Tumours of Deep Lobe of Parotid Gland: Our Experience

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Abstract Parotidectomy surgeries are being routinely performed by ENT surgeons nowadays. Parotid tumours can present with a variety of manifestations ranging from a barely noticeable mass to a large tumour with facial paralysis. Most benign parotid tumours are located in the superficial lobe though rarely deep lobe may also be involved, while malignant tumours are generally seen to involve both the lobes of the gland. We present clinico-radiological-pathological profile of 25 patients who underwent parotid surgeries for tumours involving deep lobe alone or the whole gland, and were operated at our institute during the period from January 2011 to December 2012. This study was a retrospective observational analysis with the aim of analyzing the epidemiology, radiological, surgical and histopathological profile of these patients. Among 25 patients who underwent parotid surgeries, 17 patients underwent total conservative parotidectomy, while 5 patients underwent radical parotidectomy. In 3 patients, extended radical parotidectomy was performed. We also report the complications and follow-up of these patients. We concluded that fine needle aspiration cytology (FNAC) findings and final histopathological report may not always correlate.

Keywords FNAC of parotid mass · Parotidectomy · Deep lobe tumours · Parotid tumours

Introduction

The parotid glands are the largest salivary glands in humans and are frequently involved in disease processes [1, 2]. The paired parotid glands are formed as epithelial invaginations into the embryological mesoderm and first appear at approximately 6 weeks of gestation [3]. The glands are roughly pyramidal in shape, with the main body overlying the masseter muscle. The gland is divided into superficial and deep lobes by the facial nerve, which passes through the substance of the gland. While not truly anatomically discrete, these ‘lobes’ are important surgically, as neoplasms involving the deep lobe require sometimes significant manipulation of the facial nerve to allow excision. The superficial lobe is the larger of the two and thereby the location of the majority of parotid tumours. Most of the tumours are either located in the superficial lobe or involve the entire gland [3, 4]. Tumours involving exclusively the deep lobe are very rare. Most of the neoplasms of the salivary glands account for about 6 % of head and neck neoplasms [1, 3, 5]. Approximately 25 % of parotid masses are non-neoplastic; the remaining 75 % are neoplastic [3–5]. The vast majority (approximately 80 %) of parotid neoplasms are benign. Fine needle aspiration cytology (FNAC) forms the cornerstone for the diagnosis of parotid tumours. FNAC has a high sensitivity and specificity in making a cytological diagnosis of parotid tumours [2, 6]. CT scan and MRI scans are very useful imaging tools for knowing the extent of tumour and its relationship to the facial nerve, and for differentiating superficial from deep lobe tumours [7]. Surgery is the mainstay of treatment for parotid tumours. The extent of surgery depends on the site and histological diagnosis of the tumour. Proximity of the facial nerve running between the two lobes of the gland is a major challenge for the parotid surgeon. The main trunk typically bifurcates into the zygomaticotemporal and cervicofacial branches at the pes anserinus. As the deep lobe lies medial to the facial nerve,

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total parotidectomy surgery puts the facial nerve at a much greater risk as compared to superficial parotidectomy. The rationale of our study was to determine the entire spectrum of epidemiology, FNAC, radiological profile, surgery and histopathological findings of deep lobe of parotid gland tumours.

Materials and Methods

This study is a retrospective observational analysis, whereby the medical records of patients who underwent total parotidectomy surgeries between January 2011 and December 2012 were assessed. The results were analyzed in terms of epidemiology, FNAC, radiological profile, surgery and final histopathological findings. Patients in whom superficial parotidectomy alone was done were not included in the study. All the patients included in the study were subjected to detailed history, complete ENT and head neck checkup. FNAC was done in all the patients. Radiological investigations in the form of CT scan, MRI scan or both were also done in all the patients. Total parotidectomy was performed in all the patients with the extent of surgery varying depending on the site and type of tumour. Follow-up of these patients was done for 1 year.

