

Transoral endoscopic thyroid surgery via vestibular approach with silastic chin augmentation genioplasty

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Abstract. From July 2020 to March 2022, 3 patients with papillary thyroid cancer (PTC) and microgenia underwent transoral endoscopic thyroid surgery via a vestibular approach or a endoscopic lateral neck dissection via the breast and transoral approaches with chin silastic augmentation genioplasty performed concurrently. Image documentation, patient satisfaction, complications and other factors such as demographics and clinicopathologic details were recorded. None of the patients developed major complications and there were no complications such as infection or displacement of the implant. All patients were satisfied with the cosmetic outcomes. Despite the study being limited to these 3 selected patients with PTC and microgenia, the follow-up to our initial description of the new technique established its safety and efficacy.

Introduction

Transoral endoscopic thyroid surgery via a vestibular approach is currently considered a feasible and safe surgical method (1). Transoral vestibular approach thyroid surgery has become the most common established remote access technique to avoid the traditional transcervical incision or any other cutaneous incision since its initial description (2). Nonetheless, in some patients with thyroid disease, born with short chins and mandibular retrusion, chin augmentation techniques have achieved improved outcomes with high patient satisfaction (3). If transoral endoscopic thyroid surgery via a vestibular approach is performed in these patients, chin augmentation genioplasty performed in same incision and same period prevents further trauma (1). As infection rates seem to be as

low as in conventional open thyroid surgery, infection does not to be a specific problem of transoral thyroid surgery (4). However, the feasibility of transoral endoscopic thyroid surgery via a vestibular approach with chin augmentation genioplasty remains unclear and the safety of this approach should be established. To the best of our knowledge, there are no reports available in the literature to show the operation of transoral endoscopic thyroid surgery via a vestibular approach and chin augmentation genioplasty together. The main concerns for surgeons may be the insurgence of infection and implant displacement. To address these issues, the present study reports 3 cases in which these two surgical approaches were compared.

Material and methods

Patients. The following patient inclusion criteria were used in the present study: i) Diagnosis of papillary thyroid cancer (PTC), with or without lateral lymph node metastasis, and microgenia; ii) a strong desire for good facial aesthetics; iii) microgenia urgently needing surgical treatment; and iv) thyroid tumor and lymph node without severe invasion. The exclusion criteria were as follow: i) Previous neck surgery history; ii) metastatic lymph nodes in the level I or V region; iii) metastatic lymph nodes fused or fixed in the neck; iv) invasion of surrounding tissues, such as recurrent laryngeal nerve or tracheal; and v) oral abscess or previous radiation to head and neck. A total of 3 female patients with PTC and microgenia were diagnosed and treated from July 2020 to March 2022 in Zhongshan Hospital, Xiamen University (Xiamen, China). All patients were diagnosed with papillary thyroid cancer based on fine-needle aspiration. Case no. 1 and 3 presented with papillary thyroid cancer, while case no. 2 presented with papillary thyroid cancer with lateral lymph node metastasis.

The chins of the patients were evaluated preoperatively and postoperatively by a plastic surgeon and recorded using image documentation. For the follow-up, patient satisfaction and complications were also recorded. Patient demographics, outcomes and post-surgery complications were collected retrospectively. The study protocol was approved by The Ethics and Scientific Review Board of Zhongshan Hospital of Xiamen

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University (Xiamen, China; approval no. 2021-078). Written informed consent was obtained from all the participants. All methods were performed following the relevant guidelines and regulations of the Declaration of Helsinki (5).

