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Chin Contour Changes After Transoral Endoscopic Thyroidectomy: Aesthetic Outcomes, Risk Factors, and Patient Satisfaction

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ABSTRACT

Background: Transoral Endoscopic Thyroidectomy via the Vestibular Approach (TOETVA) provides a scarless alternative to conventional thyroid surgery. However, the potential for postoperative alterations in lower facial contour, particularly chin asymmetry, remains underexplored.

Objective: This study aimed to examine the incidence, severity, and resolution of postoperative chin asymmetry following TOETVA and to evaluate its effect on patient satisfaction.

Methods: A prospective observational study was conducted at the National Cancer Institute, Cairo University, from 2023 to 2025. Thirty-one patients undergoing TOETVA for benign or indeterminate thyroid nodules (≤4 cm) were included. Postoperative chin asymmetry was clinically assessed at 1 and 3 months by two independent surgeons. Patient satisfaction with cosmetic outcomes was measured using a 10-point Likert scale. Comparative analyses were performed to explore associations between asymmetry and demographic or operative variables.

Results: Chin asymmetry was observed in 16.1% (5/31) of patients at one month, all cases being mild and resolving spontaneously by three months. Loss of chin dimple occurred in two patients (6.4%). No mental nerve injuries or sensory deficits were reported. Patients with asymmetry exhibited trends toward lower body mass index (BMI), longer operative times, and larger nodules, though these associations were not statistically significant. The mean satisfaction score was high (8.7 ± 1.1), with 90% of patients rating their chin appearance ≥8/10, including those with transient asymmetry.

Conclusions: Mild, transient chin asymmetry is a relatively frequent but self-limiting occurrence after TOETVA and does not significantly diminish patient satisfaction. Preoperative counseling should address potential alterations in chin contour, especially in patients with preexisting dimples.

Keywords: *TOETVA, Transoral Thyroidectomy, Chin Asymmetry, Mental Nerve, Cosmetic Outcome, Facial Contour, Patient Satisfaction*

1. INTRODUCTION

TOETVA has gained recognition as a scarless and minimally invasive alternative to conventional open thyroidectomy, offering improved cosmetic outcomes, particularly for younger patients or those with aesthetic concerns [1, 2]. By approaching the thyroid gland through the oral vestibule, TOETVA eliminates visible cervical scars, which can be psychologically and socially significant for patients.

Although the safety profile of TOETVA has been well established, with complication rates comparable to open surgery—including recurrent laryngeal nerve injury, hypocalcaemia, and infection[3, 4], Relatively little attention has been directed toward its impact on lower facial contour. The creation of a submental working space and the proximity of dissection to the mentalis muscle and mental nerve raise concerns about temporary or even persistent changes in chin symmetry[5-7].

Chin asymmetry, dimpling loss, and lower facial edema may be particularly distressing for patients undergoing TOETVA primarily for cosmetic reasons. However, the incidence, risk factors, and clinical significance of these changes remain poorly defined in the literature.

Aesthetic sequelae such as subtle deviations or volume shifts may not impair function but can influence patient satisfaction, a critical outcome in procedures driven by cosmetic preference.

This study aims to prospectively evaluate the incidence, severity, and resolution of chin asymmetry following TOETVA , It also examines associated patient-reported satisfaction. Additionally, it seeks to explore potential risk factors contributing to these outcomes and provide practical insights into surgical counseling and preventive strategies.

2. PATIENTS AND METHODS

This prospective observational study evaluated postoperative chin asymmetry in patients undergoing TOETVA at the National Cancer Institute, Cairo University, between 2023 and 2025. A total of 31 patients were included. Eligible participants had benign or indeterminate thyroid nodules ≤4 cm in size, without evidence of extrathyroidal extension, lymph node metastasis, or retrosternal involvement.

Exclusion Criteria include Patients had a history of facial asymmetry, prior maxillofacial or chin surgery, congenital chin deformities, or documented mental nerve dysfunction prior to the operation.

Perioperative data including age, gender, BMI, preoperative nodule size (based on ultrasound), operative time, estimated intraoperative blood loss, and length of hospital stay were collected.

Surgical technique:

All procedures were performed using a standardized three-port transoral vestibular approach. A midline mucosal incision was made in the oral vestibule, flanked by two lateral incisions near the canine teeth. A subplatysmal working space was created via hydrodissection followed by blunt dissection, and maintained using carbon dioxide insufflation.

