

Original Research Article

Role of Fine Needle Aspiration Cytology in the Pre-Operative Diagnosis of Parotid Tumours

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Abstract: Parotid gland tumours have evolved much interest and debate because of the variability of their structure and behaviour. The biological patterns in any given tumour vary from field to field. Thus most malignant mixed salivary tumours will contain both areas of completely benign mixed tumour and areas of overt carcinoma. 80-90% salivary tumours arise in the major gland about 70-85% being in the parotid gland. Benign tumours constitute 65-80% of parotid tumours. FNAC has of late become a very important and useful diagnostic aid. It is an accurate non-operative technique of diagnosing parotid tumours especially in the hands of experienced cytopathologist. The present study done in Osmania general hospital and MNJ cancer hospital Hyderabad in the period of 2007 to find out the role of fine needle aspiration cytology in the pre-operative diagnosis of parotid tumours in 42 cases. In the study male female ratio was 1:1.07 in benign tumours and 1.34:1 in malignant tumours. FNAC is helpful in patients with clinical suspicion of malignant tumour and in whom the facial nerve function is intact.

Keywords: parotid gland tumours, pleomorphic adenoma, mucoepidermoid carcinoma, FNAC.

INTRODUCTION

Salivary gland neoplasm constitute, by virtue of their diverse histopathology and variable biological course, a fascinating and challenging subject to both surgeons and pathologists in general and the head and neck surgeons in particular. Parotid gland tumours are especially challenging because of the intimate anatomical relationship of the gland to facial nerve, presence of intraparotid lymph nodes and presence of deep lobe the consequence of sacrificing the facial nerve may at times constitute a deterrent to the performance of adequate surgery for tumours arising from the parotid gland.

The range of numerous histological possibilities associated with a parotid gland mass and a lack of universally accepted classification of parotid tumours constitute a further challenge to the study.

Moreover parotid gland cancers have a variable biological course and do not follow the general familiar survival pattern of squamous cell carcinomas of the head and neck. In the words of Ackerman and Del Rio Hortega the usual tumour of parotid gland is a tumour in which the benign variant is less benign than the usual

benign tumour and the malignant variant, less malignant than the usual malignant tumour. Because of this variant although predictable biological behaviour and expression of local control, the success of treatment and ultimate prognosis can be expressed not in 5 years or 10 years but rather in 20 years.

Perhaps no tissue in the body is capable of producing such a diverse histopathological expression than the parotid gland tissue. This uniqueness is partly due to the presence of myoepithelial cells in the salivary gland. As with all other tumour surgery the principles that were rather straight forward and dogmatic in previous years, have gradually been modified to blend with other forms of therapy which showed increasing promise, such as radiotherapy and chemotherapy.

Traditionally salivary gland has not been subjected to incisional or needle biopsy because of the possible risks of fistula formation, injury to facial nerve and in case of neoplasms, of tumour implantation. However, there is no evidence that any of these complications occur with fine needle aspiration cytology. FNAC offers a fairly accurate preoperative diagnosis which helps the surgeon in planning

treatment.

As greater understanding of the biological characteristics and behaviour of these tumour is gained the surgical philosophy and practice with regard to these tumours in bound to change and had been changing gradually over the past few years. The various investigative modalities ranging from FNAC to CT and better understanding and application of other forms of treatment like irradiation, chemotherapy and immunotherapy alone or in combination have enlarged the therapeutic armamentarium of the clinician in the management of these tumors.

AIMS & OBJECTIVES

To study pre-operative fine needle aspiration cytology of parotid gland tumour and to correlate with clinical and post-operative histological features

MATERIALS AND METHODS

This study is a retrospective and prospective analysis of 42 cases of parotid gland tumour in the year of 2007 from Osmania general hospital and MNJ cancer

hospital, Hyderabad. A clinical diagnosis was made after clinical examination and patient were subjected to fine needle aspiration cytology (FNAC) using a 10cc disposable syringes. FNAC was correlated with clinical diagnosis. Operative specimens were sent for histopathological examinations in the pathology department where sections were taken using a rotary microtome. The results of FNAC were “correlated with histopathological diagnosis and concurrence analysed.

