especially pronounced in patients undergoing surgery for thyroid malignancy. Remote access approaches aim to mitigate the effect that a visible cervical incision has on patient's body image, self-perception, and overall well-being. Existing literature shows that cervical incisions do affect these domains and suggests that remote access approaches provide improved body image and self-perception. However, further large-scale research is needed

to assess how these differences affect overall QoL and if improvements persist over time.

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Footnote

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