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Original Article

Surgical Management and Outcome of Patients with Salivary Gland Tumours in A Tertiary Care Centre

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ABSTRACT

Background: Malignancies of salivary glands are less than 0.5% cases of malignancies all over the body and 80% are benign salivary gland lesions. The parotid gland comprises 64-80% of salivary gland tumours, submandibular gland possess 7-11%, sublingual gland 1% and minor salivary gland comprises 9-23% which are distributed throughout the oral cavity.

Materials and Method: a prospective and observational study carried out upon 40 patients of tumours of the salivary gland , benign and malignant, for a period of 1 year presenting to the department of ENT, Assam Medical College and Hospital, Dibrugarh for the purpose of treatment. The cases were selected irrespective of Sex, Age , Religion, Caste, duration of illness and severity of conditions.

Results: Among the 40 patients, the largest group (27.50%) consisted of 11 patients in their 4th decade (between 31-40 years old). 60% were female and 40% were male with salivary gland tumours. Male to female ratio is 1:1.5, with female preponderance. Parotid gland was the most common site involved with 25 of the patients (62.50%). Most of the tumours (65%) were Pleomorphic adenomas, with 26 patients having this type of tumour. 6 uncommon tumours appeared twice each, making up 5% of the cases each. These tumors were Warthin's tumour, Leiomyoma, Haemangioma, Myoepithelioma, and Epithelial Myoepithelial Carcinoma. Rest of the tumours such as Basal cell Adenoma, Hodgkin's Lymphoma, Mucoepidermoid Carcinoma(MEC) and Clear cell carcinoma(CCC) were 1 case each (2.50%). 35 of the salivary gland tumours (87.50%) were benign and 5 of the tumours (12.50%) were malignant. The ratio of benign to malignant is 7: 1. The most common surgical procedure performed was Superficial Parotidectomy in 19 of the patients (47.5%). Next most common surgical procedure performed was Submandibular Gland Excision in 12 of the cases (30%). Facial Nerve Palsy was seen in 5 patients (12.50%), Hypoaesthesia of the ear lobule and post-auricular skin was seen in 3 patients (7.50%), Marginal Mandibular Nerve Injury was seen in 2 patients (5%), surgical site infection was found in 2(5%) patients, Salivary Fistula, Seroma and Skin Flap Necrosis were the post-operative complications found in 1 patient each(2.50%).

Conclusion: Parotid gland involvement with salivary gland tumour was most commonly seen. Thorough clinical examination and FNAC were adequate for pre-operative diagnosis. Surgery was the preferred treatment option. Complications following surgical correction required follow-up for definitive management.

Keywords: *Salivary gland tumours, Parotid gland, Pleomorphic adenoma, FNAC diagnosis, Surgical management.*

INTRODUCTION

Parotid, Sublingual and Submandibular glands are the three pairs of major glands which perform the function of saliva secretion in the oral cavity which help to preserve the moisture of oral cavity preserving oral hygiene and also help in mastication, taste and articulation of speech[1]. Salivary gland ailments can be divided into inflammatory and neoplastic. Inflammatory conditions follow either obstruction of salivary ducts by sialoliths or secondary to more complex autoimmune or systemic inflammatory disorders[2]. Malignancies of salivary glands are less than 0.5% cases of malignancies all over the body and 80% are benign salivary gland lesions[3].The parotid gland comprises 64-80% of salivary gland tumours, submandibular gland possess 7-11%, sublingual gland 1% and minor salivary gland comprises 9-23% which are distributed throughout the oral cavity[4].

Clinical assessment may not always accurately diagnose salivary gland lesions, therefore histopathological examination of excised sample is essential for the final diagnosis[5]. FNAC has been a diagnostic tool for salivary gland lesions for more than 3 decades and was shown to be beneficial in typing and differentiating non-neoplastic from neoplastic salivary gland lesions[6]. The first ever Parotidectomy as well as treatment of Ranula and Stones of the floor of mouth was done by German surgeon Lorenz Heister in 1765[7]. In 1805, the first Parotidectomy due to cancer was done by George McClellan , professor at Thomas Jefferson University in USA[8]. Most of the time the salivary gland tumours are site specific. Adjunctive techniques can prevent some of these complications during first operations, whereas post-operative care can prevent the others. Some complications on the other hand are incurable[9].

Due to the rarity of Salivary gland tumours, this study aims to evaluate different surgical methods for treating them and to determine the rate of complications following surgery for Salivary Gland Tumours in a Tertiary care centre.

MATERIAL AND METHODS

Our study was a prospective and observational study carried out upon 40 patients of tumours of the salivary gland, benign and malignant, for a period of 1 year presenting to the department of ENT, Assam Medical College and Hospital, Dibrugarh for the purpose of treatment.

