PROSPECTIVE STUDY ON MANAGEMENT OF SALIVARY GLAND TUMOURS AND ITS OUTCOME IN GOVT RAJAJI HOSPITAL, MADURAI

DISSERTATION SUBMITTED TO

THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY
CHENNAI - 600032.

M.S. DEGREE EXAMINATION

BRANCH I – GENERAL SURGERY

Reg no 221711115

DEPARTMENT OF GENERAL SURGERY

MADURAI MEDICAL COLLEGE AND GOVERNMENT RAJAJI HOSPITAL, MADURAI – 625020.

CERTIFICATE

BY THE GUIDE AND THE HEAD OF THE DEPARTMENT

This is to certify that the dissertation entitled "**PROSPECTIVE STUDY ON MANAGEMENT OF SALIVARY GLAND TUMOURS AND ITS OUTCOME IN GOVT RAJAJI HOSPITAL, MADURAI**" submitted by **Dr.MANIKANDAN.U** to Tamil Nadu Dr. M.G.R Medical University, Chennai , done in partial fulfilment of the requirement of the award of MS Degree Branch – I (General Surgery), is a bonafide research work carried out by him under direct supervision and guidance from JUNE 2018 to JUNE 2019 in the Department of General Surgery, Madurai Medical College.

Dr.K.G.Subangi., M.S., D.G.O
Professor of General Surgery ,
Department of General Surgery,
Madurai Medical College, Madurai.

Dr.A.M.Syed Ibrahim., M.S., FAIS
Professor & Head of the Department,
Department of General Surgery,
Madurai Medical College, Madurai.

CERTIFICATE BY THE DEAN

This is to certify that the dissertation entitled " **PROSPECTIVE STUDY ON MANAGEMENT OF SALIVARY GLAND TUMOURS AND ITS OUTCOME IN GOVT RAJAJI HOSPITAL, MADURAI"**is a bonafide research work done by **DR.MANIKANDAN.U,** Post Graduate Student, Department of General Surgery, MADURAI MEDICAL COLLEGE AND GOVERNMENT RAJAJI HOSPITAL, MADURAI, under the guidance and supervision of **DR.K.G.SUBANGI M.S., D.G.O ,** Professor , Department of General Surgery, MADURAI MEDICAL COLLEGE AND GOVERNMENT RAJAJI HOSPITAL, MADURAI.

DR.K.VANITHA M.D, DCH,
DEAN
MADURAI MEDICAL COLLEGE
MADURAI

DECLARATION BY THE CANDIDATE

I, **DR.MANIKANDAN.U** hereby declare that this dissertation entitled "**PROSPECTIVE STUDY ON MANAGEMENT OF SALIVARY GLAND TUMOURS AND ITS OUTCOME IN GOVT RAJAJI HOSPITAL, MADURAI**" is a bonafide and genuine research work carried out by me in the Department of General Surgery, Madurai Medical College during the period of JUNE 2018 TO JUNE 2019. I also declare that this bonafide work or a part of this work was not submitted by me or any others for any award, degree, diploma to any other University, Board either in India or abroad. This is submitted to The Tamilnadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of regulations for the award of M.S. degree (Branch I) General Surgery course.

Dr.MANIKANDAN.U
Post graduate
Dept. of General Surgery,
Madurai Medical College,
Madurai-625020.

ACKNOWLEDGEMENT

I take this opportunity to extend my gratitude and sincere thanks to all those who have helped me complete this dissertation. I am extremely indebted and remain forever grateful to my guide, **Prof**.**Dr.K.G.Subangi M.S.,D.G.O.,** Professor of Surgery, a person who has mastered the art of surgery, for her constant able guidance and constant encouragement in preparing this dissertation and also throughout my post - graduate course.

I express my gratitude towards **Prof.Dr.A.M.Syed Ibrahim M.S.,FAIS,** Head of the Department of General Surgery, Madurai Medical college, Madurai, for his valuable suggestions, support and guidance.

It gives me immense pleasure to express my deep sense of gratitude and sincere thanks to my beloved assistant professors **Dr.G.Saravanakumar M.S.,D.A, Dr.K.S.Gokulnath Premchand M.S.,D.ORTHO**, and **Dr.S.Hemankumar M.S,** for their guidance, encouragement and support during my postgraduate course.

I thank the respected Dean of Madurai Medical College and Govt. Rajaji Hospital **Prof.Dr.K.VANITHA M.D., DCH**, for permitting me to conduct this study in the Department of General Surgery, Govt.Rajaji Hospital, Madurai.

I thank my Patients, colleagues, family and friends, without whom, this study would not have been possible.

Dr.MANIKANDAN.U
Postgraduate
Dept. of General Surgery,
Madurai Medical College,
Madurai-625020.

CONTENTS

INTRODUCTION

The salivary gland tumours constitutes about 6% of tumours of head and neck. Cancer arising in the salivary glands is a challenging problem for the head the neck surgeon. The relative rarity of these cancer makes it difficult to study their biologic activity and response to therapy. The intricate and difficult anatomy of the facial nerve and the submandibular triangle present technical challenges in surgical dissection.

The goal of surgery for salivary gland cancer is en-bloc resection of the cancer with clear surgical margins and minimal morbidity - Ries *et al.*, 1991.

In the historical survey, little was written about the salivary glands up to the middle of the 17th century. In 1660, Neil Stenson discovered the parotid duct in sheep's head and named it after him. Thomas Wharton in 1656 identified the submandibular gland and duct and hence it is called Wharton's duct. Bartholinus in 1669 identified the sublingual gland. Early operations on the parotid gland were reported by Siebold in 1781. Samuel white of Hudson, from United states successfully did the first surgical removal of the parotid gland in 1808.

The first attempt at Total Parotidectomy with preservation of the nerve was done by Codreanu in 1892. Blair in 1912, Sistrunk in 1921 and Bailey in 1941 demonstrated clear anatomy and different methods to protect the nerve.

The first clinical description of a parotid tumour was done by Mr.Kaltschmeid in 1772. A classification of salivary gland tumour based on gross morphology was given by Auguste Bernard in 1841. Further contributions to the literature on Salivary glands came from Virchow in 1863, Minsen in 1874, Adson in 1923, Warthin in 1929, James in 1934, Radon in 1934 and Billroth 1959. A new concept of conservative surgery was described by David Patey in 1965.

AIMS AND OBJECTIVES

AIM OF THE STUDY:

To study the outcome of patients diagnosed with Salivary gland tumours, managed surgically in Govt. Rajaji Hospital, Madurai.

OBJECTIVES OF THE STUDY:

- To estimate the burden of salivary gland tumors in GRH, Madurai.
- To surgically manage the patients with Salivary gland tumours
- To analyze the outcomes and complications associated with surgery

REVIEW OF LITERATURE

INTRODUCTION

There are three pairs of major salivary glands which includes Parotid, Submandibular and Sublingual gland, in addition to the numerous minor glands which exist in a submucosal location throughout the upper aerodigestive tract starting from the nasal cavity and lips down to the esophagus and trachea, more abundant in lips, tongue and palate.

EMBRYOLOGY

Embryologically, the major gland and some of the minor glands, arise from the stomatodeal ectoderm and most of the minor glands are derived from the pharyngeal endoderm.

PAROTID GLAND

Para-Around, Otis-Ear

The parotid gland is the largest of the salivary glands. The secretions are serous in nature. It is a compound Alveloar gland situated below the external acoustic meatus between the ramus of the mandible and the sternomastoid. The anterior extension of the gland over the masseter is often detached and is called

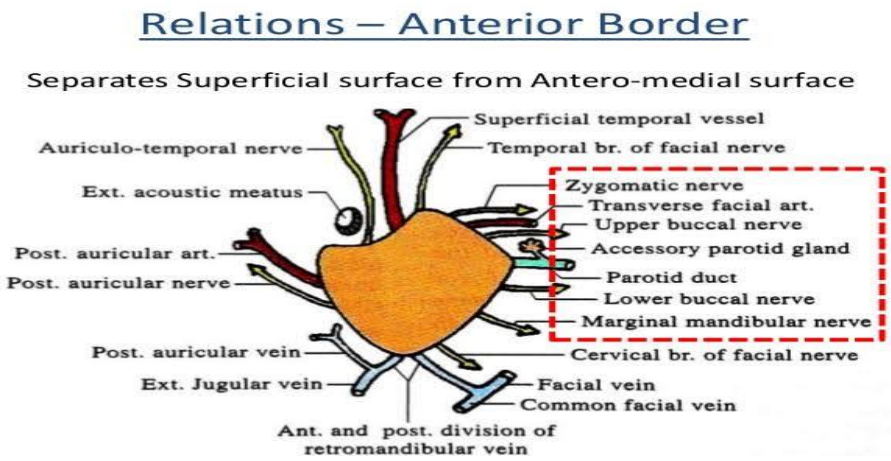
as the Accessory parotid gland which lies between the zygomatic arch and the parotid duct.

The gland resembles the shape of an inverted three sided pyramid. The investing layer of deep cervical fascia splits between the angle of the mandible and mastoid process to enclose the parotid gland. It has superficial and deep lamina. A portion of the deep lamina of parotid which extends between the styloid process and mandible, is thickened to form the stylomandibular ligament. It separates the parotid fascia which is incomplete, so there is extension of theparotid gland into parapharyngeal space, so it may manifest as dumbbell tumour of the deep lobe of the parotid.

Parotid gland has got an apex, four surfaces (superior, superficial, posteromedial, and anteromedial) and three borders (anterior, posterior and medial). The apex overlaps the posterior belly of digastric through which the cervical branch of facial nerve emerges along with the two divisions of the retromandibular vein.

Superior surface (or) base of the pyramid is in relation with superficial temporal vessels and auriculo-temporal nerve. Superficial surface is covered with superficial fascia, which contains anterior branches of the greater auricular nerve. The posteromedial surface is related to mastoid process, styloid process,

external carotid artery and internal carotid artery. The anteromedial surface is related to the masseter muscle and branches of facial nerve.



RELATIONSHIP OF FACIAL NERVE TO PAROTID GLAND

According to Bailey's bilobar theory, the parotid gland is a bilobed structure divided into a larger superficial lobe and a smaller deep lobe. Both lobes are connected by an isthmus with the facial nerve lying in a connective tissue plane separating the two lobes.

Patey's Facio-venous plane concept states that, the gland is divided into superficial and deep by the posterior facial vein and the facial nerve. But, Meckenzie explained that even when a facial plane seemed to bisect the gland

into two lobes, the nerve seemed to penetrate the substance of one or the other lobe and does not pass through the plane.

Winsten and Ward confirmed the unilobar structure and believed that rather than a “parotid sandwich” the nerve could be compared to the “Creeper Vine weaving into the meshes of a trellis work” parotid gland. The facial nerve leaves the skull by passing out through the stylomastoid foramen and at a point 2.5 to 4 cm deep to the middle of the anterior border of mastoid process, the nerve passes into the gland.

Facial nerve then passes around the neck of the condyle of the mandible and becomes superficial. It divides into a upper temporofacial division and a lower cervicofacial divisions and then into a number of branches, some of which may be interconnected like the foot of a goose known as Pes-Anserinus. There are 5 branches and are temporal, zygomatic, buccal,mandibular andcervical. Before entering the gland it gives of the posterior auricular nerve, Nerve to the stylohyoid muscle and posterior belly of digastric.

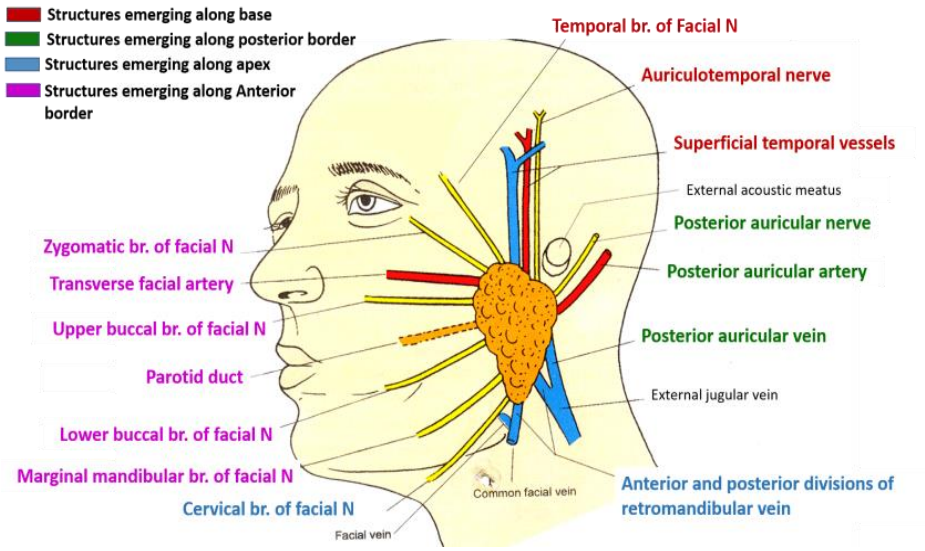
STRUCTURES WITHIN THE PAROTID GLAND

FROM MEDIAL TO LATERAL

1. External Carotid Artery : It enters the gland through its posteromedial surface and divides into its terminal branches, maxillary artery and superficial temporal artery. The maxillary artery leaves the gland through its anteromedial surface. Superfical temporal vessels emerge at the anterior part of superior surface. Posterior auricular artery, a branch of external carotid artery may arise within the gland.

2. Retromandibular Vein : It is formed within the gland by the union of superficial temporal vein and maxillary vein. In the lower part of the gland, the vein divides into 2 divisions, anterior and posterior divisions which emerge at the apex of lower pole of the gland.

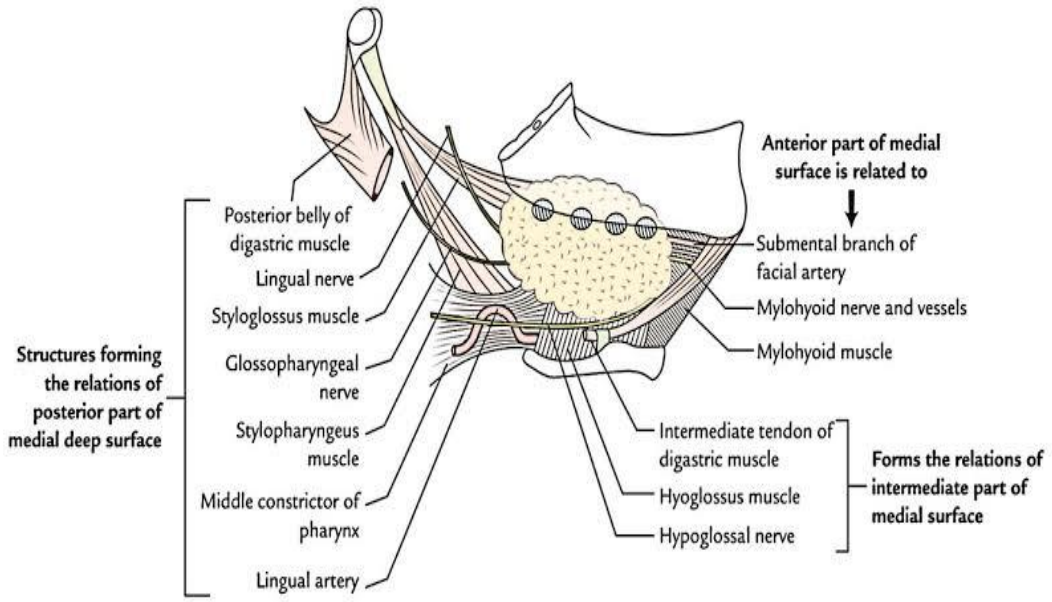
3. Parotid duct (Stenson's duct) : It is 5cm long . It begins deep to and behind the angle of the mandible. It then curves upwards and forwards through the gland receiving interlobular ducts. It passes forwards across the masseter muscle and turns around its anterior border to pierce the buccinator . It opens into the oral cavity via a small papilla on the inside of the cheek, opposite the second upper molar tooth.



