








# Management of parotidectomy with facial nerve preservation for the treatment of pleomorphic adenoma of the parotid gland

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**Objectives:** Facial paralysis is recognized as the most prevalent complication following parotidectomy. This study aimed to evaluate the symptoms and post-operative complications of parotidectomy while employing facial nerve preservation techniques. **Methods:** The study involved 14 patients (9 men and 5 women) with a mean age of  $53.0 \pm 16.5$  years. Clinical characteristics, facial paralysis, and other complications in these patients were monitored at three post-operative intervals: 1 week, 1 month, and 3 months. **Results:** Following ultrasonography, homogeneous echo textures were observed in 64.3% of tumors compared with 35.7% with heterogeneous textures. Regarding tumor locations, 50% were found in the superficial lobe, 14.3% in the deep lobe, and 35.7% involving both lobes. The FNA (Fine Needle Aspiration) test identified 64.3% of the tumors as pleomorphic, 13.3% as oncocytomas, 7.1% as Warthin tumors, and 14.3% as other benign tumors, with no cases suspected of cancer. Post-operative complications: Temporary facial paralysis was noted in 57.1% of cases at one week post-operation, declining to 28.6% after one month and 14.3% after three months. Hemorrhage occurred in 7.1% of patients, with no reports of infection, skin flap necrosis, or post-operative seroma. Additionally, 92.9% of patients experienced ear numbness at one week post-operation, decreasing to 21.4% by three months. **Conclusion:** the study demonstrates that parotidectomy, when performed with careful preservation of the facial nerve, is an effective and constructive approach for removing pleomorphic tumors in the parotid gland.

**Keywords:** Adenoma, pleomorphic. Parotid gland. Facial nerve.

## Introduction

Pleomorphic adenoma (PA) is the most common type among parotid gland tumors, with the worldwide incidence ranging from 2.4 to 3.05 cases per 100,000 people per year<sup>1</sup>. It was previously known by other names, such as a mixed tumor, enclave, branchioma, endothelioma, and enchondroma<sup>2</sup>. Many authors accept the “80 rule,” which states that 80% of salivary gland tumors are found in the parotid gland, 80% are benign, 80% occur in the superficial lobe of the parotid gland, and 80% are pleomorphic tumors<sup>3,4</sup>. They can develop at any age but are most frequently found in individuals between 30 and 60 years old, with a higher occurrence in women than in men<sup>5</sup>.

Diagnosis of PA involves identifying three cell types: epithelial, myoepithelial, and mesenchymal<sup>6</sup>. It has been reported that 80% of pleomorphic tumors develop in the superficial lobe, typically appearing as firm, easily mobile masses<sup>7</sup>. When the PA originates from the deep lobe of the parotid gland, it often takes several years for it to become noticeable, usually growing large enough to cause symptoms such as difficulty swallowing or choking<sup>8</sup>. These tumors are characterized as benign, with a slow progression, a tendency to recur easily, and the potential for malignant degeneration if left untreated<sup>5</sup>.

At present, parotidectomy is the primary treatment for PA. Although this method is effective, the intricate vascular anatomy and proximity to the facial nerve pose significant challenges for surgeons<sup>9</sup>. Preserving the facial nerve, which enters the parotid gland at its posteromedial surface, is critical to preventing facial paralysis. By focusing on both surgical technique and the preservation of nerve integrity, surgeons can enhance immediate results and reduce the risk of tumor recurrence, ultimately improving the overall effectiveness of patient treatment<sup>10</sup>.

In Vietnam, there is a scarcity of research concerning the outcomes of parotidectomy with facial nerve preservation, particularly in the context of treating PA of the parotid gland. Therefore, our research was carried out through a case series with the following specific objectives:

- To describe the clinical and paraclinical characteristics of PA-diagnosed patients who underwent parotidectomy with facial nerve preservation.
- To evaluate the post-operative complications in these patients.