The patients' ages varied widely, ranging from as young as 4 years old to as old as 72 years. Patients were given an initial diagnosis after sharing their medical history and having a thorough check-up. The cases were selected irrespective of Sex, Age, Religion, Caste, duration of illness and severity of conditions. The cases after admission were subjected to necessary investigations for the confirmatory diagnosis of Salivary Gland Tumours which include MRI, CT Scan, Ultrasonography, FNAC and Blood Investigations. Patients with salivary gland tumours who required surgery and willing to give informed consent were subjected to pre-anaesthetic investigations and counselled about the disease and the risks associated with surgery especially facial nerve paralysis after admission. Excision of the lesion or Tumour was undertaken after preparing the patients. The excised tumours were subjected to histopathogological examination. The post-surgical complications of different salivary gland tumours were assessed.

RESULTS

TABLE–1: AGE WISE DISTRIBUTION

Age Group *(in years)*	Number *(n)*	Percentage *(%)*
Upto 20	9	22.50
21–30	4	10.00
31–40	11	27.50
41–50	6	15.00
51–60	5	12.50
61–70	4	10.00
>70	1	2.50
TOTAL	40	100.00
Mean ± S.D.	37.55± 17.42*years*	
Range	4-72*years*	

Showing the age group of patients. The mean age of presentation was 37.55 ± 17.42 years. Among the 40 patients, the largest group (27.50%) consisted of 11 patients in their 4th decade (between 31-40 years old).

Figure–1: Age wise Distribution

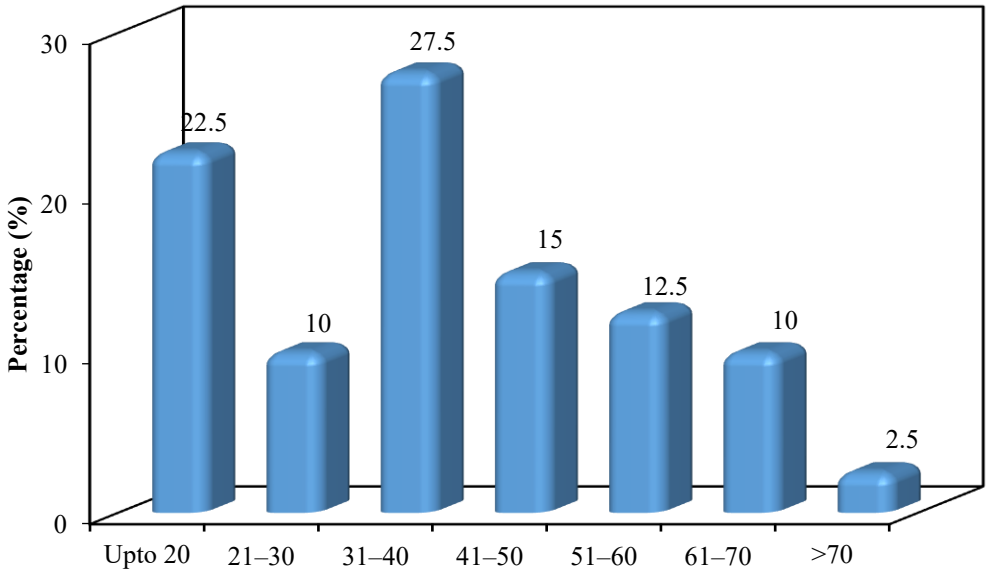
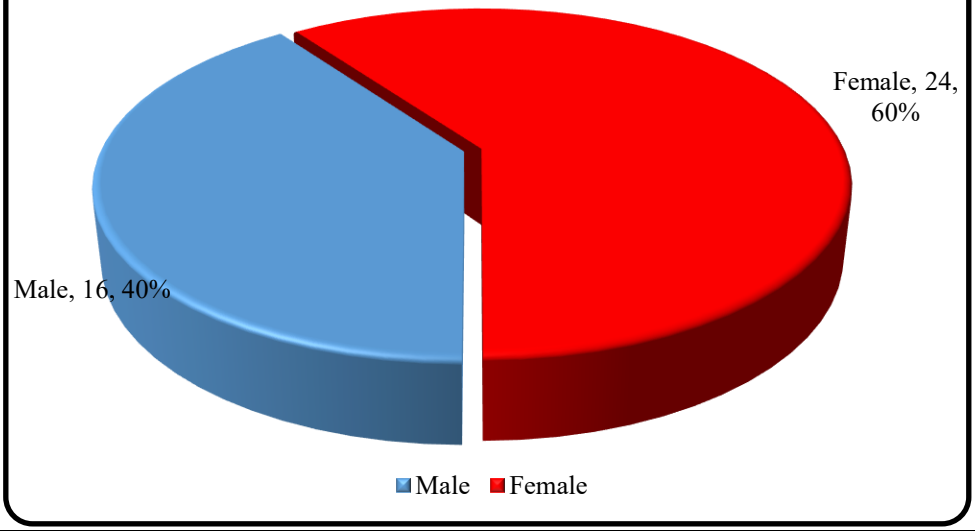


Table-2.: Gender Wise Distribution

Gender	*Number (n)*	*Percentage (%)*
Male	16	40.00
Female	24	60.00
TOTAL	40	100.00
Ratio (M: F)	1 : 1.5	

showing that 60% were female and 40% were male with salivary gland tumours. Male to female ratio is 1:1.5, with female preponderance.

