# A STUDY OF THE ROLE OF CYTOPATHOLOGY IN PAROTID SWELLINGS

**DISSERTATION SUBMITTED FOR**

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**M.S. (GENERAL SURGERY)**

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# CERTIFICATE

This is certify that dissertation entitled **"A STUDY OF THE ROLE OF CYTOPATHOLOGY IN PAROTID SWELLINGS"** Submitted by **Dr.D. LATHA** to the Tamil Nadu Dr. M.G.R Medical University, Chennai, is in partial fulfillment of the requirement for the award of **M.S Degree Branch – I (General Surgery)** and is a bonafide research work carried out by her under direct supervision and guidance.

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# DECLARATION

This is consolidated report on "**A STUDY OF THE ROLE OF CYTOPATHOLOGY IN PAROTID SWELLINGS"** based on 48 cases treated at Govt. Rajaji Hospital, Madurai, during the period June 2004 to June 2006.

This is submitted to the **Tamilnadu Dr. M.G.R. Medical University, Chennai** in partial fulfillment of the rules and regulations for the **M.S.** Degree Examination in General Surgery.

Govt. Rajaji Hospital,

Madurai Medical College, **DR. D. LATHA**

Madurai.

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# INTRODUCTION

"There would be so little danger in extracting, a small quantity of tissue from an obscure growth by the aid of needle trocar or cannula, so little substance is there necessary for the microscope that the diagnosis of cancer would no longer be embarrassing or vague."

- Velpeau. 1856.

The modern cytopathology in its latest phase in the evolution as a diagnostic discipline saw its earliest beginnings in the 19$^{th}$ century. Observations of normal & abnormal human cells, either exfoliated or imprint or scraps were steadily recorded throughout the last century.

The important era of cyto pathology began in 1941. The publication by Drs. George papanicolou and Herbert F Trant in an article in the American Journal of O & G regarding the diagnostic value in Carcinoma Cervix. Proved the importance of cytopathology.

The most important development in the cyto pathological diagnosis was the technique of FNAC long accepted and practiced in Europe especially in

Sweden, began to be widely accepted throughout the world since 1957. It was in the U.S. that the first series of aspirations from neoplasms were published from Memorial Hospital for cancer and allied diseases by Dr. Martin and Ellis.

Zajicek and Franzen at Karolinska Hospital applied the requisite scientific rigour to define the precise diagnostic criteria and determine diagnostic accuracy in a variety of conditions. The incidence of neoplastic disease in salivary glands is only 2per 1 lakh of the population. Yet since the introduction of fine needle aspiration these organs have provided an intriguing target. “Parotid tumours are particularly suited to aspiration” as Stewart wrote in 1933 from Memorial Hospital, Newyork.

Fine Needle Aspiration is now a well established technique in the management of salivary gland diseases.

## ADVANTAGE AND LIMITATIONS

FNAC is relatively painless, produces speedy result and is cheap. Its accuracy in any situation can approach that of histopathology, in providing an unequivocal diagnosis. New radiological techniques for imaging organs and lesions in sites not easily accessible to surgical biopsy have opened vast opportunities for FNAC in deeper structures. Aspirations may be taken as a first step in investigation thereby saving costly days in hospital, since a tissue diagnosis can be obtained within minutes rather than days.

FNAC is less demanding technically than biopsy. The low risk of complications is an additional advantage which allows FNAC to be done as an Out Patient or bedside procedure.

It is also highly suitable in debilitated patients, is readily repeatable and useful for multiple lesions. Serious complications such as major hamorrhage are extremely rare. Complications like fistuala formation, nerve injury, needle seeding when using Tru – cut needle are also very rare in FNAC.

FNAC preparations may aid not only in the diagnosis of malignancy but also in assessing the prognosis and possibly in the selection of appropriate therapy.

**THE PROCEDURE OF FNAC**

In the patient's best interest, the technique should be undertaken by the clinician.

Diagnosis by FNAC should only be attempted when the pathologist is cognizant of the details of the clinical history, physical examination and results of the laboratory tests. These will compensate for the short –comings of the technique in demonstrating less of the architectural arrangements of tissues than do histological sections.

One should realize that in FNAC it is extremely important to scrutinize the low power overall pattern of the smear because it represents direct sample which has been cut and withdrawn from the lesion and which contains micro

anatomical structures in addition to single cells and back ground material. Thus the approach to the interpretation of the smear is closer to that used in histopathology than to exfoliative cytology.

There are advantages and disadvantage in using airdried, Giemsa stained smears as against wet fixed papanicoloau (PaP) and Haematoxyln and Eosin preparations. In general the former technique is used in haematology. The latter technique is more popular for the same reason with cytologists who have more histopathological background. However both methods are complimentary, both should be employed because certain features are particularly distinctive in each; familiarity with both stains is indispensable in specific situations.

# FACTORS ESSENTIAL TO ACCURACY AND SUCCESS

For optimal accuracy FNAC should include a strong clinical association. Ideally the clinician and cytopathologist should examine the patient, perform the aspiration, read the smears, discuss the appearances in the light of other investigations. If appropriate, deliver the report. In surgical practice it is necessary to repeat the whole procedure in 10 – 15% of cases.

## NOMENCLATURE

**FNAC is defined by Bamforth (1966) as follows "the examination of cells obtained by needle or drill biopsy in solid organs (or) tissue masses or from the cut surface of such material freshly removed by surgical biopsy.**

The terminology of FNAB is also accepted.

## CURRENT CONSIDERATIONS

**The answer to the allegation that needle aspiration biopsy is inaccurate, certainly has a historical parallel with exfoliative cytology of all types particularly that most**

**commonly practiced, cervical, vaginal cytological diagnosis.**

Many authors believe that Stewart's statement that "Diagnosis by aspiration is as reliable as the combined intelligence of the clinician and pathologist makes it", is as appropriate today as it was in 1993.

# LITERATURE REVIEW

History of the development of cytopathology, especially in the last century and up to 5th decade of this century was published in the article “History of cytodiagnosis by linsk. J. A. the karolinska group and the book. “History of clinical cytology a selection of documents” by Zajicek J. et al in Acta laryngol stokh 1964.

As might be expected the era of cytopathology was heralded by 2 publications. First issue of Acta cytological in 1957, now the oldest journal devoted exclusively to cytopathology and 4 years later in 1961 by the publication of “Diagnostic Cytology and its Histo pathological basis” by Leopold. B. Koss and Grace R. Durfee.

Foundation of current practice of FNAC in salivary gland tumours were established by the Karolinska group headed by Linsk. J. A. who between 1964– 76 published a series of 6 studies on FNAC of salivary glands. By 1987 aly field et al published 36 papers in the Archives pathological lab medicine 1987, which together contained report of aspirates from 3000 salivary lesions.

Zajicek J. and Eneroth. C. M. published papers on Morphologic investigations in smears and histological sections from oncocytic tumours mainly on papillary cystadenoma lymphomatosum in 1965, mixed tumours in 1966, Adenoid cystic carcinoma in 1969, Acinic cell carcinoma in 1971, and Muco epidermoid carcinoma in 1979, all in the journals of Acta cytological.

Dr. Jeyaram. N. et al established the value of cyto diagnosis in salivary gland lesions in the journal “Diagnostic Cytopathology 1989”.

Koc Jan et al has performed FNAC on 52 patients with salivary gland lesions. A definitive cyto diagnosis was possible in 45 cases. A sensitivity of 89% and a specificity of 94% was achieved. The pitfalls of FNAC in salivary gland lesions are reflected by the false positive and false negative rates which were 4%. Errors of cyto diagnosis are due to the morphological variability of these tumours which make sampling and interpretation difficult.

Fine Needle Aspiration Cytology of Parotid glands

Enlargements of parotid glands are less often due to neoplasia than to inflammatory or other nonneoplastic conditions. Neoplasm of parotid glands makes fewer than 3% of all tumors in the head and neck.

30% of parotid masses are non neoplastic. The nature of the lesion cannot be determined on clinical examination and pathological examination is required for definite diagnosis. FNA may help to avoid the cost and risks of open biopsy or other surgical procedures such as fistula and facial nerve injury. FNA is virtually risk free, simple, rapid, and inexpensive technique.

**There was a brief flowering of interest in cytologic techniques in the later**

# 1920s and early 1930, as reported in the classic papers of Dudgeon and Patrick from England, who use cytologic scrape preparations of excised tissue.

1933 Stewart commented that parotid tumors are particularly suited to aspiration after he examined 66 samples.

1964-76 Karohinska group published a series of 6 studies on FNAC of parotid glands and its usefulness.

In the present study the utility of FNA cytology in the diagnosis of parotid gland enlargement were analyzed. The cytological findings were retrospectively correlated with the available histopathological features. The cytological and histopathological features of parotid gland lesions are analyzed with routine H&E stains, special stains and immunohistochemistry ..Diagnostic accuracy, specificity and sensitivity were evaluated. The diagnostic pitfalls of FNA of parotid lesions were identified and the possible ways to rectify the misdiagnosis were proposed.

**BENIGN LYMPHO EPITHELIAL CYST:**

1990 Cleary duct obstruction related to lymphoid hyperplasia or duct destruction related to Cell mediated immunity.

1997 Rivas Lacartns et al reported 3 cases of Lympho Epithelial lesion in parotid gland.

1993 Shaha et all described that the lesions show follicular hyperplasia, cystic dilatation of the ducts and the ducts are lined by psuedo stratified squamous epithelium and lymphocytic infiltrates.

**PLEOMORPHIC ADENOMA**

Occur at all ages, 1954 Prazell's series the youngest Patient was 7 and the oldest 82 years of age. Tumors exhibit both mesenchymal and epithelial differentiation histologically hence their descriptive name.

1983 Chapbin – crystalloid material containing tyrosin associated mixed parotid tumor has been occasionally identified.

2001 Webb and Eveson studied 126 primary mixed parotid tumors to correlate the capsular characterstics and concluded that parotid lesions possessed thicker capsules than submandibular tumors.

**WARTHIN'S TUMORS**

First described by Albrecht and Arzt in 1910 as papillary cystadinoma though it is often known after Warthin (1929) who described further cases under the name of papillary cyst adenoma lymphomatosum which is common

in $4^{th}$ to $6^{th}$ decade of life. Lesion is characterized by an oncocytic epithelial component and a lymphoid stroma with well developed follicles.

1950 Occurrence of sebaceous cyst like lesion has been reported by Rawson & Hon.

1986 Eveson et al - some of the apical cells shows presence of ciliated cells has been reported by Warthin though this occurrence must be rare as most other investigators have failed to find such cells.

Yoo 1994 Tumors associated with Tobacco smoking and the incidence in women appears to be rising.

1996 - Land et al – appear to be associated with exposure to ionizing radiation.

**ONCOCYTOMA**

Named and described by Hamper in 1931 84% occur in parotid mean age 58 years.

Bandwin 1991 – 20% in cases with irradiation to the region. Light brown colour tumor. Histologically the oncocytic cells are arranged in trabecular pattern.

1986 Feiner et al - luman of glandular spaces may contain psammma bodies.

1998 Gilcrease et al described Tyrosine rich crystals.

**BASAL CELL ADENOMA**

10% occur in Parotid gland. Four histological types. Solid, trabecular, tubular and membranous. The tumor cells are clearly separated from the nonmucoid stroma by a well defined basement membrane. Peripheral pallisading is characteristic.

1986 Chromette et al - cytoplasmic interdigitations and anchoring by membrane bound desmosomes are seen electron microscopically.

1981 Batsaki's et al - found in some examples that basal cell adenoma exhibits a well developed hyaline type of BM that closely resembles with skin appendage or dermal analogue tumor.

**ACINIC CELL CARCINOMA**

The tumor was originally regarded as a adenoma as it may recur and metastasize. Now it is regarded as a low grade malignancy.

1948 Godwin & Colwin - Almost 90% arise in the parotid gland, more common in women in $5^{th}$ – $6^{th}$ decade. Pattern of growth may be predominantly solid, microcystic, papillary cystic or follicular.

1965 Abrcms et al - Laminated concretions with the appearance of psamonic bodies may be seen with in the lumina.

1990 ITO K et al - a neuroendocrine component may also be present which is identified by its argyrophila and presence of dense coarse granules ultra structurally.

1997 Michal et al found that lymphoid follicles with germinal centers may be prominent at the periphery of the tumor.

1999 Depowski et al reported a few familial cases.

2003 Ran et al - reported a case of parotid swelling in a patient infected with HIV where infection of ACC following FNAC led to diagnostic difficulty in subsequent aspirate.

**MEC**

The tumor was first described by Stewest et al in 1945 who reported 45 cases. Earlier Mason & Berger who described the neoplasm as ‘epithelioma a double metaplasia’. 67% occur in parotid.

1979 Nicolator et al - The histological examination exhibits epidemoid cells growing in solid pattern, mucus producing cells and intermediate, so called basal cells.

1986 Miura et al - clear cell make up may be seen.

1975 Sidhu et al - oncolytic change may also be encountered.

1970 Healy et al - Histologically been divided into low grade and high grade types.

2003 Tamiolaxis et al - reported a case of malignant MEC in the accessory parotid gland.

**ADENOID CYSTIC CARCINOMA**

First described in 1859 by Billroth who referred the tumor as a cylindroma (that describe the cylinder like top hat) characteristic of the above lesion. In 1908 Krompecher, termed it basalioma. The term ACC was introduced by Ewing in 1954.

Occurs in 10% of all Salivary gland tumors.

Most common in submandibular and minor salivary gland.

Histology shows varied glandular differentiation coupled with local invasion and perineural infiltration. The sub types cribriform or classic, solid or basaloid and tubular variant.

1992 Ozono et al - observed hormone receptor expression.

PLGA was first identified by Bat Sakis et al in 1983 and by Fredman & Lumerman in 1983.

Arise from intro oral minor salivary gland is microscopically, is characterized by cytological uniformity and morphological diversity.

**MALIGNANT MIXED TUMOR**

The terms simply describes a salivary neoplasm that microscopically contain elements of mixed parotid tumor as well as elements of carcinoma.

1996 Allclair et al described prominent zones of hyalinization and a moderate degree of mitotic activity.

1977 Li Volsi et al have pointed out that the cytologically malignant foci are found entirely with the mixed parotid tumor.