Surgical technique. A prophylactic antibiotic (100 ml cefazolin sodium 2 g in 0.9% normal saline) was administered intravenously 30 min before the incision (6). Each patient was placed in the supine position and a pillow was placed under the patient's shoulder to slightly extend the neck. An endotracheal tube embedded with neuromonitoring electrodes was used for general anesthesia via the oral route by positioning on the right side of the mouth. A 20-mm transverse incision was made in the midline of the oral vestibule, right above the inferior labial frenulum. Electrocautery was used to divide the submucosa and mentalis muscle to allow access to the edge of the mandible. A total of 20 ml of a diluted epinephrine-saline solution (1:2,000,000; Yuanda Pharmaceutical China Co., Ltd.) was injected through the lower lip down to the tip of the chin and upper neck after the incision of the vestibule. Case no. 1 and 3 were operated on using transoral endoscopic thyroid surgery via the vestibular approach (Fig. 1A). Case no. 2 was operated on using endoscopic lateral neck dissection via the breast and transoral approaches (ELNDBTOA) (Fig. 1B) (7). After endoscopic thyroid surgery, the endoscopic working space was washed with 1,000 ml of warm distilled water. A 3-0 Quill// absorbable suture was used to suture the belt-shaped muscle and the drainage tube was placed in the submental area or through the mammary areolar incision (8).

The plastic surgeon of the hospital started to perform the chin augmentation genioplasty. The silastic was sculpted to meet the shape of the chin. Oral regions were second sterilized with iodophor (Shanghai Likang Disinfection High Tech Co., Ltd). The surgical technique involved the creation of an optimized pocket in which the silastic could be placed. The silastic was sutured to the surrounding tissue with 3-0 Ethicon Vicryl to minimize the risk of implant migration. The muscles of the vestibule were sutured with 3-0 absorbable thread and the oral mucosal incision was closed using 4-0 absorbable sutures. The chin was fixed with adhesive tape to also prevent implant migration (Fig. 1C).

Postoperative follow-up. Ultrasonography was performed to assess the thyroid bed and lateral neck compartment 6 months after operation. Cosmetic results were evaluated on a verbal response scale (9). The verbal response scale included four options: 1=poor; 2=acceptable; 3=good; and 4=excellent. All patients were asked to grade the cosmetic result at 1 month after operation.

Results

Patient demographic and clinicopathologic details are listed in Table I. None of the patients developed major complications (e.g., postoperative bleeding, neck infection, chyle leakage, vocal cord paralysis or hypoparathyroidism). All patients developed transient skin numbness in the mandibular area and patient no.1 recovered within 4 months, patient no. 2 within 1 month and patient no. 3 within 2 months, which is similar to ordinary endoscopic transoral thyroid surgery (8). The longest

Table I. Patient demographics and clinicopathologic details.

| Patient characteristics | Case no. | | |
|------------------------------------|----------|---------|---------|
| | 1 | 2 | 3 |
| Age, years | 29 | 17 | 25 |
| Sex | Female | Female | Female |
| Tumor location | Right | Right | Left |
| Lateral neck lymph node metastasis | No | Yes | No |
| Retrieved LN | 7 | 66 | 8 |
| Metastatic LN | 0 | 17 | 1 |
| TNM stage | T1N0M0 | T3N1bM0 | T1N1aM0 |
| Operation time, min | 177 | 437 | 110 |
| Operative bleeding, ml | 15 | 50 | 10 |
| Follow-up, months | 22 | 9 | 2 |
| Postoperative infection | No | No | No |

LN, lymph node; TNM, tumor-node-metastasis [the eighth edition of the AJCC cancer staging system (20)].

follow-up period was 22 months (range, 2-22 months). The incisions in the oral cavity and breast healed well in all the patients according to the SCAR (Scar Cosmesis Assessment and Rating) scale (10).

There were no complications, such as infection or displacement of the implant. All patients were satisfied with the cosmetic outcomes (Figs. 2-4). There was no evidence of local recurrence or distant metastases. The verbal response scale of cosmetic results in all three patients were 4 grade.

Discussion

In 2009, Wilhelm and Metzger (11) made the first known attempt at transoral endoscopic thyroid surgery in Germany. The surgery was performed via a sublingual approach combined with a vestibular approach. This approach presented several advantages compared with transoral thyroid surgery such as moving the incision site out of the visible cervical region to meet the higher cosmetic demands of patients, and it was further developed into a total vestibular approach (1). Transoral endoscopic thyroid surgery via the vestibular approach was appropriate for treating PTC without lateral lymph node metastasis, while for PTC with lateral lymph node metastasis, the ELNDBTOA was performed in the general surgery department of Zhongshan Hospital, Xiamen University (7). According to the present clinical observation, some patients suffered from thyroid cancer and microgenia simultaneously in ZhongShan Hospital, Xiamen University.