Figure–2: Gender wise Distribution



Table–3: Site of Lesion

Site of Lesion	Number *(n)*	Percentage *(%)*
Parotid Gland	25	62.50
Submandibular Gland	12	30
Sublingual Gland	1	2.50
Minor Salivary Glands	2	5

showing distribution according to site of Lesion. Parotid gland(PG) was the most common site involved with 25 of the patients (62.50%). Submandibular gland(SMG) was involved in 12 of the patients (30%). Sublingual gland(SG) involvement was seen in 1 (2.50%) of the patients. Whereas Minor Salivary Gland(MiSG) involvement was found in 2 (5%) of patients over the hard palate and lower left gingivobuccal mucosa.

Figure–3: Site of Lesion

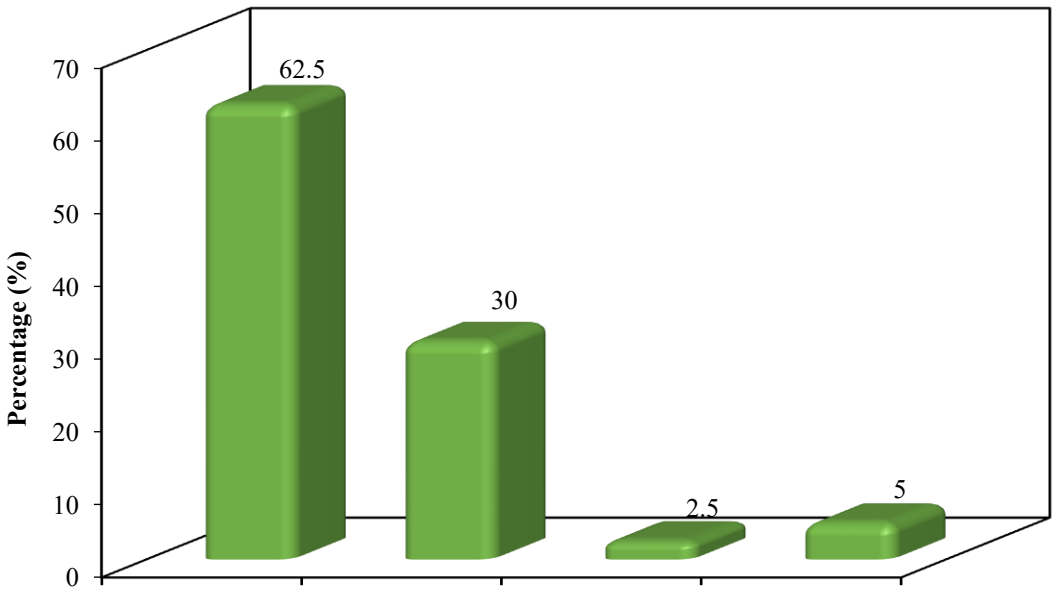


Table-4:Histopathological Diagnosis

Histopathological Diagnosis		Number *(n)*	Percentage *(%)*
Benign	Pleomorphic Adenoma	26	65.00
	Warthin's Tumor	2	5.00
	Basal cell Adenoma	1	2.50
	Leiomyoma	2	5.00
	Haemangioma	2	5.00
	Myoepithelioma	2	5.00

Malignant	Epithelial Myoepithelial Carcinoma	2	5.00
	Mucoepidermoid Carcinoma	1	2.50
	Hodgkin's Lymphoma	1	2.50
	Clear Cell Carcinoma	1	2.50
TOTAL		40	100.00

showing histopathological diagnosis of swelling after FNAC. Most of the tumors (65%) were Pleomorphic Adenomas(PA), with 26 patients having this type of tumour. Six uncommon tumours appeared twice each, making up 5% of the cases each. These tumours were Warthin's tumour, Leiomyoma, Haemangioma, Myoepithelioma, and Epithelial Myoepithelial Carcinoma. Rest of the tumours such as Basal cell Adenoma, Hodgkin's Lymphoma , Mucoepidermoid Carcinoma(MEC) and Clear cell carcinoma(CCC) were 1 case each (2.50%).