SUBMANDIBULAR GLAND

The submandibular gland fills the major portion of the digastric or submandibular triangle enclosed within a loose sheath of deep cervical fascia. The gland rests against the mylohyoid and hyoglossus muscles which forms the floor of the triangle. The gland has two portions, a superficial lobe lying superficial to the mylohyoid muscle and a deep lobe wrapping around the posterior border of the mylohyoid muscle.

Between the gland and the hyoglossus muscle lies the lingual nerve, the submandibular ganglion and the hypoglossal nerve. The submandibular duct (Wharton's duct) is about 5cm long, runs forward from the deep part of the gland and enters the floor of the mouth on a papilla, beside the frenulum of the tongue.



The facial artery ascends in a deep groove on the posterior end of the gland and then turns downwards and laterally between the gland and the mandible to enter the face at the anterior border of masseter. It is a seromucinous type of gland. The venous drainage is into the anterior facial vein and the venae commitantes of the lingual artery.

SUBLINGUAL GLAND

It lies superficially in the floor of the mouth underneath the oral mucosa. The gland does not have a single large excretory duct, but has a series of ductules that open either into the floor of the mouth directly or into the submandibular duct. The submandibular duct thus drains both the submandibular and sublingual glands.

MINOR SALIVARY GLANDS

These glands are derived from the pharyngeal endoderm. They produce serous fluids, which wash away the stagnant materials from the taste buds and thus maintains the receptivity for fresh gustatory stimuli.

The minor salivary glands consist of small accumulation of glandular tissue situated mainly beneath the oral mucosa. They empty their secretions into the oropharynx by way of small rudimentary ducts. Such salivary acini are scattered throughout the mucosal lining of the lips, buccal mucosa, palate, nasopharynx, nose and paranasal sinuses. Batsakis recorded and demonstrated such salivary tissue in the body of the mandible, lower part of the neck, hypopharynx, middle ear, sterno clavicular joint and thyroglossal duct. They are most abundant in the hard palate.

The minor salivary glands and the sublingual glands have short straight duct system and thus are rarely affected by inflammatory condition, but react to anything causing obstruction to the flow. If partial it leads to mucocele, if complete leads to atrophy of the gland.

PHYSIOLOGY OF SALIVARY GLANDS

The salivary gland network is composed of secretory elements that produce saliva upon stimulation by mastication or sensory/autonomous nervous system stimuli (i.e., smell, taste, and thought). The composition of saliva depends on the salivary gland producing it. For example, a larger concentration of serous glands is found in the parotid and mucous glands are seen in the hard palate.

Saliva produced by these glands facilitates digestion, provides lubrication and protects mucous membrane and dentition, and aids in clearance of foreign materials. Also, saliva contains enzymes (e.g., amylases, lipases, other enzymes) that initiate the digestive process, primarily of materials that contain starch.

Saliva also plays an essential role in preventing dental caries and infection by directly cleansing the foreign materials and by its antibacterial activity that is mediated through multiple factors such as immunoglobulin A and leukotrienes.

SALIVARY GLAND	REGULATOR	2ND MESSENGER	EFFECT
Parotid Gland	Acetylcholine α - adrenergic Substance P β adrenergic VIP	Ca++ AMP	Production of Saliva, Enzyme Secretion, increases cell metabolism Secretion of enzymes, increases cell metabolism
Submandibular gland	ACH α - Adrenergic β adrenergic VIP	Ca++ c.AMP	Production of Saliva Production of Mucin Potentiates Ach effects, Enhances blood flow

Willams *et al.*, 1984

HISTOLOGY:

The following picture shows the structure of the secreting unit of Salivary gland.

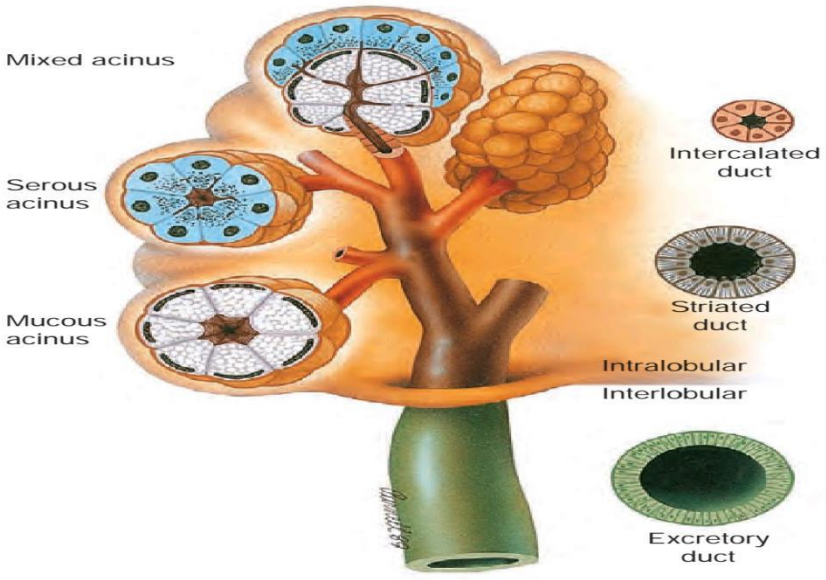


Figure 13.27 The histologic structure of the normal salivary gland.

Salivary glands are made of secretory acini, which is the secretory unit of it. Secretion may be serous or mucinous. The acini merge into intercalated ducts, which are lined by simple cuboidal epithelium and surrounded by myoepithelial cells. They continue on as striated ducts which lead into interlobular ducts, which continue as secretory ducts.

SALIVARY GLAND TUMOURS

Neoplasms of the salivary glands are rare. They account for approximately 3% to 6% of all head and neck tumours. Incidence of salivary gland tumours is approximately 2.5 to 3.0 cases per 1,00,000 per year.

Exposure to low dose radiation predisposes to neoplastic processes in the major salivary glands. Also, chronic exposure to wood dust (especially soft wood) and chemicals used in the leather tanning industry increases the risk for minor salivary gland cancers in the sinonasal tract mainly adenocarcinomas. An increased incidence of adenocarcinoma of minor salivary origin of the nasal cavity and ethmoid region is reported from Europe, whereas in United States, squamous cell carcinoma is the most common. A higher rate of malignant oncocytomas in Alaskan natives suggests that other unidentifed environmental and inherited factors also may contribute to salivary carcinogenesis.

The risk for malignancy and the histopathological distribution of malignant tumours differs between major and minor salivary glands. The incidence of malignancy in the parotid gland, submandibular gland, and minor salivary glands is 25%, 50%, and 80%, respectively . Overall, 65% of salivary gland tumours arise in the parotid gland, 8% cancers arise in the submandibular gland, and 27% arise in the minor salivary glands.The mucosa of the hard palate is the most common site of origin of minor salivary gland tumors, followed by other sites in the oral cavity and paranasal sinuses.

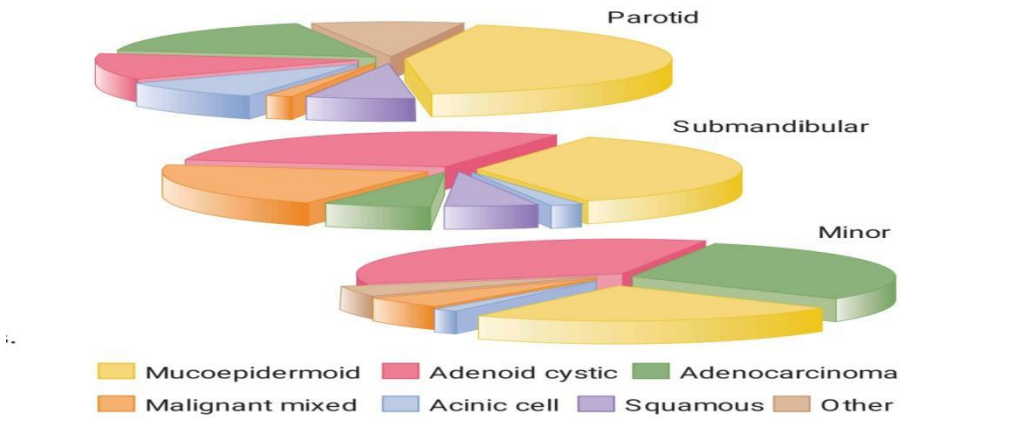


Figure 13.4 The histologic distribution of malignant tumors of the salivary glands.

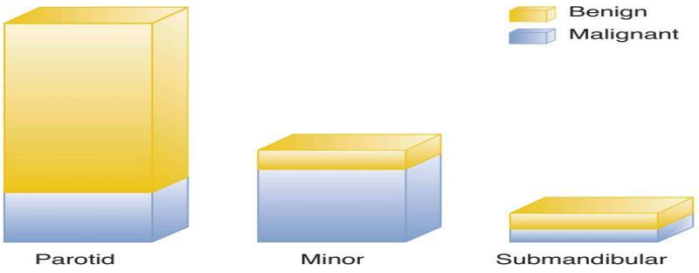


Figure 13.1 The incidence of malignant tumors among salivary glands.

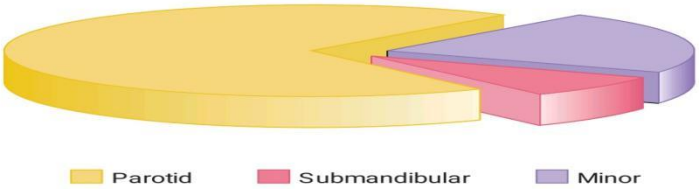


Figure 13.2 The distribution of salivary tumors among major and minor salivary glands.

CLASSIFICATION OF SALIVARY GLAND NEOPLASM

BATSAKIS CLASSIFICATION(1979)

BENIGN LESIONS

A. Mixed tumour (Pleomorphic adenoma)

B. Adenolymphoma (Warthin's tumour)

C. Oncocytosis Oncocytoma

D. Monomorphic adenoma

a) Basal cell adenoma

b) Glycogen-rich adenoma and clear cell adenoma

c) Others

E. Sebaceous adenoma

F. Papillary ductal adenoma

G. Sebaceous lymphadenoma

H. Benign lymphoepithelial lesion

MALIGNANT LESIONS

A. Carcinoma arising from a benign mixed tumour

B. Mucoepidermoid carcinomas

C. Hybrid basal cell adenoma

D. Adenoid cystic carcinoma

E. Adenocarcinoma

F. Acinic cell carcinomas

G. Oncocytic carcinoma or malignant carcinoma

H. Clear cell carcinoma

I. Epithelial or myoepithelial carcinoma of intercalated ducts.

J. Squamous cell carcinoma

K. Undifferentiated carcinoma

L. Miscellaneous which includes sebaceous carcinoma, melanoma, Stenson's duct carcinoma and carcinoma ex lymphoepithelial lesions)

M. Metastatic carcinomas

WHO CLASSIFICATION:

Due to the diverse nature of the Salivary gland tumours, many different terms and classifications were used.Of them the most widely used one is the WHO classification. The initial classification was given in 1972. Then various revisions were done. The final revision was done in 2017 and is now followed. The WHO classification of salivary gland tumours is as given below:

Table 13.1 The World Health Organization Histologic Classification of Salivary Gland Tumors

Nonneoplastic epithelial lesions	Sclerosing polycystic adenosis Nodular oncocytic hyperplasia Lymphoepithelial sialadenitis Intercalated duct hyperplasia
Benign tumors	Pleomorphic adenoma Myoepithelioma Basal cell adenoma Warthin's tumor Oncocytoma Lymphadenoma Cystadenoma Sialadenoma papilliferum Ductal papillomas Sebaceous adenoma Canalicular adenoma and other ductal adenomas
Uncertain malignant potential	Sialoblastoma
Malignant tumors	Acinic cell carcinoma Secretory carcinoma Mucoepidermoid carcinoma Adenoid cystic carcinoma Polymorphous adenocarcinoma Epithelial myoepithelial carcinoma Clear cell carcinoma Basal cell adenocarcinoma Sebaceous adenocarcinoma Intraductal carcinoma Cystadenocarcinoma Adenocarcinoma not otherwise specified (NOS) Salivary duct carcinoma Myoepithelial carcinoma Carcinoma ex pleomorphic adenoma Carcinosarcoma Poorly differentiated carcinoma (undifferentiated carcinoma, large cell neuroendocrine carcinoma, and small cell carcinoma) Lymphoepithelial carcinoma Squamous cell carcinoma Oncocytic carcinoma

HISTOGENESIS OF TUMOURS

I)Multicellular Theory of Origin :

Various cells in the functional salivary complex may give rise to different type of epithelial tumours.

1. Acinar cells - Acinic cell carcinoma
2. Striated duct cell - Oncocytic tumours.
3. Intercalated duct cells - Mixed tumours and Adenoid cystic carcinomas.
4. Excretory duct elements - Mucoepidermoid tumour, squamous cell carcinomas.

II) Basal Reserve cell or Progenitor cell theory:

The basal cells of the excretory ducts and intercalated ducts function as progenitor or reserve cells for more highly differentiated components.

The myoepithelial cell by its interaction with the epithelial component, provides the variable mesenchyme like component of the lesions and has been implicated as the element of benign mixed tumour.

PLEOMORPHIC ADENOMA:

Pleomorphic adenoma or Benign mixed tumour is a benign neoplasm characterized by mixture of epithelial, myoepithelial, and stromal elements with pleomorphism of architecture. This neoplasm represents 2/3rd of all tumours of the major salivary glands and less than 50% of those in the minor salivary glands. The most common site is in the superficial lobe of the parotid gland.

Gross appearance of Pleomorphic adenoma is generally white and firm, with a smooth outer and cut surface. The tumor may be lobulated and nodular, with "podocytes," which are noted microscopically. Microscopic appearance of pleomorphic adenomas shows a mixture of epithelial and mesenchymal elements, with ductal and myoepithelial cell types mixed with myxoid, mucoid, or chondroid stroma.

Pleomorphic adenomas are encapsulated tumours, especially in the major salivary gland, and the capsule thickness usually varies. Irregular peripheral borders and local extension of finger like processes into the capsule are seen.

They are characterized by a variable degree of morphologic diversity between individual tumors or within a single tumor. Therefore a definite

diagnosis is difficult on a representative frozen section or on a small amount of fine-needle aspiration cytology material.

Recurrence of pleomorphic adenomas are common and generally represents local re-growth and not essentially malignancy. Second surgery becomes technically difficult with reference to the preservation of the facial nerve.

Mostly recurrent pleomorphic adenomas are multifocal, and can be so widely distributed that surgical control becomes seldom possible.

Carcinoma ex pleomorphic adenoma is a malignant tumour that arises in association with pleomorphic adenoma. Typically, these tumours are high grade and show similar histology to pleomorphic adenoma. The malignant tumor component is most commonly salivary duct carcinoma and myoepithelial carcinoma. But any histological subtype of salivary gland carcinoma can arise in association with pleomorphic adenoma.

Carcinoma ex pleomorphic adenoma is classifed based on the degree of tumor and capsule invasion through the previous pleomorphic adenoma into the surrounding tissue as intracapsular, minimally invasive, and invasive. There is proven correlation between extent of invasion and the clinical outcome. A very low local recurrence rate and regional metastases are seen in patients with intracapsular minimally invasive tumors. The risk of local recurrence, metastases, and mortality is higher in patients with invasive tumors. At the molecular level, mutations of Pleomorphic adenoma gene 1 on 8q12 and HMGA2 on 12q14-15 are the most frequent genetic changes in both pleomorphic adenoma and carcinoma ex pleomorphic adenoma.