Facial aesthetics can affect a patient's appearance and self-esteem, and the chin is an important feature in the aesthetic perception of the face. A deficient chin may be short or shrink back, which is diagnosed as microgenia. Genioplasty is an efficient treatment option for the correction of chin deformities (12). Since transoral endoscopic thyroid surgery via the vestibular approach and chin augmentation genioplasty both involve the chin, it was hypothesized that

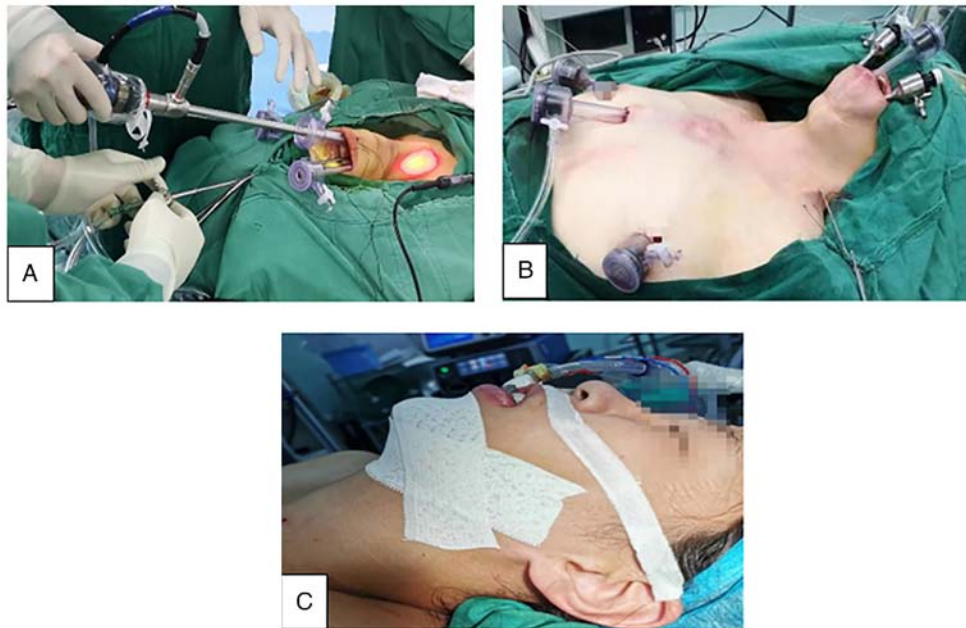


Figure 1. Surgical approach details. (A) Transoral endoscopic thyroid surgery via vestibular approach in case no. 3. (B) Endoscopic lateral neck dissection via the breast and transoral approaches in case no. 2. (C) The chin was fixed with adhesive tape after the operation in case no. 3.



Figure 2. Image documentation of the cosmetic outcome in case no. 1. (A) Before and (B) after operation.

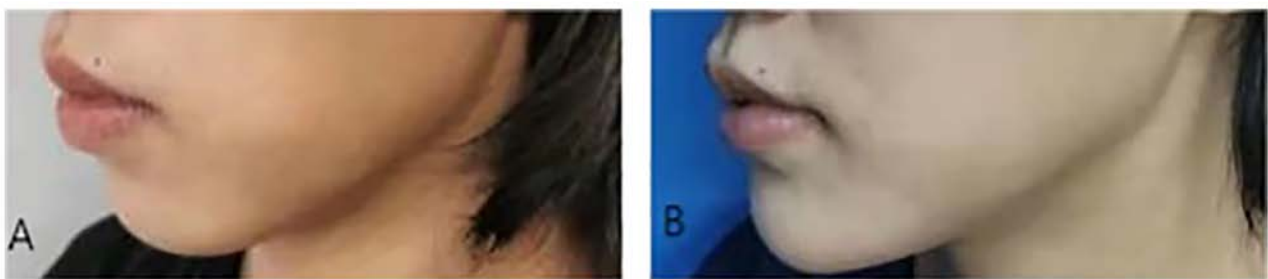


Figure 3. Image documentation of the cosmetic outcome in case no. 2. (A) Before and (B) after operation.

