

# A Comparative Study on Postoperative Quality of Life and Scar Assessment in Patients with Thyroglossal Duct Cysts and Branchial Cleft Anomalies

## Tiroglossal Kanal Kisti ve Brankial Kleft Anomalisi Olan Hastalarda Postoperatif Yaşam Kalitesi ve Yara İzi Değerlendirmesinin Karşılaştırmalı Çalışması

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**ABSTRACT Objective:** Congenital neck masses, particularly thyroglossal duct cysts (TGDC) and branchial cleft anomalies (BCA), are commonly encountered in clinical practice and are typically treated surgically. However, the impact of these surgeries on postoperative quality of life (QoL) and scarring has been less explored. This study aimed to compare the QoL and scar outcomes between patients undergoing surgery for TGDC and BCA. **Material and Methods:** This retrospective case-control study included adult patients who underwent surgery for TGDC or BCA at a tertiary center. Patients were assessed for QoL using the Glasgow Benefit Inventory (GBI) and scar condition using the Patient Scar Assessment Scale (PSAS). Data were collected through the hospital's computer-based data system and a survey administered by phone. **Results:** A total of 51 patients with a mean age of 34.37±14.98 years were included. The mean total GBI score was 1.74±5, with no significant difference observed between the TGDC and BCA groups (p=0.109). The mean total PSAS score was 8.39±4.09, with no significant difference between the groups regarding scar appearance (p=0.303). Additionally, no correlation was found between the QoL scores (GBI) and scar scores (PSAS). The preoperative infection history did not significantly affect the postoperative outcomes. **Conclusion:** The results of this study suggest that surgeries for TGDC and BCA lead to minimal improvement in QoL, with minimal scarring compared to normal skin. These outcomes were not significantly different between the groups. Based on the results, scarring did not adversely affect QoL in these patient populations.

**ÖZET Amaç:** Başta tiroglossal kanal kisti (TKK) ve brankial kleft anomalileri (BKA) olmak üzere konjenital boyun kitleleri klinik pratikte yaygın olarak karşılaşılan ve genellikle cerrahi olarak tedavi edilen patolojilerdir. Ancak, bu cerrahilerin postoperatif yaşam kalitesi (YK) ve skar üzerindeki etkisi çok fazla incelenmemiştir. Bu çalışmanın amacı, TKK ve BKA cerrahisi geçiren hastalar arasındaki YK ve yara izlerinin sonuçlarını karşılaştırmaktır. **Gereç ve Yöntemler:** Bu retrospektif vaka-kontrol çalışmasına üçüncü basamak sağlık merkezinde TKK veya BKA sebebiyle opere edilen erişkin hastalar dâhil edilmiştir. Hastaların YK değerlendirmesi için Glasgow Fayda Envanteri [Glasgow Benefit Inventory (GBI)] ve yara izi değerlendirmesi için Hasta Skar Değerlendirme Ölçeği [Patient Scar Assessment Scale (PSAS)] kullanılmıştır. Veriler, bilgisayar tabanlı hastane veri sistemi ve telefonla hastalara ulaşılarak yapılan bir anket ile toplanmıştır. **Bulgular:** Çalışmaya ortalama yaşı 34,37±14,98 yıl olan toplam 51 hasta dâhil edilmiştir. Ortalama toplam GBI skoru 1,74±5 olup, TKK ve BKA grupları arasında anlamlı bir fark gözlemlenmemiştir (p=0,109). Ortalama toplam PSAS skoru 8,39±4,09 olup, yara görünümü açısından gruplar arasında anlamlı bir fark izlenmemiştir (p=0,303). Ayrıca, yaşam kalitesi (GBI) skorları ile yara izi skoru (PSAS) arasında bir korelasyon bulunmamıştır. Preoperatif enfeksiyon öyküsünün, postoperatif sonuçlar üzerinde anlamlı bir etkisi olmamıştır. **Sonuç:** Bu çalışmanın sonuçları, TKK ve BKA cerrahilerinin YK üzerinde minimal bir iyileşmeye ve normal ciltle karşılaştırıldığında minimal bir yara izi oluşumuna yol açtığını göstermektedir. Bu sonuçlar, gruplar arasında anlamlı bir farklılık göstermemektedir. Çalışmanın sonuçlarına göre yara izi bu hasta grubunda yaşam kalitesi üzerine olumsuz bir etki oluşturmamaktadır.

