

Intra-parotid facial nerve neuroma, an overlooked differential for a parotid lesion

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ABSTRACT

Facial nerve neuromas rarely occur in the intra-parotid segment of the facial nerve and when they do, masquerade as a parotid lump. The imaging and clinical features of the intra-parotid facial neuroma overlaps with the more commonly encountered salivary gland neoplasms and is thus overlooked. However, if not recognized, may result in serious and avoidable adverse events for the patient if biopsied or surgically removed. These include pain, facial nerve palsy and cosmetic deformity. In this report, we present the case of a 47-year-old male patient with an intra-parotid facial nerve neuroma with images including computer tomography, magnetic resonance imaging and intra-operative photos. The lesion was eventually left in situ to avoid facial nerve palsy and preserve cosmesis. A discussion of the imaging characteristics and differential diagnoses is subsequently elaborated.

CASE REPORT

CASE REPORT

A 47-year-old male patient presented with a left-sided cheek lump with mild tenderness for 2 weeks. He denied worsening of the symptoms with eating or salivation. Clinical examination revealed a well-defined firm lump over the left parotid of 2cm with no overlying skin changes. Sensory and motor function of the face and intra-oral component was preserved. An oral examination showed no underlying dental pathology. The patient had already completed a week course of oral antibiotics for the lesion.

Computed tomography (CT) imaging identified a homogeneously hypodense mass within the left parotid gland

(Figure 1). The lesion was mainly sited in the superficial lobe of the left parotid gland with extension into the deep lobe.

An incisional biopsy of the lesion was performed. Intraoperatively, the lesion was inseparable from the facial nerve, with the distal branches of the facial nerve splayed around the lesion (see Figure 2). Parts of the lesion along the inferior portion of the facial nerve showed no stimulation on nerve monitoring, and this area was sampled and sent for frozen section analysis. This showed spindle cells suggesting the possibility of a neuroma, upon which the lesion was left in situ and the incision closed.

Follow up magnetic resonance imaging (MRI) of the salivary glands was performed 3 months later which showed a well-circumscribed T2-weighted(w) hyperintense lesion with corresponding T1w hypointensity within the left parotid gland (Figure 3). Extension of the lesion through the left stylomastoid foramen into the mastoid segment of the facial canal was clearly demonstrated with T2w fat-suppression images. A repeat MRI was performed 3 years after the surgery and diagnosis, showing interval stability of the lesion, please see Figure 3. Since the time of surgery, there has been no evidence of facial nerve palsy.

DISCUSSION

This case illustrates a rare tumour masquerading as an intra-parotid mass lesion which is of diagnostic importance to preserve facial nerve function. Should this entity not be recognized during parotid surgery, there may be complications of a facial nerve palsy, poor cosmesis and increased risk of exposure keratitis amongst others [1].

Etiology & Demographics:

Facial nerve neuromas describe neurogenic tumours arising from the facial nerve and may encompass histological entities including schwannomas. Facial nerve neuromas can originate along the course of the facial nerve from its intracranial component, intrapetrous component and extracranial course within the parotid gland [2-6]. Despite the possible extra-cranial location within the parotid gland, these tumours are still not typically considered within the differentials intra-parotid lesions owing to its rarity of between 0.2% to 1.5% [2-6]. Furthermore, a lack of associated facial nerve palsy further confounds the clinical diagnosis. These tumours have no gender-predilection and tend to present in the 3rd and 4th decades of life [2-6].

Differential Diagnoses:

Considering the patient's age, the commonest parotid lesion would have been a pleomorphic adenoma [6-7]. A Warthin's tumour would be expected in an older patient. If the parotid lump was present since childhood or adolescence, a first branchial cleft cyst would also have to be considered. Malignant tumours of the parotid gland may occur in this age group, the commonest is a mucoepidermoid carcinoma [8]. The list of differentials and their clinical findings are elaborated on in the differentials table.

Clinical & Imaging findings:

An intra-parotid facial nerve neuroma may possess overlapping imaging characteristics with a pleomorphic adenoma, the commonest parotid tumour [6-7]. Even so, many parotid neoplasms including malignant entities like mucoepidermoid carcinoma, the commonest parotid malignancy, share common imaging features with the other parotid neoplasms. This is further elaborated on in the differential diagnosis table. However, the diagnosis of a facial nerve neuroma is best clinched with demonstration of involvement of the facial nerve along its intra-parotid course

and close relation to the stylomastoid foramen as seen in this case [6-7]. Other reported facial neuromas also demonstrate widening of the stylomastoid foramen [6-7]. The most useful imaging modality would be an MRI consisting of fat suppressed T2-weighted sequences due to superior soft tissue contrast which can even highlight a neuroma within the petrous temporal bone [9].

Treatment & Prognosis:

Facial nerve neuromas may result in facial nerve palsy and certainly affect cosmesis when within the parotid [2-7]. Treatment options heavily depend on the presence of exiting facial nerve palsy. Surgical resection of the lesion depends on the segment of the facial nerve involved with intra-parotid neuromas being excisable however may result in facial nerve palsy and deficits if already not present [1,3,6]. Certainly neuromas involving the labyrinthine segment pose increased surgical challenge [1].