## Materials and Methods

### Objective

This study included 14 patients with preliminary clinical and paraclinical diagnoses of PA from January 2023 to June 2023. The inclusion criteria included all patients who presented parotid lesions that met surgical requirements and whose facial nerve (VII) was preserved during surgery. The exclusion criteria included patients who were non-compliant with surgery and post-operative follow-up, those with

tumors exhibiting acute inflammation or abscesses, and individuals with parotid gland cancer. We collected data on patients' age, sex, clinical, and paraclinical characteristics. Additionally, we followed up on post-operative complications at 1 week, 1 month, and 3 months.

### Pre-operative phase

- Evaluation of Facial Nerve Function: patients received a comprehensive history and examination, which included assessing facial nerve functions.
- Clinical examination: Clinical examination was performed on the tumor area, in order to define the solidity and mobility of the tumors. Routine lab investigations involved a complete blood picture, prothrombin time (PT), international normalized ratio (INR) test, and an assessment of serum creatinine levels.
- Paraclinical investigations: fine needle aspiration (FNA) tests were performed to classify the tumor based on its histological components and characteristics. Ultrasound was used to assess the size, shape, and echo textures of the tumor, as well as its relationship to surrounding structures, including the facial nerve. CT scan (Computed Tomography scan) provided further details about the parotid gland and the extent of the tumor.

### Surgical technique

All patients received general anesthesia with endotracheal intubation along with the local anesthesia with Lidocaine 2% and Adrenaline 1:100,000.

The surgical procedure in our study was performed in seven steps, described as follows:

**Step 1.** Landmarks were drawn, and an incision was made on the skin surface following the Modified Blair incision (MBI).

**Step 2.** In the preauricular region, the flap was carefully dissected using an electric knife or scissors until the fascia of the parotid gland was reached, which covers the masseter muscle. The posterior flap was then dissected in a posteroinferior direction until it reached the posterior border of the sternocleidomastoid muscle and approached the wall of the external auditory canal.

**Step 3.** When dissecting to the posterior border of the sternocleidomastoid muscle, the greater auricular nerve was preserved as much as possible in order to avoid post-operative complications of decreased sensation in the auricle.

**Step 4.** Parotidectomy with preservation of the facial nerve.

**Facial nerve localization:** The main trunk of the nerve was identified as it passed through the tumor. The branches were carefully traced with a fine Kelly clamp to identify a dissection plane.

**Superficial lobectomy:** Before performing superficial lobectomy, a piece of soft tape was used to gently hold the nerve and maintain tension. The surgeon dissects only the facial nerve branches associated with the tumor to minimize the risk of temporary

facial nerve paralysis. The resection should be about 1 cm from the tumor. For small tumors under 2 cm in the lower pole of the superficial lobe, surgery to remove this portion may be an appropriate option.

**Deep lobectomy:** If a deep lobectomy is necessary, caution is essential as the deep lobe of the parotid gland is located beneath fatty tissue and can easily be perforated into the pharynx if dissected roughly. During the procedure, ligating the external carotid artery, superficial temporal artery, and other associated vessels may also be necessary.

**Step 5.** The surgical area was gently cleansed with saline and proper hemostasis was ensured. The defect was reshaped utilizing either a superficial musculoaponeurotic system (SMAS) flap or a sternocleidomastoid flap.

**Step 6.** A negative pressure surgical drain was placed before closing the incisions. The wound was closed in two subcutaneous layers with 4-0 Vicryl sutures and the skin was closed with 5-0 Nylon sutures. A compression bandage was then applied for support.

**Step 7.** Post-operative care instructions were provided, including daily bandage changes, removal of the drainage tube after 24 hours, and suture extraction after 7 days. The tissue specimens were sent for histological analysis. We fully implemented the principles outlined in the Declaration of Helsinki and the PROCESS checklist in this study<sup>11</sup>.

### Data processing and analysis

We use a unified medical record form to gather the research information, compile detailed comments and organize the results into tables and charts. Data from FNA tests, ultrasound, CT scans, and pathology results were coordinated among researchers and experts. Data input, processing, and analysis were performed using SPSS version 20.0.