**Keywords:** Quality of life; thyroglossal duct cyst; branchial cyst

**Anahtar Kelimeler:** Yaşam kalitesi; tiroglossal kanal kisti; brankial kist

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Peer review under responsibility of Journal of Ear Nose Throat and Head Neck Surgery.

Received: 24 Feb 2025

Received in revised form: 23 Apr 2025

Accepted: 24 Apr 2025

Available online: 30 Apr 2025

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Congenital neck masses represent the most frequent type of noninflammatory neck mass.<sup>1</sup> Although they can be encountered at any stage of life, they most commonly appear in childhood. These masses are classified based on their anatomical location in the neck as midline, lateral, or involving the entire neck.<sup>2</sup> Accurate diagnosis is crucial because congenital neck masses can be mistaken for malignant tumors in older patients. The two most common congenital neck masses are thyroglossal duct cysts (TGDC), which are located in the midline, and branchial cleft anomalies (BCA), which are found in the lateral neck.<sup>3</sup> Both types have subtypes classified based on their exact location, and their standard treatment involves surgical excision.

Surgery is performed because these congenital masses can occasionally become infected, form an abscess, or even spread to the neck fascia, leading to severe infections.<sup>4</sup> Additionally, there is a potential risk of malignancy.<sup>5,6</sup> However, while surgery is curative, it also presents risks, including postoperative complications and scarring.

In recent years, there has been increasing interest in evaluating the impact of surgical interventions on patients' quality of life (QoL).<sup>7,8</sup> Beyond medical success, patient-reported outcomes, including cosmetic concerns and functional recovery, have gained prominence. Enhancing a patient's QoL after treatment is a fundamental principle of medicine

This study aimed to evaluate the QoL of adult patients following surgery for TGDC and branchial cleft cysts and to compare the effects of these procedures using the Glasgow Benefit Inventory (GBI), a validated tool for assessing the impact of otorhinolaryngology surgeries on QoL. In addition, the study assesses postoperative scarring in these individuals.

## MATERIAL AND METHODS

### STUDY DESIGN

This study was designed as a retrospective case-control study. Ethical approval was obtained from the Institutional Review Board of Ankara Bilkent City Hospital (Decision Number: TABED 1-25-977). The

study was conducted in accordance with the 1964 Declaration of Helsinki and its subsequent amendments. Informed consent was obtained from all participants.

### SUBJECTS

Patients who underwent surgery for TGDC or BCA at a tertiary center between February 2019-June 2024 were included in this study. Patients who were over 18 years old at the time of surgery, had preoperative and postoperative evaluations available in the hospital information system, had a confirmed diagnosis of thyroglossal duct cyst or fistula or branchial cleft anomaly, underwent surgery for these conditions, and agreed to participate in the study and respond to questions when contacted by phone were included. Patients who underwent surgery for conditions other than BCA or TGDC, those who had revision surgeries due to recurrence, those who underwent transoral procedures rather than a cervical approach, and those whose surgery had been performed less than 6 months prior at the time of recruitment were excluded from the study.

### DATA COLLECTION

Cases were identified through a computer-based hospital database. The demographics of the subjects (sex and age), time since surgery, comorbidities (hypertension, diabetes mellitus, coronary artery disease, cerebrovascular disease, etc.), type and location of the congenital anomaly, presence of fistula, intraoperative findings, intraoperative and postoperative complications, and follow-up data were evaluated.

The survey was conducted via phone by the same researcher. After contacting the participants, they were informed about the study, and those who agreed to participate were interviewed. First, to account for the possibility of missing data in the system, early and late postoperative complications were assessed, followed by an evaluation of the recurrence status. Subsequently, the GBI and the Patient Scar Assessment Scale (PSAS) were administered.

### SURGICAL TECHNIQUES

All procedures were performed under general anesthesia with the patient in the supine position. In cuta-

neous fistulized anomalies, the incision was planned to include and excise the fistulous tract. For thyroglossal duct cysts, the tract was followed up to the foramen cecum, including the resection of the hyoid bone corpus. It was then ligated and excised along with any possible surrounding tracts. For branchial cleft anomalies, the cyst was completely excised. Based on the preoperative and intraoperative findings, the tract or any potential tracts were included in the excised specimen.

## OUTCOMES MEASURES

QoL was assessed using the GBI. The GBI is a patient-reported measure of post-interventional benefit and is a well-established tool for evaluating the outcomes of various otorhinolaryngological interventions.<sup>9</sup> The questionnaire consists of 18 items, each rated on a 5-point Likert scale. In addition to the total score, the questionnaire provides subscore evaluating general health, social support, and physical function. The scoring system ranges from -100, indicating the most negative outcome, to +100, representing the most positive outcome.