The thyroid gland was dissected in a medial-to-lateral direction without dividing the strap muscles. The specimen was retrieved using an endobag through the central port. Surgical drains were not routinely placed. Following the procedure, a chin compression garment was applied and worn continuously for two weeks to support soft tissue healing and reduce postoperative swelling.

Chin Symmetry Assessment:

Chin symmetry was evaluated clinically at 1 month and 3 months postoperatively by two independent surgeons. Asymmetry was defined as any visible deviation, contour irregularity, or dimpling in the chin region observed during relaxed and dynamic facial movement (e.g., speaking, smiling). Asymmetry was graded as: mild: subtle deviation or contour changes not requiring intervention while **moderate** (visible during expression but not at rest), or **severe** (clearly evident at rest and/or with functional or sensory impairment).

Photographs were taken preoperatively and at follow-up visits using standardized lighting and positioning for visual comparison. No specialized imaging or software-based analysis was used.

Patients were asked to evaluate their satisfaction with the cosmetic outcome of their chin and lower face using a 10-point Likert scale (0 = very dissatisfied; 10 = completely satisfied).

Statistical analysis

Descriptive statistics were used to summarize patient demographics, operative variables, and cosmetic outcomes. Patients were categorized into two groups based on the presence or absence of chin asymmetry at one month. Continuous variables were compared using independent-samples t-tests or Mann–Whitney U tests, depending on data distribution. Categorical variables were analyzed using the chi-square test or Fisher's exact test as appropriate. A p-value of <0.05 was considered statistically significant. All statistical analyses were performed using SPSS version 27.

3. RESULTS

Patient Demographics and Operative Characteristics

The study cohort included both male and female patients, with a mean age of 32.9 ± 8.5 years (range: 18–56 years). The mean BMI was 27.1 ± 4.3 kg/m² (range: 19.5–36.8 kg/m²). The average nodule size on preoperative ultrasound was 2.8 ± 1.1 cm (range: 1.1–5.2 cm).

Operative data revealed a mean total operative time of 164.5 ± 48.2 minutes (range: 95–300 minutes). Intraoperative blood loss was minimal across cases, with a mean of 26.7 ± 15.3 mL (range: 10–100 mL). Most patients were discharged the next day postoperatively, with 85% of cases requiring only one overnight hospital stay, while a small proportion were discharged on the same day or after two days, depending on recovery progress. (See Table 1)

Table 1: Demographic data, nodule size, operative time, intraoperative blood loss, and length of hospital stay

Variable	Mean (SD)	Range
Age (years)	32.9 (8.5)	18–56
BMI (kg/m²)	27.1 (4.3)	19.5–36.8
Nodule Size (cm)	2.8 (1.1)	1.1–5.2
Operative Time (min)	164.5 (48.2)	95–300
Intraoperative Blood Loss (mL)	26.7 (15.3)	10–100
Length of Hospital Stay (days)	1.1 (0.5)	0–2

Chin Asymmetry and Patient Satisfaction

Chin asymmetry was identified in 16.1% (5 out of 31) of patients at one month postoperatively. All cases were clinically graded as mild, presenting as subtle contour deviations or dimpling without functional impairment. All asymmetry cases completely resolved by the three-month follow-up without requiring intervention.

Loss of chin dimple was observed in two patients (6.4%), though this finding did not affect their cosmetic satisfaction. No mental nerve injuries or sensory disturbances were reported in any patient. Patient satisfaction with postoperative chin appearance was consistently high. The mean satisfaction score at one month was 8.7 ± 1.1, with 90% of patients rating their outcome 8 or higher on a 10-point Likert scale—including those who had experienced transient asymmetry. (See Table 2 and Figure 1)

Table 2: Chin asymmetry outcomes and patient-reported satisfaction following TOETVA

Finding	Result
Total Patients	31
Patients with Chin Asymmetry at 1 Month	5 (16.1%)
Severity of Asymmetry	Mild in all cases
Resolution by 3 Months	100% resolution
Loss of Chin Dimple	2 (6.4%)
Mental Nerve Symptoms	None
Mean Satisfaction Score (1 Month)	8.7 ± 1.1
Patients Rating ≥ 8/10	90%

Data was presented as Mean±SD or frequency (%).