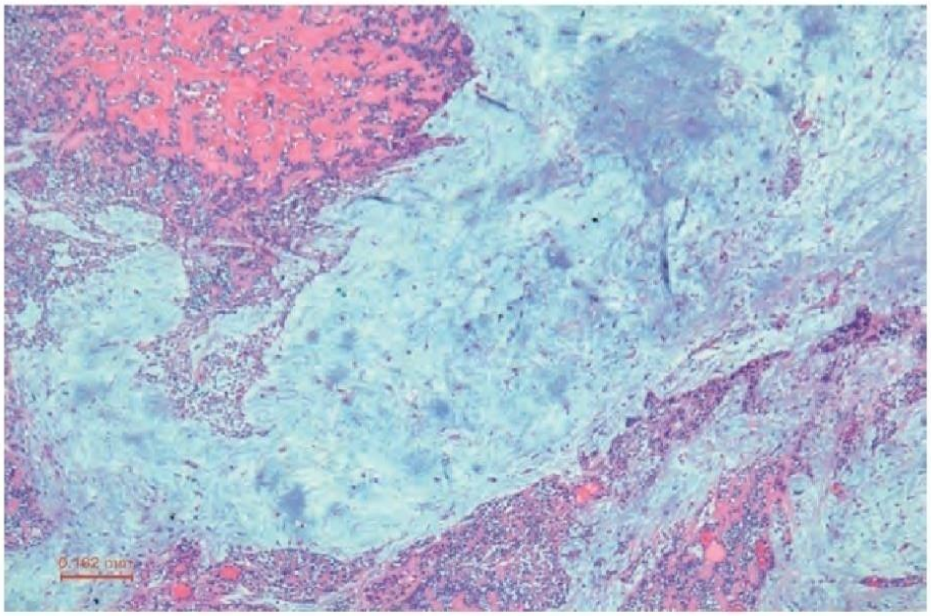


Figure 13.29 Pleomorphic adenoma demonstrating abundant myxochondroid matrix and myoepithelial cells (50× H&E stain).

ADENOLYMPHOMA OR WARTHIN'S TUMOUR

(PAPILLARY CYSTADENOMA LYMPHOMATOSUM)

Warthin's Tumour comprises of 6 – 10% of all parotid tumours . It is the second most common benign tumour of the parotid gland next to Pleomorphic adenoma. It almost occurs exclusively in the parotid gland. Very rarely it occurs in submandibular gland. It occurs between 40 to 70 years of age with slight male predominance. Malignant transformation is very rare.

Lewis *et al.*1999.

Grossly it is a well encapsulated tumour. The epithelium is double layered and is eosinophilic with the inner cells being columnar cells. Microscopically, multiple papillae filled with a lymphoid stroma are seen and they project into the cystic spaces. The lymphoid tissue found within the tumour resembles that of a lymph node. The origin of this tumour is still controversial.

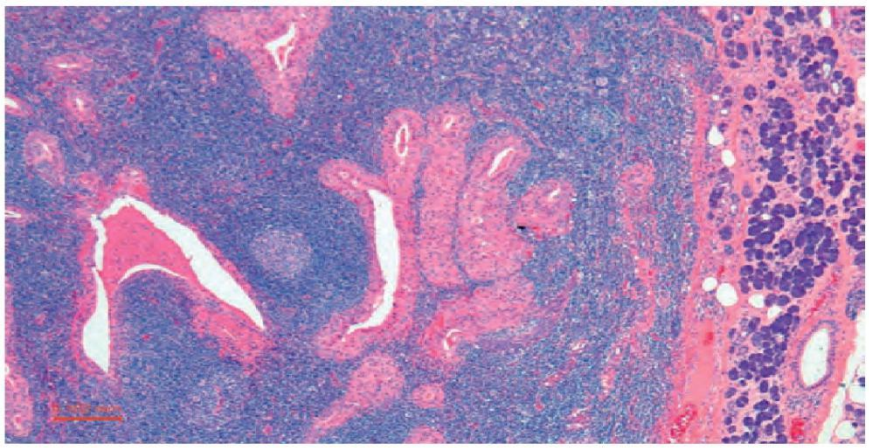


Figure 13.30 Warthin's tumor with adjacent normal parotid gland parenchyma on the right (50× H&E stain).

ONCOCYTOMA

Oncocytoma is also known as oxyphil adenoma or oncocytic adenoma. It is a benign salivary gland neoplasm which is composed of oncocytes that are benign epithelial cells packed with mitochondria which gives a granular appearance to the cytoplasm.

MONOMORPHIC ADENOMA

It is a group of tumours which involves basal cell adenoma, clear cell adenoma and glycogen rich adenoma. Common site is minor salivary glands of the upper lip followed by parotid gland. Microscopically, rows of peripherally palisading cells with a thick basement membrance is the imortant feature of this malignancy.

MUCOEPIDERMOID CARCINOMA

It is the most common malignant salivary gland tumour in both adults and children. More than half of these tumours occur in the parotid gland. When they arise in the minor salivary glands, the most common site is in the palate.

Histologically, this tumour is composed of varying proportions of epidermoid (squamoid), mucous, and intermediate cells, arranged in cystic or glandular structures or in a solid growth pattern. Mucicarmine stain highlights intracytoplasmic mucin. CK5/6 and p63 immunohistochemical stains will stain the epidermoid and intermediate cells. S100 and myoepithelial markers

(Calponin and smooth muscle actin) are usually negative in mucoepidermoid carcinoma. Variable histologic parameters such as perineural invasion and vascular invasion have been reported to correlate with the patients' clinical outcome.

However, prognosis seems to be largely dependent on tumor grade. Several grading systems exist for mucoepidermoid carcinomas, but they are graded by most pathologists, using three tiers (based on tumor cytologic and proliferative features and architecture): low, intermediate, and high grade.

At the molecular level, a chromosomal translocation(11,19), resulting in MECT1/MAML2 fusion genes, has been identifed in 40% to 80% of mucoepidermoid carcinomas. The translocation has been suggested to be associated with moreindolent clinical behavior.

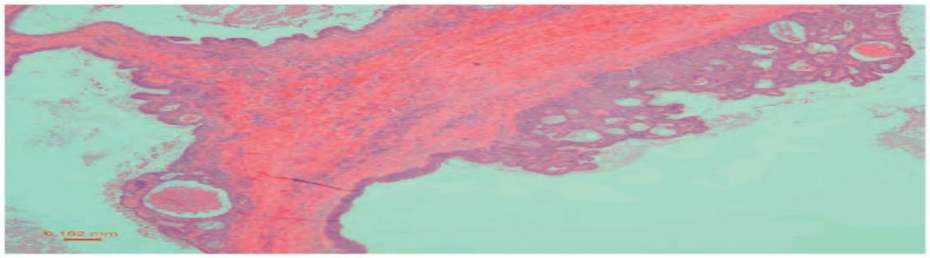


Figure 13.32 Low-grade mucoepidermoid carcinoma with more than 20% of the tumor represented by cystic spaces lined by squamoid epithelial cells (25× H&E stain).

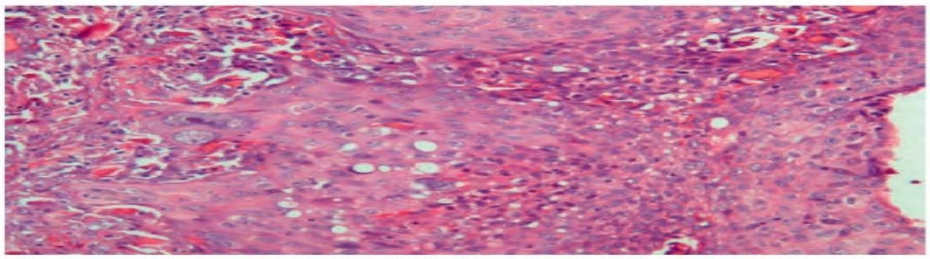


Figure 13.33 High-grade mucoepidermoid carcinoma demonstrating marked nuclear pleomorphism and areas of single-cell necrosis (200× H&E stain).

ADENOID CYSTIC CARCINOMA

Adenoid cystic carcinoma is a slow growing, insidious salivary gland malignancy, occurring in both minor and major glands, notorious for its tendency for perineural invasion, as well as local invasion and recurrence after surgical resection. These tumors may arise in the major salivary glands and also in the oral cavity, nasopharynx, nasal cavity, paranasal sinuses, lacrimal glands, and lower respiratory tract. Adenoid cystic carcinoma grows as solid, white to gray, scirrhous, infiltrative masses that tend to be hard and fixed and may tether overlying skin.

Histologically, adenoid cystic carcinoma is composed of ductal and myoepithelial cells and shows hyalinized or myxoid matrix. The tumor demonstrates three main growth patterns: cribriform, tubular, and solid.

Perineural invasion is commonly seen in adenoid cystic carcinoma Unlike mucoepidermoid carcinoma, grading of adenoid cystic carcinoma does not seem to be signifcant in the prediction of the behavior of this malignancy. The presence of solid tumor growth seems to correlate with more aggressive behavior and poor survival. It is infrequent to see lymph node metastases;
rather, one is more likely to see distant spread to the lungs and solid organs such as the kidney, with as much as a 15-year latency period.

The MYB protooncogene occurs in the majority of adenoid cystic carcinomas, with a translocation (6,9) resulting in fusion of the MYB and NFIB genes being the most common mechanism. The 6,9 translocation has been described in about 65% of adenoid cystic carcinomas of the head and neck and various anatomic sites, including the breast and lung.

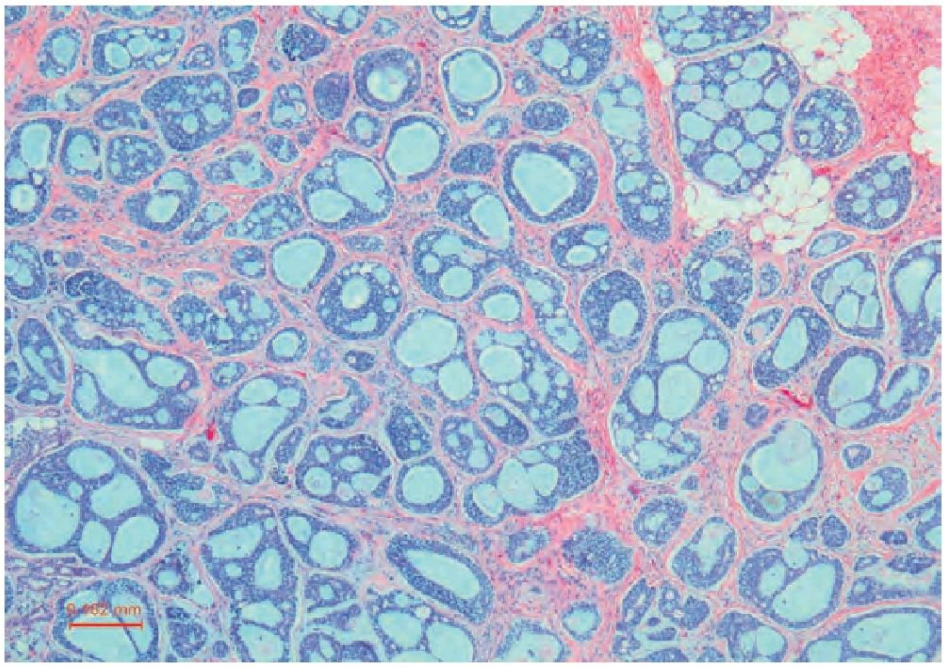


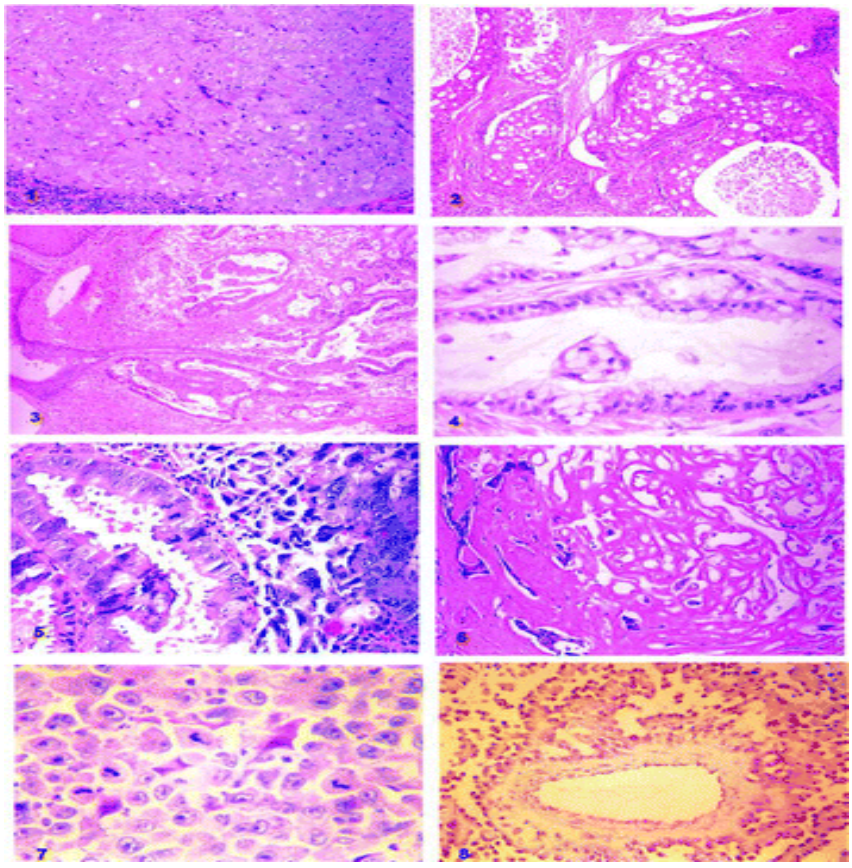
Figure 13.34 Adenoid cystic carcinoma of the parotid gland demonstrating a predominantly cribriform architectural pattern (50× H&E stain).

POLYMORPHOUS LOW GRADE ADENOCARCINOMA

Polymorphous low-grade adenocarcinoma (PLGA), now shortened to polymorphous adenocarcinoma (PAC), occurs mainly in minor salivary glands, with the hard palate being the most common location. It is important to

differentiate PAC from adenoid cystic carcinoma since it typically has an indolent course.

These tumors show one cell type with cytologic uniformity and various growth patterns. Perineural invasion may be seen. A cribriform variant, which is considered a separate entity by some authors, has been reported to have a greater capacity for regional metastasis. Activation of PRKD1 point mutation has been recently reported in about 73% of PLGA.



SECRETORY CARCINOMA:

Mammary analog secretory carcinoma (MASC) is a recently described salivary gland tumor that was likely classifed as acinic cell carcinoma in the past. The tumor has striking histologic and molecular similarities to secretory carcinoma of the breast. The offcial terminology of this entity is now “secretory carcinoma.” At the histologic level, tumor cells have eosinophilic or clear bubbly cytoplasm, and they may grow as tubules or microcysts, papillae, or macrocysts. Secretions are almost always present in the microcysts and/or macrocysts. MASC characteristically harbors a balanced chromosomal translocation (12, 15), resulting in the formation of the ETV6–NTRK3 fusion genes.

SALIVARY DUCT CARCINOMA:

Salivary duct carcinoma is an aggressive, high-grade carcinoma that resembles high-grade breast ductal carcinoma. Typically the tumor is composed of ductal cells arranging in tubules, as solid and cribriform growth with central necrosis.

