

Research Article

Deep lobe parotid tumors in a tertiary care center

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ABSTRACT

Background: Salivary gland tumors are uncommon, accounting for between 2 to 6.5 percent of all neoplasms of the head and neck. About 70% of all salivary gland tumors arise in the parotid gland and a great number of these are benign tumors, with an average prevalence of 75%-85%. Parotid gland can give rise to a wide variety of neoplasms because of their mixed array of cells and tissues. Involvement of deep lobe is common in malignancy.

Methods: The aim of the study is to analyze the deep lobe involvement in parotid tumors and to study incidence of facial nerve injury in deep lobe parotid tumors. Our study is a prospective study done between April 2012 to October 2014 in the Department of General Surgery, Sri Ramachandra University, Chennai, Tamilnadu.

Results: In our study in about 36% of the tumors, the deep lobe was involved and facial nerve injury was present in 55.5% of the patients.

Conclusions: We conclude that deep lobe involvement in parotid tumors are rare and identifying it by clinical and imaging modalities plays an important role in reducing the perioperative complications like facial nerve injury.

Keywords: Parotid gland, Parotid tumors, Facial nerve, Retromandibular vein

INTRODUCTION

Salivary gland tumors are uncommon, accounting for between 2 to 6.5 percent of all neoplasms of the head and neck. Pleomorphic adenoma is considered as the most common benign salivary gland neoplasm, comprising about 50%-74% of all parotid tumors.¹ It is followed by Warthin's tumor, which accounts for about 4-14% of all parotid tumors. Approximately 90% of parotid tumors occur in the superficial lobe while the remaining 10% occur in the deep lobe, lying deep to the Retromandibular vein.²

Ultrasound (US) and computed tomography (CT) are done to determine deep lobe involvement.³ Surgery can determine with certainty the location of the tumor.

Superficial parotidectomy is the most widely accepted surgical treatment for parotid tumors involving the superficial lobe while total conservative parotidectomy is recommended for tumors involving the deep lobe. Preoperative knowledge of deep lobe involvement helps the surgeon in being better prepared for the operative procedure and can help in the effective preoperative counselling of patients regarding the increased risk of facial nerve injuries.

METHODS

This is a prospective study conducted in Department of General Surgery, Sri Ramachandra University, Porur, Chennai, India between April 2012 to October 2014 involving a study population of 25 patients with parotid swellings. All patients above the age of 18 years who

present to the general surgery OPD with parotid swelling diagnosed to be neoplastic by means of an FNAC were included. Recurrent tumors of the parotid were excluded. All patients underwent clinical examination, FNAC, radiological assessment by USG of the parotid region and CT neck.

RESULTS

In our study, superficial lobe involvement was noted in most of the patients with parotid tumors (64%). Deep lobe involvement was noted only in a small proportion of patients (36%). Most of the deep lobe tumors were found to be malignant (78.8%).

Table 1: Tumors in deep lobe.

Deep lobe * HPE cross tabulation				
		HPE		Total
		Benign	Malignant	
Deep lobe	Negative	14	2	16
	Positive	2	7	9
Total		16	9	25

In our study, ct has been found to be a very reliable indicator of deep lobe involvement in parotid tumors with a sensitivity of 77.8%, whereas ultrasound showed a sensitivity of 44.4%. Clinically deep lobe involvement was found in 33.3% of the cases.

Table 2: Sensitivity of USG, CT and clinical examination in parotid tumors.

	USG	CT	Clinical
True positive	4	7	3
False negative	5	2	6
True negative	15	15	15
False positive	0	0	0
Sensitivity Tp / (tp+fn)	0.4444	0.778	0.3333
	44.44%	77.8%	33.33%

DISCUSSION

Parotid gland consists of a superficial and deep lobe. The deep lobe is medial to the facial nerve and located between the mastoid process of the temporal bone and the ramus of the mandible. Another way to separate the deep and superficial lobes is based on the faciovenous plane of Patey. In our study tumors in the parotid were predominantly benign (64%). Malignancies formed only a small portion of the tumors detected in the parotid (36%). Even though there was a wide variation in the age distribution of patient with parotid tumors, benign tumors were found to be more common between 20 – 40 years of age. Malignancies of the parotid were found to be more common among the older age groups with a mean age of 51 years.^{1,2}

Studies done by Eveson et al and Spiro et al show a higher mean age among patients with malignancies (55 years) when compared to patients with benign diseases (45 years).^{4,5} In our study females were more involved (64%) than males (36%).