The data were analysed by Carl Pearson’s method of analysis for statistical significance. The results of the study are compared to similar studies published nationally and internationally.

RESULTS

Total number of cases comprising the study material 42cases (n=42)

Incidence of benign tumours 27(64.28%), incident of malignant tumour 15(35.71%)

Table 1: Incidence of Types of Benign Tumours

SL.NO	TUMOUR TYPE	NO. OF CASES	PERCENTAGE
1	Pleomorphic adenoma	23	81.18%
2	Monomorphic adenoma	2	7.4%
3	Warthin’s tumour	1	3.7%
4	Nonspecific inflammation(clinico diagnosis as malignant tumour)	1	3.7%

Table 2: Incidence of Types of Malignant Tumours

SL.NO	TUMOUR TYPE	NO. OF CASES	PERCENTAGE
1	Mucoepidermoid carcinoma	.6	40%
2	Malignant mixed tumour(carcinoma ex-pleomorphic adenoma)	3	20%
3	Adenoid cystic carcinoma	3	20%
4	Undifferentiated carcinoma	2	13.3%
5	lymphoma	1	6.6%

AGE INCIDENCE

AGE GROUP	NO.OF CASES
0-10	0
11-20	5
21-30	6
31-40	6
41-50	12
51-60	6
61-70	7
71-80	0
TOTAL	42

SEX INCIDENCE

Number of male's 22, females 20. incidence of benign tumour in males 13, in females 14, male female

ratio 1:1.07. Incidence of malignant tumour in males 8, in females 6, ratio 1.34:1

CORRELATION OF FNAC WITH CLINICAL AND HISTOPATHOLOGICAL FEATURES

Table 3: Benign Tumours

SL.NO	DIAGNOSTIC MODALITY	NO. OF CASES
1	Clinically diagnosed as benign	27
2	Diagnosed as benign of FNAC	31
3	Proven to be benign on histopathology	26

Five cases diagnosed as benign were actually proved to be malignant on histology i.e FNAC gave a

false positive diagnosis in 14.8% of cases. Accuracy of FNAC for benign tumour is approximately 81%.

Table 4: Malignant Tumours

SL.NO	DIAGNOSTIC MODALITY	NO. OF CASES
1	Clinically diagnosed as malignant	16
2	Diagnosed as malignant of FNAC	9
3	Proven to be malignant on histopathology	15

One case reported as malignant on FNAC turned out be nonspecific inflammation, i.e, 6.6% incidence of false positivity for malignant tumour on FNAC. One case reported as benign on FNAC turned out to be lymphoma. These observations concur with that J.P shah who states that chronic sialadenitis and lymphoma are the most frequent cause of diagnostic error on FNAC [1].

Over all accuracy of FNAC in correctly diagnosing the lesion is about 85.72% whereas clinical examination is almost 100% accurate in diagnosing benign tumour and about 94% accurate in diagnosing malignant tumour with an overall accuracy of 97%.

Table 5: Incidence of Case Diagnosed Clinically As Malignant

SL.NO	CLINICAL FEATURES OF MALIGNANCY	NO.OF CASES	PERCENTAGE
1	Facial nerve paralysis	3/15	20
2	Fixity to underlying structures	10/15	66.7
3	Hardness of consistency	8/15	53.4
4	Fixity to overlying skin including ulceration	3/15	20
5	Lymph node metastasis	2/15	13.4

Types of Surgical Treatment Adopted In This Series

SL.NO	TYPE OF SURGERY	NO.OF CASES	PERCENTAGE
1	Superficial parotidectomy	20	47.6
2	Total(conservative parotidectomy)	11	26.1
3	Radical parotidectomy	4	9.5
4	Radical parotidectomy with nerve grafting	1	2.3
5	Excision	4	9.5
6	Enucleation(from deep lobe)	1	2.3
7	Incision and drainage with biopsy	1	2.3

INCIDENCE OF FACIAL NERVE PARALYSIS

Pre-operative facial nerve palsy (due to malignant tumour) in 3 cases. Post-operative facial nerve palsy seen in 16 cases. All cases were of

complete lower motor neuron type of facial nerve paralysis.