Figure–4: Histopathological Diagnosis

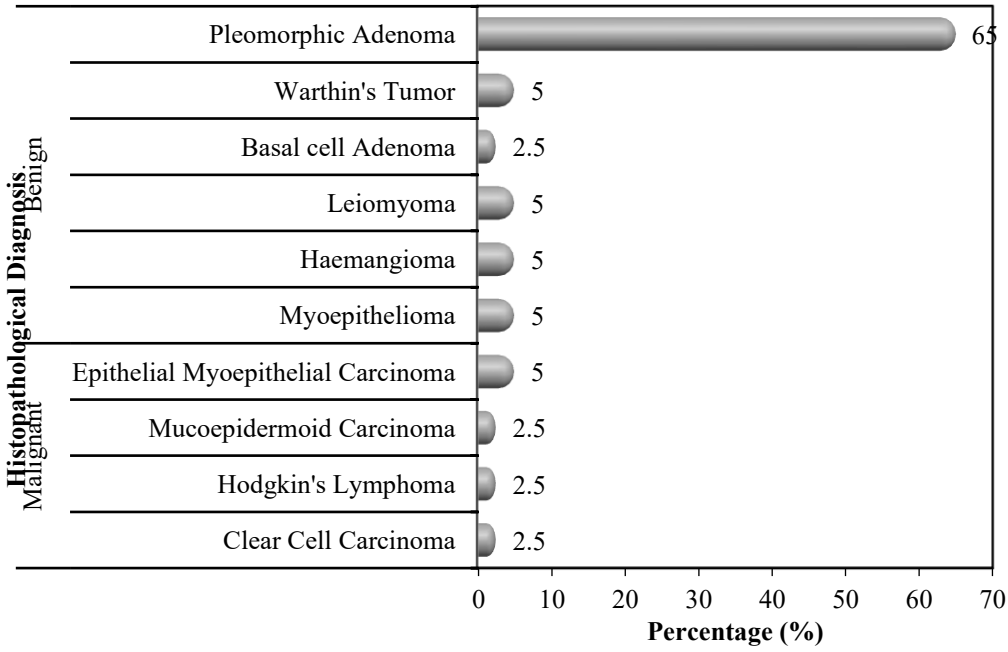


Table-5: Distribution Of Individual Tumours According to Site Of Lesion

Histopathology	**Parotid (*n* = 25)**		**Submandi-bular (*n* = 12)**		**Sublingual (*n* = 1)**		**Minor Salivary Gland (*n* = 2)**	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Pleomorphic Adenoma	15	60.00	9	75.00	1	100.00	1	50.00
Warthin's Tumour	2	8.00	0	0.00	0	0.00	0	0.00
Basal cell Adenoma	1	4.00	0	0.00	0	0.00	0	0.00
Leiomyoma	1	4.00	1	8.33	0	0.00	0	0.00
Haemangioma	2	8.00	0	0.00	0	0.00	0	0.00
Myoepithelioma	1	4.00	1	8.33	0	0.00	0	0.00
Epithelial Myoepithelial Carcinoma	2	8.00	0	0.00	0	0.00	0	0.00
Mucoepidermoid Carcinoma	0	0.00	0	0.00	0	0.00	1	50.00
Hodgkin's Lymphoma	0	0.00	1	8.33	0	0.00	0	0.00

Clear Cell Carcinoma	1	4.00	0	0.00	0	0.00	0	0.00

showing distribution of individual tumours according to site. In the PG, PA was not only the most common tumour overall, but also the most common non-cancerous (benign) tumour. There were 15(60%) cases of PA in the Parotid, 9(75%) in Submandibular, 1(100%) in sublingual gland and 1(50%) in minor salivary gland of hard palate. There were 2 cases(8%) of Warthin's and Haemangioma each in the PG. There were 2 cases(8%) of Leiomyoma, 1(4%) in Parotid and 1(8.33%) in SMG. Similarly there were 2 cases of Myoepithelioma, 1(4%) in Parotid and 1(8.33%) in SMG. There was 1(4%) case of Basal cell Adenoma in the Parotid. Among the Malignant tumours, there were 2 cases(8%) of Epithelial Myoepithelial Carcinoma in the Parotid. There was 1 case(50%) of MEC of the MiSG of lower left gingivobuccal sulcus, 1 case(8.3%) of Hodgkin's Lymphoma of the SMG and 1 case(4%) of CCC of the Parotid gland.