1984 Tortoledo et al described that both epithelial and mesenchymal like elements have a malignant appearance and the term carcinoma ex pleomorphic adenoma was inappropriate and Stephen et al 1986 proposed the term True Malignant Mixed Tumor or Carcinosarcoma.

**ANAPLASTIC SMALL CELL CARCINOMA (NEUROENDOCRINE CARCINOMA)**

Recognised since 1972 by Koss et al who coined the name oat cell Carcinoma. The demonstration of neuro secretary granules is essential.

1985 Woodruff found a microscopic variant resembling to medullary Carcinoma of thyroid.

**FINE NEEDLE ASPIRATION BIOPSY**

For over 100 years pathologist concentrated more on diagnostic histopathology by analyzing the arrangement and functional pattern of cells.

For the past 60 years exfoliated and abraded samples of cells have been collected from accessible anatomical surfaces and examined by cytologist.

In 1883 Leyden and 3 years later in 1886 Menetrier employed needles to obtain cells and tissue fragments.

Sampling of tumors by means of narrow gauge needle was first described in the United States by Martin and Collis in 1930.

In 1933 Stewart commented that parotid tumors are particularly suited to aspiration and that he had examined 66 samples.

In 1950-1960’s the FNAC technique began to flourish in Scandinavia in Europe.

1964-76 Karohinska group published a series of 6 studies on FNA of salivary glands.

1987 Layfield et al identified 36 papers in a review of published work on aspirates from 3000 leisons.

1989 Jeyram et al in their study of 178 cases had the accuracy of cytodiagnosis 87.7% with the sensitivity of 80.9% and a specificity of 94.3%.

In 1989 Nettle and orell in their study described that the cytologic diagnosis by FNAB correlated exactly with the histologic diagnosis in 95% of benign neoplasms and 68% malignant neoplasm with overall accuracy of 88%.

In 1990 Cohen MB et al described the FNAB features in 34 cases of muco epidermoid carcinoma. The cytologic features are intermediate cells, squmous cells and overlapping epithelial groups, with these three features the sensitivity and specificity were 97%and 100% respectively.

In 1990 Sherman ME et al oncocytic metaplasia in the salivary gland of elderly patients and FNA biopsy is useful in evalving salivary gland lesions in elderly patients who are not candidate for surgery.

1992 Wein berger et al studied FNAC in 49 cases of Parotid gland lesions and the concurrance rate for distinguishing benign from malignant was 87.2% The sensitivity for malignant was 78.6% and the specificity was 90.9%.

1994 Jayaram et al found in their study of 247 cases, that the overall diagnostic accuracy of FNA cytology for neoplastic lesions was 91%. The sensitivity rate for detecting malignant tumors was 87.8 and the specificity was 98%. There was 100% sensitivity for diagnosis of Benign tumors.

In 1995, Pisharodi et al found the FNAB specimen of Basal cell adenocarcinoma contained cohesive, focally papillary and filiform groups of neoplastic cells which were highly remiscent of basal cell adenoma (on low power examination) on high power revelated significant cytologic atypia and mitotic activity.

1996 Le SS observed a plasmatoid appearance of individual tumor cells with abundant cytoplasm was a reliable finding in pleo adenoma, for differentiating it from adenoid cystic carcinoma.

1997 Nagell H et al cycologic findings in Acinic cell Carcinoma characterized by acinar differentiated tumor cells, vacuolated cells, cells resembling oncocytes along with pronounced lympho cytic reaction.

In 1997 Viguer JM, FNAC in pleomorehic adenoma with features of cellular atypia, cystic transformation, and presence of cylindromatous pattern.

1998 Moore JB et al described the cytologic findings in large cell undifferentiated Carcinoma which showed isolated loosely cohesive large cells with abundant cytoplasm and variably pleomorphic nuclei with prominent nucleoli. The pattern of positive Keratin, negative s100 and HMB 45 and lack of mucin production were helpful in correct diagnosis.

1998 Jayaram et al described that Squamous metaplasia of salivary ducts may mimic cystic squamous cell Carcinoma in FNAC which showed keratnizing squamuos cells with nuclear atypia.

2000 Li S et al described that the histologic alterations include the following squamous metaplasia, infarction, necrosis, sub epithelial stromal hyalinization, granulation tissue with fibrosis, haemorrhage, psuedoxanthomatous reaction and microcystic degeneration.

In 2000 Nasuti et al Non tyrosine crystalloids are produced by oncocytic cells and present as abundant polyhedral multifaceted crystalloids in the background of scanty cellular specimens of neoplastic and non neoplastic lesions.

In 2001 Henke et al - Cytologic findings showed yellow coloured fluid with red blood cells, lymphocyts and rare fragments of benign appearing salivary gland epithelium in Lymphangioma.

2001 Schneller et all FNAC showed clusters of minimally atypical epithelial cells in which occasional vacuolated cells containing mucin could be

seen. Histologic diagnosis of mucinous cystadenocarcinoma made but cytologically DD of MEC of low grade and mucinous adenocarcinoma has to be thought of.

In 2002 Mathur et al - Benign peripheral nerve, sheath tumor should be always considered in the DD of pleomorphic adenoma, if FNAC shows spindle cell lesions.

2003 Verma K, Kapik. K, Aspirates of oncocytoma are cellular, with oncocytic epithelial cells in sheets, papillary fragments and singly. Epithelial atypia was minimal and lymphoid component absent.

2003 Loducca et al Immuno expression of integrins beta 1, 3 & 4 in FNAC will be useful in diagnosis of malignant tumors.

2004 Vera Alvarez et al FNAC characterised by aggregates of uniform epithelial cells and cell groups bordered on thick basement membrane like material in Dermal analogue tumor.

In 1966 Eneroth described that aspirates contain sheets of flat polyhedral oncocytes that are scattered among amorphous debris mixed with lymphocytes in Warthins tumor.

In 1981, Droese described that the cytologic findings in sialadenitis smear contain a mixed population of neutrophils, foamy cells and endothelial cells.

1983 Hood et al – described the cytologic features of basal cell adenoma. The cells are uniform with scanty cytoplasm, oval nuclei, finely granular chromatin, sparse homogenous background material.

Orell 1995 - the hyaline globules in monomorphic adenoma are smaller and of relatively uniform size which differentiate it from adenoid cystic Carcinoma.

In 1984 Bottles et al found that tyrosine crystals has been noted in some cases of pleomorphic adenoma.

In 2004 Siewert et al concluded that ultra sound guided FNA of salivary glands is a safe procedure with a low prevalence of non diagnostic sampling.

In 2004 Cohan et al studied 258 patients who underwent FNAB between 1996 and 2000 with a positive and negative predictive value of 84 & 77% in malignant lesions, and 83 & 88% in benign lesions.

In 2004 Wong DS and Wong LY studied cystic parotid swelling, the incidence was 17.4%. The aspirates could be serosanguinous, serous or purulent according to the pathological nature of the lesions.

In 2004 Postema et al in their study of cytologic confirmation of malignancy by FNAC found that the sensitivity, specificity and the accuracy were 88% 99% and 96% respectively.

2003 He Y et al evaluated the effectiveness of FNAC in the diagnosis of parotid gland masses. The diagnostic accuracy was89.26%, the sensitivity for tumors was 91.25% and the specificity was 100%.

1999 Background et al described the technique of ultrasound guided 18 gauge (1.2mm) needle biopsy in parotid gland lesion which gave the diagnostic accuracy of 100%.

1999 chhieng et al described that in HIV infected cases, the majority of cystic salivary gland lesions are benign Lympho epithelial lesion.

In 1999 Domanski – said that Intravenous pyogenic granuloma occurring in parotid region may be interpreted as pleomorphic adenoma when it is presenting cytlogically as spindle cell lesion.

1997 Young and Kuhel described that in Acinic Cell tumor smears were stained with Diff-Quick, novel negative images of crystals were found intracytoplasmically and extra cellularly.

1976 Lind berg and akerman, studied the cytologic reports in 461 patients with final diagnosis during the year 1966-1972, and found that it had a exact agreement in 63% and false reports in 11% pts.

1985 Aufdemorte et al observed that Adenomatoid hyperplasia resemble low grade MEC in FNAC.

1986 Geisinger and Weidner commented that, atypia in reactive non neoplastic epithelium could result in a false positive diagnosis.

# AIM OF THE STUDY

Treatment of Parotid swellings is mainly based on clinical diagnosis and investigation. As we are living in the era of consumer act, among the investigations, biopsy takes the prime lead today as no treatment is possible without a pathological diagnosis.

Conventional preoperative biopsies like incisions and wedge biopsies and Tru – cut biopsies are contra indicated in parotid swellings for the fear of

1. damage to intra parotid vessels
2. damage to facial N.
3. seedling along the Needle tract in Tru-cut needle biopsy

Cytopathology comes as a handy and very useful tool to establish preoperative diagnosis in parotid swellings. Cyto pathology requires a good cytopathologist who is available in our Medical College. Hence this study is taken up to

1. Establish usefulness of cytopathology in the parotid swellings.
2. To compare its accuracy with postoperative histopathological report.
3. To study the complications, merits and demerits of the above procedure.
4. To derive statistical information from the data collected.

Hence, this topic has been taken for dissertation.

# MATERIALS AND METHODS

The materials were collected from 48 patients with parotid swellings – (all solid swellings), from the Department of Surgery, all surgical units Govt. Rajaji Hospital, Madurai. Clinical features and other information were filled up into a proforma. FNAC was performed on all patients who had clinical evidence of solid swellings of parotid. Histopathological report of the patients who underwent surgery were collected and compared with FNAC results.

# BASIC EQUIPMENT

1. 20ml disposable plastic syringe

2. # 23 G Disposable needle

   # 21G Disposable needle.

3. Alcohol preparation sponge
4. Microscopic glass slide.
5. Fixative solution – cytofix containing
6. Carbowax and alcohol.

**Aspiration Technique:**

Aspiration cytology necessitates reviewing the history of the patients, determining the clinical problem in relation to the lesion, the biopsy and finally deciding whether FNAC is justified.

# Patient Prepartion

A clear explanation of the procedure ensured the patient's consent and cooperation.

**Positioning of the patient:**

Procedure was carried out with the patient lying supine on an ordinary examination couch. While positioning the patient for FNAC, the patient should be comfortable and the mass must be readily palpable and easily grasped.

**When aspirating the parotid gland swelling the patient was positioned with the head turned to the opposite side and with slight extension of neck so that the lesion became more prominent.**

**Antisepsis:**

**Simple disinfection (cetrimide swabs) as for routine injection was used. It is preferable to use isopropyl alcohol swab.**

**Anaesthesia:**

No form of anaesthesia was employed in this study.

**Needle Insertion:**

The lesion was grasped with one hand and fixed. Skin was prepared with antiseptic. Then the needle attached to the syringe was quickly pushed into the swelling. Better control of needle is obtained by supporting the barrel of the syringe by the free hand.

**Aspiration:**

Full suction was applied to the syringe while the needle was moved back and forth in quick strokes in slightly different direction without releasing the negative pressure. Suction was released as soon as any material appeared in the well of the needle and the syringe with the needle was withdrawn. The syringe was detached from the needle, filled with air, reattached and the material in the needle blowed on to glass slide. Function of the negative pressure is not to tear cells from tissues but to hold the tissue against the sharp cutting edge of the needle. The soft tissue components that protruded over the edge were cut or scraped off and accumulate in the lumen of the needle as it was advanced through the tissue. Aggregates of tumour cells, glandular and epithelial structures are softer and more friable than the supporting stroma and

are therefore selectively sampled whereas the stroma is poorly represented in the aspirate. One should never wait to see material entering into the syringe.

After aspiration, pressure was applied to minimize Oozing.

**Failure to obtain a representative sample:**

The possible reasons for failure in obtaining a representative sample are:

1. If a tumor is narrowly missed and needle passes it tangentially only, the adjacent inflammatory reaction is sampled and an erroneous diagnosis of an inflammatory process may be made.

2. Central necrosis, haemorrhage or cystic change are commonly seen in tumours and if the aspirate is taken from such areas no diagnostic cells may be found in the smears.

**Preparing the aspirate:**

**Aspirate material was smeared on the glass slide with a coverslip or other glass slide. Before the smear dries up, it was fixed by covering the slides with cytofix**

**solution. The cytofix solution was allowed into contact for about 2 minutes and the slide was air dried.**

About 2 slides were prepared of each representative sample. The slides were properly labeled and sent to Department of Pathology, where the slides were stained with Haematoxylin and Eosin and mounted for examination.

All the slides were examined and reported by only one pathologist in order to get good results.

## PRECAUTIONS DURING ASPIRATION

1. While performing aspiration the junction of needle and hub of syringe should be observed for appearance of any specimen. Aspiration is stopped immediately to avoid dilution of aspiration with blood or fluids

2. The needle should never be withdrawn from the mass with any vacuum in the syringe. If this happens the aspirate will be lost into the syringe and diluted with air which immediately causes drying artifacts.

3. If a cyst is aspirated, the area should be reexamined for any residual mass, which if present should be aspirated again.

4. Prepared smears must be immediately covered with a fixative to prevent drying artefact.

5. When aspirating two lesions needle should be changed for each one.

**Staining Procedures:**

Eosin Solution 5%

Harris Hematoxylin

Dilute Ammonium Hydroxide

(Add one drop of concentrated ammonium hydroxide to 1000ml of distilled water).

## STAINS

| | |
|---|---|
| 1. Harris Hematoxylin | 2 minutes |
| 2. Tap Water | Several Drips |
| 3. Dilute Ammonium Hydroxide | 1 to 2 dips |
| 4. Eosin Y | 30 seconds |
| 5. Tap Water | Several Dips |
| 6. Tap Water | Several Dips |
| 7. 95% Ethyl alcohol | Several Dips |

| | |
|---|---|
| 8. Absolute Ethyl alcohol | Several Dips |
| 9. Absolute Ethyl alcohol | Several Dips |
| 10. Acetone | Several Dips |
| 11. Xylol | 1 minute |

cover the slide with coverslip.

# ANATOMY

Parotid gland is predominantly a serous salivary gland.