DISCUSSION

The general incidence of salivary gland tumour

is about 3-6% of all head and neck cancers and parotid gland tumour account for about 65% of these. About 80% of these are benign tumours and pleomorphic adenoma is the commonest, accounting for 55% of all parotid tumours and 80% of benign tumours (memorial Sloan Kettering cancer centre, New York data). The present study of 42 cases exhibit an incidence of 64.3% benign tumours and 35.7% malignant tumours with

pleomorphic adenoma accounting for 77.8% of benign tumour and about 57% of all parotid neoplasms. This is in agreement with memorial Sloan Kettering cancer centre statistics (head and neck surgery 1986). 75% benign and 25% malignant.

The distribution of various tumours is as follows in comparison with Spiro's series [2, 3].

Sl.no	Type of tumour	% of present series	% in Spiro's series	% in Eneroth series
1	Pleomorphic adenoma	57.1	45.4	45.7
2	Monomorphic adenoma	4.7	0.2	-
3	Warthims tumour	2.3	1	3.3
4	Nonspecific benign	2.3	1	-
5	Muco epidermoid carcinoma	14.9	15.7	20.9
6	Malignat mixed tumour	7.1	5.7	-
7	Adenoid cystic carcinoma	7.1	10	8.5
8	Undifferentiated carcina	4.7	1.3	-
9	Lymphoma	2.3	-	-

SEX –there were 22 male patients and 20 female patients in this series. The male female ratio for benign tumours was almost equal there was a slight female preponderance (1:1.07) for malignant tumour there was a slight male preponderance (1.14:1)

AGE- while the youngest patient was 10 years, the oldest patient in this study was 60 years, the peak was in the 40-50 years age group.

FNAC CONCURRENCE WITH HISTOLOGY

Examination of parotid gland by FNAC has become routine now. A correct cytological diagnosis helps the surgeon in planning the appropriate treatment. Malignant features on cytology, especially when combined with clinical suspicion of malignancy means that the facial nerve has to be sacrificed, while benign cytology would dictate a surgery. Accuracy of Cytodiagnosis depends on the experience of the pathologist. In this study the FNAC of cases were compared with histopathological features, concurrence analysed and compared to similar studies.

Complications like injury to the facial nerve, seeding of needle track with tumour cells and necrosis and infarction of the parotid gland are known to occur after FNAC but in the present study no such complications occurred. But one case of necrosis os pleomorphic adenoma following FNAC has been reported by Gottschalk Sabag. S and Glick [4].

Another case of infarction of parotid gland after FNAC was reported by pinto R.G. Mandrekar *et al.*; from Goa medical college, bombolin. The

significance of these is that necrosis associated with infarction after FNAC may cause diagnosis problems in two settings, FNAC fielding necrotic debris may result in false negative diagnosis on repeat aspiration. Alternatively, post FNAC infarction may observe the nature of a neoplasm diagnosed by FNAC making histologic confirmation difficult.

Clinical examination is almost 100% accurate in diagnosing the nature of the tumour as benign or malignant. 27 cases were diagnosed clinically as benign and 26 cases proved to be benign histologically. However, FNAC yielded benign cytology in 31 cases while the actual benign cases were 26 i.e 5 cases reported as benign were false positive. FNAC histological concurrence for benign tumour is approximately 81%.

For malignant tumour 16 cases were diagnosed as malignant, while the actual incidence on histology was 15 cases. One case suspected to be malignant clinically, showed features of nonspecific benign features on repeated FNAC and incisional biopsy.

Only 9 cases out of 15 malignant tumour could be diagnosed as malignant or FNAC ie. The accuracy is only 60% for malignant tumours. Clinical examination was almost 100% accurate in diagnosing benign lesions and 94% accurate in diagnosing malignant lesions with an overall accuracy of 97%. The overall accuracy of FNAC incorrectly diagnosing the tumour in 70.5% with 81% sensitivity or benign tumours and 60% sensitivity for malignant tumours.