## Results

**Table 1.** Gender, age, and clinical and paraclinical symptoms

<b>Characteristics</b>		<b>Mean<math>\pm</math> <sup>1</sup>SD [Range] or n (%)</b>
Gender	Male	9 (64.3)
	Female	5 (35.7)
Age		53.0 $\pm$ 16.5 [24-73]
Position	Left	7 (50.0)
	Right	7 (50.0)
Solidity	Firm	12 (85.7)
	Soft	2 (14.3)
Mobility	Freely mobile	11 (78.6)
	Fixed	3 (21.4)
Boundary	Well-defined	13 (92.9)
	Irregular	1 (7.1)
First symptom	Raised	13 (92.9)
	Raised and painful	1 (7.1)
Position	Superficial lobe	7 (50.0)
	Deep lobe	2 (14.3)
	Total	5 (35.7)
Number of tumors	1	13 (92.9)
	2	1 (7.1)
Size	2-4cm	11(78.6)
	>4cm	3 (21.4)
Echo texture	Homogeneous	8 (57.1)
	Heterogeneous	6 (42.9)
Density	Increase	3 (21.4)
	Decrease	4 (28.6)
	Mixed	7 (50.0)
<sup>2</sup> FNA result	Pleomorphic adenoma	9 (64.3)
	Oncocytoma	2 (14.3)
	Warthin's tumour	1 (7.1)
	Other benign tumors	2 (14.3)

<sup>1</sup>SD: Standard Deviation

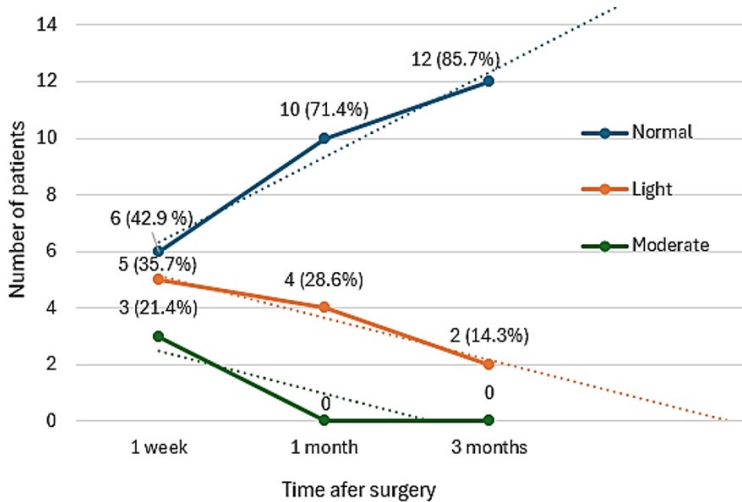
<sup>2</sup>FNA: Fine Needle Aspiration

Our study involved 14 patients, including 9 men (64.3%) and 5 women (35.7%), with a mean age of 53.0  $\pm$  16.5 years, who underwent parotidectomy while preserving the facial nerves.

The data on patient information, including clinical and paraclinical characteristics, are presented in Table 1. Clinical data showed that 78.6% of tumors measured between 2 and 4 cm, while 21.4% exceeded 4 cm. Most tumors (92.9%) had clear boundaries, with only one case exhibiting an irregular shape (7.1%). The most

noticeable initial symptom in the patients was a raised tumor (92.9%), while only one patient reported experiencing pain (7.1%). The tumor ratio on the left and right sides was the same (i.e., 50%). In terms of solidity, 85.7% of the tumors felt firm when touched, while 14.3% felt soft. Additionally, the tumors were easily movable in 78.6% of cases, while 21.4% were fixed in place.

Following ultrasonography, homogeneous echo textures were observed in 64.3% of tumors compared with 35.7% with heterogeneous textures. Regarding tumor locations, 50% were found in the superficial lobe, 14.3% in the deep lobe, and 35.7% involving both lobes. The FNA test identified 64.3% of the tumors as pleomorphic, 13.3% as oncocytomas, 7.1% as Warthin tumors, and 14.3% as other benign tumors, with no cases suspected of cancer (Appendix Figure A1).