It has a irregular shape because it fills in the gap between the mastoid process, Ramus of Mandible and styloid process. It has upper & lower poles and 3 surfaces – lateral, anterior and deep.

It is surrounded by tough capsule, the parotid sheath, derived from investing layer of deep cerical fascia.

Upper pole is concave, adheres to the cartilage of external acoustic meatus and lies adjacent to capsule of temporomandibular joint.

Lower pole is subcutaneous

Anterior Surface clasping the ramous of mandible with masseter on its outer surface inferiorly, the outer edge of this surface meets the lateral surface over masseter to form the convex anterior border, deep to which emerge the parotid duct and five branches of the facial nerve that fan out over the face. From the Deeper part of this surface, the terminal branches of the external carotid artery leave the gland.

Deep Surface is indented by the mastoid process and lies against stytoid process. External carotid artery enters the gland through the lower part of this surface. The styloid process separates the gland from the internal jugular vein.

Embedded within the gland are facial nerve, retromandibular vein and external carotid artery from superficial to deep. The gland is arbitrarily divided into superficial and deep parts by this faciovenous plane of PATEY. Lymph node of the preauricular group may be found within the gland substance. The gland is penetrated by auriculo temporal nerve which provides the secretomotor fibres.

Parotid duct (Stensen), 5cm long, passes forwards across the masster to pierce the buccinator. The duct opens on the mucous membrane of the cheek opposite the upper second molar tooth.

Blood Supply – through external carotid artery.

Venous drainage by Retromandibular vein.

## CLASSIFICATION OF SALIVARY GLAND TUMORS (SIMPLIFIED)

| Type | Sub group | Common examples |
|---|---|---|
| I. Adenoma | Pleomorphic<br>Monomorphic | Pleomorphic Adenoma<br>Adenolymphoma, Warthin's |
| II. Carcinoma | Low grade<br><br><br><br>High grade | Acinic cell carcinoma.<br>Adenoid cystic carcinoma<br>Low grade muco epidermoid carcinoma,<br>Adenocarcinoma<br>Squamous carcinoma<br>High grade muco Epidermoid carcinoma |
| III. Non epithelial tumours | | Haemangioma,<br>Lymphangioma |
| IV. Lymphomas | Primary lymphomas<br>Secondary lymphomas | Non Hodgkins lymphomas<br>Lymphomas in Sjogren syndrome |
| V. Secondary tumours | Local<br>distant | Tumours of head & neck<br>Skin & bronchus |
| VI. Unclassified tumours | | |
| VII. Tumours like lesions | Solid lesions<br><br>Cystic lesions | Adenomatoid Hyperplasia<br>Benign lymphoepithelial lesion,<br>Salivary gland cysts. |

# FNAC FEATURES

**FNAC features of parotid gland lesions:**

Though disease free salivary glands are impalpable and therefore not a target for FNAC, knowledge of the normal parotid anatomy is essential. Because normal cells may always be obtained by FNAC along with abnormal.

**NORMAL FNAC findings of parotid:**

Contain

1. Acinar cells
2. Ductal cells

Acinar cells are large with abundant cytoplasm and small round uniform nuclei. The cytoplasm is finely granular in serous glands and clear to lightly vacuolated in mucous glands. Either type is fragile and easily disrupted by smearing so that bare dispersed nuclei may be present in the back ground. When complete acini are aspirated the cells occur in lobulated group.

**Ductal cells:**

The larger ducts are lined with columnar epithelium and the smaller ones with cuboidal cells. Normal epithelial cells are usually found in flat sheets displaying good cohesion and uniform morphology.

Small pointed nuclei arising from myeopithelial cells present between the epithelium and basement membrane may occasionally be identified.

Oncocytosis of both ductal and acinar tissue occurs with age and group of polygonal oncocytes with granular cytoplasm are not uncommon in aspirates from elderly.

**Non Neoplastic Disease:**

**1. Simple parotid cyst**

**The aspirated fluid will contain cholesterol crystals, macrophages, debris and degenerated squamous cells.**

**2. Acute Sialadenitis**

Commonly due to specific bacterial or viral origin which is clinically obvious, FNAC is not indicated.

**3. Chronic Sialadenitis**

The aspirated material may show only normal salivary gland acini. Rarely may show presence of lymphocytes.

**4. Graulomatous Sialadenitis – Sarcoidosis**

# Multinucleated giant cells and clusters of epitheloid cells against a background of lymphocytes are seen in aspirates.

**5. Benign lympho epithelial lesion**

Ranges from localised myo epithelial Sialadenitis to systemic Sjogren's syndrome are included in this benign Sialadenopathy.

**Aspirate contains**

- many reactive lymphoid cells, plasma cells and histiocytes
- Clusters of myo epithelial cells are sometimes present

## Neoplasms

**1. Pleomorphic adenoma**

Criteria for diagnosis

Cellular aspirates with large amount of myxoid background matrix.

- Epithelial cells singly or in sheets
- Cell nuclei vary in size but have uniform chromatin
- Spindle shaped mesenchymal cells

- Chondroid material sometime seen

## Problems in diagnosis

1. The predominance of one element leading to apparent absence of other components.
2. If the epithelial cells are very numerous and the mesenchymal material is not readily apparent, the tumor may be misdiagnosed as monomorphic adenoma.
3. If muco myxomatous component is very abundant, the lesion may be mistaken for a retention cyst.

**2. False suspicion of malignancy**

Occasionally, pleomorphic adenoms are densely cellular and display marked cytological atypia showing loss of cohesion and nuclear enlargement and hyperchromasia of epithelial cells.

If the globules are few and other cellular features of pleomorphic adenoma are present, false suspicion of malignancy should not be raised.

Epithelial atypia in an otherwise typical mixed tumour should not generally be interpreted as indicated as indicating malignancy unless of severe degree. Malignant change in these lesion is exceptional. Its diagnosis requires

the co existence of poorly differentiated malignant cells and the usual components of pleomorphic adenoma.

3. The distinction between pleomorphic adenoma and adenoid cystic carcinomas is not easy. Myxoid acellular material may occur in both and globules of basement membrane material, so characteristic of adenoid cystic carcinoma can sometimes be seen in pleomorphic adenoma.

4. Mucin production by pleomorphic adenoma is another difficulty in differentiating from

Adenolymphoma and

Low grade Muco epidermoid carcinoma.

5. Extensive squamous mataplasia may pose problems in distinguishing from muco epidermoid carcinoma.

## Mono morphic adenoma

**Warthins tumor:**

1. Watery or mucoid aspirate
2. Sheets of large pale columnar oncocytes
3. Admixture of lymphocytes
4. Back ground debris.

## Problems in diagnosis

1. Obtaining representative material may be difficult. Both oncocytic and lymphoid tissue may be sparse, absent, obscured by mucoid debris.

2. The mucoid material with flakes of homogenous and granular debris is rather characteristic but not specific and similar material may be aspirated from muco epidermoid tumours or necrotic malignancies.

3. Degenerate oncocytic cells may closely resemble squanous cells and may appear quiet atypical.

Confusion with matastatic or primary squamous cell carcinomas with central cystic degeneration may occur. Confusion with oncocytoma is possible, though the oncocystic cells in the latter should be in three dimensional clumps rather than flat sheets as in Warthins tumour.

**Oncocytoma**

## Criteria for diagnosis

1. Cohesive three dimensional clumps of oncocytic cells with small regular nuclei.

2. Absence of fluid, debris and lymphoid cells,

**Problems in diagnosis:**

1. Oncocytomas may be cystic and may be confused with Warthins tumour.

2. Malignant oncocytic neoplasms have been described.

## Other adenomas

**Very uncommon**

**Criteria for diagnosis**

1. Numerous cell clusters with few dissociated cells
2. Regular round or oval nuclei and sparse cytoplasm
3. Small amount of homogenous stromal tissue

## Carcinomas

**1. Acinic cell carcinoma**

**Criteria for diagnosis**

- Large cohesive tumour cells with fragile granular cytoplasm and dark nuclei
- Bland mono morphic picture
- Clean back ground with bare nuclei but no necrosis.

**Problems in diagnosis:**

1. The resemblance of acinic cells to oncocytes
2. Abundant cytoplasm may also be present in the cells of mucopidermoid tumour and adeno carcinoma. It should be noted

that intra cellular mucus vacuoles are not found in acinic cell tumour.

**2. Muco epidermoid tumour:**

**Criteria for diagnosis**

- ❖ Mucoid material in low grade types
- ❖ Large vacuolated glandular tumor cells
- ❖ Intermediate cell with sparse cytoplasm
- ❖ Squamous cells inconspicuous in low grade tumor
- ❖ High grade tumor include squamous and intermediate cells
- ❖ Absence of mucus glandular cells in high grade tumors

**Problems in diagnosis:**

1. More anaplastic forms are difficult to distinguish cytologically from other poorly differentiated primary carcinoma or metastasis.
2. Benign lesions such as retention cysts or other simple cysts as well as inflammatory lesion may yield mucus, debris, mataplastic squamous cells and glandular cells in a combination simulates muco epidermoid tumour.

## Adenoid cystic carcinoma

**Criteria**

- ❖ Cellular aspirate

- ❖ Clusters of monomorphic tumour cells with hyperchromatic nuclei
- ❖ Circular globules of mucoid material surrounded by tumour cells
- ❖ Similar material with elongated processes.

**Problems in diagnosis:**

1. **Distinction from mono morphic adenoma is a problem if globular bodies cannot be found.**
2. More anaplastic forms of adenoid cystic carcinoma may resemble anaplastic carcinoma from other sites.
3. Pleomorphic adenomas may contain areas indistinguishable from adenoid cystic carcinoma. If there is any suggestion of myxoid mesenchymal tissue in a smear with globular bodies, caution should be exercised in diagnosing adenoid cystic carcinoma.

Dermal sweat gland neoplasms may closely resemble adenoid cystic carcinoma in aspiration smears.

## Adenocarcinoma

**Criteria for diagnosis :**

1. Obvious nuclear features of malignancy
2. Intra cellular and / or extracellular mucus secretion

**Problems in diagnosis :**

1. Metastatic adeno carcinoma
2. Poorly differentiated muco epidermoid carcinoma
3. Other poorly differentiated carcinomas.

**Carcinoma ex pleomorphic adenoma:**

- ❖ Scanty cytoplasm with pleomorphic hyperchromatic nuclei
- ❖ Residual evidence of benign mixed tumour is seldom evident
- ❖ Anaplastic picture

# OBSERVATION

**In the 2 year study period from June – 2004 to June-2006 FNAC from 60 cases of parotid swelling received form all surgical units, general surgery department, Govt. Rajaji Hospital, Madurai. Among them, 48 cases had post surgical histopathological correlation.**

## CYTOLOGIC DIAGNOSIS

Out of the 48 smears, benign salivary gland tumor was reported in 26 cases. Among them pleomorphic adenoma was the commonest tumor (24 cases) observed. Mucoepidermoid carcinoma was the common malignant tumor (7 cases) encountered. 9 cases were reported as non neoplastic lesion.

**Table No.1**

**CYTOLOGIC DIAGNOSIS**

| FNAC Diagnosis | No. of cases | Incidence Percentage (%) |
|---|---|---|
| **BENIGN** | | |
| Pleomorphic Adenoma | 24 | 50.00 |
| Warthin tumor | 1 | 2.08 |
| Oncocytoma | 1 | 2.08 |
| **MALIGNANT** | | |
| Mucoepidermoid carcinoma | 7 | 14.58 |
| Acinic cell carcinoma | 2 | 4.16 |
| **NON NEOPLASTIC** | 9 | 18.75 |
| Unsatisfactory | 4 | 8.3 |

# HISTOPATHOLOGICAL DIAGNOSIS

With histopathological study the most common benign tumor encountered was pleomorphic adenoma (43.75%). Among the malignant tumors, mucoepidermoid carcinoma (22.91%) was the commonest lesion. In the non neoplastic lesions, one case of actinomycosis was reported.

**Table No. 2**

**HISTOPATHOLOGICAL DIAGNOSIS**

| HP Diagnosis | No. of cases | Incidence Percentage (%) |
|---|---|---|
| Pleomorphic Adenoma | 20 | 41.66 |
| Warthin tumor | 1 | 2.08 |
| Oncocytoma | 1 | 2.08 |

| | | |
|---|---|---|
| Neurofibroma | 1 | 2.08 |
| Mucoepidermoid carcinoma | 11 | 22.91 |
| Acinic cell carcinoma | 2 | 4.16 |
| Carcinoma ex pleomorphic adenoma | 3 | 6.25 |
| Non neoplastic | 9 | 18.75 |

# CORRELATION BETWEEN CYTOLOGICAL AND HISTOPATHOLOGICAL DIAGNOSIS

In the present study 24 cases were cytologically diagnosed as pleomorphic adenoma. Among them 19 cases were subsequently histopathologically confirmed. Among the rest of 5 cases, one case was reported as tuberculous sialadenitis. The other 3 cases were false negatively diagnosed as benign lesions, but histopathology revealed carcinoma in pleomorphic adenoma and one case was found to be neurofibroma.

7 cases, which were given as mucoepidermoid carcinoma in cytology and later confirmed by histopathology. 2 cases had been reported in cytology as acinic cell carcinoma and confirmed by histopathology.

Of the 9 cases, which were reported as non neoplastic lesions in cytology, five cases were found to be chronic non specific sialadenitis, one

case of tuberculous sialadenitis, one case of actinomycosis of parotid gland and one case as a benign lymphoepithelial cyst in histopathology. One case was reported as a cystic lesion in cytology later found to be a low grade mucoepidermoid carcinoma.

Among the four unsatisfactory smears, 3 cases were found to be mucoepidermoid carcinoma and one case of pleomorphic adenoma in histopathology.