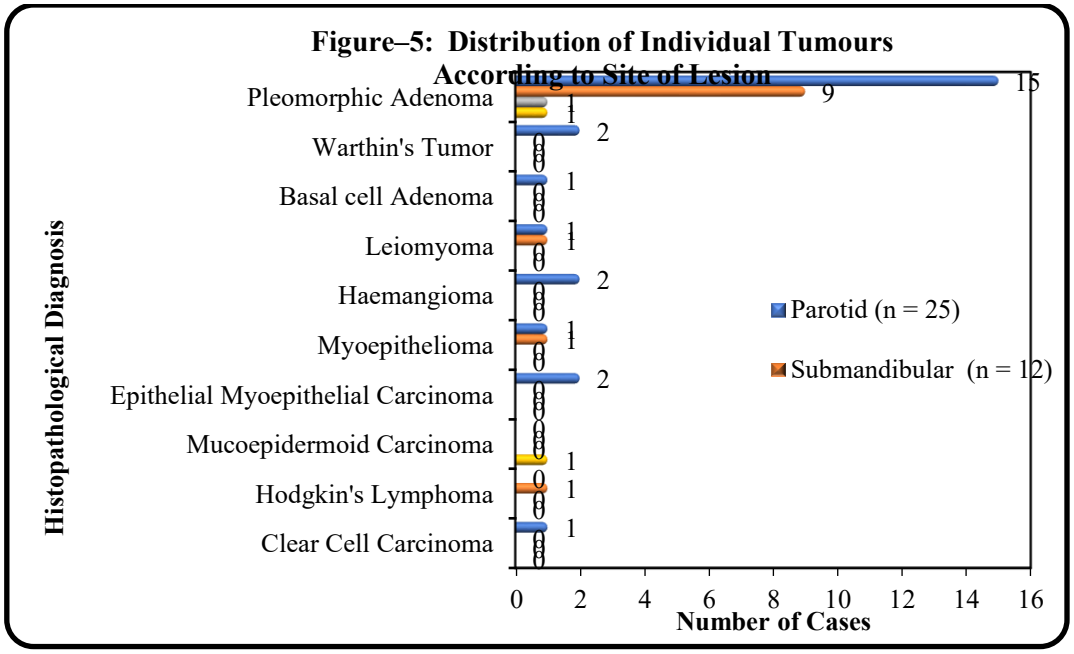


Table-6:Type Of Tumour

Type of Tumour	Number *(n)*	Percentage *(%)*
Benign	35	87.50
Malignant	5	12.50
TOTAL	40	100.00

showing the type of tumour. 35 of the salivary gland tumours (87.50%) were benign and 5 of the tumours (12.50%) were malignant. The ratio of benign to malignant is 7: 1.

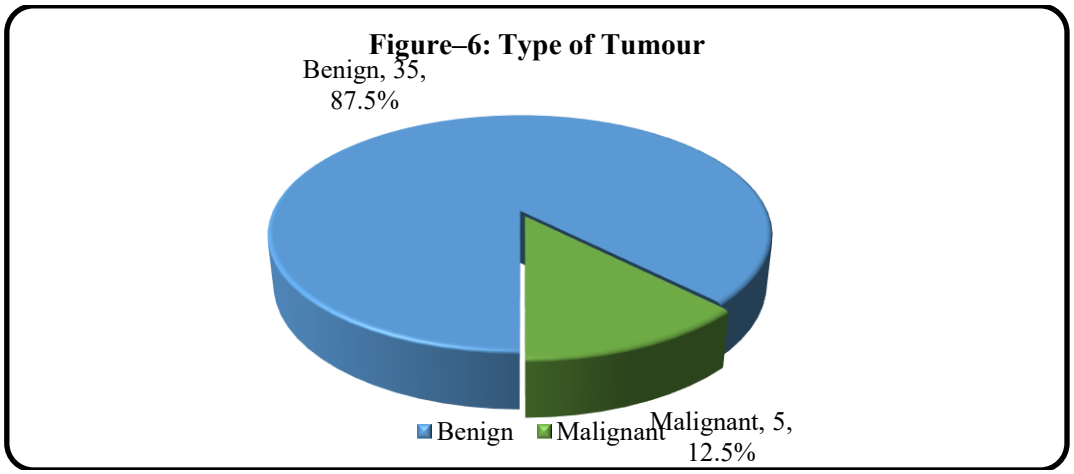


Table-7:Type Of Surgical Management

Type of Surgical Management	Number *(n)*	Percentage *(%)*
Superficial Parotidectomy	19	47.50
Total Conservative Parotidectomy	1	2.50
Radical Parotidectomy	0	0
Submandibular Gland Excision	12	30.00
Sublingual Gland Excision	1	2.50
Wide Local Excision of Mass	2	5.00
Haemangioma Excision	0	0.00
Sclerosing Agent	2	5.00
Total Parotidectomy	3	7.50
TOTAL	40	100.00

showing type of surgical management. The most common surgical procedure performed was Superficial Parotidectomy in 19 of the patients (47.5%). Next most common surgical procedure performed was Submandibular Gland Excision in 12 of the cases (30%).Total Parotidectomy was done for 3 patients(7.5%).Wide Local Excision of Mass was done in 2 patients (5%). Sclerosing agent was given in 2 haemangioma patients (5%). Total Conservative Parotidectomy was done for 1 patients (2.5%). Sublingual Gland Excision was done for 1 patient (2.5%).