The PSAS is a subscale of the Patient and Observer Scar Assessment Scale (POSAS) version 2 and was used in this study. The observer component of POSAS, in which patients are assessed by an observer, was not utilized. PSAS consists of 2 components: a 6-item “total score” scale and a single-item “overall opinion” scale. Each sub-item was rated on a 10-point scale, comparing the patient’s scarred skin to the normal skin. A score of one indicates normal skin, while a score of ten represents the worst imaginable scar (Table 1).<sup>10-12</sup>

TABLE 1: Patients Scar Assessment Scale	
Items of the scale	Scores (minimum-maximum)
Pain	1-10
Itch	1-10
Color	1-10
Stiffness	1-10
Thickness	1-10
Irregularity	1-10
Total score (above items)	6-60
Overall opinion	1-10

## STATISTICAL ANALYSIS

SPSS Statistics 26.0 (IBM, Chicago, Illinois) was used for the statistical analysis. Descriptive statistics are presented as frequency and percentage (%) for categorical variables and as mean, standard deviation, minimum, and maximum values for numerical variables. The relationships between the categorical variables were evaluated using the Pearson chi-square test. The distribution of the numerical variables was assessed using both visual and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests). Because the data did not follow a normal distribution, non-parametric tests were used for mean comparisons. Spearman correlation analysis was conducted to assess the correlations between the total GBI scores, PSAS scores, and other variables. A p value of less than 0.05 was considered statistically significant in all analyses.

## RESULTS

A total of 51 patients were included in the study, of whom 26 (50.98%) were female and 25 (49.02%) were male. The mean age of the patients was  $34.37 \pm 14.98$  years. On average,  $31.98 \pm 19.26$  months had elapsed since the surgery, and approximately  $30.1 \pm 46.28$  months had passed since the patients were diagnosed with a congenital cyst. Among the participants, 28 underwent surgery for TGDC, while 23 underwent surgery for BCA. There were no statistically significant differences between these groups regarding gender, age, time since surgery, or the interval between diagnosis and surgery (Table 2).

A total of 3 patients (5.88%) experienced post-operative complications. Two cases involved wound infections (TGDC: 1, BCA: 1), and one case involved a hematoma (TGDC). Recurrence was observed in one patient who had undergone surgery for TGDC. Among the 28 TGDC cases, only one (3.57%) was located in the suprahyoid region, while the remaining cases were located in the thyrohyoid region. All 23 BCA cases were classified as type 2, with 12 on the right side of the neck and 11 on the left. Before surgery, the existing cysts were infected in 17 patients (33.3%) (TGDC: 8, BCA: 9). The mean number of infections per patient was  $2 \pm 1.27$  (range, 1–5).

**TABLE 2:** Demographic and clinical characteristics of the patients

		TGCD	BCA	Total	p value
Gender	Female	14 (50%)	12 (52.17%)	26 (50.98%)	0.877*
	Male	14 (50%)	11 (47.83%)	25 (49.02%)	
Age (years)		36.07±14.97	32.3±15.06	34.37±14.98	0.293**
Time after surgery(month)		28.96±20.09	35.65±17.94	31.98±19.26	0.14**
Time from diagnosis to surgery (months)		32.71±51.71	26.91±39.6	30.1±46.28	0.924**

\*Chi square test; \*\*Mann-Whitney U. TGCD: Thyroglossal duct cyst; BCA: Branchial cleft anomalies

The mean total GBI score for all patients was  $1.74 \pm 5$ . In patients who underwent surgery for TGDC, the score was  $0.59 \pm 4.62$ , while in those who underwent surgery for BCA, it was  $3.14 \pm 5.18$ . There was no statistically significant difference in the GBI scores between these groups ( $p=0.109$ , Mann-Whitney U). Similarly, no statistically significant difference was observed between the groups in the separate evaluation of the 6 sub-items of the PSAS or in their total scores (8.75 vs. 7.96). The rating of the general opinion regarding the difference in the scar appearance compared to normal skin was  $2.64 \pm 1.45$  in the TGDC group and  $3.09 \pm 1.91$  in the BCA group, with no statistically significant difference between the groups ( $p=0.472$ , Mann-Whitney U) (Table 3). Additionally, there was no statistically significant difference in GBI scores, total PSAS scores, or PSAS subscale scores between female and male subjects ( $p>0.05$ , Mann-Whitney U). Furthermore, no statistically significant differences in GBI or total PSAS scores were observed between patients with and with-

out a history of preoperative infection ( $p>0.05$ , Mann-Whitney U).