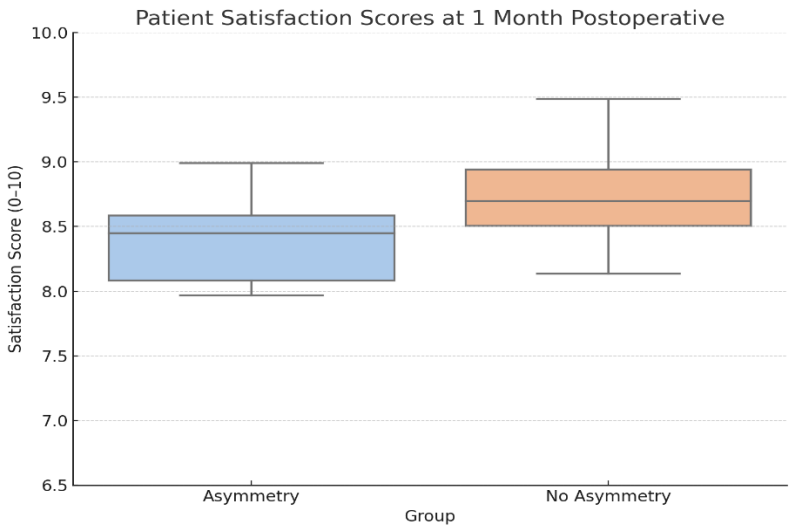

Figure 1: Distribution of patient satisfaction scores at one month postoperatively.

Risk Factor Trends

Patients with operative times exceeding 180 minutes demonstrated a higher incidence of chin asymmetry, with a borderline significant p-value (p = 0.068). A similar trend was observed in patients with lower BMI (<26 kg/m²), who showed increased susceptibility (p = 0.078). However, larger nodule size (>3 cm) and greater intraoperative blood loss (>30 mL) were not significantly associated with asymmetry risk (p = 0.134 and 0.211, respectively). Table 3- Figure 2

Table: Risk factors for chin asymmetry

Risk Factor	χ^2 test	p-value	Interpretation
Low BMI (<26 kg/m²)	3.638	0.056	Trend toward association
Long Operative Time (>180 min)	3.877	0.049	Borderline significance
Large Nodule (>3 cm)	2.706	0.10	Not statistically significant
High Blood Loss (>30 mL)	1.929	0.165	Not statistically significant

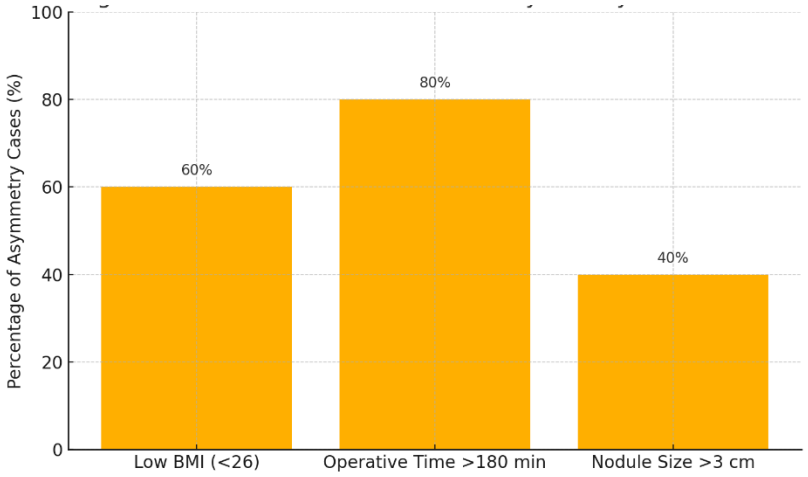

Figure 2: Risk factor trends for chin asymmetry after TOETVA.

Postoperative Aesthetic Outcomes

By three months, minimal submental swelling was observed, and no patients developed visible cervical scarring. Chin contour was fully restored in all cases with asymmetry, as illustrated in Figure 3.

Figure 3: Postoperative chin appearance at three months in a patient following TOETVA.

4. DISCUSSION

This prospective observational study assessed the incidence and clinical course of chin asymmetry following TOETVA. Mild asymmetry was observed in 16.1% of patients at one month, with complete resolution in all cases by three months. Notably, these transient contour changes did not adversely affect patient-reported satisfaction, as the majority rated their cosmetic outcomes highly. These findings align with existing literature underscoring the aesthetic benefits of TOETVA [2, 8].

The etiology of postoperative chin asymmetry is likely multifactorial. A plausible explanation involves transient soft tissue trauma or oedema resulting from submental dissection, particularly near the mentalis muscle during trocar placement and flap elevation. Although the mental nerve was preserved in all cases, subclinical neuropraxia or traction on its perimental branches may have contributed to temporary alterations in muscle tone and lower facial symmetry [9, 10]. Similar mechanisms have been described in other transoral procedures, where minimal manipulation of perioral tissues has been associated with temporary changes in facial contour[11].