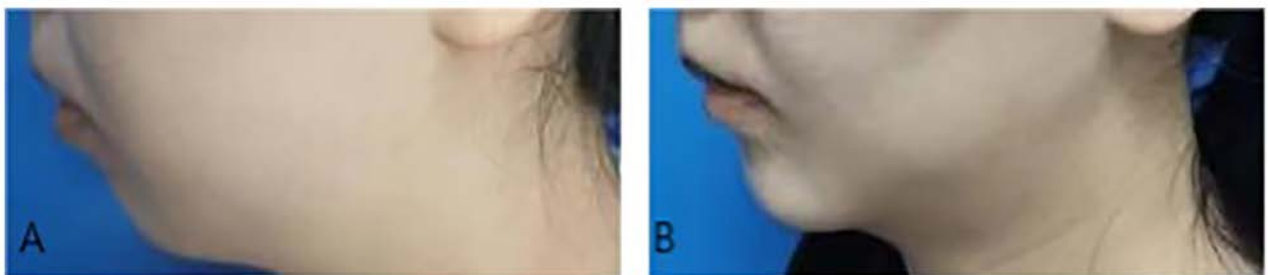


Figure 4. Image documentation of the cosmetic outcome in case no. 3. (A) Before and (B) after operation.

it was possible to perform these two operations at the same time.

A wide variety of materials such as silastic (solid silicone), mersilene mesh (polyester fiber mesh), supramid (polymide nylon mesh), proplast (polytef), medpor (porous polyethylene) and Gore-Tex (polytetrafluoroethylene) in chin augmentation are currently available (13). These materials vary in density, ability to be sculpted, tissue reaction, resorption, migration, the incidence of infection, extrusion rate and ease of removal. Silastic augmentation genioplasty is a common procedure, with consistent aesthetic results in properly selected patients who have short chins and mandibular retrusion (13). Silastic augmentation genioplasty may be the best choice if there are any concerns regarding infection or potential future infection (13). It is also inexpensive and easily sculpted; therefore, it was selected for the present study.

Common complications of chin implantation include, in decreasing order of importance, asymmetry, malposition, infection, extrusion, mental nerve dysfunction and chin ptosis (14,15). A case series of 324 chin implants found an infection rate of 0.62%, while another case series of 125 consecutive patients reported no infections (16,17). It has been suggested that the infection rate may increase after the proposed combination surgery since transoral endoscopic thyroid surgery via a vestibular approach and the ELNDBTOA are long surgeries. Nonetheless, the present cases did not present with related complications. The absence of related complications might be due to the small number of cases considered in the present study and the short follow-up time. One drawback of a silastic chin prosthetic is the risk of resorption at the implant-bone interface (18). Porous polyethylene typically presents a higher risk of infection and was therefore not used in the present study (19). Perhaps another attractive alternative chin implant material may be developed in the future. Further investigation is needed to elucidate this new technique and assess the rates of infection and extrusion.

Despite the study being limited to these 3 selected patients with PTC and microgenia, the follow-up to the initial description of the new technique established the safety and efficacy of the procedure. This new combined technique needs to be further explored to confirm its feasibility and safety.

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Availability of data and materials

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

Authors' contributions

YYW analyzed the data and wrote, prepared and submitted the manuscript. GW conceived the study and designed and performed all the surgeries of transoral thyroid surgery. YYW,

FL, WY and SL collected and analyzed the data and revised the manuscript critically. YZ prepared the figures, collected and analyzed the data and performed all the surgeries of chin silastic augmentation genioplasty. YL collected and analyzed the data and prepared the figures. GW and YZ confirm the authenticity of all the raw data. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The study protocol was approved by The Ethics and Scientific Review Board of the Zhongshan Hospital of Xiamen University (Xiamen, China; approval no. 2021-078).

Patient consent for publication

All patients provided verbal and written consent for publication.

Competing interests

The authors declare that they have no competing interests.

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