## Table - 3

## CORRELATION BETWEEN CYTOLOGICAL AND HISTOPATHOLOGICAL DIAGNOSIS

| FNAC diagnosis | No. of cases | Pleomorphic adenoma | HP diagnosis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Warthin tumour | Onco cytoma | Neuro Fibroma | MEC | ACC | Car. in ple. Adeno | Non neoplastic |
| Plemorphic adenoma | 24 | 19 | | | 1 | | | 3 | 1 |
| Warthin tumor | 1 | | 1 | | | | | | |
| Oncocytoma | 1 | | | 1 | | | | | |
| MEC | 7 | | | | | 7 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ACC | 2 | | | | | | 2 | | |
| Non neoplastic | 9 | | | | | 1 | | | 8 |
| Unsatisfactory | 4 | 1 | | | | 3 | | | |
| **Total** | **48** | **20** | **1** | **1** | **1** | **11** | **2** | **3** | **9** |

# PLEOMORPHIC ADENOMA

In the present study, a cytological diagnosis of pleomorphic adenoma was made in 24 cases, 19 cases were proved in histopathology. One case was reported as tuberculous sialadentits (false positive) in histopathology. The other 3 cases were false negatively diagnosed as benign lesions, but in histopathology it revealed carcinoma in pleomorphic adenoma and one case was fond to be neurofibroma and hence the sensitivity of FNAC in diagnosis of pleomorphic adenoma in our series is 86.36% while the specificity is 90.9% with the diagnotic accuracy of 88.63%.

**MUCOEPIDERMOID CARCINOMA:**

Final confirmatory histopathological diagnosis of mucoepidermoid carcinoma was made in 7 (True positive) out of 7 cases with initial cytological diagnosis of mucoepidermoid carcinoma. One case was false negatively reported as cystic lesion in cytology, but histopathology showed features of mucoepidermoid carcinoma.

After evaluating the above findings, the sensitivity, specificity and accuracy in detecting mucopidermoid carcinoma were found to be 87.5%, 100% and 97.72% respectively.

## WARTHIN TUMOR

Out of 48 cases of FNAC studied, only one case was detected as Warthin tumor. This was later confirmed in histopathology with a diagnostic accuracy of 100%.

## ONCOCYTOMA

One case of oncocytoma was reported in cytology. Histopathology also revealed the same and the diagnostic accuracy was found to be 100%.

## ACINIC CELL CARCINOMA

**Acinic cell carcinoma was diagnosed in 2 cases out of the 48 smears. It was confirmed in histopathology examination and showed a diagnostic accuracy of 100%.**

## NON NEOPLASTIC LESIONS

**Among the 9 cases which were diagnosed in cytology as non neoplastic lesions, 5 cases were found to be chronic non specific sialadenitis and one case of**

**tuberculous sialadenitis. Actinomycosis and benign lymphoepithlial cyst were the other 2 cases. One case was false negatively diagnosed as cystic lesion but histopathology revealed mucoepidermoid carcinoma. In diagnosing non neoplastic lesion the sensitivity was 88.8%, while the specificity was 97.14% and the diagnostic accuracy was 95.45%.**

## DISCUSSION

**Recently FNAC is becoming a widely recognized practical and useful technique in the diagnosis of swellings of salivary glands.**

**The technique is simple and rapid, and no expensive instruments are needed. The cytological diagnosis is rapid and eliminated the need for**

**surgical procedures in some patients. Moreover it is safe and well tolerated by most patients.**

FNAC diagnosis and assessment of histopathological follow up and correlation

## PLEOMORPHIC ADENOMA

**Pleomorphic adenoma was the commonest benign tumor in our study. The criteria used to define pleomorphic adenoma were, chondromyxoid background, and varying combinations of epithelial and mesenchymal cells. (Figure)**

**Pleomorphic adenomas are well circumscribed tumors with smooth surface. The cut surface shows tan to white colour with myxochondroid zones.(Figure).**

**Histopathologically pleomorphic adenoma shows biphasic appearance with intimate admixture of epithelium and chondromyxoid stroma. (Figure)**

**The sensitivity of FNAC in diagnosing pleomorphic adenoma in our series is 86.36% while the specificity is 90.9%. Viguer et al also had the sensitivity and specificity of FNAC 92.6% and 98.4% respectively. The reason for low sensitivity in our study was due to 3 false negative cases. 3 cases of carcinoma in pleomorphic adenoma were reported as benign pleomorphic adenoma in cytology. The specificity in our study when compared to Viguer et al was low. This can be avoided by taking adequate samples and aspirations from multiple sites.**

**The cytologic variations in FNAC of pleomorphic adenoma must be considered inorder to avoid important errors in diagnosing salivary gland lesions.**

## WARTHIN TUMOR

**1 case has cytohistopathological correlation and was later histopathologically confirmed with the diagnostic accuracy of 100%. FNAC showed bland oncocytic cells in cohesive monolayered sheets and many lymphocytes. (Figure). Histopathologically Warthin tumor shows cystic spaces lined by papillary proliferation of bilayered oncocytic epithelium with a supporting lymphoid tissue rich stroma (figure).**

## ONCOCYTOMA

**1 case was diagnosed in cytology, and later confirmed by histopathology in a female patient. Cytology revealed sheets and group of cells with abundant granular eosinophilc cytoplasm, central or eccentric vesicular nuclei with distinct cell boundaries (Figure) Oncocytoma shows an organoid pattern of clusters of cells with abundant eosinophilic cytoplasm separated by thin fibro vascular strands in histopathology (Figure). The diagnostic accuracy in diagnosing oncocytoma was 100% in the present study.**

NEUROFIBROMA

**One case was diagnosed as neurofibroma in parotid gland, earlier in cytology it was reported as pleomorphic adenoma. Cytology revealed spindle**

**cells with moderate degree of cellular pleomorphism in a fibrillar background, and misdiagnosed as pleomorphic adenoma. Benign peripheral nerve sheath tumor should be considered in the differential diagnosis of pleomorphic adenoma as observed by Mathur et al.**

MUCOEPIDERMOID CARCINOMA

**In cytology, the smears showed dirty background with mucus material and cell debris. Cohesive clumps and sheets of cells and small streams of cells found within the mucus. Variation in cell type-intermediate,, squamous, mucin secreting cell with abundant cytoplasm were also observed (figure).**

**Mucoepidermoid carcinoma grossly present as grey to tan yellow solid mass, with multiple small cysts (Figure) according to the grading of the tumor.**

**Histopathology showed varying combinations of mucus, epidermoid and intermediate cells in both solid and cystic configuration. In high grade tumors solid growth with areas of necrosis and neural invasion are evident. Low grade mucoepidermoid carcinomas are prominently cystic in nature (figure).**

**The sensitivity, specificity and accuracy rates in detecting mucoepidermoid carcinoma were found to be 87.5%, 100% and 97.72 respectively. The diagnostic accuracy in the present study is in accordance with the study of Maheswari et al. The low sensitivity in our study was due to false negative**

**reporting of one case of mucoepidermoid carcinoma as a cystic lesion. The cytologic diagnosis of cysts should be interpreted with caution.**

ACINIC CELL CARCINOMA

**2 cases had been reported in cytology as acinic cell carcinoma with a 100% cytohistopathological correlation. Both were female patients with a history of recurrence. The cytology showed highly cellular smears. The cells were in cohesive clusters with mildly pleomorphic nuclei and abundant granular cytoplasm and were resembled acinar cells. In Giemsa stained smears the cytoplasm was vacuolated foamy and grey (figure).**

**Grossly acinic cell carcinoma was found as solid, multi nodular grey to yellow mass (figure).**

**Histopathology showed solid sheets of differentiated acinar cells traversed by thin fibrovascular strands. Clear cells were predominating the lesion in some cases (figure). The diagnostic accuracy in diagnosing acinic cell carcinoma was found to be 100%.**

NON NEOPLASTIC LESIONS

**One case was actinomycosis of parotid gland and one case was a benign lymphoepithelial cyst. In cytology one case was false positively reported as pleomorphic adenoma and histopathology revealed tuberculous sialadenitis. Tuberculous sialadenitis in cytology revealed epithelial cells and collections of epitheloid cells in a necrotic background.**

**Histopathology also showed epitheloid cell granulomas with Langhans giant cells .**

**Actinomycosis was reported in a single case which showed inflammatory cells in the cytology. Gram positive actinomycotic bacterial filaments with peripheral Hoeppli-Splendore reaction were observed in histopathological sections .**

**Non neoplastic lesions were reported with a sensitivity of 88.8%, specificity of 97.14% and the diagnostic accuracy of 95.45%. This is in accordance with a study of Maheswari et al.**

**The overall diagnostic accuracy in diagnosing salivary gland lesions was 86.36% in our study which is correlating with the studies conducted by Jayaram**

**et al and Maheswari et al. The comparative study is shown in Table No. 4**

**Table No. 4**

COMPARATIVE STUDY OF DIAGNOSTIC ACCURACY BY VARIOUS AUTHORS

| S.No. | Name of the Author | No. of cases | Diagnostic accuracy |
|---|---|---|---|
| **1** | **Jeyaram et al** | **141** | **73.6%** |
| **2** | **Orell and Nettle** | **106** | **88%** |
| **3** | **Maheswari et al** | **135** | **90.7%** |

| | | | |
|---|---|---|---|
| **4** | **Present study** | **48** | **86.36%** |

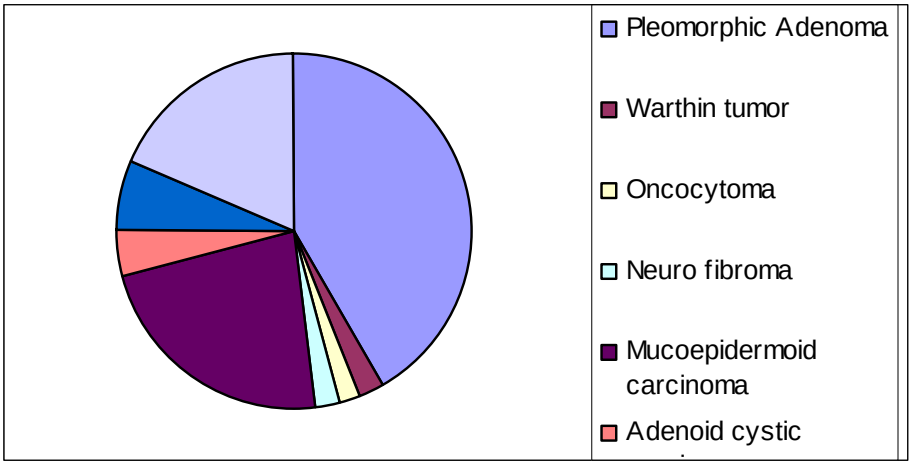
## CONCLUSION FROM OUR STUDY

1. **Cytopathology is one of the very useful and simple tool to establish**

**preoperative diagnosis and to plan treatment accordingly in parotid neoplasms.**

2. With the availability of a good cytopathologist the accuracy varies from 86% - 92%
3. Complications like tumour spill, change of pattern of lymphatic metastasis etc., are purely theoretical and not noted in our study.
4. A good caution must be taken is selection of the size of needle, technique of doing cytopathology – to achieve maximum accuracy and to avoid complications.

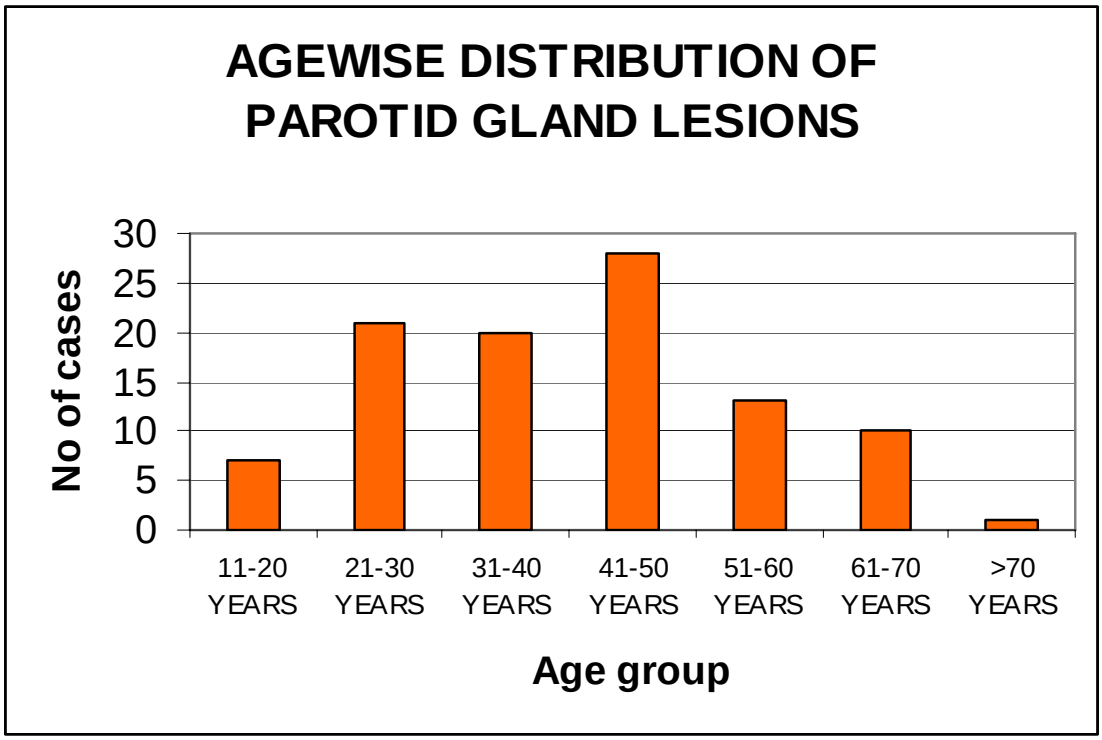
# INCIDENCE OF NEOPLASMS IN PAROTID




Out of all tumors pleomorphic adenoma occurs in parotid gland with the incidence of 41.70% . Warthin , oncocytoma & neurofibroma each accounts for 2.08%