Comparative studies of sensitivity of FNAC of parotid tumours

SL.NO	STUDY	PRESENT STUDY	J.P Shah & Janet K.Ihde [5]	Jayaram verma <i>et al.</i> ; [6]	Deans, briggs <i>et al.</i> ; [7]	Bifforetti & Giannoni [8]
1	Over all diagnostic accuracy	70.5	88	91	87	89.7
2	Sensitivity of benign tumours	81	95	100	88	-
3	Sensitivity of malignant tumours	60	65	87.8	66	-
4	False +ve benign	19.2	5.5	-	-	-
5	False +ve malignant	6.6	-	-	4	-
6	False -ve malignant	6.6	-	-	4	-

Thus it can be seen that FNAC correlates well with histology which statistically significant.

CONCLUSIONS

- Parotid gland tumours in general are relatively rare in comparison to other head and neck cancers.
- A total of 42 cases equal number from Gandhi hospital and MNJ cancer hospital, Hyderabad in the period of 2007 were studied.
- The peak incidence occurred in the 40-50 years age group. The mean age was 40.4 years. The mean age of incidence in males was 43.4 years and in females 35.7 years.
- The male to female ratio was almost equal with a slight female preponderance (1:1.07) for benign cases and slight male preponderance (1.34:1) for malignant tumours.
- Benign tumours constituted 64.3% and malignant tumors 35.7%. The apparent high incidence of malignant tumour is due to the fact that the cases taken cancer hospital represented a higher incidence of malignant neoplasms.
- Fine needle aspiration cytology has become a very valuable pre-operative diagnostic modality in the evaluation of parotid gland tumours. Unlike in the past, when needle aspiration of parotid was contraindicated, FNAC of parotid has assumed an important role in the diagnosis of benign and malignant lesion thus helping the surgeon in planning a correct surgical approach.
- FNAC is helpful in patients with clinical suspicion of malignant tumour and in whom the facial nerve function is intact. If the diagnosis of a malignant tumour is established preoperatively it helps to prepare the patient and surgeon for possible deliberate sacrifice of the facial nerve.
- FNAC has a high diagnostic accuracy and sensitivity and augmented with clinical diagnosis establishes a correct diagnosis pre-operatively.
- FNAC is safe with negligible complication and can be repeated.
- However, a negative needle biopsy does not rule out malignancy.

- The overall accuracy of 85.72% of FNAC and histological concurrence is comparable with similar results of internationally published studies.
- The observations are statistically significant with the p value of p=0.0028
- Nonspecific inflammation and lymphoma were the most frequent causes of diagnostic error on FNAC.
- The commonest benign tumor was pleomorphic adenoma and the commonest malignant tumour was muco epidermoid carcinoma.

REFERENCES

1. Jatinp Shah, Janet K Ffide: current problems in surgery- salivary gland tumours, dec 1990.
2. Spiro R.H, Huvos A.G, Berk R, Strong E.W; Mucoepidermoid carcinoma of salivary gland origin: a clinicopathologic study of 367 cases. The American Journal of Surgery, 1978; 136(4): 461-468.
3. Spiro R.H, Huvos A.G, Strong E.W; Malignant mixed tumor of salivary origin. A clinicopathologic study of 146 cases. Cancer, 1977; 39(2): 388-396.
4. Gottschalk-Sabag S, Glick T; Necrosis of parotid pleomorphic adenoma following fine needle aspiration. A case report. Acta cytologica, 1994; 39(2): 252-254.
5. Rosai J; Rosai and Ackerman's surgical pathology. Elsevier Health Sciences. 2011.
6. Jayaram G, Verma AK; fine needle aspiration of salivary gland tumours- j .oral path med: 1994; 23(6): 256-61.
7. Deans G.T, Briggs K, Spence R.A; An audit of surgery of the parotid gland. Annals of the Royal College of Surgeons of England, 1995; 77(3): 188.
8. Bifaretti G, Ionnoni M, Ranieri A; fine needle aspiration in the cytopathologic correlation in 49 cases –Minerva stomatol 1996; 45(1-2):9-16.