Technique

Parotidectomy was performed by the modified Blair incision. The incision was deepened to the subplatysmal plane in the neck, and the anterior flap was elevated. Similarly, posterior flap was created, and the tragal cartilage identified. Sternocleidomastoid (SCM) muscle was identified along with greater auricular nerve and external jugular vein. The nerve was transected and the vein ligated. After retracting the SCM posteriorly, the posterior belly of the digastric was identified.

After mobilizing the superficial lobe anteriorly, the main trunk of facial nerve was identified. The main landmarks used for identification of facial nerve were tragal pointer and posterior belly of digastric. The nerve was found about 1–1.5 cm inferior and medial to tragal pointer and supero-medial to posterior belly of digastric. In few patients with bulky tumours, retrograde approach after identifying the terminal branches was used. The superficial gland was separated by dissecting along the branches of the facial nerve. Deep lobe of the gland was approached by retracting the facial nerve branches and delivering the tumour between them. After achieving hemostasis, the wound was repaired in two layers after putting a negative suction drain. The drain was removed when the amount was less than 10 ml in 24 h. A pressure bandage was applied after removing the drain, and sutures were removed on the seventh postoperative day. Depending on final histopathological diagnosis, patients were further subjected to radiotherapy and chemotherapy.

Results

A total of 25 patients were included in the study. There were 14 male and 11 female patients. Age of these patients ranged from 8 to 68 years with mean age of 42.7 years. Most patients presented with chief complaints of facial swelling (25), pain (11), facial asymmetry (7; Fig. 1a, b) and previous parotid surgery (5). Duration of these symptoms varied from 1 month to 32 years. FNAC was done in all the 25 patients. FNAC findings were suggestive of pleomorphic adenoma in 9 patients, mucoepidermoid carcinoma in 5 patients, carcinoma ex pleomorphic in 3 patients, adenoid cystic carcinoma in 2 patients, poorly differentiated carcinoma, adenocarcinoma and acinic cell carcinoma in 1 patient each (Table 1). In 3 patients, FNAC findings were suggestive of malignancy, but exact histological profile could not be determined. All these

Fig. 1 a, b Patients presenting with facial palsy

Table 1 Showing the FNAC and HPE findings

S. No.	FNAC diagnosis	HPE diagnosis
1	Pleomorphic adenoma	Pleomorphic adenoma
2	Pleomorphic adenoma	Ca ex pleomorphic adenoma
3	Mucoepidermoid Ca	Mucoepidermoid Ca
4	Adenocarcinoma	Adenocarcinoma
5	Adenoid cystic Ca	Adenoid cystic Ca
6	Poorly differentiated Ca	Poorly differentiated Ca
7	Ca ex pleomorphic adenoma	Ca ex pleomorphic adenoma
8	Inconclusive	Mucoepidermoid Ca
9	Pleomorphic adenoma	Mucoepidermoid Ca
10	Pleomorphic adenoma	Pleomorphic adenoma
11	Mucoepidermoid Ca	Mucoepidermoid Ca
12	Ca ex pleomorphic adenoma	Ca ex pleomorphic adenoma
13	Mucoepidermoid Ca	Mucoepidermoid Ca
14	Adenoid cystic Ca	Adenoid cystic Ca
15	Inconclusive	Salivary duct Ca
16	Acinic cell Ca	Acinic cell Ca
17	Pleomorphic adenoma	Pleomorphic adenoma
18	Inconclusive	Acinic cell Ca
19	Pleomorphic adenoma	Pleomorphic adenoma
20	Mucoepidermoid Ca	Mucoepidermoid Ca
21	Ca ex pleomorphic adenoma	Ca ex pleomorphic adenoma
22	Pleomorphic adenoma	Mucoepidermoid Ca
23	Pleomorphic adenoma	Pleomorphic adenoma
24	Mucoepidermoid Ca	Mucoepidermoid Ca
25	Pleomorphic adenoma	Ca ex pleomorphic adenoma