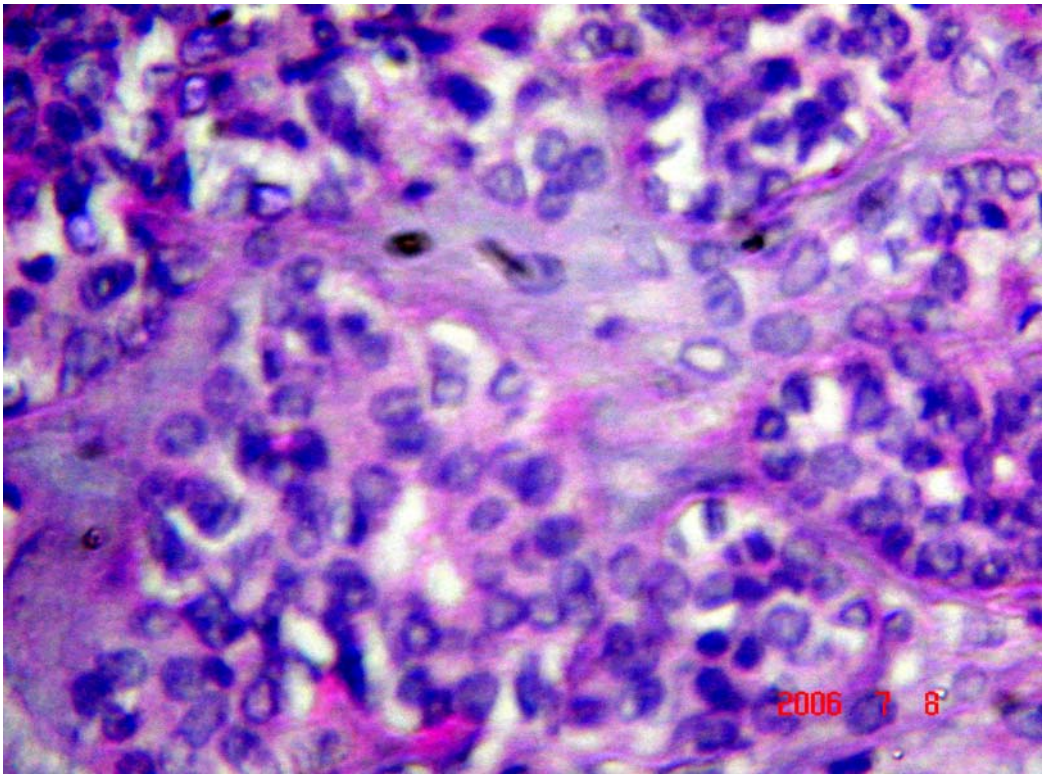
Muco epidermoid carcinoma occurs with incidence of 22.9%. Adenoid cystic carcinoma has an incidence of 4.16% . Carcinoma occurs in pleomorphic adenoma with an incidence of 6.25%

Non neoplastic lesion accounts for 18.75%

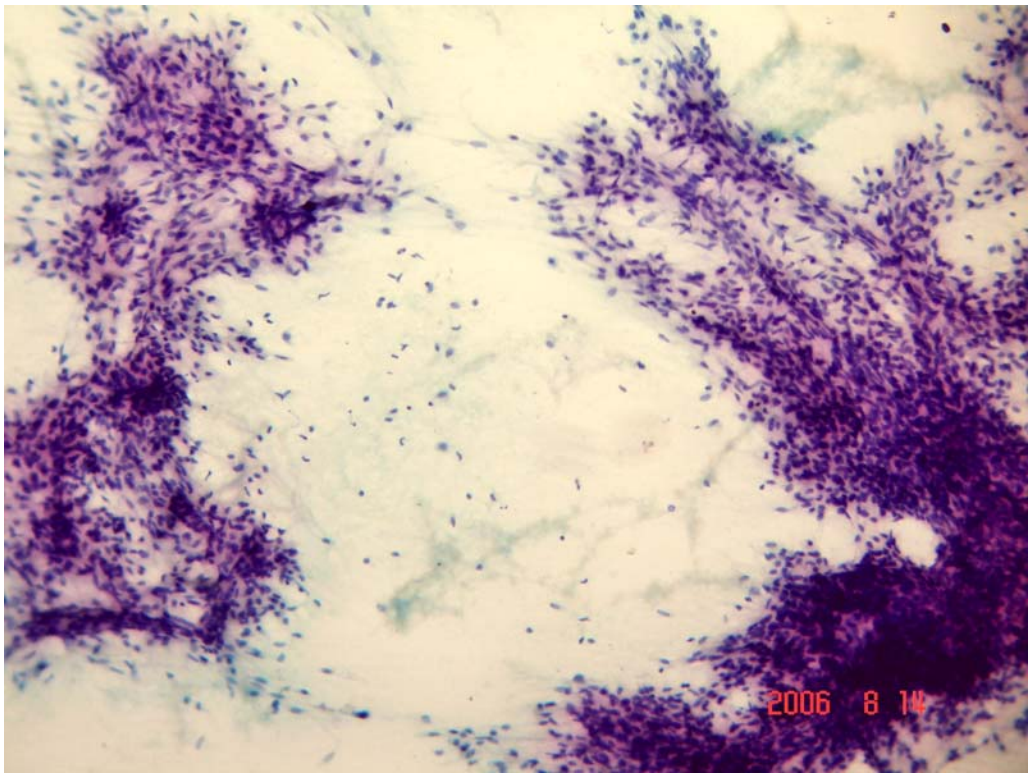



7% of tumors in parotid gland occur in age group of 11-20 years , 21% of tumors in parotid gland occur in age group of 21-30 years . 20% of tumors in parotid gland occur in age group of 31-40 years . 28 % of tumors in parotid gland occur in age group of 41-50 years . 13% of tumors in parotid gland occur in age group of 51-60 years . 10% of tumors in parotid gland occur in age group of 61-70 years. 1% of tumors in parotid gland occur in age group of >70 years

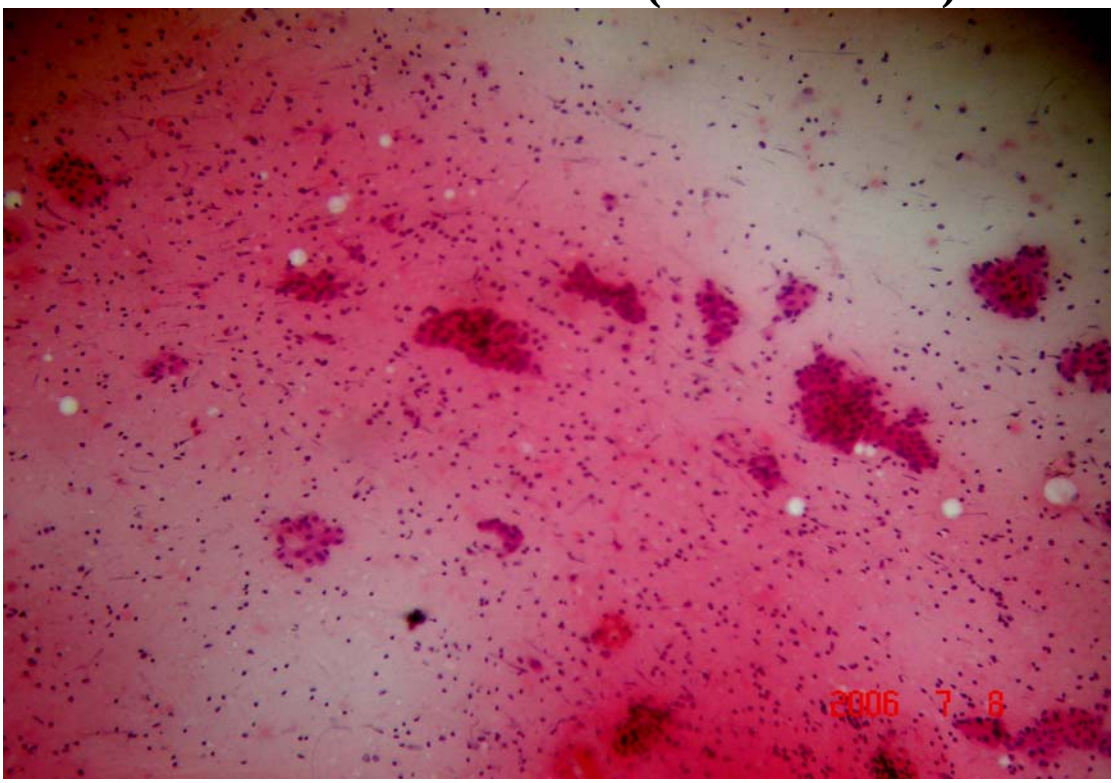
# PLEO MORPHIC ADENOMA (CYTOLOGY)