**Figure 1.** Post-operative temporary facial paralysis level at different time points.

Follow-up examinations indicated that temporary facial paralysis occurred in 57.1% of cases at one week post-operation, dropping to 28.6% after one month and 14.3% after three months. All measurements were performed following the House–Brackmann scale (Figure 1).

**Table 2.** Post-operative complications.

Characteristics	1 week after surgery (n, %)	1 month after surgery (n, %)	3 months after surgery (n, %)
Hemorrhage	1 (7.1)	0	0
Infection	0	0	0
Skin flap necrosis	0	0	0
Post-operative seroma	0	0	0
Post-operative fluid leakage	0	0	0
Numbness around the ear	13 (92.9)	8 (57.1)	3 (21.4)

In terms of other post-operative complications, hemorrhages occurred in 7.1% of patients, with no reports of infection, skin flap necrosis, or post-operative seroma. Additionally, 92.9% of patients experienced ear numbness at one week post-operation, decreasing to 21.4% by three months (Table 2; Appendix Figure A2).

## Discussion

Facial paralysis is the most common complication after parotidectomy to treat pleomorphic adenoma of the parotid gland. Therefore, facial nerve preservation is extremely important for ensuring surgical outcomes<sup>12</sup>. The modified Blair incision, which has been shown to provide excellent exposure of the parotid gland and facial nerve, facilitates anterograde resection and provides adequate access to the neck for possible neck dissection<sup>13</sup>, was used in all surgical cases in our study to preserve the facial nerve.

We found that the rate of temporary facial paralysis one week after surgery was 57.1%, corresponding to 8 out of 14 cases. Despite the complexity of the surgery, no cases of permanent facial paralysis were reported in our research. Infante-Cossio et al.<sup>14</sup> have previously reported a temporary facial paralysis rate of 77.2% one week after tumor resection and superficial lobe surgery in a study involving 79 patients. Similarly, Phuc<sup>15</sup> documented a temporary facial paralysis rate of 37% following tumor resection and partial superficial lobe surgery. The differing rates of facial paralysis in our study, when compared with other research, may be due to the differences regarding the invasiveness of the surgical techniques used. This aligns with the findings of Albosaily et al.<sup>16</sup>, who demonstrated that a greater surgical width in total parotidectomy is associated with a significantly higher incidence of temporary post-operative facial paralysis.

Quang<sup>17</sup> studied the progression of facial paralysis following surgery and reported that the average recovery time was  $3.8 \pm 2.2$  months, with 94.8% of patients recovering within six months. In a study by Gaillard et al.<sup>18</sup>, which involved 131 patients with tumors of the parotid gland who underwent superficial lobectomy and total gland resection, it was indicated that the average recovery time for facial paralysis was  $3.2 \pm 2.2$  months, with 100% of patients fully recovering after 6 months. These findings are consistent with the recovery of temporary facial paralysis in our study, where the rate declined to 28.6% after one month and further decreased to 14.3% after three

months. The growing success rate in facial nerve recovery highlights that post-operative facial paralysis is typically linked to temporary issues, such as mechanical trauma during dissection, inflammatory fluids, and pressure from hematomas<sup>19,20</sup>. Together, these results demonstrate how important meticulous surgical planning and technical proficiency are in reducing the risk of post-operative complications in the parotidectomy procedure.

## Conclusions

While our research faced the limitation of a relatively short follow-up period, it strongly highlighted the significant benefits of incorporating the facial nerve preservation technique during parotidectomy. Through optimizing these critical steps, we can enhance the recovery rate of temporary facial paralysis as well as minimizing other post-operative complications.

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## Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and the ethical approval for this study was obtained on January 06, 2023, from the Institutional Review Board (Code: 62722812 CK; No: 70/QĐ-YDHP) of Haiphong University of Medicine and Pharmacy.

## Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

## Data Availability Statement

Datasets related to this article will be available upon request to the corresponding author.