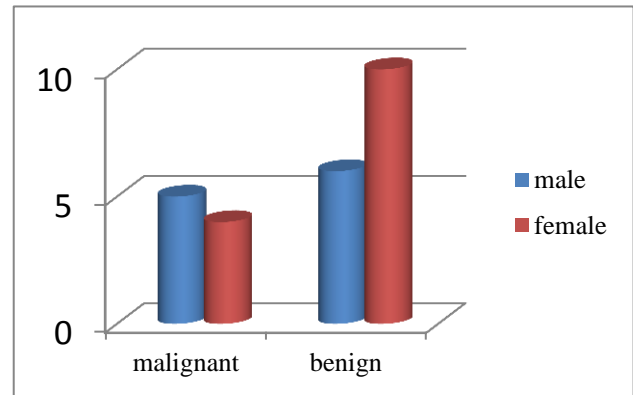


Figure 1: Male and female incidence of parotid tumors.

Pleomorphic adenoma was the most common benign tumor noted. Auclair et al also recorded similar findings.¹ Among the malignancies mucoepidermoid carcinoma was the most common. The benign tumors were found to be more common in females when compared to males with a ratio of 1:3. This is in accordance with a study conducted by Ademar et al and Ito et al.^{6,7} There was however no significant sex predominance among patients with malignant tumors of the parotid. It is to be noted that most of the studies regarding parotid tumors report an increased incidence among women of both benign and malignant tumors. However study done by Ito et al⁷ showed a male predominance among patients with parotid malignancies.⁷

In our study, superficial lobe involvement was noted in most of the patients with parotid tumors (64%). Deep lobe involvement was noted only in a small proportion of patients (36%). However the value was higher when compared to studies done by Nigro et al which showed an incidence of 11%.⁸ Study done by Munir et al has documented a higher incidence similar to our study (Table 1).⁹

Malignancies were seen to involve the deep lobe more frequently. However Nigro et al have reported a higher incidence of benign tumors in the deep lobe compared to malignancies.⁸ The study has also reported a higher incidence of malignancies in the deep lobe when compared to the superficial lobe. This deep lobe involvement could either be a primary parotid tumor involving the superficial lobe extending into the deep lobe or a primary deep lobe parotid tumor.

Detecting whether the tumor is in the superficial or deep lobe is helpful for preoperative planning by allowing the surgeon to determine the optimal surgical approach and

to appropriately counsel the patient. This information directly impacts the surgical approach of parotid neoplasms. In addition, patients should be informed of the risk to the facial nerve during surgery, since lesions in the deep or both lobes require more manipulation and possible injury of the facial nerve. Due to the significant morbidity associated with facial nerve damage, it is appropriate to provide patients with the best preoperative information possible.

Clinical assessment of deep lobe involvement is done by examination of the oral cavity. Medialisation of the anterior tonsillar pillar is suggestive of deep lobe involvement. Clinical assessment of deep lobe involvement even though is well documented no previous study has been done to determine its effectiveness. In our study, we found that clinical assessment can identify deep lobe involvement correctly in 33.33% of the patients.

Assessment of its full dimensions is not possible once it extends into the parapharyngeal space. In our study sensitivity of USG in detecting superficial lobe involvement in parotid tumors was found to be 95% while specificity was 60%. Gozzi et al have documented that USG is the best investigation to detect parotid tumors involving the superficial lobe.¹⁰ However in detecting deep lobe involvement USG has a lower sensitivity when compared to CT with a value of 44.44%. Margarida Maria et al have documented a sensitivity of 40% in detecting deep lobe involvement by means of an USG.¹¹

CT assessment of the deep lobe is comparatively easier. Deep lobe is visualised in a CT as part of the parotid located deep to the Retromandibular vein. Study done by Margarida Maria et al reports the sensitivity of CT to be close to 90% in detecting deep lobe involvement Using the Stensen's duct, visualized by CT sialography, is said to be as accurate in differentiating deep lobe from superficial lobe as Retromandibular vein.^{10,12,13} In our study, CT has been found to be a very reliable indicator of deep lobe involvement in parotid tumors with a sensitivity of 77.8% which is slightly lower than the value of 86.4% reported by Vasu Divi et al.¹⁴ The positive predictive value was the same as reported in the study (100%) In our study, CT scan was able to detect superficial lobe tumors in 95% of cases and was able to exclude the same in 100% cases (Table 2).¹⁵⁻¹⁷

In our study it was noted that among the patients with deep lobe involvement 5 had facial nerve paresis after undergoing conservative total parotidectomy. Among these cases 4 were found to have malignant tumors of the parotid gland. These findings are consistent with those of Maurizio et al who have reported that factors predisposing to nerve damage after total conservative parotidectomy are malignant tumors with deep lobe involvement.¹⁸ Deep lobe malignant tumors are potential risk factor for permanent paralysis which may be related to stretch injury or as a result of surgical interference with the vasa nervosum.

In our study, facial nerve injury was noted in 55.5% of patients undergoing total conservative parotidectomy. This value is less when compared to studies done by Mokhtar Fareed et al and MA Rahman et al who have documented values of 75% and 71.42% respectively.^{19,20}

Post superficial parotidectomy facial nerve paresis has been reported to be seen in 26.08% of patients as per study conducted by M A Rahman et al while the value was 38.46% among those undergoing superficial parotidectomy in our study.^{20,21}

Two other patients who had facial nerve paresis preoperatively were not included. The patients with facial nerve paresis documented in our study need to be followed up to assess if the injury is permanent or temporary.