Androgen receptor (AR) expression by immunohistochemistry is identifed in the vast majority of salivary duct carcinoma. In addition to AR, immunohistochemical overexpression of human epidermal growth factor receptor 2 (HER2) has been reported in a good percentage of salivary duct

carcinoma with or without amplifcation of the gene by fuorescence in situ hybridization.

Targeted therapeutic modalities, including anti-ERBB2 antibodies and androgen deprivation therapy, are characterized by variable results. Additionally, various genetic alterations have been reported in salivary duct carcinoma, including TP53, PTEN, EGFR, and phosphoinositide 3-kinase (PIK3CA) pathway.

CLINICAL FEATURES OF SALIVARY NEOPLASMS:

Salivary gland tumours are generally slow growing. Parotid tumour present as asymptomatic mass either below the ear lobule and behind the ramus of the mandible or the cheek, lying below the zygomatic arch and on the masseter muscle. It may be firm or hard. Warthin's tumour may be cystic, transilluminant.

Pain is usually absent. Malignant tumours infiltrate sensory nerves earlier and produce vague pain in the distribution of greater auricular and auriculotemporal nerve distribution.

Malignancy in suspected when there is short history, pain, rapid growth fixity to muscle or skin, nerve involvement, restriction of temporomandibular

joint and enlargement of lymph node. In parotid deep lobe tumour may present intra orally pushing the tonsil medially. Mucosa over the lump will be freelymobile. Facial nerve palsy either total or incomplete will occur in 8-26% of parotid malignancies.

Submandibular gland tumour should be examined bimanually to differentiate if from lymphnode swelling. Minorsalivary gland tumour may present as intra oral tumours.

INVESTIGATIONS:

1)PLAIN X-RAY FILM

It may show bony erosion

2)SIALOGRAM

Not very useful in diagnosis of tumours. If may show displacement of duct in benign tumours and irregularity in case of malignant tumours. Displacement of parotid duct in the case of intraglandular lesions will give a “Bell in hand” configuration.

3)ANGIOGRAPHY

When deep lobe tumours are suspected, it is useful.

4)RADIOISOTOPE SCAN

Scanning done with Technetium 99M pertechnetate shows,all the tumour to be cold except Warthin's tumour which is"hot".

5)CT SCAN

-To differentiate cystic and solid lesions

-To look for adjacent tissue infiltration

-To differentiate deep lobe parotid tumours from parapharyngeal space tumours

6)MRI

MRI is useful in delineating the relationship between the parotid tumour and the facial nerve.

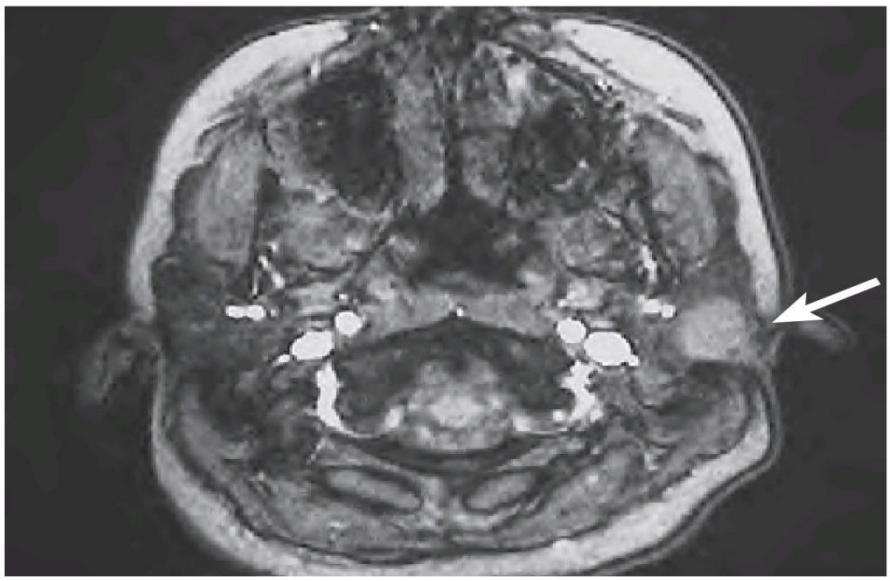


Figure 13.21 A T2-weighted magnetic resonance imaging scan showing a benign mixed tumor in the superficial lobe of the left parotid gland (*arrow*).

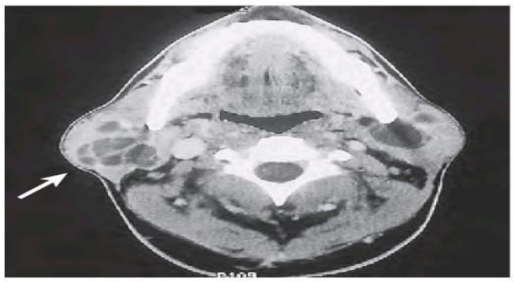


Figure 13.19 A computed tomography scan showing bilateral Warthin's tumors, which are multiloculated on the right-hand side (*arrow*) and uniloculated on the left-hand side.

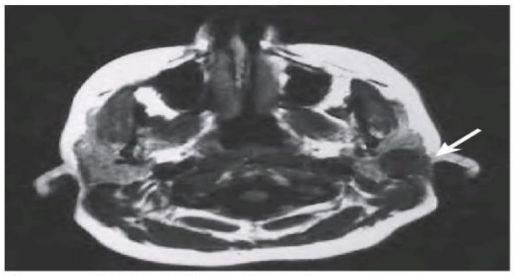


Figure 13.20 A T1-weighted magnetic resonance imaging scan showing a benign mixed tumor in the superficial lobe of the left parotid gland (*arrow*).

TREATMENT OF SALIVARY NEOPLASMS:

FACTORS AFFECTING CHOICE OF TREATMENT:

The factors that affect the choice of initial therapy are related to the tumor and the patient. The size of the primary tumor and its histologic grade are vitally important tumor factors that influence choice of initial therapy. Low-grade, low-stage malignant tumors confined to the superficial lobe of the parotid gland are easily treatable with a superficial parotidectomy. Surgery alone in this clinical setting is adequate treatment. High-grade, high-staged tumors may require a total parotidectomy or even an extended radical parotidectomy with or without sacrifce of the facial nerve and with or without neck dissection.

Advanced tumors occasionally may require excision of the auditory canal, the ascending ramus of the mandible, or even temporal bone resection. Sacrifice of the facial nerve leads to significant functional and aesthetic morbidity in all age groups. Therefore facial nerve grafting should be considered when appropriate. If a facial nerve graft is not feasible, then rehabilitative measures for facial nerve paralysis should be instituted.
These measures include a lateral tarsorrhaphy, a lateral canthoplasty, and a gold weight implant in the upper eyelid as well as static or dynamic reconstruction of the oral commissure.

Similar principles can be applied to malignant tumors of the submandibular salivary gland and those of minor salivary origin. Loss of the hypoglossal and lingual nerves and the marginal branch of the facial nerve is not as debilitating as the loss of the entire facial nerve. Therefore special rehabilitative measures are seldom indicated for radical operations for submandibular salivary gland tumors.

Preservation of function, particularly of the facial nerve and its branches, is an important goal in surgery for parotid and submandibular gland tumors. Similarly, the goal for treatment of malignant tumors of salivary origin is control of cancer with preservation of function when feasible.

SUPERFICIAL PAROTIDECTOMY:

The main objective in superficial parotidectomy is preserving the facial N.

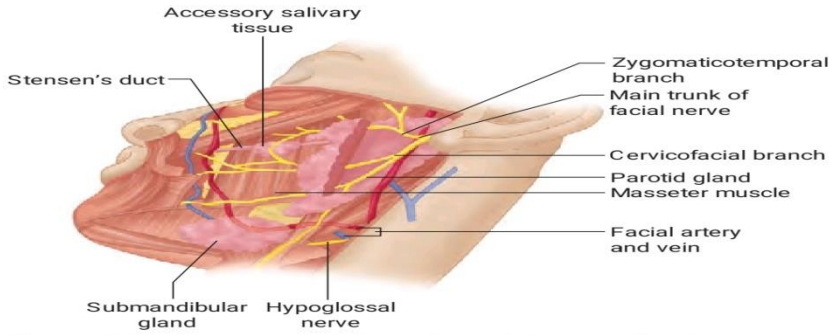


Figure 13.38 The anatomic relationships of the parotid and submandibular salivary glands to adjacent cranial nerves.

IDENTIFICATION OF FACIAL NERVE:

Identification of the facial nerve can be done by two ways.

1. By identifying trunk

2. By Identifying peripheral branches.

Identifying the trunk first has more advantages and chances of injuring the nerve is less, as the main trunk of the nerve is constant in position, can be easily identified.

Sistrunk, Bailey and Hobsley identified the peripheral branch first, namely the mandibular branch. This method proved to be difficult, as some of the tumors are tightly wedged between bony walls of parotid compartment and give difficulty in exposing the trunk at the stylomastoid foramen. Riessner recommended dissection starting at the zygomatic arch for tumours just below the zygomatic arch. He demonstrated that the upper two branches of the nerve were more constant in position the were large in size at the level of zygoma and

lay directly on the periosteum. So it was not necessary to go through salivary tissue to expose the nerves.

SURGICAL TECHNIQUE OF SUPERFICIAL PAROTIDECTOMY:

Under general hypotensive anaesthesia the head of the operating table is elevated to promote venous drainage. A transparent adhesive is prepared. The incision starts at the top of the helix and dips in to the tragal notch continued inferiorly in front of the ear and turnsback gently under the earlobe to 2.5cm above the tip of mastoid process. The incision is extended up to the greater horn of hyoid.

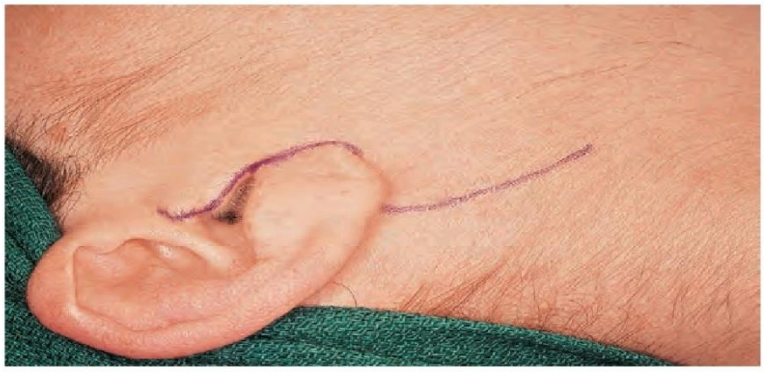


Figure 13.77 The modified tragal incision is outlined.

The skin flap is dissected of the parotid upto the masseter anteriorly (care taken to avoid damage to the Facial branches). The greater auricular nerve and the external jugular vein are identified and divided. The posterior belly of diagastric is traced of the retracting sternocleidomastoid up to the mastoid process.

The dissection is carried along the perichondrium of the tragal cartilage which ends in a pointer, which points to the facial nerve 1cm medially and inferiorly. The bridge of parotid tissue over the facial nerve is elevated down to the diagastric musle. Hemostasis is secured using bipolar diathermy. Nerve is followed forwards which divides after 2 cm. The upper division is dissected out first, followed by the lower division. The parotid gland is dissected from the nerve and turned downwards.

After the removal of the superficial lobe, facial nerve is seen over the massester and retromandibular portion of thegland. After perfect hemostasis with bipolar diathermy or with adrenaline soaks, the wound is sutured in two layers with suction drains.

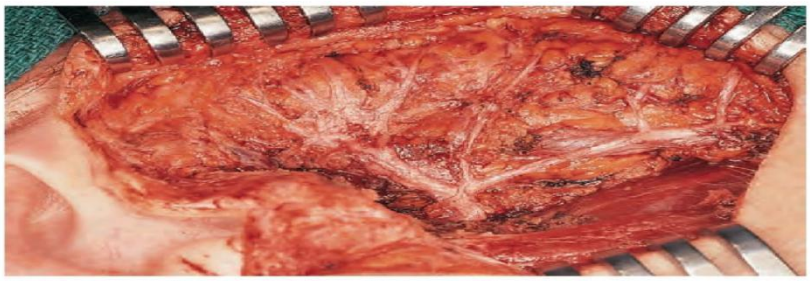


Figure 13.88 The surgical field after removal of the specimen.

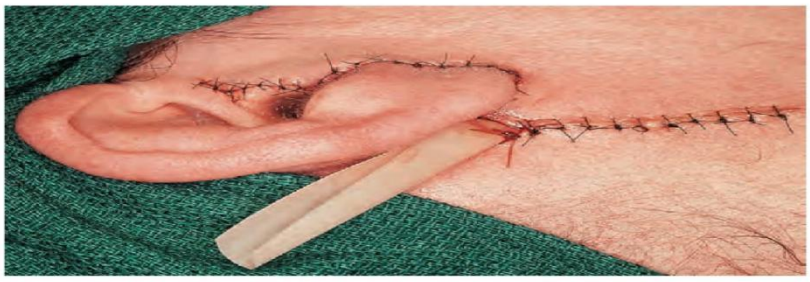


Figure 13.89 Closure of the incision.

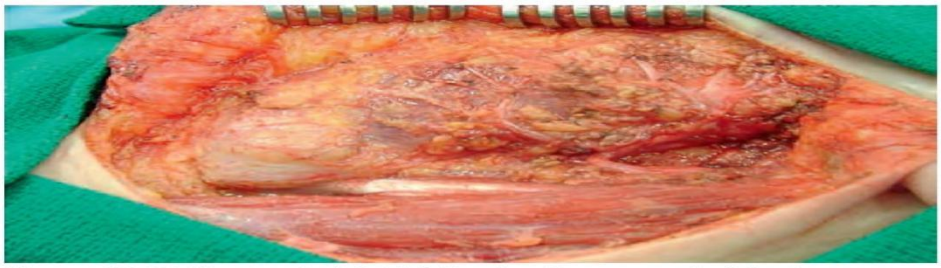


Figure 13.96 The surgical field following the removal of the tumor shows intact facial nerve.

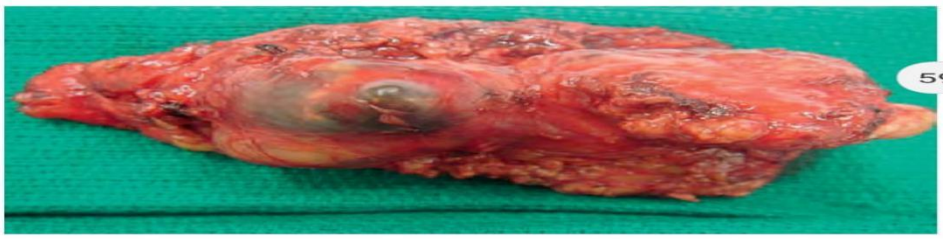
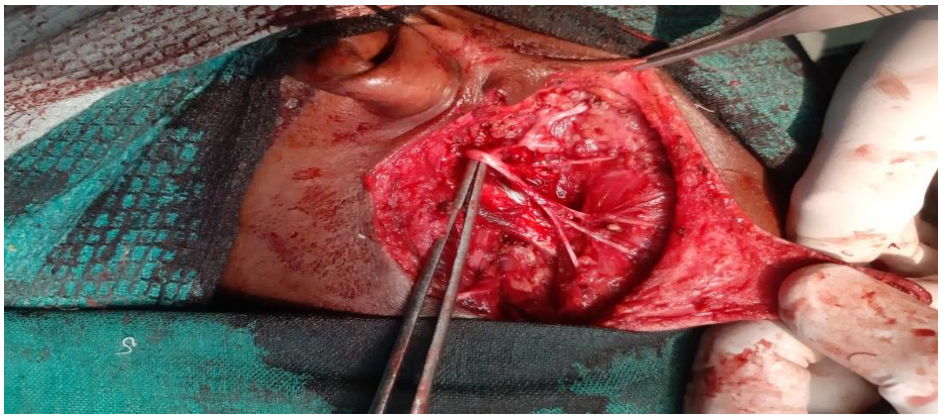


Figure 13.97 The surgical specimen shows a bilobed tumor with indentation created by the bifurcation of the facial nerve.