## Conflicts of Interest

The authors declare no conflicts of interest.

## Author Contributions

**Hai Thanh Pham:** conceptualization, data curation, formal analysis, project administration, supervision, writing—review and editing; **Tin Duc Nguyen:** data curation, formal analysis, funding acquisition, writing—original draft, writing—review and editing; **Anh Tuan Dang:** data curation, formal analysis, writing—original draft, writing—review and editing; **Hung Quang Vu:** conceptualization, supervision, writing—review and editing; **Hoa Thai Nguyen:** conceptualization, supervision, writing—review and editing; **Thao Thi Thu Nguyen:** data curation, formal analysis, writing—review

and editing; **Thuc Xuan Nguyen**: conceptualization, writing—review and editing. All authors agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors actively participated in the manuscript findings and have revised and approved the final version of the manuscript.

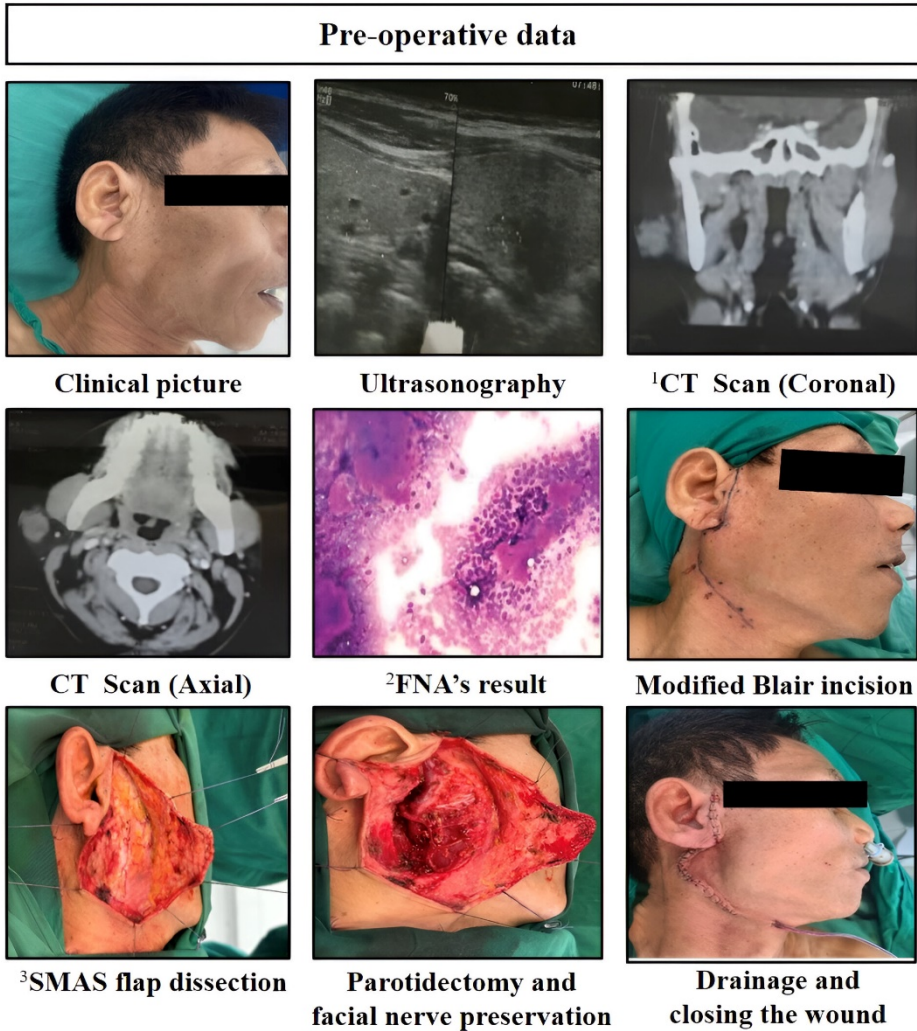
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## References