Rows highlighted in bold show the patients in whom the FNAC and HPE were different

patients underwent imaging in a form of CT scan, MRI scan or both. CT scan was done in 17 patients, MRI in 11 patients, while both CT and MRI were done in 6 patients (Fig. 2a, b). All these patients were posted for surgery under general

anaesthesia after taking informed and detailed consent. Total conservative parotidectomy was performed in 17 patients, radical parotidectomy in 5 patients and extended total parotidectomy in 3 patients. Facial nerve was identified using tragal pointer and posterior belly of digastric in 22 patients, and by using retrograde approach in 3 patients (Fig. 3a, b). Facial nerve or its branches were sacrificed if involved by the malignancy. The average duration for which drain was kept was 4.2 days and of hospital stay was 9.6 days. Complications in the form of facial palsy were seen in 4 patients, facial paresis in 5 patients, hypoaesthesia over the pinna in 5, wound defect in 3 and Frey's syndrome in 3 patients (Table 2). All patients with facial paresis were given facial exercises, and they recovered in 4–6 weeks' duration. Wound dehiscence was also managed by conservative measures and recovered in all patients. A final diagnosis was made after a biopsy report. In 4 patients where the diagnosis of pleomorphic adenoma was made on FNAC, final biopsy was suggestive of malignancy (Table 1). Five patients in whom either there was stage 4 disease or histopathological diagnosis suggestive of salivary duct carcinoma or poorly differentiated carcinoma received radiotherapy, while in these 2 patients, concurrent chemotherapy was also given. Regular follow-up of the patients was done up to 1 year. Follow-up could be done in 22 patients, while the remaining 3 patients were lost to follow-up. In 3 patients, there was recurrence of the disease, while 2 patients died due to tumour spread.

Discussion

Approximately 2,500 new cases of salivary gland neoplasms are diagnosed each year [2]. Parotid neoplasms account for 80 % of salivary neoplasms. Of parotid masses, 75 % are neoplastic; the remaining 25 % are non-neoplastic such as cysts and inflammation [2, 3]. Most of parotid neoplasms are

Fig. 2 **a** MRI showing tumour involving whole of the right parotid gland. **b** CECT scan showing tumour involving both lobes of the right parotid gland reaching up to the skin

Fig. 3 **a, b** Intra-operative photos of facial nerve branching with deep lobe of parotid gland

benign (70–80 %). Except for Warthin tumours, benign tumours of the parotid gland are more likely to occur in females. The median age for occurrence of these tumours is in the fifth decade of life [1, 3, 5]. Parotid tumours occur most commonly in Caucasians. The aetiology of these tumours is unknown, but the possibility of an adenoma gene currently is under investigation for its involvement in the development of pleomorphic adenomas [3]. The most common benign parotid tumour in children is the mixed tumour. Mucoepidermoid carcinoma is the most common malignant tumour of the parotid gland, accounting for 30 % of parotid malignancies [6, 8]. Malignant mixed tumours arise most commonly as a focus of malignant degeneration within a preexisting benign pleomorphic adenoma (carcinoma *ex* pleomorphic adenoma). Adenocarcinoma of the parotid develops from the secretory elements of the gland [9, 10]. This is an aggressive lesion with potential for both local lymphatic and distant metastases. Overall, 5-year survival is 19–75 %, as it is highly variable and related to grade and stage at presentation. Salivary duct carcinoma is a rare and highly aggressive tumour with poor prognosis [4, 9]. Evaluation of a patient with a suspected parotid gland malignancy must begin with a thorough medical history and physical examination. The most common presentation is a painless, asymptomatic mass; more than 80 % of patients presented with a mass in the parotid region. We found that almost every patient in our study presented with facial mass. Pain most likely indicates perineural invasion, which greatly increases the likelihood of malignancy in a patient with a