TOTAL PAROTIDECTOMY:

It was indicated for deep lobe tumours and in low grade malignancies. The procedure is same as superficial parotidectomy until the extension between superficial and deep lobes becomes apparent. The attachment can be between the two division or below the lower division of facial nerve.

In the first type dissection of superficial lobe from facial nerve should be from below upwards. In the second type only the lower division with its distal branches is dissected. Para pharyngeal space allow easy finger dissection. Retromandibular vein is always ligated.



RADICAL PAROTIDECTOMY:

It is indicated in high grade malignancy with facial nerve infiltration especially in adenoid cystic carcinoma. This procedure consist of removal of tumour with facial nerve along with cuff of tissue around the parotid gland.This consist of platysma laterally, masseter muscle medially, posterior belly of digastric and stylohyoid the superiorly deep jugular nodes and associated fat inferiorly and the tip of the mastoid and a portion of the sternomastoid posteriorly.

EXTRACAPSULAR DISSECTION:

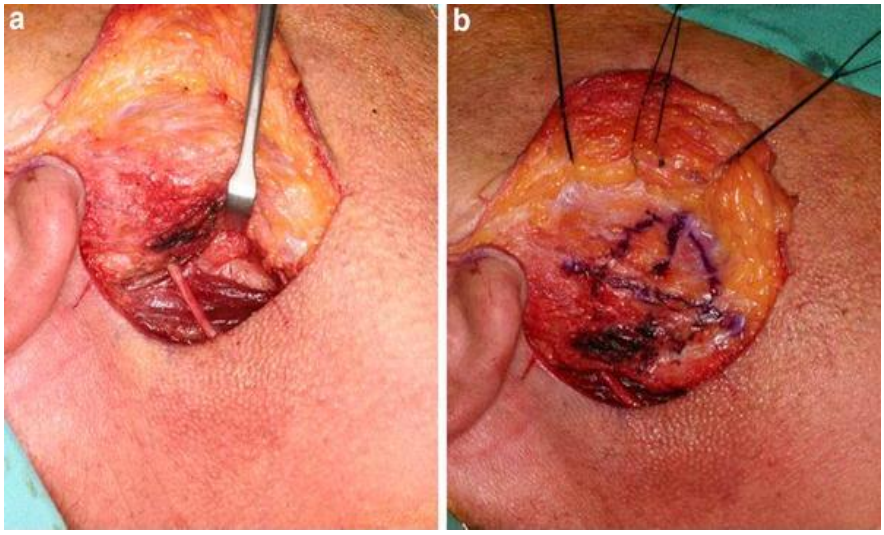
The tumor for which Extracapsular dissection is ideally suited is one that is well defined, mobile, approximately 2 cm in diameter, and lies in the superficial lobe of the parotid gland.

Ideal criteria to avoid an adverse outcome using ECD

1.	Benign tumor by fine needle aspiration cytology
2.	Mobile neoplasm
3.	Neoplasm <4 cm
4.	Neoplam in the superfical lobe
5.	Neoplasm in the tail of parotid
6.	Nerve integrity monitoring
7.	Palpable extent of tumor appreciated
8.	Surgeon trained to convert the procedure to a facial nerve dissection technique if necessary
9.	Experienced parotid surgeon
10.	High volume parotid surgeon

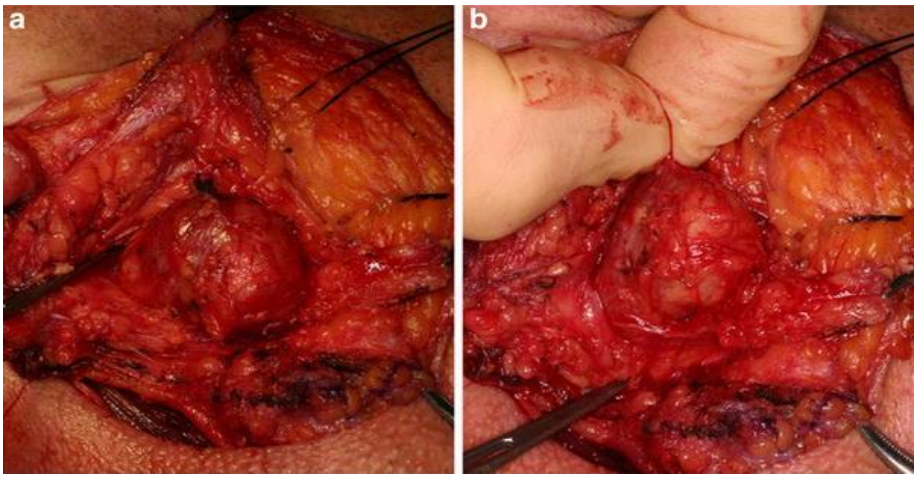
The incision is normally more conservative with ECD. After dissection of the subcutaneous tissue, the sternomastoid muscle and the greater auricular nerve together with the capsular of the parotid gland are exposed. Before the parotid parenchymal fascia is opened, the tumor is once again palpated to ensure that it is free and there is no suggestion of infiltration and tethering that would raise the prospect of a malignant tumor.

A useful technical adaption, when tumors are present in the lower pole of the parotid, is to release the parotid from the sternocleidomastoid muscle by dissection below the deep cervical fascia . This allows the parotid gland to be rotated forward so exposing the posterior and deep surface of the gland as far as the posterior belly of the digastric muscle. This gives much improved access for ECD.



If the exact position of the tumor cannot be determined, an intraoperative ultrasound scan can be performed. A cruciate incision is then marked over the surface of the parotid lump extending approximately 1 cm peripheral to the tumor margin. This is an important technical point; the incision should not stop at the tumor margin but extend for at least 1 cm peripheral to it. This gives much improved access during the dissection. Four artery clips are applied to the parotid fascia at the centre of the cruciate incision and used to retract the parotid

fascia, and with it the underlying parotid tissue is drawn away from tumor This an important technical point for with this tension, tissue planes start to appear which direct the line of dissection.



Meticulous hemostasis is important and is complemented by careful blunt dissection through the parenchyma until the tumor becomes apparent. This form of dissection is familiar to parotid surgeons, as it is the technique that is used when searching for the trunk of the facial nerve. As the parenchyma is carefully dissected under tension of the artery clips, the tumor is gradually separated from the underlying parenchyma. With this technique, a small rim of healthy glandular tissue is left on the tumor.

The facial nerve is not placed at risk with this technique in experienced hands as the facial nerve appears in the surgical field as the glandular tissue is parted. The tumor itself can then be rolled from side to side as the dissection proceeds. The tumor should be retracted by finger pressure alone; retractors

may be applied to the parotid gland but not the tumor for fear of rupture. After the tumor has been released from the surrounding tissue, the edges of the cruciate incision are reapproximated and sutured together.

Draining the wound is optional, but the use of pressure dressings in the form of modified mastoid dressings is recommended by some but not all surgeons. The pressure dressing potentially reduces the incidence of sialoceles and should be retained for 48 h if possible. In appropriate patients and tumors, the ECD operation can be undertaken as a day-care procedure.

In a series of 76 patients with pleomorphic adenomas, treated by ECD and followed for a mean of 7.4 years, no recurrences were observed. In a series of 176 cases followed for 52 months. the rate of recurrence comparing ECD and superficial parotidectomy was 4.5 versus 3.6 %

Permanent facial nerve dysfunction is reported in 0–4 % of cases following facial nerve dissection procedures. A meta-analysis showed twice the chance of permanent facial nerve dysfunction with ECD compared with superficial parotidetomy and a three times higher chance following total parotidectomy compared to superficial parotidectomy . However, the incidence of injury following ECD is 2 % in high volume centers.

Meta-analysis summary effect for transient facial nerve dysfunction shows a 2.3 times higher incidence with total parotidectomy compared with

superficial parotidectomy and 2.0 times higher with superficial parotidectomy compared to ECD.

COMPLICATIONS AND TREATMENT:

CLASSIFICATION OF COMPLICATIONS:

A)INTRAOPERATIVE COMPLICATIONS

-Transection of facial nerve

-Rupture of capsule of parotid tumour

-Incomplete surgical resection

B)EARLY POSTOPERATIVE COMPLICATIONS

- Facial nerve paralysis
- Haemorrhage or haematoma
- Infection
- Skin flap necrosis
- Cosmetic deformity
- Trismus
- Parotid fistula

C)LATE POSTOPERATIVE COMPLICATIONS

- Facial sinkinesis
- Hypoesthesia of Greater auricular nerve
- Recurrent tumour
- Soft tissue deficit
- Hypertrophic scar
- Frey's syndrome

1. FACIAL NERVE PALSY:

Postoperative facial nerve dysfunction is an important early complication of parotid gland surgery. Permanent Facial nerve paralysis is seen is 3-5% of cases and transient palsy is seen in 8-65% of cases. Transient palsy resolves usually in 6 months. The incidence is more with Total parotidectomy than superficial parotidectomy.

Palsy may be due to stretch of the nerve or injury to vasa nervosum. Marginal mandibular branch is the most commonly involved branch. Older patients are more susceptible.

TREATMENT:

In temporary palsy, eye protection with ophthalmic eye drops and tarsorraphy may be required.

In case of accidental injury, the nerve is repaired primarily. If the Facial nerve is sacrificed, autogenous nerve grafting is performed using greater auricular nerve. Glossopharyngeal, accessory spinal and hypoglossal nerves can be used to anastomose with the peripheral facial nerve. Transfer of masseter for lower part and temporalis muscle for upper part of the face can be trained. Gille's procedure with temporalis muscle to establish motor power for eyelids is also tried.

2. FREY'S SYNDROME (AURICULO TEMPORAL SYNDROME):

In this condition, there is flushing and sweating of the skin innervated by the auriculo temporal nerve, whenever salivation is stimulated. The condition may follow surgery on parotid and temporomandibular joint.

It is thought that following injury to the auriculotemporal nerve, post ganglionic parasympathetic fibres from the otic ganglion become united to sympathetic nerves from the superior cervical ganglion destined to supply these vessels and glands of the skin.

Antiperspirant can be used to treat this condition. When this produces severe inconvenience, infra tympanic section of Jacobson's nerve (tympanic

nerve running from the 9th nerve via superficial petrosal to the otic ganglion) with or without section of chorda tympani has good results.

3. SALIVARY FISTULA

A salivary fistula is a communication between the skin and a salivary duct or gland, through which saliva is discharged. Parotid salivary fistula is a relatively common complication after parotidectomy. Salivary fistula or sialocele occurs if the resected edge of the remaining salivary gland leaks saliva and drains through the wound or collects beneath the flap (sialocele). Flow through the fistula increases during meals, particularly during mastication. Salivary fistula and sialoceles are usually self-limiting problems and are initially submitted to conservative treatment.

The first step to reduce salivary secretion is to reduce oral intake by means of enteral or parenteral feeding. Repeated needle aspiration and pressure dressing are carried out. In a few rare cases, insertion of a suction drain, in combination with a pressure dressing, is necessary. Anticholinergic drugs induce a temporary decrease in salivary secretion and are consequently considered useful in fistula management, but cause distressing side-effects. However, if a sialocele or a fistula are resistant to this form of treatment, a more aggressive approach is necessary.

Various forms of treatment have been described for parotid gland fistula, including tympanic neurectomy with or without chorda tympani section,

radiotherapy and even completion of the parotidectomy. Fistulas and sialoceles are managed with botulinum toxin injection after conventional conservative management techniques fail. Inhibition of parotid secretion leads to a temporary block in salivary flow followed by glandular atrophy, thus allowing healing of the fistula.

4.HYPOESTHESIA OF GREATER AURICULAR NERVE

Feeling of numbness around the ear will be present. It usually improves spontaneously within one year period.

5.AMPUTATION NEUROMA

Neuroma of greater auricular nerve may occur after parotidectomy. Treatment is simple excision.

6.HAEMORRHAGE

It may be due to inadequate haemostasis. Traetment includes evacuation of haematoma and control of bleeding. It is a rare complication.

7.INFECTION

Infection may lead to abscess formation. Treatment includes drainage and antibiotics.

8.TRISMUS

It occurs due to fibrosis and contraction of masseter muscle. It is self limitimg complication. It usually settles with physiotherapy and exercises.

9.SEROMA

It is rare. It is managed by aspiration of the accumulated fluid.

SURGICAL MANAGEMENT OF SUBMANDIBULAR TUMOURS

SUBMANDIBULAR GLAND EXCISION:

Sub mandibular gland excision should be performed under General anesthesia. The incision about 5cm placed 2 – 3 cm below the inferior border of the mandible, carried down through the platsyma. The capsule of the gland and surrounding soft tissue should be left intact over the gland when excision is carried out for a neoplasm. In this technique, the marginal mandibular nerve is at risk, so the facial vein and artery should be located, as close to the gland as possible immediately and after transaction should be elevated, superiorly to reflect the marginal mandibular nerve from the field. The gland and surrounding soft tissue should be dissected from the under surface of the mandible.

The inferior border of the gland is then elevated from the digastric muscle. The facial artery, if transected superiorly will again be transected posterolaterally, as one near its origin from the external carotid artery. The gland is reflected laterally to expose the mylohyoid muscle. As the free edge of the mylohyoid muscle is retracted, the lingual and hypoglassal nerves and Wharton's duct are identified. The lingual nerve is the parasympathetic supply to the gland, with the apex at the mid point of the gland.

The Wharton's duct lies inferior to the lingual nerve and the hypoglossal nerve is more inferior, which is identified by an accompanying vein, the ranine vein. When all the structures are identified, the duct and branch of the lingual nerve to the gland are ligated and transected. The gland and contiguous soft tissue may be dissected free and removed. A rubber drain is inserted deep to the platysma and the wound is closed in layers.

In case of tumours which is locally invasive, the lingual, hypoglassal and marginal mandibular nerve, the floor of the mouth, tongue, mandible and skin may be included in resection.

COMPLICATIONS:

1. Seroma

2. Injury to cervical branch of facial nerve : 6-9 months should elase before offering treatment. If residual weakness persist, division of the equivalent branch on the other side will help to equalize the tone. No functional defect results.

3. Injury to lingual and hypoglassal nerves will result in little deformity and there is no specific treatment.

SURGICAL MANAGEMENT OF MINOR SALIVARY GLAND TUMOURS

80 – 90% occur within the buccal cavity the commonest site being hard palate. 60% are cylindromas which are locally invasive and also metastasize

late. 40% are mixed tumours. Preliminary biopsy is advised to establish the diagnosis. The treatment of choice is, radical excision including a wide margin of healthy tissue including mucosa and even bone using diathermy for hemostasis.

The expirpation of oral neoplasm must be planned on an individual basis in each instance. Closure in lip, buccal area, floor of mouth and tongue, can generally be effected by primary suture. Defects in the palate, that do not penetrate the full thickness can be left open to granulate and heal by secondary intention. Larger defects require local or transferred mucosal or skin flaps. Through and through palatal losses necessitate use of dental prosthesis. Paranasal salivary tumours are treated by maxillectomy via the usual Weber Ferquson Cheek Flap. When regional lymphnodes are involved the Radical dissection is performed. Post operative irradiation is advocated for all malignant tumours.