Loss of natural chin dimples, noted in two patients (6.4%), may reflect transient dysfunction of the mentalis muscle. This muscle is crucial for chin puckering and dimple formation, and temporary denervation, likely due to indirect mechanical effects during dissection, may explain dimple loss despite preservation of the mental nerve. While previous studies have emphasized the importance of preserving mental nerve integrity during TOETVA to prevent long-term sensory or motor deficits[12, 13]Our findings suggest that even in the absence of overt nerve injury, subtle morphological changes can occur

Preserving subtle facial features, such as chin dimples, is a relevant consideration in TOETVA, particularly among patients pursuing the procedure for aesthetic reasons. Although dimple loss did not affect overall satisfaction in our cohort, it may be of greater concern in individuals with prominent baseline dimples or heightened cosmetic expectations. As the mentalis muscle plays a key role in dimple formation, its temporary dysfunction may result from intraoperative factors such as asymmetric flap elevation, excessive retraction, or submuscular dissection[2, 12].

Based on our findings and existing literature, several strategies may help reduce the risk of postoperative chin contour changes following TOETVA. These include minimising trauma during lower vestibular dissection, maintaining gentle and symmetric retraction during trocar placement, and ensuring a precise midline incision to preserve muscular symmetry. The use of fibrin sealants may enhance haemostasis and soft tissue adhesion, potentially reducing postoperative oedema and tissue shift [6, 7, 14].Additionally, the application of chin compression garments in the early postoperative period may support soft tissue recontouring and improve aesthetic recovery [15].

Although these measures are commonly employed in clinical practice, their efficacy remains largely anecdotal. Validation through larger, prospective studies with standardised aesthetic outcome assessments is warranted. The incorporation of three-dimensional morphometric imaging or quantitative symmetry analysis may also improve the objectivity of future evaluations [16].

Ultimately, surgical technique and preoperative counselling should be tailored to each patient's anatomy and cosmetic expectations. As TOETVA continues to gain global traction, optimising both functional and aesthetic outcomes remains essential to its continued refinement.

In our cohort, statistical analysis indicated a trend toward an increased risk of postoperative chin asymmetry in patients with longer operative times (>180 minutes; $p = 0.049$) and lower BMI (<26 kg/m²; $p = 0.056$). These associations may reflect increased soft tissue manipulation and prolonged retraction in leaner patients, who have less subcutaneous fat to buffer tissue distortion. This finding is consistent with previous reports suggesting that patients with lower BMI may be more vulnerable to transient contour changes following transoral or endoscopic neck procedures[17].

Despite the occurrence of temporary chin asymmetry, overall patient satisfaction remained high (mean score: 8.7 ± 1.1), aligning with prior studies that underscore the scarless and cosmetically favorable nature of TOETVA as a major factor influencing patient preference [18, 19]. The consistently high satisfaction reported by patients with mild asymmetry further suggests that short-term, non-functional aesthetic changes are generally acceptable, particularly when weighed against the long-term benefit of avoiding a visible cervical scar.

This study has several limitations that should be acknowledged. The relatively small sample size (n = 31) may limit statistical power and restrict the generalisability of the findings. The absence of objective imaging modalities—such as three-dimensional surface scanning or facial morphometric analysis—also limited the precision of asymmetry assessment. Additionally, the three-month follow-up period precluded evaluation of long-term outcomes, and the grading of chin asymmetry was inherently subjective, relying on clinical observation rather than standardised, imaging-based tools.

Future studies should incorporate larger, multicentre cohorts, objective aesthetic assessment methods, and extended follow-up to enhance external validity. Furthermore, the potential roles of intraoperative nerve monitoring, standardised retraction protocols, and muscle-preserving dissection techniques in reducing postoperative facial asymmetry merit further investigation.

5. CONCLUSIONS

This prospective study demonstrates that transient, mild chin asymmetry is a self-limiting cosmetic finding after TOETVA, affecting 16.1% of patients at one month postoperatively. All cases resolved without intervention by three months, and no mental nerve injuries or functional deficits were observed. Patient satisfaction with chin appearance remained high, suggesting these minor contour changes did not significantly affect perceived cosmetic outcomes.

While lower BMI and longer operative time were associated with a higher incidence of asymmetry, these trends did not reach statistical significance. Temporary loss of natural chin dimples occurred in a small subset of patients and should be specifically addressed during preoperative counselling, particularly in individuals with prominent baseline dimples.

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Conflict of Interest: Nil

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