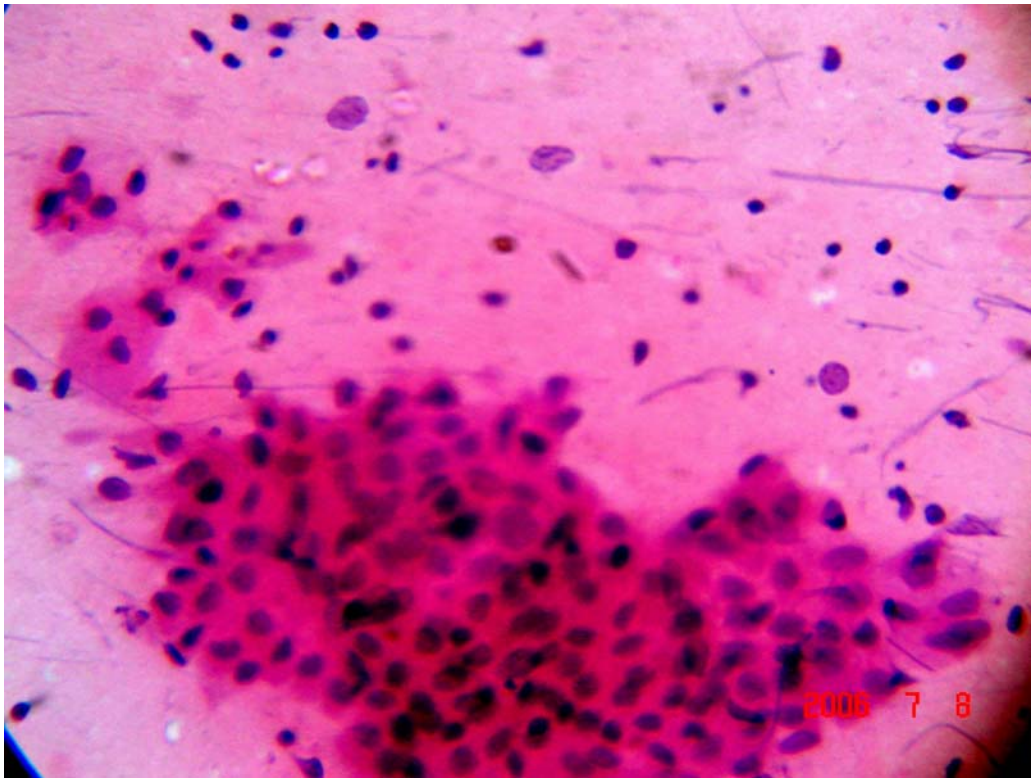

# PLEO MORPHIC ADENOMA (HPE)



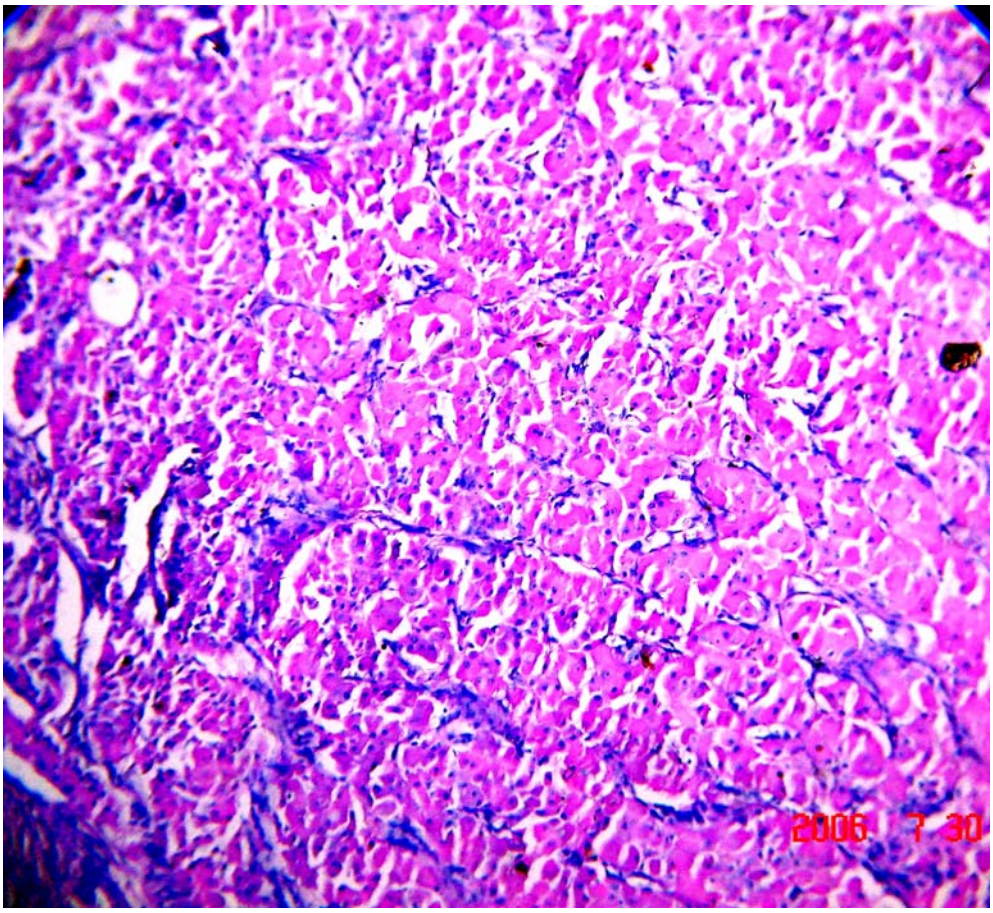

## WARTHIN'S TUMOR (CYTOLOGY)



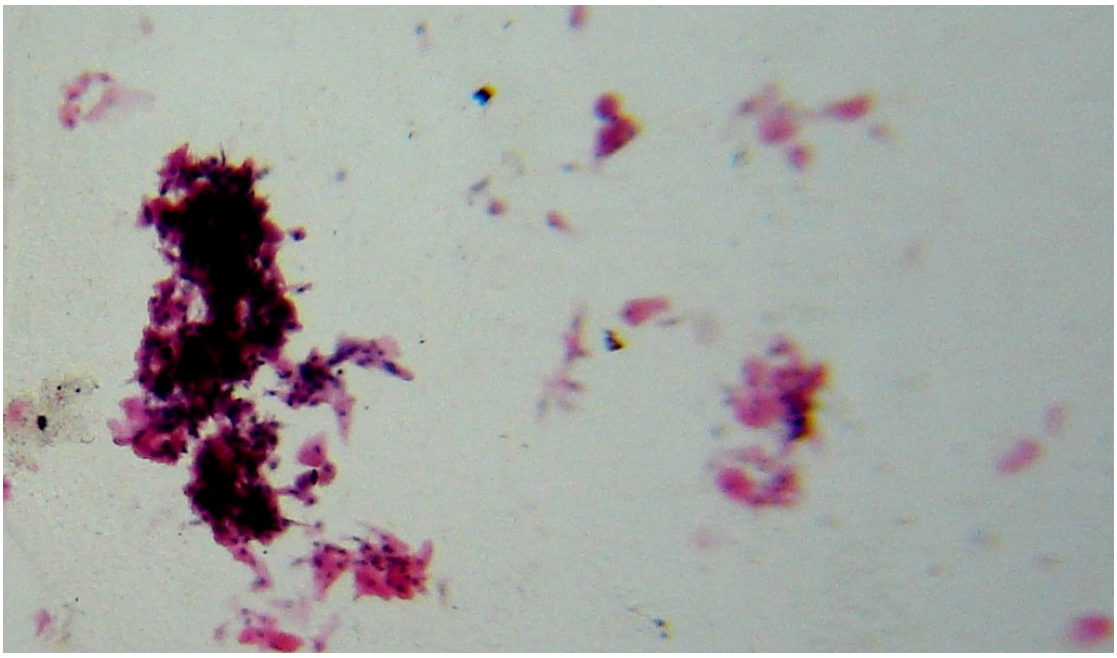
## WARTHIN'S TUMOR



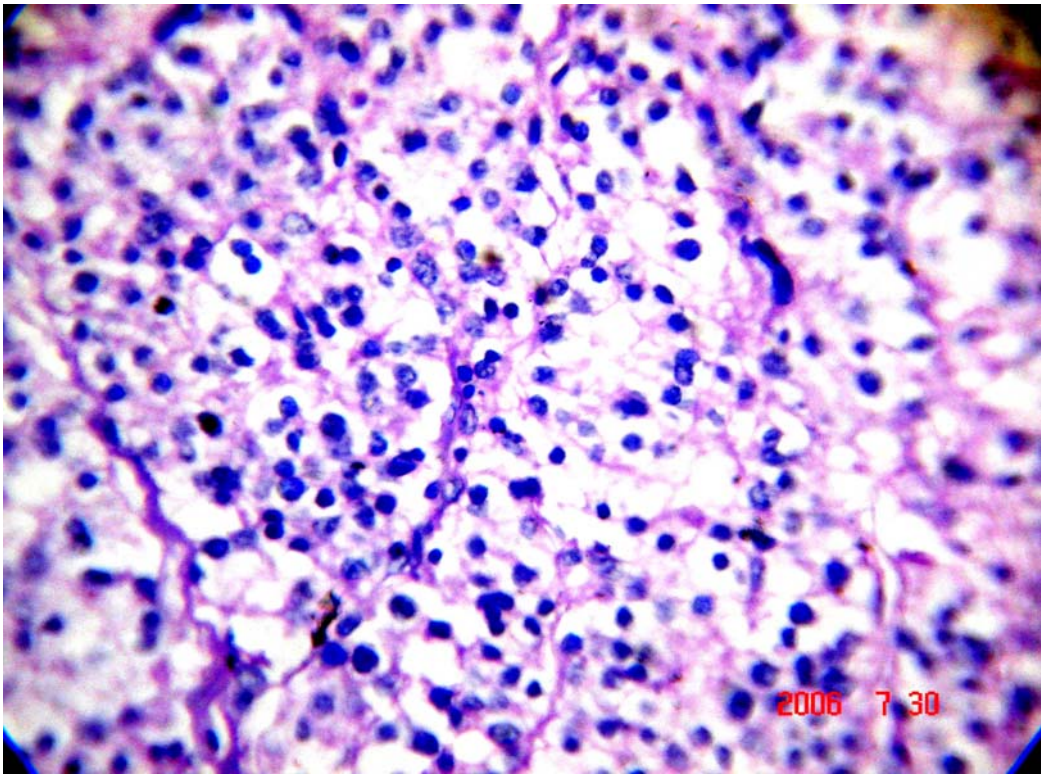

## ONCOCYTOMA (CYTOLOGY)



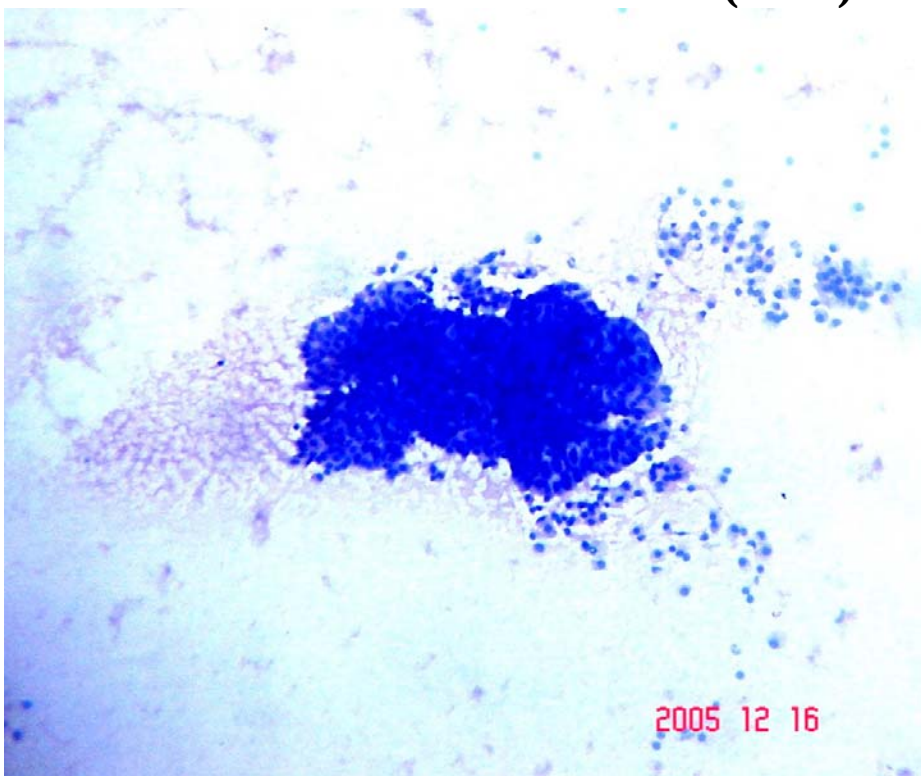

**ONCOCYTOMA (HPE)**



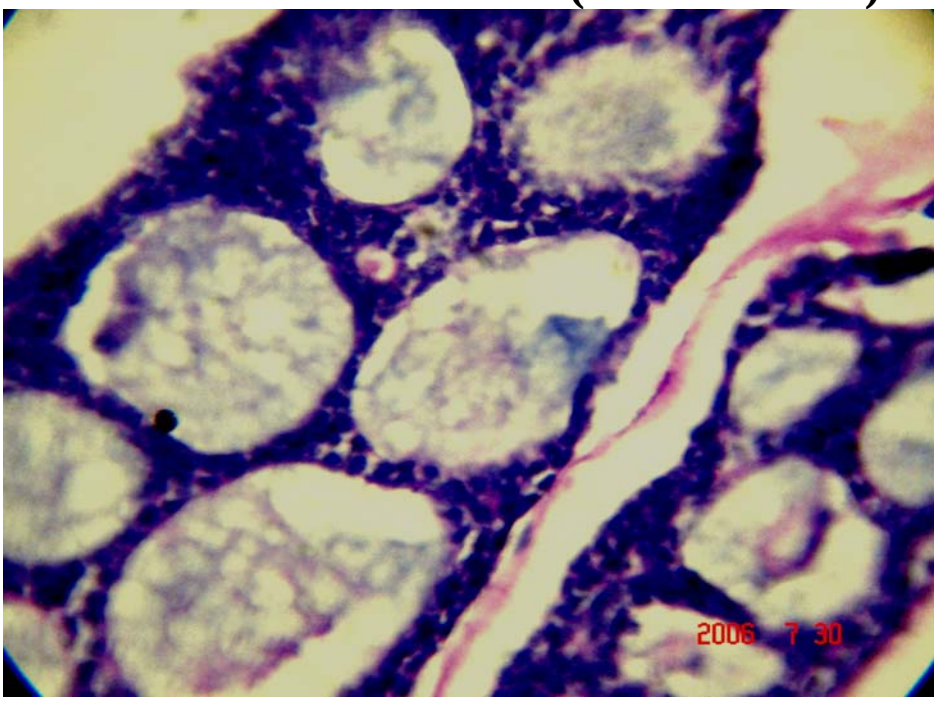
# ACINIC CELL CARCINOMA (CYTOLOGY)



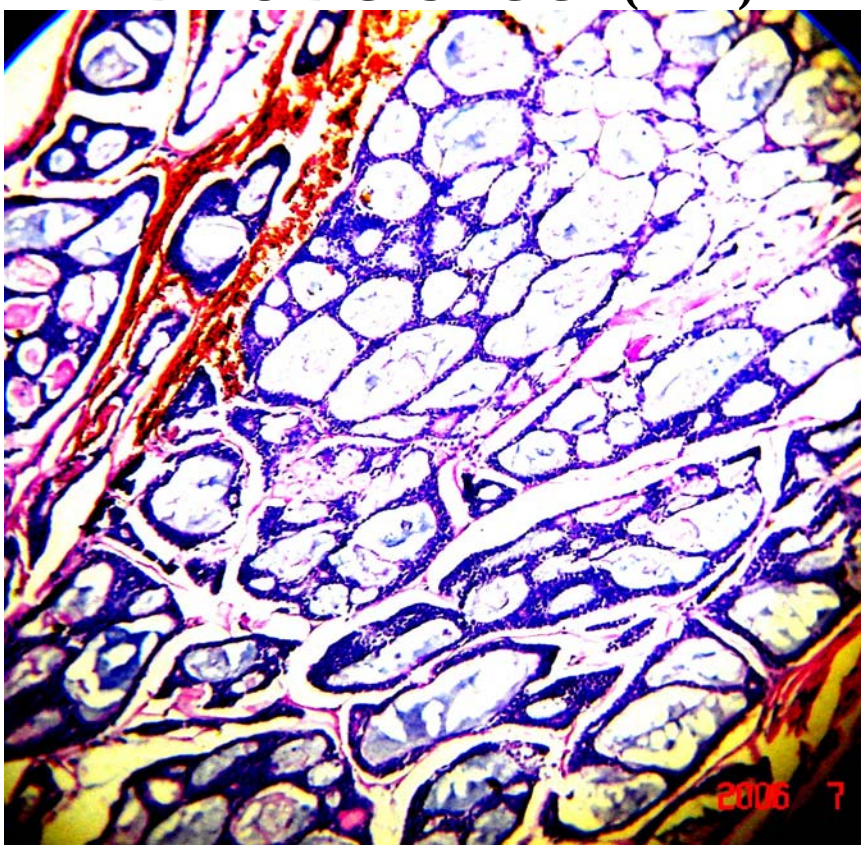
# ACINIC CELL CARCINOMA (HPE)