ROLE OF NECK DISSECTION IN SALIVARY TUMOURS:

There is difference of opinion concerning the indication for neck dissection in salivary gland carcinoma. Eneroth and Hamberger advocate elective neck dissection in all cases of salivary gland cancer, except in low grade mucopidermoid carcinoma.

Sinha and co-workers recommended neck dissection only in clinically apparent metastasis. Maccomb et al., did not recommend elective neck

dissection for parotid cancers but advised neck dissection for malignant tumours of submandibular gland since he demonstrated lymphnode metastasis in 43.7% of submandibular tumours and only 23% in parotid tumour.

ROLE OF RADIOTHERAPY:

Fletcher and co-workers recommended adjuvant radiation therapy for high grade cancers and those patients with residual cancer to reduce the local failure rate. But there was no survival advantage for these patients.

In adenoid cystic carcinoma where there is perineural spread, local recurrence rate of 24 – 54% following surgery alone, was reduced to 14% when surgery is combined with post operative irradiation (Spiro et al., 1975)

The indications for Radiotherapy are as following:

1. Presence of locally aggressive cancer.
2. Perineural spread of tumours
3. Cervical metastatic disease
4. Positive surgical margins.
5. Cancer close to the facial nerve.
6. High grade or recurrent tumour

Pre operative radiotherapy in doses of 1200 to 3500 rad is very helpful to reduce the tumour size in radiosensitive tumours viz. adenoid cystic tumours and acinic cell tumours.

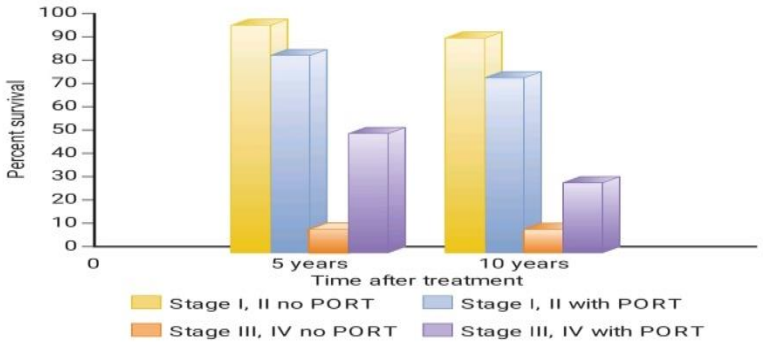


Figure 13.206 The favorable impact of adjuvant postoperative radiotherapy (PORT) is observed in advanced stage disease but not in early stage disease.

ROLE OF CHEMOTHERAPY:

The salivary glands are moderately sensitive to chemotherapy durgs. Adenocarcinoma like tumours (adenoid cystic, Adenocarcinoma, acinic cell tumours) respond well to adriamycin, cisplatinum and 5FU. The squamous cell carcinoma and mucoepidermoid tumour respond well to methotrexate and cisplatinum. The overall response rate was 42%. There was regression mainly of local regional disease.

PROGNOSIS:

Depends upon a number of factors

1. Histological types:

Adenoid cystic cancers and malignant mixed tumours have a better prognosis. Squamous cell carcinoma, Adenocarcinoma, mucoepidermoid, undifferentiated carcinoma all have a poor prognosis.

2. Facial nerve involvement:

Patients presenting with facial palsy have poor prognosis.

3. Lymph node metastasis:

Patients with lymph node metastasis have poor prognosis.

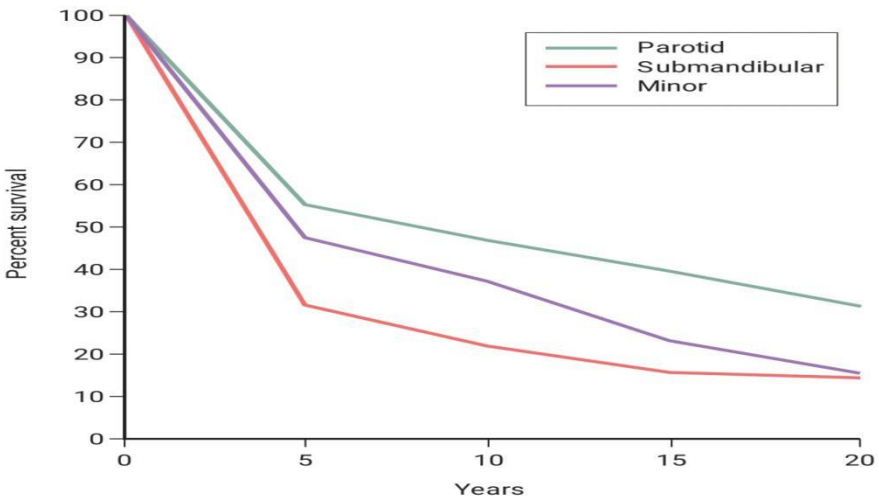


Figure 13.202 The overall survival of patients with malignant tumors of the major and minor salivary glands.

REVIEW OF LITERATURE - STATISTICS

Salivary gland tumours are uncommon, and their epidemiology has not been well described. Salivary gland tumours account for only 6% of head and neck cancer and 0.3% of all cancer (Ries et al., 1991).

Mixed pleomorphic adenomas are more common in 3rd or 4th decade and more prevalent in women.

Warthin's tumours has a strong predilection for males with a male : Female ratio 5:1, it usually occurs in patients over 40 yrs of age.

Monomorphic adenomas occurs on an average in patients over the age of 60.

AGE INCIDENCE:

AGE	Witt 1999	
	No.	%
11-20	2	3
21-30	2	3
31-40	10	17
41-50	10	17
51-60	17	29
61-70	13	22
71-80	5	8

According to this study, the parotid tumour occur mostly in 3rd-7th decade.

SEX INCIDENCE:

Types	Male	Female
Benign		
Benign Mixed Tumour	2	16
Warthin's tumour	6	2
Monomorphic adenoma	3	-
Inflammatory	1	5
Lipoma	1	-
Sub Total	13	23

Malignant		
Squamous cell carcinoma	5	5
Adeno Carcinoma	3	2
Lymphoma	1	1
Merkel Cell Carcinoma	1	-
Basaloid Neoplasm	1	-
Sub Total	11	4

According to the study, the benign tumours are more prevalent in females. Warthin's tumour is more common in males. Carcinoma is more common males.

HISTOPATHOLOGICAL FINDINGS OF PAROTID GLAND TUMOUR

Classification	**Hugo 1973 N=914)**		**Witt 1999 N=53**		**Pinkston and Cole 1999 N=212**		**Vargas PA et al 2002 N=88**	
	No	%	**No**	%	No	%	No	%
Pleomorphic adenoma	8	4	17	32	113	53	58	66
Warthins Tumour	18	9	19	36	60	28	13	14
Mucoepidermoid carcinoma	-	-	1	2	19	9	9	10
Adenoid cystic ca	12	6	-	-	1	0.5	-	-
Malignant mixed tumour	18	9	-	-	2	1	3	3.4
Acinic cell tumour	-	-	-	-	-	-	1	1.1

According to this table benign tumours are more common parotid of which mixed parotid tumour is the commonest. Warthin's tumour occurs in 9% - 36% of all tumours. Of the malignancies mucoepidermoid carcinoma is present in 9-21% of the tumour.

SUBMANDIBULAR GLAND TUMOURS:

Type	Conley et al., 1972 N=115	Spiro et al., 1975 N=217	Pinkston & Cole 1999 N=36	Vargas PA et al., 2002 N=30
Benign	53%	44%	78%	80%
Malignant	47%	56%	22%	20%

This table shows that in all studies, benign tumours are more common in submandibular glands.

INCIDENCE OF SUBMANDIBULAR GLAND MALIGNANCIES:

Type	Conley et al., 1972 N=115	Spiro et al., 1975 N=217	Pinkston & Cole 1999 N=36	Vargas PA et al., 2002 N=30
Adenoid cystic ca	40	31	35	4
Adenocarcinoma	0	15	12	1
Mucoepidermoid ca	10	31	19	1

Among the malignancies of the submandibular gland, adenoid cystic carcinoma is more common.

MATERIALS AND METHODS

INCLUSION CRITERIA:

- Patients mare than 15 years, in both sexes, presenting with salivary gland tumours in GRH, Madurai.
- Patients with salivary gland tumours requiring surgical management.
- Patients consented for inclusion in the study according to the designated proforma.

EXCLUSION CRITERIA:

- Patients less than 15 years of age.
- Patients requiring conservative management.
- Patients not consented for inclusion in the study.

METHODOLOGY:

In this study, 50 consecutive patients with various salivary gland tumors presented between 2018-2019 were studied. Various clinical manifestations of salivary gland tumours were analysed. Age, Sex, duration of illness, involvement of adjacent structures, histopathological nature of the tumour were studied. Based on the histopathological type treatment was planned. All patients were managed surgically. Post Operative morbidity and mortality were studied. A proforma was devised and cases were followed.

HISTOPATHOLOGICAL INVESTIGATION:

FINE NEEDLE ASPIRATION CYTOLOGY :

In the present study, FNAC was done in all 50 cases.

TECHNIQUE:

The skin is cleaned with spirit. A 22 G needle attached to a 20ml syringe is used for aspiration. The area to be aspirated is fixing with thumb and index finger of one hand. The needle with syringe is inserted into the mass with a single quick motion without negative pressure in the syringe. Then negative pressure is created by retracting the plunger of the syringe. The needle is moved back and forth several times into different areas of the mass maintaining the negative pressure throughout. The plunger is released to equalize the pressure, needle is withdrawn and pressure applied over the puncture site. The content of the needle lumen is expelled on a series of glass slides, smeared, air dried and stained with Hematoxylin and Eosin stain.

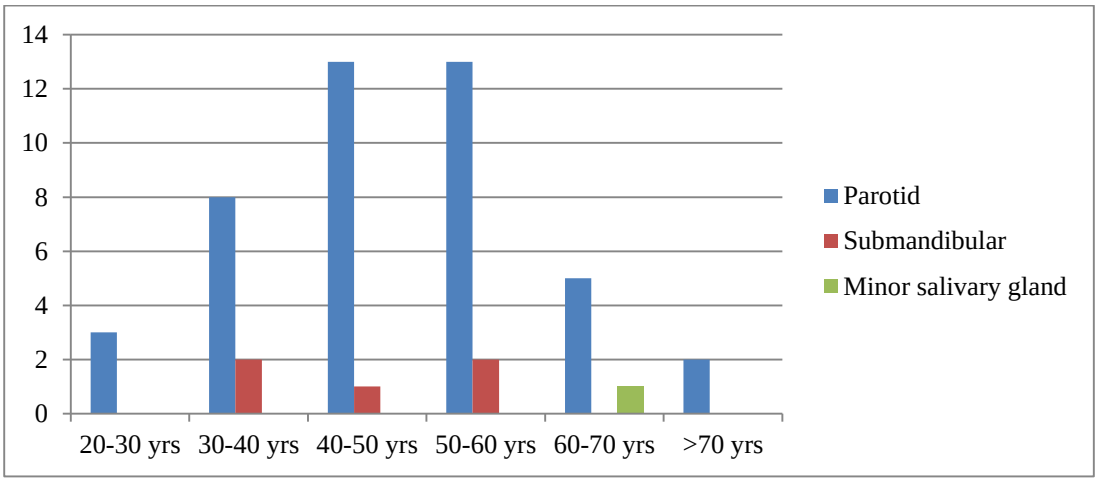
STATISTICAL ANALYSIS:

- Data to be entered in Microsoft Excel and analysed using SPSS software latest version.
- Categorical datas will be represented as Mean and Standard Deviation.
- Results will be represented as Graphs and Tables.

RESULTS

AGE DISTRIBUTION

	PAROTID GLAND		SUBMANDIBULAR GLAND		MINOR SALIVARY GLAND	
AGE	NO	%	NO	%	NO	%
20-30 YRS	3	6	-	-	-	-
30-40 YRS	8	16	2	4	-	-
40-50 YRS	13	26	1	2	-	-
50-60 YRS	13	26	2	4	-	-
60-70 YRS	5	10	-	-	1	2
>70 YRS	2	4	-	-	-	-



Thus in our study, parotid tumours are common in 4th to 6th decade, Submandibular gland tumours in 5th and 6th decade.

SEX DISTRIBUTION

	PAROTID GLAND		SUBMANDIBULAR GLAND		MINOR SALIVARY GLAND	
AGE	NO	%	NO	%	NO	%
Male	38	76	-	-	1	2
Female	6	12	5	10	-	-

In our study, Parotid tumours have a male predominance and submandibular gland tumours have a female predominance.

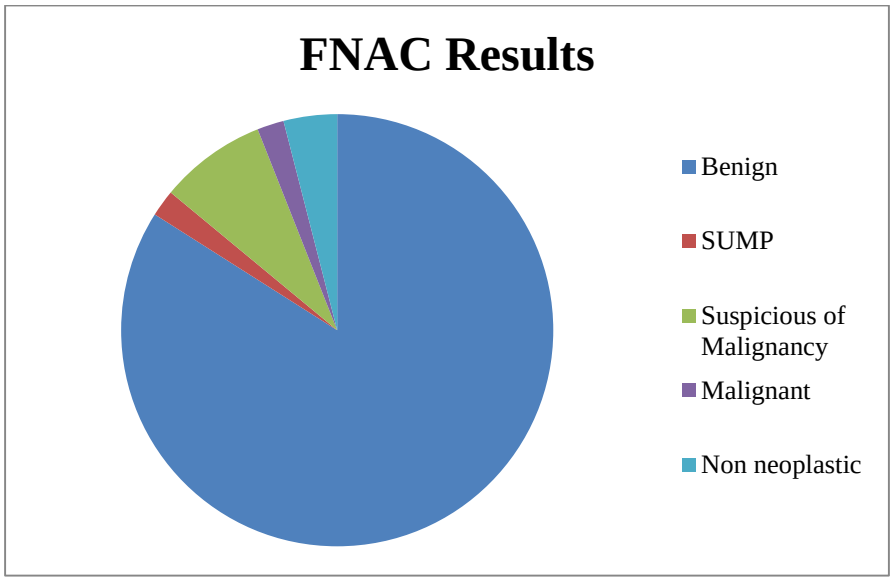
CLINICAL MANIFESTATIONS

SIGNS	PAROTID GLAND		SUBMANDIBULAR GLAND	
	NO	%	NO	%
Pain	20	45.5%	4	80%
Swelling	42	95.4%	5	100%
Facial nerve involvement	2	4.5%	-	-
Muscle involvement	-	-	-	-
Deeplobe involvement	2	4.5%	-	-
Lymph node involvement	-	-	-	-

In our study, Swelling is the most common symptom followed by pain in both Parotid and Submandibular glands. Out of 44 patients with parotid tumour, 2 patients had facial nerve involvement and 2 had deep lobe involvement, all of them malignant. There was no deep lobe involvement and lymph node involvement.

