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CASE REPORT

Challenges Associated With Aberrant Facial Nerve Anatomy in Parotidectomy: A Case Report

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ABSTRACT

Lesions within the parotid gland can significantly displace the facial nerve, leading to substantial anatomical deviations that undermine the reliability of traditional intraoperative landmarks. These deviations necessitate increased vigilance to prevent iatrogenic injury to the facial nerve during surgery. We describe a challenging case involving a 75-year-old Chinese woman with a parotid lesion that caused an undetected preoperative displacement of the facial nerve. This unexpected deviation from the nerve's typical pathway required intraoperative adaptability. Employing a retrograde dissection technique, as opposed to the conventional anterograde approach, was crucial to preserve the integrity of the facial nerve. Despite the availability of advanced imaging techniques, anatomical anomalies can still significantly complicate surgical procedures. This highlights the need for tailor-made surgical strategies to ensure patient safety and successful outcomes.

INTRODUCTION

Preserving the facial nerve during parotidectomy is of paramount importance. However, the size, position, and involvement of the primary parotid lesion can complicate this endeavor. It is well-documented that both superficial and deep lobe parotid lesions can alter the facial nerve's course [1–3], making standard anatomical landmarks unreliable for identifying the nerve. These deviations from typical facial nerve anatomy add to the surgery's complexity and may lead to an increased risk of postoperative facial paresis.

In this paper, we describe a case that highlights the challenges of aberrant facial nerve anatomy due to a parotid lesion. We also discuss the benefits of employing a retrograde dissection technique rather than the conventional anterograde approach. This method allowed us to preserve the integrity of the facial nerve while effectively managing the parotid lesion.

CASE PRESENTATION

A 75-year-old Chinese female presented to our Ear, Nose, and Throat (ENT) clinic with a right neck mass that had persisted for three weeks. The initial computed tomography (CT) scan of the neck displayed a 2.7 × 3.1 × 2.9 cm mass in the superficial right parotid region. A fine needle aspiration (FNA) biopsy suggested a pleomorphic adenoma. The patient defaulted on the follow-up and returned three years later, reporting an increase in the size of her neck mass. Upon physical examination, a 6 cm firm mass was palpable over the right angle of the jaw. No cervical lymphadenopathy was detected, and facial nerve function was intact. Nasoendoscopy findings were within normal limits. A repeat CT scan demonstrated marked growth of the mass, now centered in the superficial parotid gland, with patchy enhancement (Figure 1A), raising suspicions of a low-grade parotid malignancy. There was no radiological evidence of cervical lymph node involvement. The patient was scheduled for surgery to obtain a definitive histological diagnosis.

A superficial parotidectomy was performed with dual-channel facial nerve monitoring (Medtronic NIM-Response 3.0) in accordance with our institution's standard practice. Intraoperatively, we encountered a large 6 cm tumor located in the anterior portion of the right superficial parotid lobe, extending towards the deep lobe. Initial anterograde dissection attempts, employing standard surgical landmarks (the tragal pointer, the posterior belly of the digastric, and the tympanomastoid suture), were unsuccessful in identifying the pes anserinus, indicating anomalous facial nerve anatomy. Consequently, a decision was made early on to shift to retrograde dissection to circumvent iatrogenic injury to the main nerve trunk.

The pes anserinus was eventually located using the retrograde approach. Following this, the main nerve trunk was discovered to loop posteriorly towards the tragus (Figure 1B), then run anteriorly across the tumor surface, bifurcating into superior and inferior divisions (Figure 1C). All facial nerve branches were meticulously identified and conserved after en bloc tumor excision (Figure 1D).

Given the preoperative FNA diagnosis of pleomorphic adenoma and the imaging features suggestive of a possible low-grade parotid malignancy without nodal involvement, no intraoperative frozen section was performed. The surgical strategy was limited to the parotidectomy alone. At the conclusion of the operation, all branches of the right facial nerve were responsive to stimulation at 0.8 mA.

The final histological analysis confirmed the presence of a pleomorphic adenoma. In the immediate postoperative phase, the patient exhibited right-sided forehead, eye, and mouth movement weakness, graded as House-Brackmann score 4. By the 6-month postoperative follow-up, her condition had improved to a House-Brackmann score of 2.