Figure–7: Type of Surgical Management

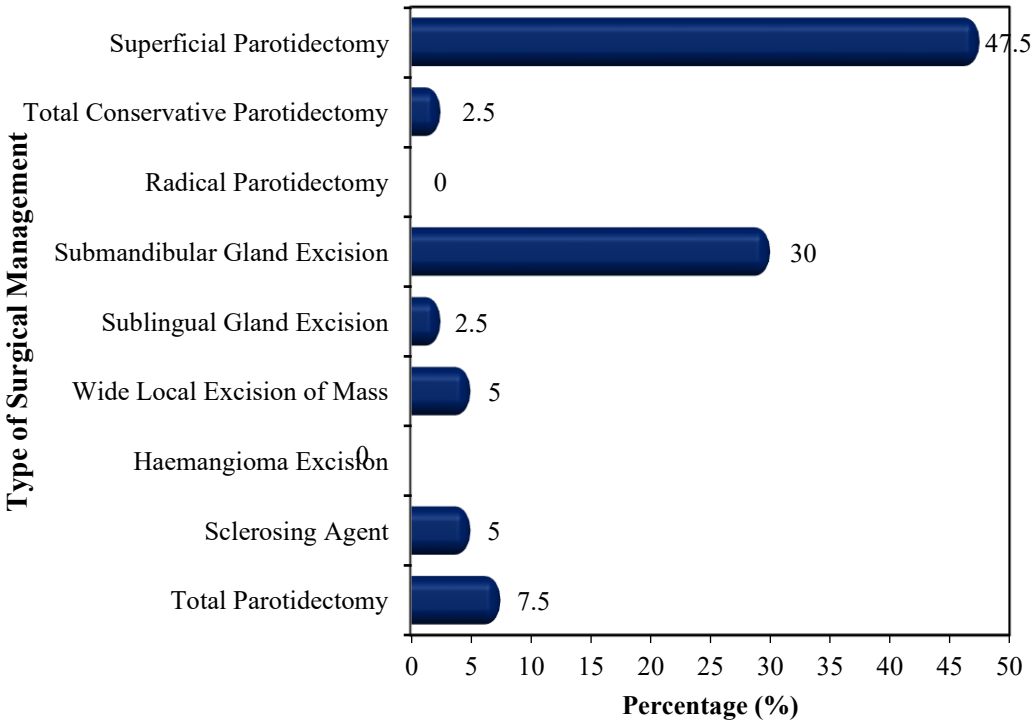


TABLE-8:POST SURGICAL COMPLICATIONS

Post Surgical Complications	Number *(n)*	Percentage *(%)*

Facial Nerve Palsy	5	12.50
Hypoaesthesia due to auricular nerve transection	3	7.50
Marginal Mandibular Nerve injury	2	5.00
Frey's Syndrome	0	0.00
Haematoma	0	0.00
Salivary Fistula	1	2.50
Sialocoele	0	0.00
Seroma	1	2.50
Infection	2	5.00
Hypertrophic Scar	0	0.00
Skin flap necrosis	1	2.50

showing complications following surgery. Facial Nerve Palsy was seen in 5 patients (12.50%). Hypoaesthesia of the ear lobule and post-auricular skin was seen in 3 patients (7.50%). Marginal Mandibular Nerve injury was seen in 2 patients (5%). Postoperative surgical site infection was found in 2(5%) patients with Superficial Parotidectomy. Salivary Fistula, Seroma and Skin Flap Necrosis were the post-operative complications found in 1 patient each(2.50%).