FNAC RESULTS

FNAC RESULTS	NO	%
Benign	40	80
Salivary Neoplasm of Uncertain malignant potential (SUMP)	1	2
Suspicious of Malignancy	4	8
Malignant	1	2
Non – neoplastic	2	4



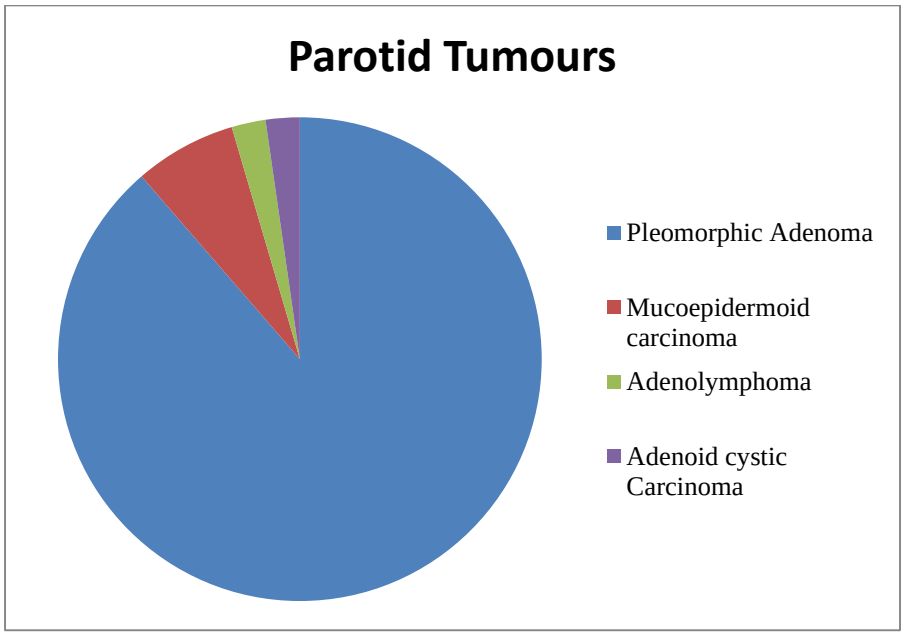
In our study, FNAC was done in 48 out of 50 patients. In Parotid tumours, out of 44 patients, FNAC was done in 42 patients. According to FNAC report 34 were benign, SUMP-1, Suspicious of malignancy-4, malignancy-1 and non-neoplastic-2.

5 out of 5 patients with submandibular gland tumours and 1 patient with minor salivary gland tumour were benign.

PAROTID TUMOURS

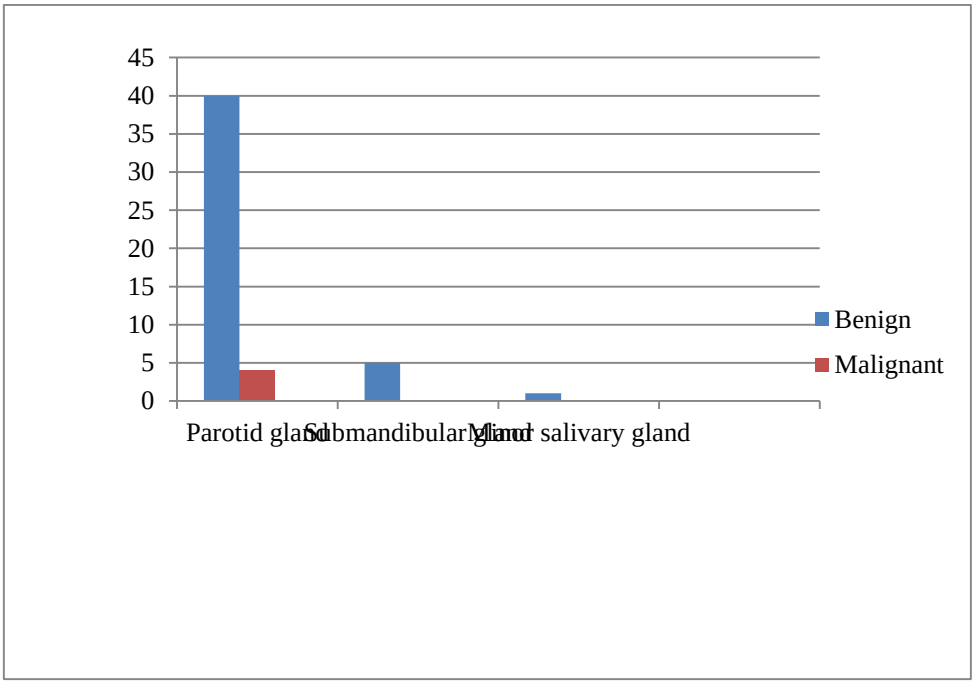
PAROTID TUMOURS	NUMBER	%
Pleomorphic Adenoma	39	88.6
Mucoepidermoid carcinoma	3	6.8
Adenoid cystic carcinoma	1	2.3
Adenolymphoma	1	2.3
Total	44	100

Thus in parotid tumours, Pleomorphic adenoma is the Most common benign tumour and Mucoepidermoid tumour is the most common malignant tumour.



BENIGN VS MALIGNANT

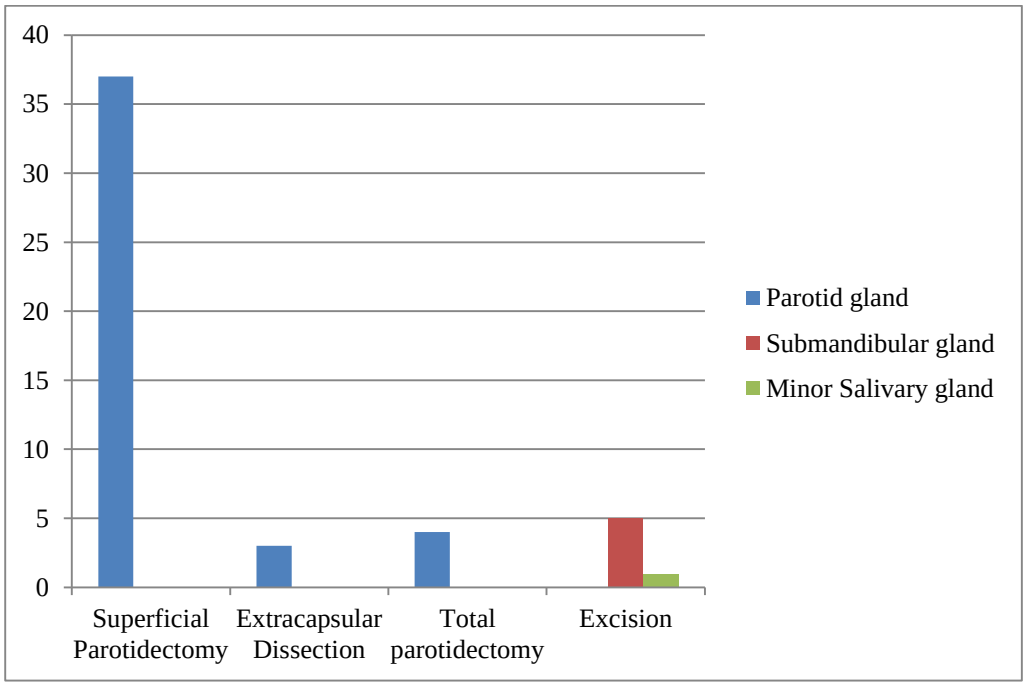
Gland	No. of benign cases	No. of Malignant cases
Parotid Gland	40	4
Submandibular Gland	5	0
Minor Salivary Gland	1	0



In our study, with the follow up of postoperative biopsy reports, Out of 44 parotid tumour patients, 40 had benign tumours and 4 of them were malignant. 5 ot of 5 submandibular gland tumours and 1 minor salivary gland tumour were benign.

SURGERIES PERFORMED

SURGERIES DONE	Number
Superficial Parotidectomy	37
Extracapsular Dissection	3
Total Parotidectomy	4
Excision	6

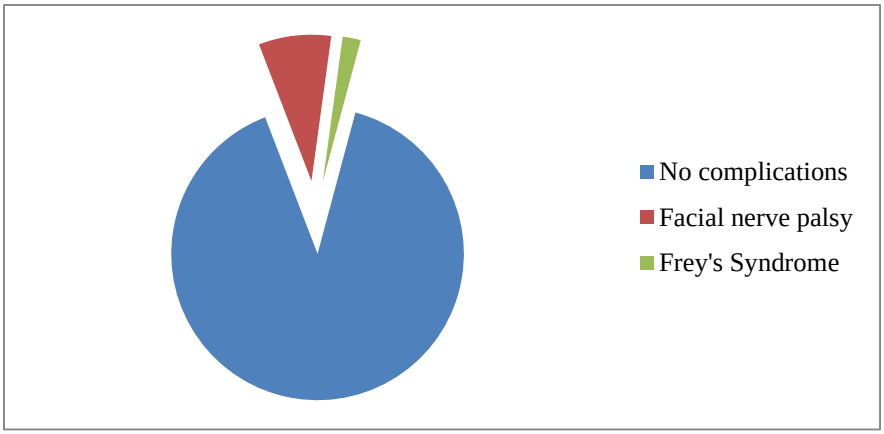


In our study, out of 44 Parotid tumour patients, 37 had undergone Superficial Parotidectomy. Extracapsular dissection was done in 3 patients and Total Parotidectomy in 4 patients.

5 out of 5 patients with Submandibular gland tumours and 1 minor salivary gland tumour patient had undergone Excision.

COMPLICATIONS AFTER SURGERY

Complications After Surgery	No.	%
No Complications	45	90
Facial nerve palsy	4	8
Frey's Syndrome	1	2



In our study, Out of the 44 patients who underwent parotid surgery, 4 had facial nerve palsy and 1 patient developed Frey's syndrome. Out of the 4 with facial nerve palsy, 2 had transient palsy and recovered later and 2 had permanent palsy. Patient who developed Frey's syndrome recovered spontaneously.

39 out of 44 parotid patients, all patients with submandibular and minor salivary gland tumour had no complications. There was no wound infection, skin necrosis and salivary fistula.

There was no recurrence so far in all the patients.

DISCUSSION

The parotid, submandibular, and sublingual glands constitute the major salivary gland. When functioning properly the glands are rarely noticed but when involved with neoplastic disease, they can be a challenge in diagnosis and treatment.

In this study, the parotid, submandibular tumours were analysed. Age, Sex incidence, histopathologic type and various treatment modalities were analysed in particular reference to FNAC, surgical treatment and post-operative complication mainly of the facial nerve injury.

PAROTID TUMOURS:

AGE INCIDENCE:

AGE	Witt study 1999	Present study
11-20	3	0
21-30	3	6
31-40	17	16
41-50	17	26
51-60	29	26
61-70	22	10
71-80	8	4

The neoplasms of the parotid is more common in 3rd -7th decade. In our study also the parotid tumours are more common in 4th-6th decade.

SEX INCIDENCE:

Previously reported studies show the incidence rate of salivary neoplasms varied considerably by sex. The male : female incidence ratio for benign mixed tumour showed predominance of female patients. In the present study, there is a male predominance.

Previous studies showed that the male incidence for Warthin's tumour, was more than double that of female patients. In this present study the Warthin's tumour is reported in only one male patient.

Incidence rate of all malignant tumour was more than 3 times in males to that of female patients. In this present study also we noticed higher incidence of carcinoma in males.

ROLE OF FNAC:

Salivary glands form an important area for aspiration because,

1. Glands are eminently accessible
2. Material is obtained easily
3. Complications are nil
4. Incisional biopsy is contraindicated because of risks of fistula.

5. Good diagnostic accuracy can be achieved with experience (90-95%).

The decision regarding surgical therapy of salivary gland tumours depends mainly on the histopathologic identity of the tumours. Either open biopsy or large bore needle biopsy of salivary gland tumour is undesirable because of the risk of secondary tumours into the wound or needle track. Experience has shown however the fine needle (22 Gauge) aspiration cytology does not result is seeding and this has become useful in pre-op diagnosis.

Jayaram and others reported on FNAC cytologic findings of 247 salivary gland lesions. They reported sensitivity and specificity rates of 87.8% and 98% respectively for the detection of malignant tumours.

Pitts and collegues found the diagnostic sensitivity of FNAC was only 58% for cancer of the salivary gland. Heller and other state the sensitivity for the diagnosis of benign salivary gland tumour ranges from 88% to 98% with a specificity of 94%.

The sensitivity for the detection of malignant tumours of salivary glands ranges from 58% to 96%, with specificity of 71% to 88%. Additionally, FNAB is not very accurate in differentiating among the various types of malignant tumour with a specific accuracy of only 27% to 85%.

The sensitivity of FNAC in the current study is 96%.

PAROTID TUMOURS:

In the present study Pleomorphic adenoma was diagnosed in 88% of parotid cases. Out of the 39 pleomorphic adenoma patients, 36 had undergone Superficial Parotidectomy and 3 had undergone Extracapsular dissection. Follow up showed no incidence of recurrence. The recurrence rate of mixed tumours offered in the literature vary widely. The primary reasons of recurrence is inadequate removal at the onset (i.e enucleation versus removal of a margin of uninvolved gland). The tumours persist or recur, because pseudopod or parts of the tumour are not removed at the operation, due to neglect or fear of damaging the facial nerve. Rupture or seeding or other seasons. Adequate surgical removal i.e., atleast superficial parotidectomy must be performed. For tumours deep to the facial nerve, the procedure of total conservative parotidectomy is performed by removal of the portion of the gland deep to the nerve, with preservation of the nerve and its branches.

In our study Warthin's tumour is encountered in 1 case, (2.3%) of tumours, who underwent Superficial Parotidectomy. Previous reports indicate the presence of Warthin's tumour almost exclusively in parotid gland which occurred between 4th and 7th decades. In our study the tumour occurred in the 4th decade.

In our study malignancy is reported in 4 cases, all of them had undergone Total Parotidectomy. Two cases of mucoepidermoid carcinoma with Preoperative facial nerve involvement underwent Total parotidectomy.

One case diagnosed as adenoid cystic carcinoma with facial nerve palsy underwent Total Parotidectomy. In the previous study also, due to its strong tendency to invade nerves and perineural lymphatics facial nerve involvement was high (30%), because of which it has poor prognosis. In our study, the incidence of adenoid cystic Ca was 2.3% which co-relate with the previous studies.

SUBMANDIBULAR GLAND TUMOURS:

Of the 50 salivary gland tumours, 5 cases were diagnosed as submandibular tumours, of which all were benign mixed tumour. It is common in the 4^{th} and 5^{th} decade.

In the previous studies 5% of tumours were seen in submandibular gland of which 50% are malignant. In our study 10% of tumours occurred in submandibular glands of which all are benign tumours. FNAC was done in all the 5 cases, of which all showed benign mixed tumour. All the 5 cases had undergone excision. There was no recurrence and postoperative complications.

MINOR SALIVARY GLAND TUMOURS:

Asinglemale patient in the 7^{th} decade was recorded in the study. It was a benign tumour and excision was done. There was no recurrence and postoperative complications.

POST OPERATIVE COMPLICATIONS:

The most feared complication after parotidectomy is facial nerve paralysis, which is reported to be 3 – 5% permanently and transient facial nerve palsy is reported to be 8.2 to 65%. (Mehle et al., 1993.)

In our study, permanent facial palsy is seen 2 cases (4%) and transient facial palsy in 2 cases (4%). This is mainly because identification of the facial nerve was carried out by identifying mastoid process initially as its spatial relation to the nerve trunk is constant. So in the initial step of superficial parotidectomy the trunk is identified first the plane of dissection maintained immediately on the anterior surface of the mastoid process as no vital structure lies between the fingerstip and the stem of the seventh nerve. Many techniques have been proposed over the years for accomplishing parotidectomy with identification and preservation of the facial nerve and its five or more major branches. Full knowledge of the anatomy is essential for safe surgery on this gland (Beahrs 1977).

CONCLUSION

- ✓ Parotid tumours are common in 4^{th} to 6^{th} decade, Submandibular gland tumours in 5^{th} and 6^{th} decade.

- ✓ Parotid tumours has a male predominance and Submandibular gland tumours has a female predominance.

- ✓ Incidence of malignant tumours is more in male patients.

- ✓ Swelling is the most common presentation in all salivary gland tumours followed by pain.

- ✓ Sensitivity of FNAC is 96%
- ✓ No complication was encountered following FNAC. So it has go a definitive role in pre-operative diagnosis of all tumours of parotid gland and submandibular gland tumours. This simple and effective procedure with high specificity and sensitivity can be recommended in all salivary gland tumours.