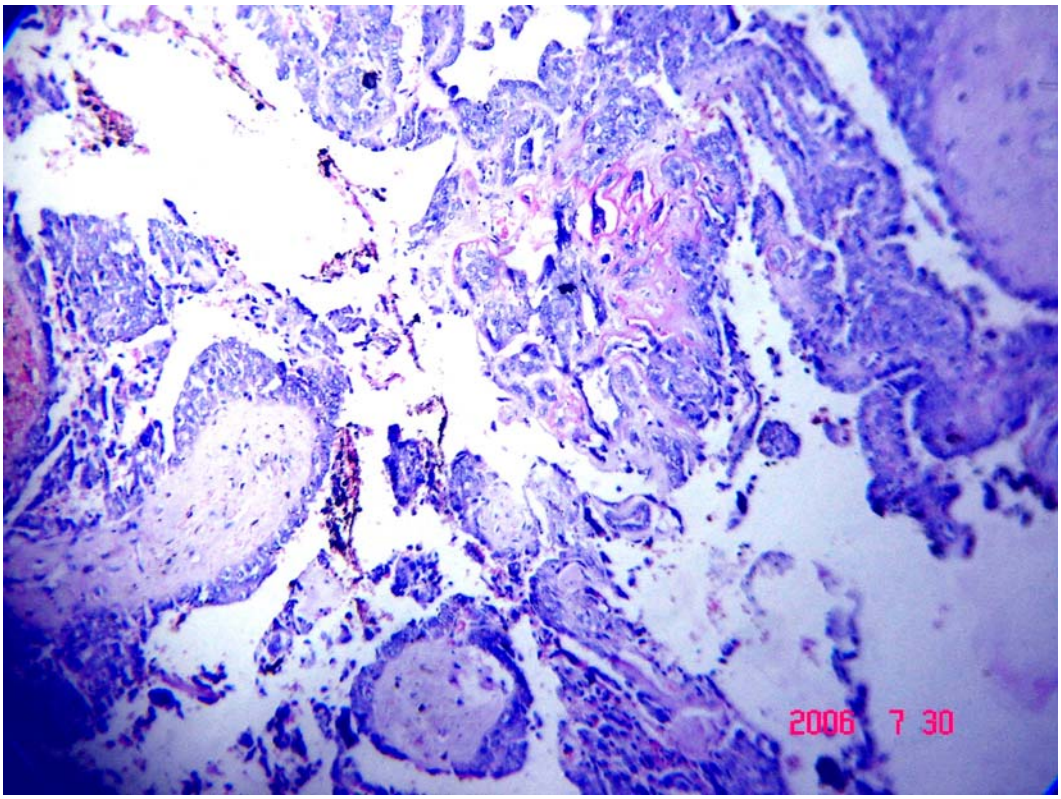

# ADENOID CYSTIC CA (CYTOLOGY)



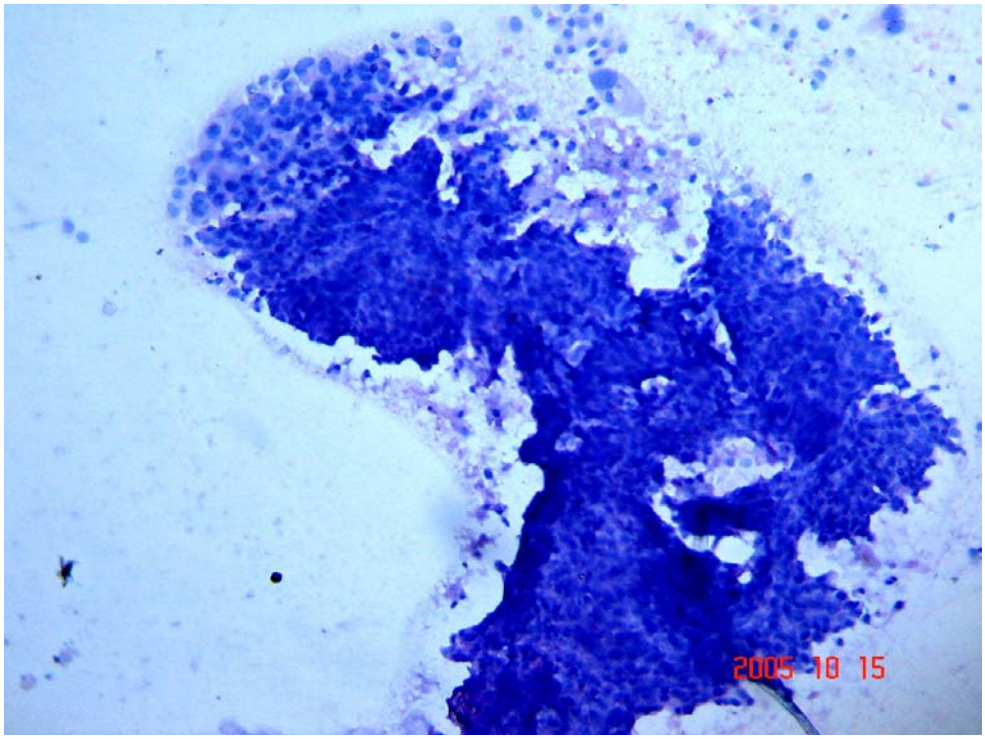
## ADENOID CYSTIC CA (HPE)




## MUCOEPIDERMOID CA (CYTOLOGY)




# MUCOEPIDERMOID CA (HPE)



Picture

There are advantages and disadvantage in using airdried. May Giemsa stained smears as against wet fixed papanicoloau (PaP) and Haematoxyln and Eosin preparations. In general the formes technique is used in haematology. The latter technique is more popular for the same reason wit those cytologist who have more histopathology background. However both methods are complimentary both should be employed because certain feautures are particularly distinctive in each; familiarity with both stains is indispensable in specific situations.

## FACTORS ESSENTIAL TO ACCURACY AND SUCCESS

For optimal accuracy FNAC should include a story clinical association. Ideally the clinician and cytopathogist should examine the patient, perform the aspiration, read the smears, discuss the appearances in the light of other investigations. If appropriate and deliver the report. In surgical practice it is necessary to repeat the whole procedure in 10 – 15% of cases.

## NOMENCLATURE

**FNAC is defined by Bamforth (1966) as follows “the examination of cells obtained**

**by needle or drill biopsy in solid organs (or) tissue masses of from the cut surface of such material freshly removed by surgical biopsy.**

The terminology of FNAB is also accepted.

## CURRENT CONSIDERATIONS

**The answer to the allegation that needle aspiration biopsy is inaccurate, certainly has a historical parallel with exfoliative cytology of all types particularly that most commonly practiced, cervical, vaginal cytological diagnosis.**

Many authors believe that Stewart's statement that "Diagnosis by aspiration is as reliable as the combined intelligence of the clinician and pathologist makes it", is as appropriate today as it was in 1993.

# LITERATURE REVIEW

History of the development of cytopathology especially of the last century and up to 5th decade of this century was published in the article "History of cytodiagnosis by linsk. J. A. the karolinska group and the book. "History of clinical cytology a selection of documents" by Zajicek J. et al in Acta laryngol stokh 1964.

As might be expected the era ofcytopathology was hearalded by 2 publications. First issue of Acta cytological in 1957, Now the oldest journal devoted to exclusively to cytopathology and 4 years later in 1961 by th epublication of "Diagnostic Cytology abd its Histo pathological basis" by Leopold. B. Koss and Grace R. Durfee.

Foundation of current practice of FNAC in salivary gland tumours were established by the Karolinska group headed by Linsk. J. A. who between 1964 – 76 published a series of 6 studies on FNAC od salivary glands. By 1987 aly field et al pulished 36 papers in the Archives pathological lab medicine 1987. Which together contained report of aspirates from 3000 salivary lesions.

Zajicek J. and Eneroth. C. M. published papers on, Morphologic investigations in smears and histological sections from oncocytic tumours mainly of papillary cystadenoma lymphomatosum in 1965 and on mixed tumours in 1966 and Adenoid cystic carcinoma 1969. On Acinic cell carcinoma in 1971 on Muco epidermoid carcinoma in 1979. All in the journals of Acta cytological.

Dr. Jeyaran. N. et al established value of cyto diagnosis of salivary gland lesions in the journal “Diagnostic Cytopathology 1989”.

Koc Jan et al has performed FNAC on 52 patients with salivary gland lesions. A definitive cyto diagnosis was possible in 45 cases. A sensitive of 89% and a specifity of 94% was achieved. The pitfalls of FNAC of salivary gland lesions are reflected by the false positive and false negative rates which were 4%. Errors of cyto diagnosis are due to the morphological variability of these tumours which make sampling and interpretation difficult.

# AIM OF THE STUDY

Treatment of Parotid swellings is mainly based on clinical diagnosis and investigation. As we are living in the era of consumer act, among the investigation biopsy takes the prime lead today as no treatment is possible with out a pathological diagnosis.

Conventional preoperative biopsies like incisions and wedge biopsies and Tru – cut biopsies are contra indicated in parotid swellings for the fear of

4. damage to authoparotid vesseh
5. damage to facial N
6. seedling along the Needle tract in Tru-cut needle biopsy

Cytopathology comes as handy but very useful tool to establish preoperative diagnosis in parotid cyto pathology requires a good cytopathologist who is available in our Medical College. Hence this study is taken up to

6. Establish usefulness of cytopathology in the parotid swellings.
7. To compare its accuracy with postoperative histopathological report.
8. To study the complications, merits and demerits of the above procedure.
9. To derive statistical information from the data collected.

Hence, this topic has been taken for dissertation.

# MATERIALS AND METHODS

The materials were collected from 48 patients with parotid swellings – all solid swellings), from the Department of Surgery all surgical units Govt. Rajaji Hospital, Madurai. Clinical fearures and other information were filled up into a proforma. FNAC was performed on all patients who had clinical

evident solid swellings of parotid. Histopathological report of the patients who underwent surgery were collected and compared with FNAC results.

# BASIC EQUIPMENT

7. 10ml disposable plastic syringe
8. # 23 G Disposable needle

   # 21G Disposable needle.
9. Alcohol preparation sponge
10. Microscopic glass slide.
11. Fixative solution – cytofix containing
12. Carbowax and alcohol.

**Aspiration Technique:**

Aspiration cytology necessitates reviewing the history of the patients, determining the clinical problem in relation to the lesion the biopsy and finally deciding whether FNAC is justified.

# Patient Prepartion

A clear explanation of the procedure will ensure the patients consent and cooperation.

**Positioning of the patient:**

Procedure was carried out with the patient lying supine on an ordinary examination couch. While positioning the patient for **FNAC the patient**

**should be comfortable and the** mass must be readily palpable and easily grasped.

**When anspirating the parotid gland swelling the pt is placed in head turned to opposite side and with slight extention of neck so that the lesion becomes more prominent.**

**Antisepsis:**

**Simple disinfection (cetrimide swabs) as for routine injection is used. It is preferable to use isopropyl alcohol swab.**

**Anaesthesia:**

No form of anaesthesia is employed in this study.

**Needle Insertion:**

The lesion grasped with one hand and fixed. Skin is prepared with antiseptic. Then the needle attached to the syringe is quickly pushed in to the swelling. The better controle of needle is obtained by supporting the barrel of the syringe by the free hand.

**Aspiration:**

Full suction is applied to the syringe while the needle is moved back and forth in quick strokes in slightly different direction with out releasing the negative pressure. Suction is released as soon as any material appears in the well of the needle and the syringe with the needle is withdrawn. The syringe is detached from the needle, filled with air, reattached and the material in the needle blowed on to glass slide. Function of the negative pressure not to tear cells from tissues but to hold the tissue against the sharp cutting edge of the needle the soft tissue components protrude over the edge are cut or scraped off and accumulate in the lumen as the needle advanced through the tissue. Aggregates of tumour cells, glandular and epithelial structures are softer and more friable than the supporting stroma and are therefore selectively sampled. Where as the stroma is poorly represented in the aspirate. One should never wait to see material entering in to the syringe.

After aspiration pressure should be applied to minimize Oozing.

**Failure to obtain a representative sample:**

The possible reasons for failure obtain a represntative sample are:

1. If a tumor is narrowly missed and needle pases it tangetitally only at the adjacent inflammatory reaction is sampled and an erroneous diagnosis of an inflammatory process amy be made.

2. Central necrosis, haemorrhage or cystic change commonly seen in tumours and if the aspitate is taken from such areas no diagnosis cells amy be found in the smears.

**Preparing the aspirate:**

**Aspirate material is smeared on the glass slide with a coverslip or nother glass slide. Before the smear dries up it is fixed by coverin ghte slides with cytofix solution. The cytofix solution is allowed into contract for about 2 minitues and the slide is air dried.**

About 2 slides are prepared of each representation sample. The slides were properly labeled and sent to Department of Pathology, where the sliders are stained with Haematoxylin and Eosin and mounted for examination.

All the slides are examined and reported by only one pathologist in order get good results.

# PRECAUTION DURING ASPIRATION

1. While performing aspiration the junction of needle and hub of syringe should be observed for appearance of any specimen. Aspiration is topped immediately to avoid dilution of aspiration with blood or fluids

2. the needle should never be withdrawn from the mass with any vacuum in the syringe. If this happens the aspirate will be lost into the syringe and diluted with air which immediately causes drying artifacts.

3. If a cyst is aspirated, the arease should be reexamined for any residual mass, which if present should be aspirated again.

4. Prepared smears must be immediately covered with a fixative to prevent drying artefact.

10. When aspirating two lesions needle should be changed for each one.

**Staining Procedures:**

Eosin Soultion 5%

Harris Hematoxylin

Dilute Ammonium Hydroxide

(Add one drop of concentrated ammonium hydraoxide to 1000ml of distilled water

| | |
|---|---|
| 1. Harris Hematoxylin | 2 minutes |
| 2. Tap Water | Several Drips |
| 3. Dilute Ammonium Hydroxide | 1 to 2 dips |
| 4. Eosin Y | 30 seconds |
| 5. Tap Water | Several Dips |
| 6. Tap Water | Several Dips |
| 7. 95% Ethyl alcohol | Several Dips |
| 8. Absolute Ethyl alcohol | Several Dips |
| 9. Absolute Ethyl alcohol | Several Dips |
| 10. Acetone | Several Dips |
| 11. Xylol | 1 minute |

12. Mount with permount and coverslip.

# Anatomy

Parotid gland is predoninantly a serous salivary gland.

It has a irregular shape because it fells in the gap between the mastoid process, Ramus of Mandible, styloid process. It is having upper & lower poles 3 surfaces – latered, antenior & deep.

It is surrounded by tough capsule, the parohid sheath, derived from incustay layer of deep cericalfasvia.

Upper pole is concare that adheres to the carhilage of Temporo mandibular joint

Lower pole is subcukneous

Anterior Surface clasping the ramous of mandible with massager on its ontu suyace inferioly, the ontu edge of this surface meels the latenl surface over masester to form the cover onteroir bordu, deep to which emerge the parohd duct and fine branches of the facial never that fan out over the 6 ace. From the Deeper part of this surface, the linunal branches of the external carotid artery leave the glad.

Deep Surface is indented by the mastoid process and his against stytoid process. External carolid a enters the gland through the lower part of this surface. The stylrid process separates the gland from the internal jugular vein.

Embedded uithis the gland are facial nerle, Retormendiaular vein and external carstid artery from superficial to deep. The gland is arbitrarily dinided into superfinial and deep by this faniovenous plane of PATEY Lymph rody of the preauriculou group may be within the gland substanc. The gland is peretrated by auroculo temporal never which provide the secretomoter fibres.

Parotid duct (stensen), 5cm long, pases forwards across the massdin to pierce the buccinator. The duct opens on the mucous memberance of the cheek opposite the upper second molar tooth

Blrvd Supply – this external carchid artery

Venous drairage by Retromandibular veni.

Classification of Salivary gland tumors (Simplified)

| Type | Insgroup | Common examples. |
|---|---|---|
| I. Aden our | Pleomorphic monomorphic | Pleomorphic Adenonur<br>Adeuolyphour |
| II. Carcinoma | Low grade<br><br><br><br>High grade | Acirci cell carcinoma.<br>Adenoid cystic carcinoma<br>Low grade meco epidermoid carunome<br>Adenocennoms squamous carrions high grade mnio<br>Gridermoid ca |
| III. Non epithelial famours | | Haemaryiome Lymphayious |
| IV. Lymphomas | Primary lymphomas<br>Secondary lymphomas | Non hodgkins lymphomas<br>Lymphomas in sjogrem syndrome |
| V. Secondary famous | Local<br>distant | Famous of head & neck<br>Skin & bronchus |
| VI. Unclassifined famous | | |
| VII. Famous like lesions | Solid legions<br><br>Cyshic lerions | Adenomatoid Hyperplaria<br>Benigr lymphoepithal lerian<br>Salivary gland cysts. |

FNAC FEATURES

FNAC features of parotid gland lesions:

Though disease free salivary glands are impalpable and there fore not a targe for FNAC, knowledge of the always be obtained by FNAC along with abnormal.