CONCLUSION

Parotid tumors though rare, require a definite diagnostic plan for its proper management. Playing an important role in the management of parotid tumors, is the assessment of superficial and deep lobe involvement. USG should be considered as the first line imaging modality in detecting parotid tumors. However when deep lobe involvement is to be ruled out CT neck should be considered as a viable option. Identifying deep lobe involvement plays an important role in the preoperative planning of surgery and can help in reducing perioperative complications.

Deep lobe involvement by itself is a risk factor for facial nerve injury, more so if the tumor is malignant. Conservative total parotidectomy is associated with a high incidence of facial nerve injury. Deep lobe involvement if present should be assessed with CT neck in order to rule out malignancy and to decrease the morbidity.

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Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Auclair PL, Ellis GL, Gnepp DR, Wenig BN, Janey CG. Salivary gland neoplasms: Surgical pathology of the salivary glands. Philadelphia: WB Saunders. 1991:135-64.
2. Fischer JE. Mastery of surgery. vol. 1, 6th edition; page 305.
3. Smith JRG, King WWK, Tang WYM, et al. Differentiating tumors of the deep and superficial lobes of the parotid gland by computed tomographic sialography. Clin Radiol. 1987;38:345-9.
4. Eveson et al. Salivary gland tumors: A review of 2410 cases with particular reference to histological

- types, site, age and sex distribution. *J Pathol*. 1985;146(1):51-4.
5. Spiro RH. Salivary neoplasms: Overview of a 35-year experience with 2,807 patients. *J Head Neck Surg*. 1986;8:177-84.
6. Ademar TJR, de Almeida OP, Paulo L. Parotid neoplasm: Analysis of 600 patients attended at a single institution. *Brazilian journal of Otorhinolaryngology*. 2009;75(4):497-501.
7. Ito FA, Ito K, Vargas PA, Almeida OP, Lopes MA. Salivary gland tumors in a Brazilian population: a retrospective study of 496 cases. *Int J Oral Maxillofac Surg*. 2005;34:533-6.
8. Nigro MF, Spiro RH. Deep lobe parotid tumors - *Am J Surg*. 1977;134:523-7.
9. Munir N, Baldwin D, Mal R. Deep lobe parotid pleomorphic adenoma: 10 year retrospective review of cases treated at a united kingdom regional tertiary referral centre. *The internet journal of head and neck surgery*, 2006.
10. Gozzi G, Di Bonito, Bazzouli M. Malignant tumors clinical use of Computed tomography. *J Computed Assisted tomography*. 1990;20:444-7.
11. Margarida Maria et al. The role of ultrasonography and computed tomography in the evaluation of surgical treatment of parotid gland neoplasms. *Brazilian J Radiol*. 2003.
12. Carr RJ, Bobr JO, Werman JE. A Review of tumours of the deep lobe of the parotid salivary gland. *Br J Oral Maxillofacial surgery*. 1986;24(3):155-68.
13. Lurie M, Misselevitch I, Fradis M. Diagnostic value of fine-needle aspiration from parotid gland lesions. *Curr Opin Otolaryngol Head Neck Surg*. 2006;14(2):62-6.
14. Vasu Divi BA, Fatt MA, Teknos TN, Mukherji SK. Use of cross-sectional imaging in predicting surgical location of parotid neoplasms. *Journal of Computer Assisted Tomography*. 2005;29(3):315-9.
15. Kurabayashi T, Ida M, Ohbayabhi N, et al. Criteria for differentiating superficial from deep lobe tumours of the parotid gland by computed tomography. *Dento Maxillofac Radiol*. 1993;22:81-8.
16. Byrne JW. A Comparison of computed tomography and ultrasound in the assessment of parotid masses; *Clin Radiol*. 1987;38:339-43.
17. Isaza M, Ikezoe J, Morimoto S, et al. Computed tomography and ultrasonography in parotid tumors; *Acta Radiol*. 1989;30(1):11-15.
18. Marchesi M, Biffoni M, Trinchi S, et al. Facial Nerve Function After Parotidectomy for Neoplasms with Deep Localization. *Surg Today*. 2006;36:308-31.
19. Fareed M, Mowaphy K, Abdullah H, Mostafa M. Temporary facial nerve paralysis after parotidectomy: The Mansoura experience-a prospective study. *The Egyptian journal of surgery*. 2014;33(2):117-24.
20. Rahman MA, Alam MM. Study of nerve injury in parotid gland surgery-Nepalese journal of ENT head and neck surgery. 2011;2(1):17-9.
21. Kim JYS, Deepak N. Facial Nerve Paralysis. <http://emedicine.Medscape>, 2015.

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