1. Barnes L, Eveson JW, Reichart PA, Sidransky D, editors. World Health Organization Classification of Tumours. Pathology & Genetics Head and Neck Tumours. Lyon, France: IARC Pres; 2005. p.254.
2. Regezi JA, Batsakis JG. Histogenesis of salivary gland neoplasms. *Otolaryngol Clin North Am*. 1977 Jun;10(2):297-307.
3. Comoglu S, Ozturk E, Celik M, Avci H, Sonmez S, Basaran B, et al. Comprehensive analysis of parotid mass: A retrospective study of 369 cases. *Auris Nasus Larynx*. 2018 Apr;45(2):320-7. doi: 10.1016/j.anl.2017.04.003. Epub 2017 May 1.
4. Thielker J, Grosheva M, Ihrler S, Wittig A, Guntinas-Lichius O. Contemporary management of benign and malignant parotid tumors. *Front Surg*. 2018 May;5:39. doi: 10.3389/fsurg.2018.00039.
5. Almeslet AS. Pleomorphic Adenoma: A Systematic Review. *Int J Clin Pediatr Dent*. 2020 May-Jun;13(3):284-87. doi: 10.5005/jp-journals-10005-1776.
6. Xu X, Xie J, Ling R, Ouyang S, Xiong G, Lu Y, et al. Single-cell transcriptomic analysis uncovers the origin and intratumoral heterogeneity of parotid pleomorphic adenoma. *Int J Oral Sci*. 2023 Sep;15(1):38. doi: 10.1038/s41368-023-00243-2.
7. Lingam RK, Dagher AA, Nigar E, Abbas SA, Kumar M. Pleomorphic adenoma (benign mixed tumour) of the salivary glands: its diverse clinical, radiological, and histopathological presentation. *Br J Oral Maxillofac Surg*. 2011 Jan;49(1):14-20. doi: 10.1016/j.bjoms.2009.09.014.
8. Guerra G, Testa D, Montagnani S, Tafuri D, Salzano FA, Rocca A, et al. Surgical management of pleomorphic adenoma of parotid gland in elderly patients: role of morphological features. *Int J Surg*. 2014;12 Suppl 2:S12-6. doi: 10.1016/j.ijsu.2014.08.391.
9. Zar K, Tabib R, Rushinek H, Madmon I, Keidar Haran T, Alterman M. "The correlation between histopathological pattern and surgical treatment for palatal pleomorphic adenoma. Can we choose a more conservative approach?". *J Craniomaxillofac Surg*. 2024 Dec;52(12):1469-75. doi: 10.1016/j.jcms.2024.08.015.
10. Yu G, Peng X. Conservative and functional surgery in the treatment of salivary gland tumours. *Int J Oral Sci*. 2019 Aug;11(3):22. doi: 10.1038/s41368-019-0059-9.
11. Mathew G, Sohrabi C, Franchi T, Nicola M, Kerwan A, Agha R et al. Preferred Reporting Of Case Series in Surgery (PROCESS) 2023 guidelines. *Int J Surg*. 2023 Dec;109(12):3760-3769. doi: 10.1097/JS9.0000000000000940.
12. Barca I, Cristofaro MG. Surgical approach to parotid pleomorphic adenoma: a 15-year retrospective cohort study. *Br J Oral Maxillofac Surg*. 2020 Jul;58(6):659-662. doi: 10.1016/j.bjoms.2020.03.020.
13. Özer C, Tamer Y, Bayram B, Pektaş ZÖ. Modified blair approach for the treatment of mandibular condyle fractures. *J Craniofac Surg*. 2022 Oct;33(7):2231-2234. doi: 10.1097/SCS.00000000000008571.
14. Infante-Cossio P, Gonzalez-Cardero E, Garcia-Perla-Garcia A, Montes-Latorre E, Gutierrez-Perez JL, Prats-Golczer VE. Complications after superficial parotidectomy for pleomorphic adenoma. *Med Oral Patol Oral Cir Bucal*. 2018 Jul;23(4):e485-92. doi: 10.4317/medoral.22386.