Correlation analyses were conducted to assess the relationships between the variables. No significant correlation was found between the total GBI score and the total PSAS score (Spearman's test,  $p=0.829$ ). Additionally, no significant correlations were observed between age, time since surgery, time from diagnosis to surgery, number of infections, total GBI score, and total PSAS score (Spearman's test,  $p>0.05$ ).

## DISCUSSION

Congenital neck masses are typically detected either due to infection or by causing swelling in the affected area. Today, improved access to radiological examinations has led to an increased detection of asymptomatic congenital neck masses.<sup>13</sup> Although congenital neck masses are most commonly observed in childhood, they can also occur in older individu-

**TABLE 3:** Comparison of GBI and PSAS scores in thyroglossal duct cyst and branchial cleft anomalies

	Thyroglossal Duct Cyst		Branchial Cleft Anomalies		Total		p value*
	$\bar{X} \pm SD$	Median (minimum-maximum)	$\bar{X} \pm SD$	Median (minimum-maximum)	$\bar{X} \pm SD$	Median (minimum-maximum)	
Total GBI score	$0.59 \pm 4.62$	0 (-8.33+8.33)	$3.14 \pm 5.18$	2.77 (-5.55+16.66)	$1.74 \pm 5$	0 (-8.33+16.66)	0.109
Pain	$1.29 \pm 0.76$	1 (1-4)	$1.04 \pm 0.21$	1 (1-2)	$1.18 \pm 0.59$	1 (1-4)	0.219
Itch	$1.36 \pm 0.83$	1 (1-4)	$1.35 \pm 0.65$	1 (1-3)	$1.35 \pm 0.74$	1 (1-4)	0.626
Color	$1.46 \pm 0.88$	1 (1-4)	$1.22 \pm 0.67$	1 (1-4)	$1.35 \pm 0.8$	1 (1-4)	0.268
Stiffness	$2 \pm 1.94$	1 (1-8)	$1.57 \pm 1.2$	1 (1-6)	$1.8 \pm 1.65$	1 (1-8)	0.556
Thickness	$1.43 \pm 1.23$	1 (1-6)	$1.3 \pm 0.93$	1 (1-5)	$1.37 \pm 1.09$	1 (1-6)	0.862
Irregularity	$1.25 \pm 0.52$	1 (1-3)	$1.48 \pm 1.12$	1 (1-5)	$1.35 \pm 0.84$	1 (1-5)	0.956
Total PSAS score	$8.75 \pm 4.38$	7 (6-23)	$7.96 \pm 3.75$	6 (6-21)	$8.39 \pm 4.09$	7 (6-23)	0.303
Overall opinion	$2.64 \pm 1.45$	2,5 (1-7)	$3.09 \pm 1.91$	3 (1-9)	$2.84 \pm 1.66$	3 (1-9)	0.472

\*Mann-Whitney U. SD: Standard deviation; GBI: Glasgow Benefit Inventory; PSAS: Patient Scar Assessment Scale

als.<sup>14,15</sup> In such cases, it is particularly important to rule out malignant neck masses.<sup>3,16</sup> In this study, we included only adult patients to avoid confounding results, particularly in QoL and scar evaluation, as the number of pediatric patients was limited for various reasons.

Enhancing the QoL is a primary objective of all surgical procedures. In this study, we specifically assessed the QoL in patients who underwent surgery for congenital neck masses. The GBI has been widely used in otorhinolaryngology to evaluate the outcomes of various surgical procedures, ranging from stapedotomy to endoscopic dacryocystorhinostomy.<sup>17</sup> With the increasing emphasis on patient-reported outcome measures in the surgical field, the use of the GBI in this study provides a standardized, quantitative assessment of the impact of thyroglossal duct cyst and branchial cleft cyst surgery on patients' health-related QoL. The findings of the current study indicate that these surgical interventions have a neutral effect on patients' quality of life—neither markedly improving nor adversely affecting it—which supports their safety and acceptability from a patient-centered perspective. Additionally, no significant difference was observed between the TGDC and BCA groups.