Therefore, in this case a pre-operative MRI might have provided clues regarding the nature of the parotid lump and diagnosed a facial nerve neuroma. A pre-operative MRI for parotid lesions in the deep lobe proves useful for pre-surgical planning may reduce surgical morbidity.

TEACHING POINT

When dealing with lesions located in the deep lobe of the parotid gland, examine the relation of the lesion to the stylomastoid foramen. Consider an intra-parotid facial neuroma when the parotid lesion is inseparable from the stylomastoid foramen or when there is expansion of the foramen.

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FIGURES



Figure 1: 47-year-old male with left sided intra-parotid facial nerve neuroma.

FINDINGS:

(A) and (B) Contrast enhanced axial CT images show a homogeneous lesion within the deep lobe of the left parotid, hypodense to the masticatory muscles and hyperdense to the background parotid (white arrow). This is in close relation to the stylomastoid foramen and styloid process.

(C) Contrast enhanced coronal CT views of the same lesion (white arrow) demonstrating the relationship with the stylomastoid foramen, (D) contrast enhanced sagittal CT views of the same lesion (white arrow).

TECHNIQUE:

Contrast enhanced CT in the venous phase (70s after injection) with 70mls iohexol contrast, Dual Source CT scanner, 1063 mA, 100.0 kV, Slice thickness: 3mm, Contrast material: iohexol, 70mls.

Axial (A & B), coronal (C) and sagittal (D) CT images.



Figure 2 (right): 47-year-old male with left sided intra-parotid facial nerve neuroma.

FINDINGS:

Intraoperative photos of the left parotid gland showing a lobulated lesion extending into the stylomastoid foramen. The lesion was tested with a nerve stimulator which showed no stimulation. Frozen section samples showed spindle cells in keeping with a neuroma in which the lesion was left in situ.