DISCUSSION

The identification of the facial nerve is crucial in parotid surgery, requiring surgeons to be vigilant of atypical nerve positions, especially when neoplasms may cause displacement. In a certain case series, the incidence of facial nerve displacement associated with superficial lobe tumors was noted to be as high as 38.3% [2]. Diverse displacement patterns have

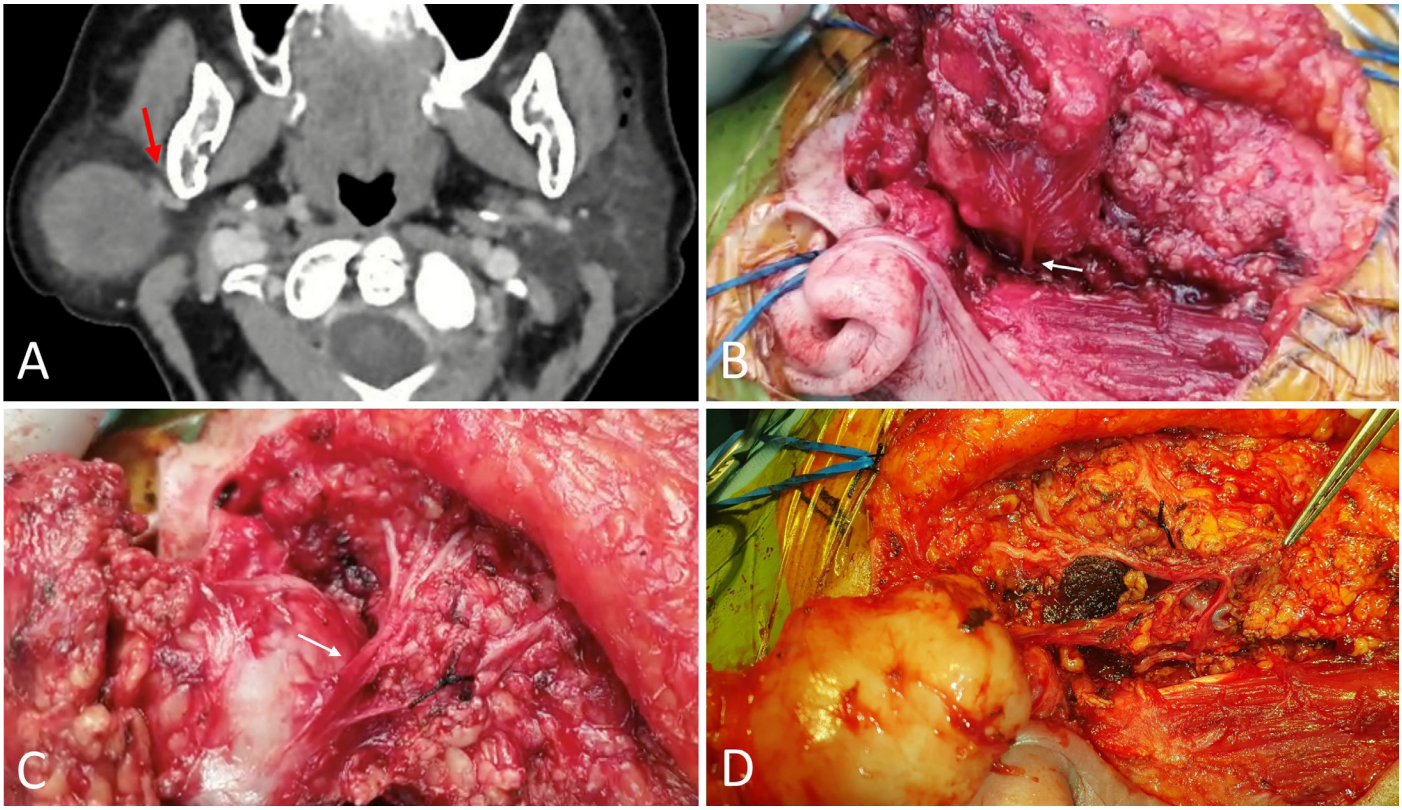

Figure 1. (A) An axial section of the preoperative CT scan illustrates the proximity of the lesion to the retromandibular vein, indicated by the red arrow. (B) Depiction of the main trunk, highlighted by the white arrow, curving posteriorly towards the tragus. (C) The white arrow shows the branches of the facial nerve extending anteriorly across the tumor's surface. (D) The facial nerve and its branches following the excision of the tumor.