- ✓ Pleomorphic adenoma is the most common benign Parotid tumour and mucoepidermoid carcinoma is the most common malignant tumour.

- ✓ In our study all cases of Submandibular tumours and 1 minor salivary gland tumour were benign.

- ✓ Incidence of facial nerve palsy in postoperative period is 8%. It occurs in 3 malignant cases, for whom Total parotidectomy as done and 1 benign case, for which Superficial Parotidectomy was done. Facial nerve palsy is not seen in Extracapsular dissection.

- ✓ 1 case of Frey's syndrome was reported. No salivary fistula, Sialocele and wound complications were reported.

BIBLIOGRAPHY

1. Batsakis JG, 1996 Journal of head and neck, 2nd edition clinical and pathological consideration, p-18.
2. Batsakis J.G, 1998, The pathology of head and neck tumours, salivary gland, part 1, head and neck surgery 1 : 59
3. Heller et al., 1992, American Journal of Surgery 164 ; 667- 670
4. Jayaram et al., 1994, Journal of Oralpathology Med 23; 256-261.
5. Lewis et al., 1999, British Journal of surgery 86, 1275 –1280.
6. McMinn R.M.H. Last's Anatomy, 10th edition.
7. Pitts et al.1992 Arch.Otolaryngology head and neck surgery 118 ; 479 - 482
8. Jatin Shah's Head and neck Surgery and Oncology, 5th edition; 557-600
9. Ries et al., 1991, National Cancer institute, NIH Publication No.91 – 2789.
10. Witt 1999, Otolaryngology, head and neck surgery Vo. 121; 210 -3.
11. Martin H. The operative removal of tumors of the parotid salivary gland. Surgery. 1952;31:670–82.
12. Klintworth N, Zenk J, Koch M, et al. Postoperative complications after extracapsular dissection of benign parotid lesions with particular reference to facial nerve function. Laryngoscope. 2010;120:484–90.

13. Orabona GD, Bonavolonta P, Iaconetta G, Forte R, Califano L. Surgical management of benign tumors of the parotid: ECD versus superficial parotidectomy-our experience in 232 cases. J Oral Maxillofac Surg. 2013;71:410–3
14. Smith S, Komisar A. Limited parotidectomy: the role of ECD in parotid gland neoplasm. Layngoscope. 2007;117:1163–7
15. Witt RL, Rejto L. Pleomorphic adenoma: extracapsular dissection versus partial superficial parotidectomy with facial nerve dissection. *Delaware Medical Journal*. 2009;81(3):119–125.
16. Speight PM, Barrett AW. Salivary gland tumours. *Oral Diseases*. 2002;8(5):229–240.
17. Arshad AR. Parotid swellings: report of 110 consecutive cases. *Medical Journal of Malaysia*. 1998;53(4):417–422.
18. Brandwein MS, Ivanov K, Wallace DI, et al. Mucoepidermoid carcinoma: a clinicopathologic study of 80 patients with special reference to histological grading. *American Journal of Surgical Pathology*. 2001;25(7):835–845.
19. Bell RB, Dierks EJ, Homer L, Potter BE. Management and outcome of patients with malignant salivary gland tumors. *Journal of Oral and Maxillofacial Surgery*. 2005;63(7):917–928.

PROFORMA

A) PARTICULARS OF THE PATIENT

Name: Ip.No:

Age: D.O.A:

Sex: D.O.S:

Occupation: D.O.D:

Religion:

Address:

B) PRESENTING SYMPTOMS

a) Duration of swelling

b) Mode of onset

c) Pain

d)Fever

e)Facial Nerve involvement

C) PAST/PERSONAL/FAMILY HISTORY

D) GENERAL EXAMINATION

E) LOCAL EXAMINATION

a) Swelling – Site, size, shape, extent, consistency, skin, warmth, fluctuation.

b) Examiantion of facial nerve

c) Examination of neck nodes

F) INVESTIGATIONS

a) Imaging – USG, CT, MRI

b) FNAC

c) Other routine investigations

G) DIAGNOSIS

H) PROCEDURE DONE

I) POSTOPERATIVE COMPLICATIONS

J) MANAGEMENT OF POSTOPERATIVE COMPLICATIONS

K) POSTOPERATIVE BIOPSY

L) ANY ADJUVANT THERAPY

M) FOLLOW UP

CONSENT

I _____, Hosp.no_____, in my full senses hereby give my complete for _____ or any other procedure deemed fit which is a diagnostic/ therapeutic/ procedure/ biopsy/ transfusion/ operation to be performed on me/ my son/ my daughter/ ward _____ age _____, under any anaesthesia deemed fit. The nature and risks involved in the procedure have been explained to me in my own language to my own satisfaction. For academic and scientific purpose, the operation/procedure be television or photographed, or used for statistical measurements.

Date:

Signature/Thumb Impression/ of Patient/Guardian

Name:

Designation:

Guardian:

Relationship:

Full Address

ETHICAL COMMITTEE CERTIFICATE

MADURAI MEDICAL COLLEGE
MADURAI, TAMILNADU, INDIA -625 020
(Affiliated to The Tamilnadu Dr.MGR Medical University,
Chennai, Tamil Nadu)

Prof Dr V Nagaraajan MD MNAMS
DM (Neuro) DSc.,(Neurosciences)
DSc (Hons)
Professor Emeritus
in Neurosciences,
Tamil Nadu Govt Dr MGR Medical University
Chairman, IEC

Dr.K.Raadhika, MD.,
Member Secretary,
Asso.Professor of Pharmacology,
Madurai Medical College,
Madurai.

Members

1. Dr.C.Anitha Mohan, MD,
Asso.Professor of Physiology &
Vice Principal,
Madurai Medical College

2. Dr.P.Raja, MCh., Urology,
Medical Superintendent Govt.
Rajaji Hospital, Madurai

3.Dr.R.Balajinathan MD., (General Medicine) Professor & HOD of Medicine, Madurai Medical & Govt. Rajaji Hospital, College, Madurai.

4.Dr.P.Amutha, MS., (General Surgery) Professor & H.O.D Madurai Medical College & Govt. Rajaji Hospital, Madurai.

5.Dr.N.Sharmila thilagavathi, MD., Professor of Pathology, Madurai Medical College, Madurai

6.Mrs.Mercy Immaculate Rubalatha, M.A., B.Ed., Social worker, Gandhi Nagar, Madurai

7.Thiru.Pala.Ramasamy, B.A.,B.L., Advocate, Palam Station Road, Sellur.

8.Thiru.P.K.M.Chelliah, B.A., Businessman,21, Jawahar Street, Gandhi Nagar, Madurai.

ETHICS COMMITTEE CERTIFICATE

Name of the Candidate	:	Dr.Manikandan .U
Designation	:	PG in M.S., General Surgery
Course of Study	:	2017- 2020
College	:	MADURAI MEDICAL COLLEGE
Research Topic	:	Prospective study on Management of salivary gland tumours and its outcome in Govt Rajaji Hospital, Madurai
Ethical Committee as on	:	25.04.2019

The Ethics Committee, Madurai Medical College has decided to inform that your Research proposal is accepted.

Member Secretary Chairman Dean / Convenor

Prof Dr V Nagaraajan
M.D., MNAMS, D.M., (Neuro), Dsc (Hon)
Chairman
IEC - Madurai Medical College
Madurai

DEAN
Madurai Medical College
Madurai-20

10 MAY 2019

PLAGIARISM CERTIFICATE

Urkund Analysis Result

Analysed Document:	Mani Thesis plagiarism Copy.docx (D57134097)
Submitted:	10/16/2019 6:19:00 PM
Submitted By:	manitvmc.u@gmail.com
Significance:	6 %

MASTER CHART

S.NO	NAME	AGE/SEX	GLAND INVOLVED	FNAC RESULTS	PATHOLOGY	MANAGEMENT
1	Rathinam	45/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
2	Pandiyan	29/F	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
3	Lakshmi	65/M	Parotid	Not done	Benign	Superficial Parotidectomy
4	Ahamed Nisha	57/F	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
5	Karuppasamy	49/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
6	Perumal	45/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
7	Balakrishnan	72/M	Parotid	FNAC +ve	Suspicious of malignancy	Total Parotidectomy
8	Murugan	53/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
9	Kottaisamy	27/M	Parotid	FNAC +ve	Benign	Extracapsular dissection
10	Palanivel	67/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
11	Alagammal	37/F	Submandibular	FNAC +ve	Benign	Excision
12	Sadik Basha	48/M	Parotid	Not done	Benign	Superficial Parotidectomy
13	Krishnamoorthi	61/M	Parotid	FNAC +ve	Malignancy	Total Parotidectomy
14	Muthu	71/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
15	David	40/M	Parotid	FNAC +ve	Suspicious of malignancy	Superficial Parotidectomy
16	Mahadevan	52/M	Parotid	FNAC -ve	Non neoplastic	Superficial Parotidectomy
17	Ammasi	34/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
18	Veerabaghu	58/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
19	Eswaramoorthy	26/M	Parotid	FNAC +ve	Benign	Extracapsular dissection
20	Neethidasan	60/M	Parotid	FNAC +ve	SUMP	Superficial Parotidectomy
21	Maruthupandi	67/M	Parotid	FNAC +ve	Suspicious of malignancy	Total Parotidectomy
22	Pandiyammal	52/F	Submandibular	FNAC +ve	Benign	Excision
23	Arunchunaikani	43/M	Parotid	Not done	Benign	Superficial Parotidectomy
24	Muthudevar	46/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
25	Arjunan	37/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
26	Vijayalaskhmi	46/F	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
27	Muniraj	55/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
28	Periyasamy	60/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
29	Kamatchi	47/F	Submandibular	FNAC +ve	Benign	Excision
30	Muthupandi	39/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
31	Anjappan	57/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
32	Palpandi	64/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
33	Gopal	44/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
34	Vellaisamy	40/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
35	Shanthi	38/F	Submandibular	FNAC +ve	Benign	Excision
36	Irulan	60/M	Parotid	FNAC +ve	Suspicious of malignancy	Total Parotidectomy
37	Shanmugam	50/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
38	Valarmathi	45/F	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
39	Pitchai	52/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy

40	Amsupandi	39/M	Parotid	FNAC -ve	Non neoplastic	Superficial Parotidectomy
41	Masanam	42/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
42	Ravi	61/M	Minor salivary gland	FNAC +ve	Benign	Excision
43	Alagupandi	56/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
44	Chitra	40/F	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
45	Jeyakodi	49/F	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
46	Muthumari	55/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
47	Anthonisamy	52/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
48	Thirupathi	35/M	Parotid	Not done	Benign	Extracapsular dissection
49	Selvakumar	41/M	Parotid	FNAC +ve	Benign	Superficial Parotidectomy
50	Panchavarnam	60/F	Submandibular	FNAC +ve	Benign	Excision

S.NO	NAME	COMPLICATION	HOSPITAL STAY	POSTOP BIOPSY	RADIO - THERAPY	RECURRENCE
1	Rathinam	Nil	7 days	Pleomorphic adenoma	No	No
2	Pandiyan	Nil	7 days	Pleomorphic adenoma	No	No
3	Lakshmi	Nil	8 days	Pleomorphic adenoma	No	No
4	Ahamed Nisha	Nil	7 days	Pleomorphic adenoma	No	No
5	Karuppasamy	Nil	7 days	Pleomorphic adenoma	No	No
6	Perumal	Nil	8 days	Pleomorphic adenoma	No	No
7	Balakrishnan	Facial nerve palsy	12 days	Mucoepidermoid tumour	No	No
8	Murugan	Nil	7days	Pleomorphic adenoma	No	No
9	Kottaisamy	Nil	8 days	Pleomorphic adenoma	No	No
10	Palanivel	Nil	8 days	Pleomorphic adenoma	No	No
11	Alagammal	Nil	6 days	Pleomorphic adenoma	No	No
12	Sadik Basha	Nil	7 days	Pleomorphic adenoma	No	No
13	Krishnamoorthi	Facial nerve palsy	14 days	Mucoepidermoid tumour	Yes	No
14	Muthu	Frey's Syndrome	8 days	Pleomorphic adenoma	No	No
15	David	Nil	7 days	Adenolymphoma	No	No
16	Mahadevan	Nil	7 days	Pleomorphic adenoma	No	No
17	Ammasi	Nil	7 days	Pleomorphic adenoma	No	No
18	Veerabaghu	Nil	9 days	Pleomorphic adenoma	No	No
19	Eswaramoorthy	Nil	6 days	Pleomorphic adenoma	No	No
20	Neethidasan	Nil	7 days	Pleomorphic adenoma	No	No
21	Maruthupandi	Facial nerve palsy	11 days	Adenoid cystic carcinoma	No	No
22	Pandiyammal	Nil	5 days	Pleomorphic adenoma	No	No
23	Arunchunaikani	Nil	7 days	Pleomorphic adenoma	No	No
24	Muthudevar	Nil	8 days	Pleomorphic adenoma	No	No
25	Arjunan	Nil	6 days	Pleomorphic adenoma	No	No
26	Vijayalaskhmi	Nil	7 days	Pleomorphic adenoma	No	No
27	Muniraj	Nil	7 days	Pleomorphic adenoma	No	No
28	Periyasamy	Nil	7 days	Pleomorphic adenoma	No	No
29	Kamatchi	Nil	5 days	Pleomorphic adenoma	No	No
30	Muthupandi	Nil	7 days	Pleomorphic adenoma	No	No
31	Anjappan	Nil	7 days	Pleomorphic adenoma	No	No
32	Palpandi	Nil	9 days	Pleomorphic adenoma	No	No
33	Gopal	Nil	7 days	Pleomorphic adenoma	No	No
34	Vellaisamy	Nil	7 days	Pleomorphic adenoma	No	No
35	Shanthi	Nil	5 days	Pleomorphic adenoma	No	No
36	Irulan	Nil	10 days	Mucoepidermoid tumour	No	No
37	Shanmugam	Facial nerve palsy	11 days	Pleomorphic adenoma	No	No
38	Valarmathi	Nil	7 days	Pleomorphic adenoma	No	No
39	Pitchai	Nil	8 days	Pleomorphic adenoma	No	No

	Amsupandi	Nil	7 days	Pleomorphic adenoma	No	No
41	Masanam	Nil	7 days	Pleomorphic adenoma	No	No
42	Ravi	Nil	5 days	Pleomorphic adenoma	No	No
43	Alagupandi	Nil	7 days	Pleomorphic adenoma	No	No
44	Chitra	Nil	8 days	Pleomorphic adenoma	No	No
45	Jeyakodi	Nil	7 days	Pleomorphic adenoma	No	No
46	Muthumari	Nil	7 days	Pleomorphic adenoma	No	No
47	Anthonisamy	Nil	7 days	Pleomorphic adenoma	No	No
48	Thirupathi	Nil	5 days	Pleomorphic adenoma	No	No
49	Selvakumar	Nil	8 days	Pleomorphic adenoma	No	No
50	Panchavarnam	Nil	5 days	Pleomorphic adenoma	No	No

CERTIFICATE

This is to certify that this dissertation work titled **PROSPECTIVE STUDY ON MANAGEMENT OF SALIVARY GLAND TUMOURS AND ITS OUTCOME IN GOVT RAJAJI HOSPITAL, MADURAI** of the candidate **MANIKANDAN.U** with Reg .No **221711115** for the award of Master Degree in the branch of General Surgery. I have personally verified the urkund.com website for plagiarism check. I found that the uploaded thesis file contains all from introduction to conclusion pages and results shows **6%(SIX)** of plagiarism in the dissertation

Guide and Supervisor Sign and seal