Figure–8: Post Surgical Complications

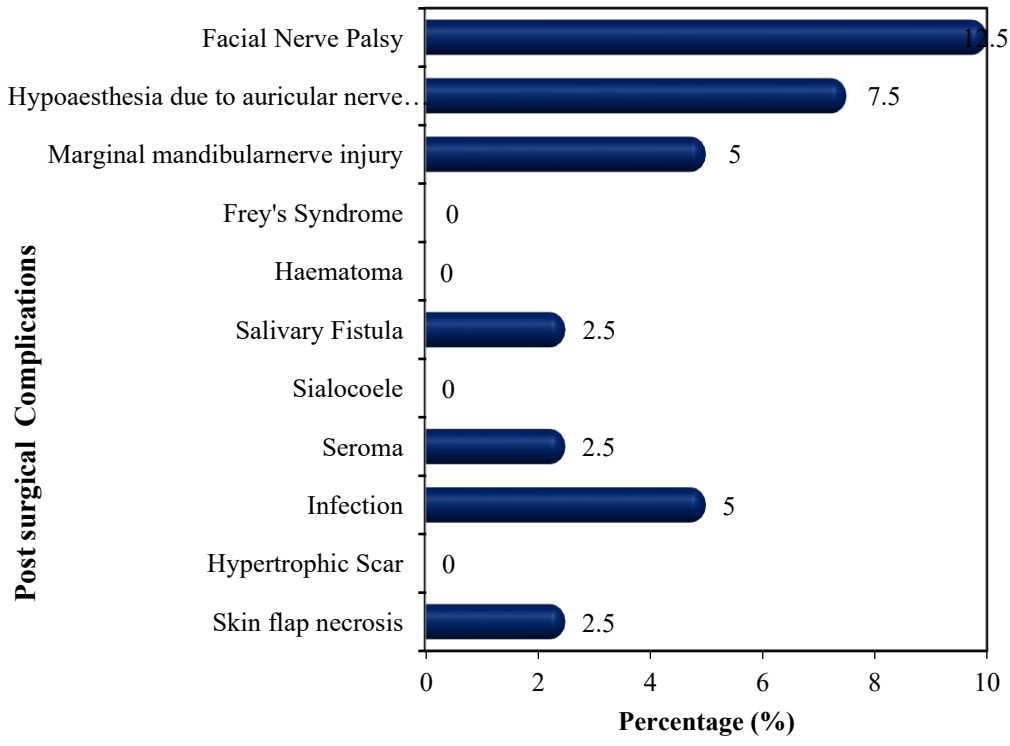


Table-9: Follow-Up Of Post Surgical Complications

Post Surgical Complications	at 1 month		at 2month		at 3month	
	n =40	%	*n* =40	%	*n* =40	%
Facial Nerve Palsy	5	12.50	2	5.00	1	2.50

Hypoaesthesia due to auricular nerve transection	0	0.00	0	0.00	0	0.00
Marginal mandibularnerve injury	2	5.00	2	5.00	0	0.00
Frey's Syndrome	0	0.00	0	0.00	0	0.00
Haematoma	0	0.00	0	0.00	0	0.00
Salivary Fistula	1	2.50	0	0.00	0	0.00
Sialocoele	0	0.00	0	0.00	0	0.00
Seroma	0	0.00	0	0.00	0	0.00
Infection	0	0.00	0	0.00	0	0.00
Hypertrophic Scar	0	0.00	0	0.00	0	0.00
Skin flap necrosis	0	0.00	0	0.00	0	0.00

showing follow up of individual complications at 1 month, 2 months and 3 months interval. All 5 patients with Facial Nerve Palsy came for follow –up at 1 month post surgery. Out of them 2 patients followed up at 2 months interval. 1 patient's facial nerve palsy had resolved at 2 months follow-up. 1 Facial Nerve Palsy Patient presented with persistent Palsy at 3 months. 2 patients with Marginal Mandibular Nerve injury followed up at 1 month and 2 months. 1 patient with Salivary Fistula followed up at 1 month. Rest patients with complications didn't follow up.