15. Phuc NH. Results of partial parotid lobe resection in the treatment of benign mixed tumors [PhD thesis in Medicine]. Ho Chi Minh City: University of Medicine and Pharmacy; 2017.
16. Albosaily A, Aldrees T, Doubi A, Aldhwaihy L, Al-Gazlan NS, Alessa M, et al. Factors associated with facial weakness following surgery for benign parotid disease: a retrospective multicenter study. *Ann Saudi Med.* 2020 Sep-Oct;40(5):408-16. doi: 10.5144/0256-4947.2020.408.
17. Quang LV. Clinical and paraclinical characteristics and surgical results of benign parotid gland epithelial tumors from 2009 – 2013 [master's thesis in Medicine]. Hanoi Medical University; 2013.
18. Gaillard C, Périé S, Susini B, St Guily JL. Facial nerve dysfunction after parotidectomy: the role of local factors. *Laryngoscope.* 2005 Feb;115(2):287-91. doi: 10.1097/01.mlg.0000154735.61775.cd.
19. Marchese-Ragona R, De Filippis C, Marioni G, Staffieri A. Treatment of complications of parotid gland surgery. *Acta Otorhinolaryngol Ital.* 2005 Jun;25(3):174-8.
20. Zanghi A, Cavallaro A, Marchi M, Marchi M, La Via L, Sanfilippo F, et al. Surgical management of benign tumors of the parotid gland: the advantages of extracapsular dissection compared to traditional surgical techniques. *Front Surg.* 2025 Jan;11:1415485. doi: 10.3389/fsurg.2024.1415485.

## Appendix



<sup>1</sup>CT: Computed Tomography

<sup>2</sup>FNA: Fine Needle Aspiration

<sup>3</sup>SMAS: Superficial Musculoaponeurotic System

**Figure A1.** Pre-operative data.

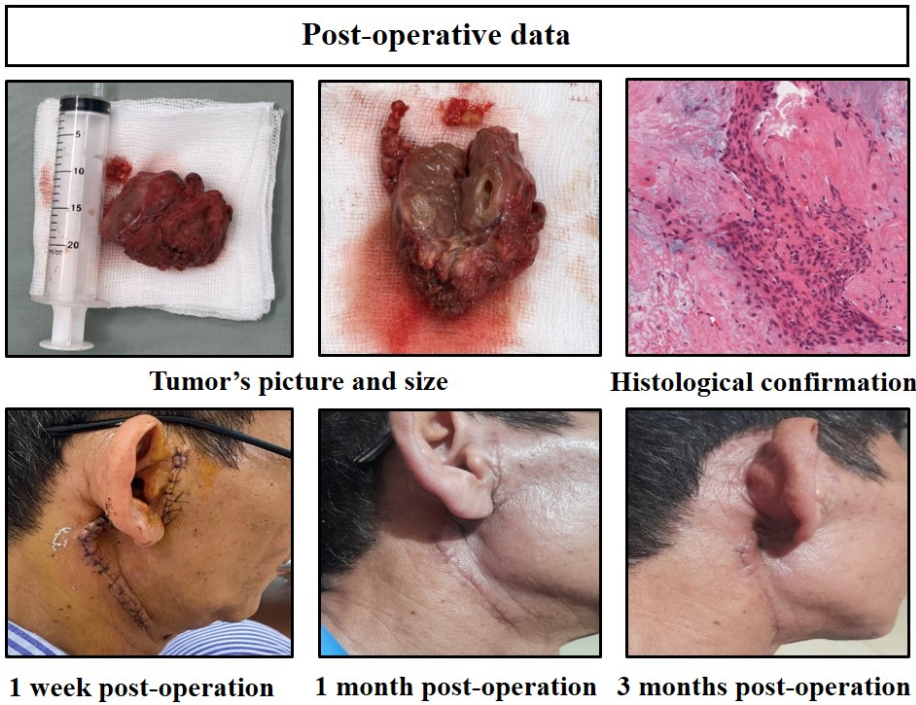


Figure A2. Post-operative data.