parotid mass. Of patients with malignant parotid tumours, facial nerve weakness or paralysis is seen in 7–20 %, which almost never accompanies benign lesions and indicates a poor prognosis [5, 9]. Physical examination of the head and neck must be thorough and complete. FNAC is the investigation of choice for making a histological diagnosis. The sensitivity of this procedure is greater than 95 % in experienced hands. In our study, we found the sensitivity of FNAC to be about 80 %. The major drawback of FNAC is that the needle may miss the tumour and requires considerable skill on the part of the pathologist [4, 9]. Imaging studies may be helpful in staging and for surgical planning. CT scan and MRI can be valuable for evaluation of parotid malignancies. CT scan provides better details of the surrounding tissues, whereas MRI demonstrates the mass in greater contrast than a CT scan [7]. Generally, therapy for parotid malignancy is complete surgical resection followed, when indicated, by radiation therapy. The extent of resection is based on tumour histology, tumour size and location, invasion of local structures, and the status of regional nodes. The most important initial step is identification of the facial nerve and its course through the substance of the parotid gland. In order to preserve the facial nerve, it is important to try to determine the proximity of the nerve to the capsule of the tumour prior to surgery. The facial nerve may be found exiting the stylomastoid foramen by reflecting the parotid gland anteriorly and the sternocleidomastoid muscle posteriorly. Landmarks include the posterior belly of digastric muscle and the tympanomastoid suture. Knowledge of the relationships among these structures allows more efficient identification of the nerve. The cartilaginous external auditory canal lies approximately 5 mm superior to the facial nerve in this region [2, 11]. The facial nerve is also anterior to the posterior belly of the digastric muscle and external to the styloid process. A second technique for locating the facial nerve is to identify a distal branch of the nerve and to dissect retrograde toward the main trunk. This technique may be more difficult depending on the ease of identifying the branching pattern. To perform this manoeuvre, the buccal branch may be found just superior to

Table 2 Showing the common complications seen in our patients

Complications	No. of patients
Facial paresis	5
Facial palsy	4
Hypoaesthesia over pinna	5
Wound dehiscence	3
Frey's syndrome	3

the parotid duct, or the marginal mandibular branch may be found superficial to the facial vessels [4, 12]. These may then be traced back to the origin of the main facial nerve trunks. If the tumour is high grade or >4 cm in greatest diameter, or lymph node metastasis is identified within the specimen, a complete total parotidectomy should be performed [12, 13]. If the facial nerve or its branches are adherent to or directly involved by the tumour, and FNAC shows malignancy, they must be sacrificed. This was done in four of our cases. Tumours of the deep lobe are treated by total parotidectomy [11]. Identification of the facial nerves and branches is the first and most crucial step. Parotidectomy can be performed with little morbidity and no mortality. Most serious complications result from damage to the facial nerve (either temporary or permanent paralysis). Injury to the greater auricular nerve results in hypoaesthesia of the ear. A slight loss of fullness and an increased prominence of the angle of the mandible may occur after superficial parotidectomy. Uncommon sequelae include salivary fistula, seroma, hematoma and infection. Frey's (auriculotemporal nerve) syndrome results from aberrant regeneration of auriculotemporal nerve fibres to sweat glands in the skin. The result is sweating on the affected side of the face during mastication. For certain histologic subtypes, some clinicians recommend combined modality chemotherapy and radiation. The major determinants of survival are histology and clinical stage. Poor prognostic factors include high grade of mitosis, neural involvement, locally advanced disease, advanced age, regional lymph node metastases and distant metastasis [5, 12, 13]. Overall, 5-year survival for all stages and histologic types is approximately 62 % [13]. Because of the risk of recurrence, all patients who have had a histologically proven malignant salivary gland tumour should have a lifelong follow-up.

Conclusion

Parotid tumours are commonly seen in the ENT practice. Surgery is the mainstay of treatment of parotid tumours. Deep lobe of parotid gland tumours provides a considerable challenge to a surgeon because of close proximity to facial nerve.

Thorough knowledge of the anatomy and different methods of locating the facial nerve play a key role in preventing complications. We also concluded that fine needle aspiration cytology (FNAC) findings and final histopathological report may not always correlate. Radiotherapy and chemotherapy are administered to the patients depending on the staging and histopathology of the tumour. Long term follow-up of the patients is essential to look for early recurrences and intervention.

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