**NORMAL FNCA findings of parotid:**

Contain

3. Acinar cells
4. Ductal cells

Acinar cells are large with abundant cytoplasm and small round uniform unclei. The cytoplasm is finely granular in serous glands, clear to lightly vacuolated in mucous glands. Either type is fragile and easily disrupted by smearing so that bare dispersed nuclei may be present in the back ground. When complete acini are aspirated the cells occur in lobulated group.

**Ductal cells:**

The larger ducts are line with Columnar eoithlium and the smaller ones with cuboidal cells. Normal epithelial cells are usually found in flat sheets displaying good cohesion and uniform morphology.

Small pointed niclei arising fron myeopithelial cells. Present between the epithelium and basement membrane may occasionally be identified.

Oncocytosis of both ductal and acinar tissue occurs with age and group of polygonal oncoctes with granular eytoplasm are not uncommon in aspirates from elderly.

**Non Neoplastic Disease:**

**1. Simple parotid cyst**

**The aspirated fluid will contain cholesterol crystals, macrophages, debris and degenerated squamous cells.**

**2. Acute Sialadenitis**

commonly due to specific bacterial of viral origin which is clinically obvious FNAC is not indicated.

**3. Chronic Sialadenitis**

The aspirated material may show only normal salivary galnd acini. Rarely many show presence of lymphocytes.

**4. Graulomatous Sialadenitis – Sarcoidosis**

**multinucleated giant cells and clusters of epitheloid cells against a background of lymphocytes are seen in aspirates.**

**5. Benign lympho epithelial lesion**

Ranges from localised myo epithelial Sialadenitis to systemic sjogren's syndrome are includedin this benign sialadenopathy.

Aspirate contains

- many reactive lymphoid cells, plasma cells and histiocytes
- Clusers of myo epithelial cells sometimes present

## Neoplasms

**1. Pleomorphic adenoma**

Criteria for diagnosis

Cellular aspirates with large amount of my xoid background matrix.

- Epithelial cells singly or in sheets
- Cell nuclei vary in size but have uniform chromatin
- Spindle shaped mesenchymal cells
- Chondroid material sometime seen

# Problems in diagnosis

1. The predominance of one element leading to apparent absence of other components.

If the epithelial cells are very numerous and the mesenchymal material is not readily apparent the tumory may be misdiagnosed as monomorphic adenoma.

If muco myxomatous component is very abundant the lesion may be mistaken for a retention cyst.

**2. False suspicion of maliganancy**

Very occasional example of pleomorphic adenoms are densely cellular and display marked cytological atypiashowing loss of cohesion and nuclear enlargement and hyperchromasia of epithclial cells.

Epithelial atypia in an otherwise typical mixed tumour should not generally be interpreted as indicated as indicating malignancy unless of sever degreee, malignant change in these lesion is exceptiated malignant cells and the usual components of pleomorphic adenoma.

3. the distinction between pleomorphic adenoma and adenoid cystic carcinomas is not easy. Myxoid acellular material may occur in both and globules of basement membrane material, so characteristic of adenoid cystic carcinoma can sometimes be seen in pleomorphic adenoma.

4. Mucin production by pleomorphic adenoma is another difficulty in diagnosing from

Adenolymphoma and low grade

Muco epidermoid carcinoma.

5. Extensive squamous mataplasia may pose problems in distinguishing from muco epidermoid carcinoma.

**Mono morphic adenoma**

**Warthins tumor:**

5. Watery or mucoid aspirate
6. Sheets of large pale columnar oncocytes
7. Admixture of lympho cytes
8. Back ground debris.

## Problems in diagnosis

1. Obtaining representative material may be difficult. Both oncocytic and lymphoid tissue may be sparse, absent, obscured by mucoid deris.

2. The mucoid material with flakes of homogenous and gramular debris is rather characteristic but not specific and similar material may be aspirated from muco epidermoid tumours or necrotic malignancies.

3. Degenerate oncocytic cells may closely resemble squanous cells and may appear quiet atypical.

Confusion with matastatic or primary squamous cell carcuromas with central cystic degeneration may occur. Confusion with oncocytoma is possible, though the oncocystic cells in the latter should be in three dimentional clumps rather than flat sheets as in warthins tumour.

**Oncocytoma**

## Criteria for diagnosis

1. Cohesive three dimentional clumps of oncocytic cells with small regular nucler.

2. Absebce of fluid, debris and lymphoid cells,

**Problems in diagnosis:**

1. Oncocytomas may be cystic and may be confused with warthins tumour.

2. malignant oncocytic neoplasms have been described.

Other adenomas

Very uncommon

Criteria for diagnosis

4. Numerous cell clusters with few dissociated cells
5. Regular round or oval nuclei and sparse cytoplasma
6. Small amount of homogenous stromal tissue

# Carcinomas

**1. Acinic cell carcinoma**

**Criteria for diagnosis**

- Large cohesive tumour cells with fragile granular cytoplasm and dark muclei
- Bland mono morphic picture
- Clean back ground with bare nuclei but no necrosis.

**Problems in diagnosis:**

3. The resemblence of acinic cells to oncocytes
4. Abundant cytoplasm may also be present in the cells of mucopidermoid tumour and adeno carcinoma. It should be noted that intra celluar mucus vacuoles are not found in acinic cell tunour.

**2. Mico epidermoid tumour:**

**Criteria for diagnosis**

- Mucoid material in low grade types
- Large vacuolated glandular tumor cells
- Intermediate cell with sparse cytoplasm
- Squamous cells inconspicuous in low grade tumor
- High grade tumor include squamous and intermedia cells

- Absence of mucus glandular cells in high grade tumors

**Problems in diagnosis:**

1. More anaplastic froms are difficult to distinguish cytologically from other poorly differentiated primary corcinoma or metastasis.

2. Benign lesions such as retention cysts or other simple cysts as well as inflammatory lesion may yield mucus, debris, mataplastic squamous cells and glandular cells in a combination simulates muco epidermoid tumour.

**Adenoid cystic carcinoma:**

**Criteria**

- cellular aspirate
- clusters of mono morphic tumour cells with hyperchromatic nuclei
- circular globules of mucoid material surrouded by tumour cells
- similar material in elongated processes.

**Problems in diagnosis:**

**4. distinction from mono morphic adenoma is a problem if globular bodies can be found.**

5. more anaplastic forms of adenoid cystic carcinoma may resemble anaplastic carinoma from other sites.
6. pleomorphic adenomas may contain areas indistinguishable from adenoid cystic carcinoma. If there is any suggestion of myxoid mesenchymal tissue in a smear with globular bodies, caution should be exercised in diagnosis adenoid cystic carcinoma.

Dermal sweat gland neoplasms may closely resemble adenoid

# cystic carcinoma in aspiration smears.

## Adenocarcinoma

**Criteria for diagnosis :**

3. Obvious unclear features of malignancy
4. Intra cellular and / or ectra cellular mucus secretion

**Problems in diagnosis :**

4. Metastatic adeno carcinoma
5. Poorly differentiated muco epoidermoid carcioma
6. other poorly differentiated carcinomas.

**Carcinoma ex pleomorphic adenoma:**

- Scanty cytoplasm with pleomorphic hyperchromatic nuclei

- Residual evidence of being mixed tumour is seldom evident
- Anaplastic picture

## OBSERVATION

**In the 2 year study period from June – 2004 to June-2006 FNAV from 60 cases of parotid swelling receited form all surgical units, general surgery department, Govt. Rajaji Hospital, Madurai. Among them, 48 cases had post surgical histpathological correlation.**

## CYTOLOGIC DIAGNOSIS

Out of the48 smears, being salivary gland tumor was report in 26 cases among them pleomorphic adenoma was the commonest tumor ( 24 cases) observed

Mucoepidermoid carcinoma was the common malignant tumor (7 cases) encountered. 9 cases were reported as non neoplastic lesion.

## HISTOPATHOLOGICAL DIAGNOSIS

With histopathology study the most common benign tumor encountered was pleomorphic adenoma (43.75%). Among the malignant tumors mucoepidermoid carcinoma (22.91%) was the commonest lesion. In the non neoplastic leions, one case of actinomycosis was reported.

# CORRELATION BETWEEN CYTOLOGICAL AND HISTOPATHOLOGICAL DIAGNOSIS

In the present 24 cases were cytological as pleomer phic adenoma. Among them 19 cases were subsequently histopathology. One case was reported as tureculous sialadenitis. The other 3 cases were false negative diagnosis as being lewsions, but histopathlogy revealed carcinoma in pleomorphic adenoma and one case was found to be neurofibroma.

7 cases, which were given as mucoepidermoid carcinoma in cytology and later confirmed by histopathology by 2 cases had been reported in cytology as acinic cell carcinoma and confirmed by histopathology. Of the

9 cases, which were reported as non neoplastic lesions in cytology, five cases were found to be chronic non specific sialadenitis, one case of tuberculous sialadenitis, one case of actinomycosis of parotid gland and one case as a benign lymphoepithelial cyst in histopathology. One case was reported as a cystic lesion in cytology later found to be a low grade mucoepidermoid caricinoma.

Among the four unsatisfactory smears, 3 cases were found to be mucoepidermoid carcinoma and one case of pleomorphic adenoma in histthology.

# PLEOMORPHIC ADENOMA

In the present study, a cythological pleomorphic adenoma was made in 24 cases, 19 cases were proved in histopathology. One case was reported as tuberculous saildentits (false positive) in histopathology. The other 3 cases were false negatively diagnosis as benign lesions, but in histopathology it revealed carcinoma in pleomorphic adenoma and one case was fond to be Neurofibroma and hence.

The sensitivity of FNAC in diagnosis pleomorphic adenoma in our series is 86.36% while the specificity is 90.9% the diagnosis accuracy is 88.63%.

**MUCOEPIDERMOID CARCINOMA:**

Final confirmatory histopathology diagnosis of mucoepidermoid carcinoma was made in 7 (True positive) out of 7 cases with initial cytological diagnosis of mucoepidermoid carcinoma. One case was false negatively reported as cysticlesion in cytology, but histopathology showed features of mucoepidermoid carcinoma.

After evaluating the above findings, the sencificity and accuracy in detecting mucopidermoid carcinoma were found to be 87.5%, 100% and 97.72% respectively.

## WARTHIN TUMOR

Out of 48 cases of FNAC studied, only one case was detedcted a warthin tumor. This was later confimed in histopathology with a diagnostic accuracy of 100%.

## ONCOCYTOMA

One case of oncocytoma was reported in cytology. Histopathology also revealed the same and the diagnosis accuracy was found to be 100%

## ACINIC CELL CARCINOMA

**Acinic cell carcinoma was diagnosed in 2 cases out of the 48 smears. It was confirmed in**

**histopathology examination and showed a diagnosis accuracy of 100%**

## NON NEOPLASTIC LESIONS

Among the 9 cases which were diagnosis in cytology as non beoplastic lesions, 5 cases were found to be chornic non specific sialadenitis and one case of tuberculous sialadenitis. Actinomycosis and being lymphoepithlial cyst were the other 2 cases. One case was false negative reported as cystic lesion but histopathology revealed mucoepidermoid carcinoma. In diagnosing non neoplastic lesion the sentitivity was 88.8%, while the specificity of 97.14% and the diagnostic accuracy of 95.45%.

## DISCUSSION

**Recently FNAC is becoming a widely recognized practical and useful technique in the diagnosis masses in salivary glands.**

**The technique is simple and rapid, and no expensive instruments are needed. The cytological diagnosis is rapid and eliminated the need for**

**surgical procedures in some patients. Moreover it is safe and well tolerated by most patients.**

**The salivary gland lesions in the present study shows the incidence rate of 0.98%, which is fairly correlating with similar studies onducted other centers. Sevakumaran et al showed the incidence rate of 0.6%.**

**FNAC diagnosis and assessment of histopathological following and correlation**

PLEOMORPHIC ADENOMA

**Pleomorphic adenoma was the commonest benign tumor in our study. The criteria used to define pleomorphic adenoma were, chondromyxoid**

**backgound, and varying combinations of epithelial and mesenchymal cells. (Figure )**

**Pleomorphic adenmas are well circumscribed tumors with smooth surface. The cut surface shows tan to while colour with myxo chomdroid zones.(Figure).**

**Histopathologically pleomorphic adenoma shows biphasic apperance with intimate admixture of epithelium and chondromyxoid stroam. (Figure)**

**The sensitivity of FNAC in diagnosing pleomorphic adenoma inouor series is 86.36% while the specificity is 90.9% vaguer et al also had the sensiticity and specificity of FNCA 92.6% and 98.4% respectively. The reson for low sensitivity in our study was due to 3 false negative cases. 3 cases of**

**carcinoma in pleomorphic adenoma were reported as pleomorphic adenoma in cytology. The specificity in our study when compared to vaguer et al was low. This can be avoided by taking adequate samples and aspirations from multiple be considered inorder to avoid important errors in diagnosis salivary gland lesions.**

WARTHIN TUMOR

**1 case has cytohistopathological correlation and was later high cythological confirmed with the diagnosis accuracy of 100%. FNAC showed bland oncocytic cells in cohesive monolayered sheets and many lymphocytes. (Figure). Histopathologically warthin tumor shows cystic spaces lined by papillary**

**proliferation of bilayered oncocytic epithelium with a supporting lymphoid tissues rich storma.(figure).**

ONCOCYTOMA

**1 case was diagnosis in cytology, and later confirmed by histopathlogy in a female patient. Cytology revealed sheets and group of cells with abundant granular eosinophilc cytoplasm,, central or eccentric vesicular nuclei with distinct cell boundaries (Figure ) Oncocytoma shows an organoid pattern of clusters of cells with**

## CONCLUSION FROM OUR STUDY

**5. cytopathology is one of the very useful and simple tool to establish preoperative diagnosis and to plan**

**treatment accordingly in parotid neoplasms.**

6. With the availability of a good cytothologist the accuracy varies from 86% - 92%
7. Complications like tumour spill, change of pattern of lymphatic metastasis ets., are purely theoretical and not noted in our study.
8. a good caution must be taken is selection of the size of needle, technique of doing cytopathology – to achieve maximum accuracy and to avoid complications.

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