Surgical interventions, particularly those involving the neck, can cause scarring, which may be a concern for a patient population predominantly composed of younger individuals. Therefore, we contacted the patients who had undergone surgery and asked them to report on the condition of their scars. Patients generally reported favorable cosmetic outcomes, with scar appearances perceived as close to normal and causing minimal esthetic concern. Since the scars of BCA, which are laterally located, and TGDC, located along the midline, are also situated in these areas, it can be concluded from our study that there was no significant difference between the groups regarding lateral and midline neck scars. Furthermore, our findings indicate that individuals with higher scar scores did not exhibit significantly different GBI scores. There was no meaningful association between perceived scar severity and QoL, suggesting that scarring did not influence patients' subjective well-being. In the literature, various meth-

ods have been used to evaluate scarring in branchial cleft cyst excisions, including VAS scores and cosmetic satisfaction scores. To minimize visible scarring, alternative surgical approaches such as endoscopic and robotic postauricular incisions have been explored for branchial cleft cyst excisions.<sup>18,19</sup> Similarly, for thyroglossal duct cyst excisions, techniques such as transoral, retroauricular, submental, and axillary incisions, as well as robotic and endoscopic approaches, have been employed to improve cosmetic outcomes.<sup>20-23</sup>

Individuals with congenital neck cysts may experience infections as these cysts become infected. In some cases, the infection may open to the skin or lead to severe deep neck infections that require drainage.<sup>24,25</sup> In fact, recurrent infections are the main common indication for the surgical excision of these cysts. It is reasonable to assume that frequent infections negatively impact QoL and that surgical intervention might improve QoL in affected individuals. However, an interesting finding in our study was that patients with a history of infections did not exhibit a significant postoperative change in QoL compared with those without prior infections. Additionally, no correlation was observed between the number of recurrent infections and the PSAS or GBI scores.

## LIMITATIONS

The subjects included in this study were retrospectively selected from the hospital's data pool, with only 51 patients evaluated. The retrospective design, timing, and sample size of the study represent its primary limitations. Due to its retrospective nature, the study lacked standardized preoperative data, which naturally restricted the ability to conduct meaningful comparisons between pre- and postoperative patient outcomes. Additionally, because the study period coincided with the opening of our newly established hospital and the subsequent coronavirus pandemic, the data collected may be incomplete, as these represent the first recorded datasets at the hospital. This could lead to gaps in the data. Although the surgical procedures were performed using similar techniques, the fact that they were conducted by multiple surgeons at a single center introduces the possibility of variability in the results. However, these minor dif-



ferences may not necessarily be a weakness, as they contribute to data diversity, thereby enhancing the study's generalizability. Another limitation is the variability in the timing of questionnaire administration, as patients were surveyed at different time points postoperatively, which could influence the assessment of QoL and scarring. Nevertheless, since only patients who had undergone surgery at least 6 months prior were included, this limitation was mitigated.

Despite these limitations, this study, to the best of our knowledge, is the first to evaluate and compare scarring and QoL outcomes in 2 distinct patient groups (TGDC and BCA). As such, it provides valuable contributions to the existing literature.

## CONCLUSION

Our findings suggest that surgical intervention for TGDC and BCA results in minimal improvement in QoL, as measured by the GBI. Additionally, scarring, as assessed by the PSAS-a self-reported evaluation by the patients-was found to be at an acceptable level, with no significant concerns reported. No statistically significant differences were observed between the TGDC and BCA groups in terms of QoL outcomes or scar assessment. Furthermore, the absence of a correlation between PSAS and GBI scores indicates that scarring does not appear to influence postoperative

QoL. These findings contribute to the growing body of literature on patient-reported outcomes following congenital neck mass surgery.

## Source of Finance

*During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.*

## Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

## Authorship Contributions

**Idea/Concept:** Burak Hazır, Çetin Şahutoğlu, Ağah Yeniçeri, Nagihan Gülhan Yaşar, Mustafa Çolak, Serdar Ensari; **Design:** Burak Hazır, Çetin Şahutoğlu; **Control/Supervision:** Mustafa Çolak, Serdar Ensari; **Data Collection and/or Processing:** Burak Hazır, Çetin Şahutoğlu, Ağah Yeniçeri, Nagihan Gülhan Yaşar; **Analysis and/or Interpretation:** Burak Hazır, Çetin Şahutoğlu, Ağah Yeniçeri, Nagihan Gülhan Yaşar, Mustafa Çolak, Serdar Ensari; **Literature Review:** Burak Hazır, Çetin Şahutoğlu, Ağah Yeniçeri, Nagihan Gülhan Yaşar; **Writing the Article:** Burak Hazır; **Critical Review:** Mustafa Çolak, Serdar Ensari; **References and Fundings:** Burak Hazır, Çetin Şahutoğlu, Nagihan Gülhan Yaşar, Ağah Yeniçeri; **Materials:** Burak Hazır.

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