been documented. For instance, pediatric patients with deep lobe parotid tumors have been reported to experience posterolateral nerve displacement and elongation of the main facial trunk [1], whereas vertical displacement has been observed in a case involving locally advanced mucoepidermoid carcinoma [4]. In the case of our patient, the parotid lesion caused such significant elongation and posterior displacement of the main trunk that the nerve formed a 180-degree loop anteriorly as it proceeded to the pes anserinus and the distal branches.

Displacement of the facial nerve's main trunk can render standard anatomical landmarks unreliable, necessitating an adapted surgical approach to prevent iatrogenic injury. In the case discussed, the aberrant anatomy of the main trunk prevented anterograde dissection using conventional landmarks, leading to a strategic shift to the retrograde approach. The critical nature of systematic evaluation of these landmarks, along with prompt decision-making and a resolute commitment to preserving the facial nerve, is paramount in cases featuring atypical anatomy. Insistence on dissection in the absence of recognizable landmarks may compromise the chances of atraumatic preservation of the facial nerve. While the anterograde approach is the routine choice for many surgeons in facial nerve dissection [5], the presence of anomalous anatomy or acquired aberrations, such as in revision parotidectomy cases, requires surgeons to be adept with the retrograde method or a combination of techniques to safely locate the facial nerve. In benign parotid surgery, both approaches are associated with comparable postoperative incidences of transient or permanent facial nerve injury [6].

Preoperative imaging using CT or magnetic resonance imaging (MRI) is instrumental for assessing tumor size and characteristics, as well as for predicting the tumor's location within the parotid gland. Additionally, preoperative imaging can assist in estimating the intraparotid facial nerve's position by evaluating landmarks such as the retromandibular vein. However, anatomical variations in these landmarks may lead to inaccuracies in identifying the facial nerve [7]. Consequently, it is not surprising that radiological predictions of facial nerve positioning have been reported to be accurate in only 69% of cases [8]. Considering this, surgeons might resort to multiple imaging modalities preoperatively to refine surgical planning, carefully assessing the facial nerve's trajectory, where discernible, and the degree of deep lobe involvement in the parotid lesion.

High-resolution MRI protocols that incorporate steady-state sequences and diffusion-weighted imaging have also been employed for direct visualization of the intraparotid facial nerve. A recent systematic review and meta-analysis by Lee et al. has reported facial nerve detection rates as high as 99.8% with the use of these advanced imaging techniques [9]. While such MRI protocols have yet to be universally standardized, they could be considered in situations where aberrant facial nerve anatomy is anticipated. This includes scenarios involving large tumors that extend across both superficial and deep lobes of the parotid or tumors situated near the stylomastoid foramen, potentially leading to altered facial nerve pathways.

The literature extensively details variations in the facial nerve's terminal branches [10,11], yet reports of the main trunk's anatomical deviations are less common. This case report enhances our understanding of the potential for unusual positioning of the main trunk and the possible surgical complications that could follow. Both preoperative imaging and intraoperative nerve monitoring are vital in facilitating the detection and protection of the facial nerve in surgical settings. It is crucial for surgeons to be aware of and prepared for non-standard facial nerve anatomies, employing a range of surgical techniques to secure parotid surgery's safety.

CONCLUSION

This case report elucidates uncommon anatomical deviations of the main trunk of the facial nerve, which may pose significant surgical complications. It emphasizes the critical role of preoperative diagnostic imaging and vigilant intraoperative neuro-monitoring for the accurate detection and conservation of the facial nerve's integrity. The report advocates for surgeons to maintain a high degree of awareness and preparedness for non-standard anatomical structures when undertaking parotidectomy procedures.

ARTICLE INFORMATION

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