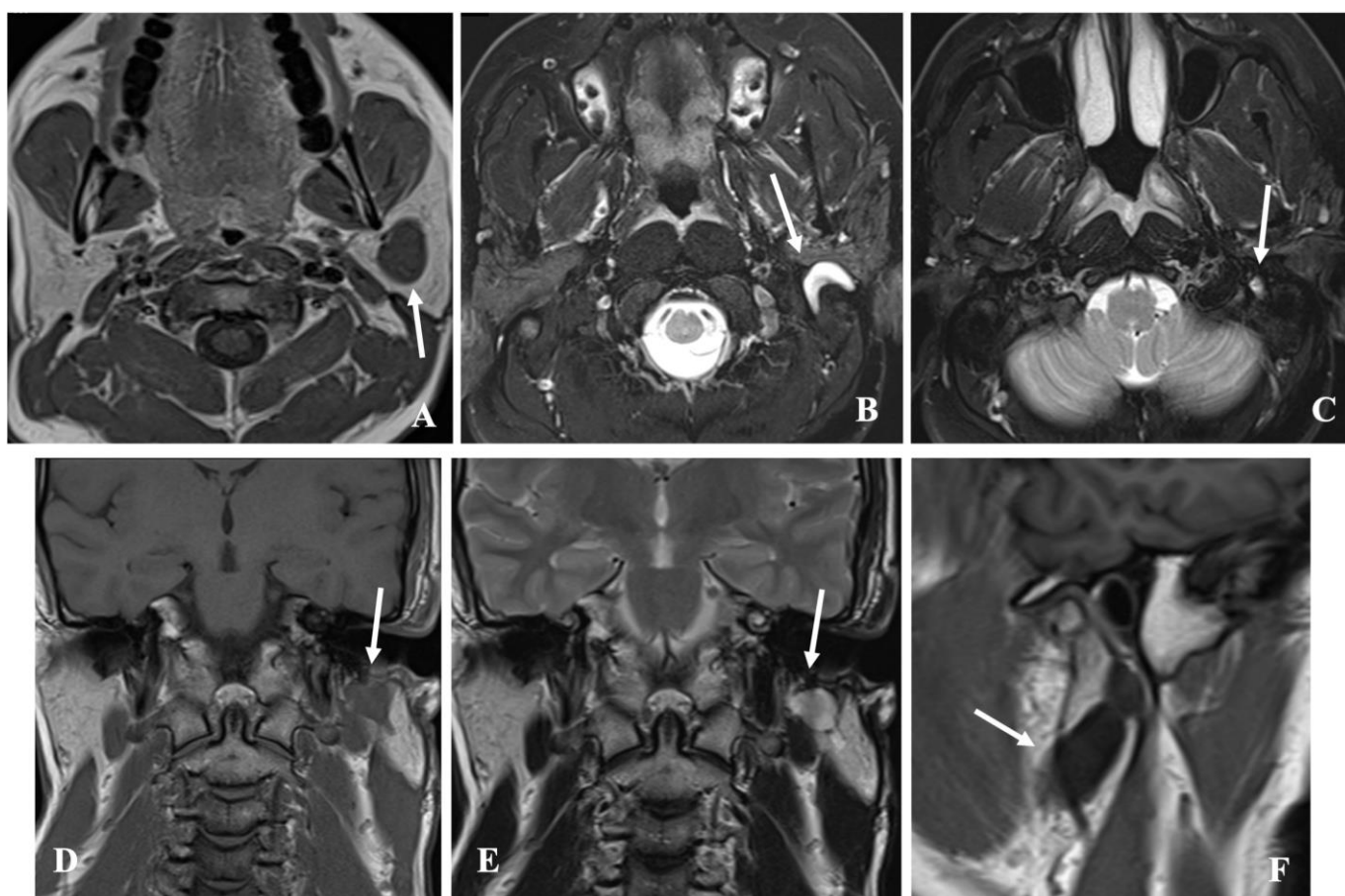


Figure 3: 47-year-old male with left sided intra-parotid facial nerve neuroma.

FINDINGS:

- (A): A T1w hypointense well-circumscribed intra-parotid lesion is seen in the left parotid gland (A, white arrow).
- (B): Fat suppressed T2w images show hyperintensity of the lesion with clear demonstration of a component of the lesion extending into the stylomastoid foramen.
- (C): Cephalad slice of the same fat suppressed T2w image show contiguous T2w hyperintensity of the lesion extending into the mastoid segment of the left facial canal (white arrow).
- (D) and (E): Unenhanced T1w and T2w coronal images showing the lesion abutting the stylomastoid foramen.
- (F): Unenhanced T1w sagittal image showing the lesion extending along the expected course of the facial nerve.

TECHNIQUE:

Contrast enhanced MRI (1.5 Tesla) with gadoterate meglumine contrast, 14 mls used.

T1w sequence parameters: TR: 498msec TE: 11msec, Slice thickness 4.0mm.

Fat suppressed T2w sequence parameters: TR: 3240msec, TE: 77msec, Slice thickness: 4.0mm.

T2w sequence parameters: TR: 2460msec, TE: 87msec, Slice thickness: 4.0mm

Summary table	Intra-parotid facial neuroma
Etiology	Slow growing neoplasms of Schwann cell origin
Incidence	0.2% to 1.5%, 9% of facial nerve neuroma/schwannomas occur extra-temporally.
Gender ratio	No gender predilection 1:1
Age predilection	Commonly in the 3 rd and 4 th decades, ranging 20-80
Risk factors	None known
Treatment	If facial nerve palsy present at time of diagnosis resection can be considered, otherwise resection may result in facial nerve palsy.
Prognosis	Local mass effect, Remodelling of surrounding bone/stylomastoid foramen, Potential cosmetic deformity due to size of the neoplasm, Facial nerve palsy
Findings on imaging	Intra-parotid well defined lesion MRI: T1w hypointense and T2w hyperintense Closely related to the stylomastoid foramen, extension into the facial canal or widening of the stylomastoid foramen

Table 1: Summary table of intra-parotid facial nerve neuroma.

	CT Features	MRI Features
Facial neuroma	Hypodense to muscle on CT No calcifications May show widening of the stylomastoid foramen.	T1w hypointense T2w hyperintense May show extension into the stylomastoid foramen, particularly on T2w fat suppressed images
Pleomorphic adenoma	T1w hypointense, T2w hyperintense, Calcifications may be present. Commoner in the superficial lobes.	T1w hypointense T2w hyperintense May show bosselated borders (small undulations).
Warthin's tumour	Heterogeneously dense on CT with mixed solid-cystic components May be bilateral	T1 hypointense, T2w hyperintense though lesions may be heterogeneous with internal cystic and solid components.
Mucoepidermoid carcinoma	Low grade lesions may resemble the imaging characteristics of a pleomorphic adenoma. More aggressive tumours have poorly defined borders and an infiltrative appearance.	Heterogeneous signal intensity with intermediate or mildly increased T2w signal as opposed to the typically hyperintense T2w signal of other benign parotid lesions
First branchial cleft cyst	Appears cystic, predominantly hypodense. Often related to the pinna, external acoustic meatus	Fluid signal and thin walled well circumscribed mass
Intraparotid lymph nodes	Internal low density to soft tissue density lesions, appearing homogeneous	Often shows restricted diffusion as with nodes in other parts of the body
Sialectasis	Tubular or branching morphology with internal fluid density on CT, may occur in association with ductal calculi.	Tubular or branching T2w hyperintense foci

Table 2: Differential diagnosis table for intra-parotid facial nerve neuroma.

ABBREVIATIONS

CT = Computed Tomography

MRI = Magnetic Resonance Imaging

T1w = T1-weighted

T2w = T2-weighted

KEYWORDS

Facial nerve neuroma; Parotid lesion; Intra-parotid facial nerve neuroma; Parotid neurogenic tumor; CT salivary glands; Sialogram

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