Figure–9: Post Surgical Complications

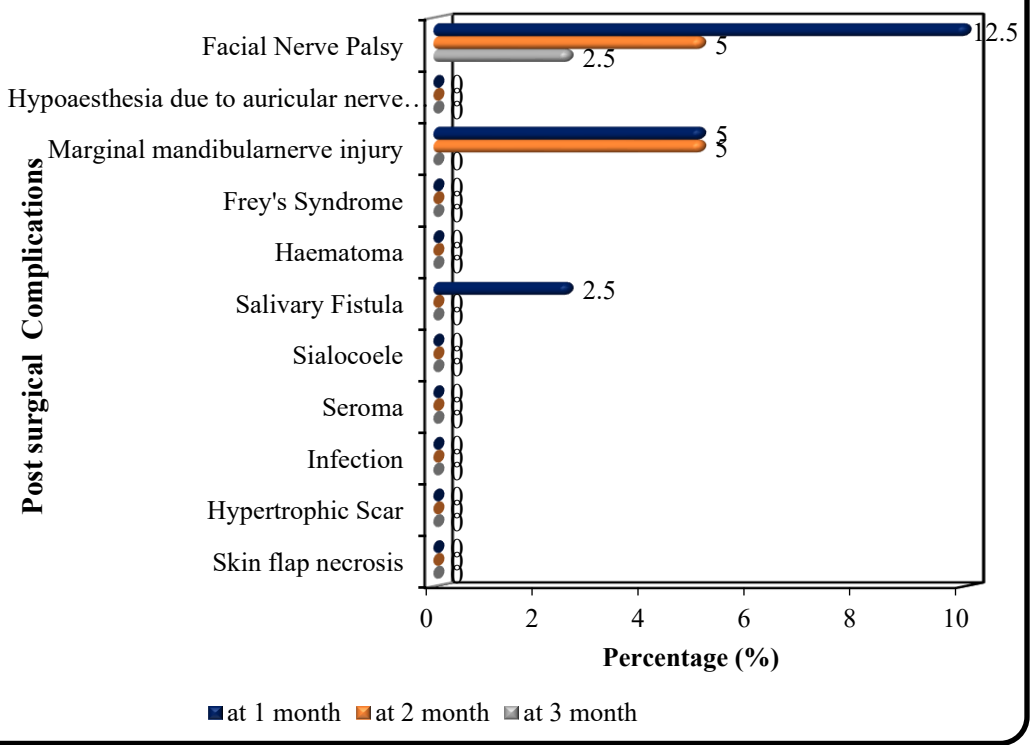


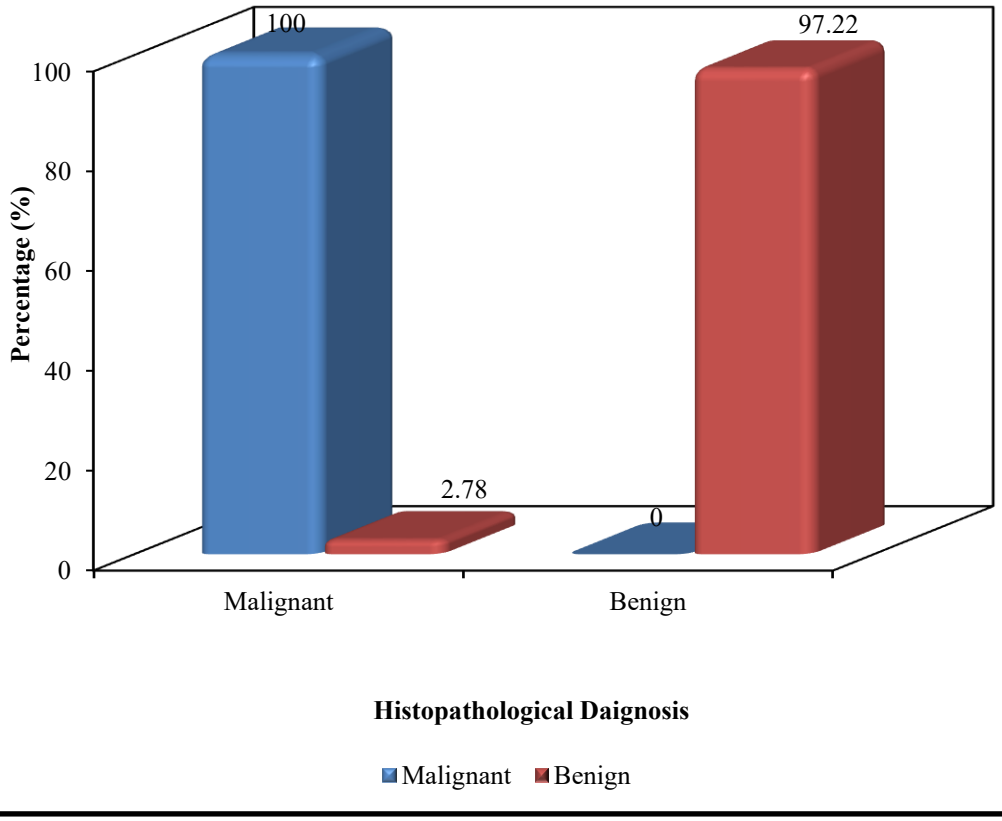
Table-10:Fnac And Hpe Correlation

Histopathological Daignosis	Fine Needle Aspiration Cytology				TOTAL *(n)*
	Malignant		Benign		
	n	*%*	*n*	*%*	

Malignant	4	100.00	1	2.78	5
Benign	0	0.00	35	97.22	35
TOTAL	4	100.00	36	100.00	40

showing co-rrelation between Fine Needle Aspiration Cytology (FNAC) and Histopathological Examination(HPE). On FNAC 5 Salivary gland tumours came out to be Malignant and 35 benign. On HPE 4 salivary gland tumours were Malignant and 36 were Benign. False Positive Rate (FPR) of FNAC is 2.78%, False Negative Rate (FNR) is 0.00%,Sensitivity is 100.00%, Specificity is 97.22%, Positive Predictive Value (PPV) is 80%,Negative Predictive Value (NPV) is 100.00%,Accuracy is 97.50%.

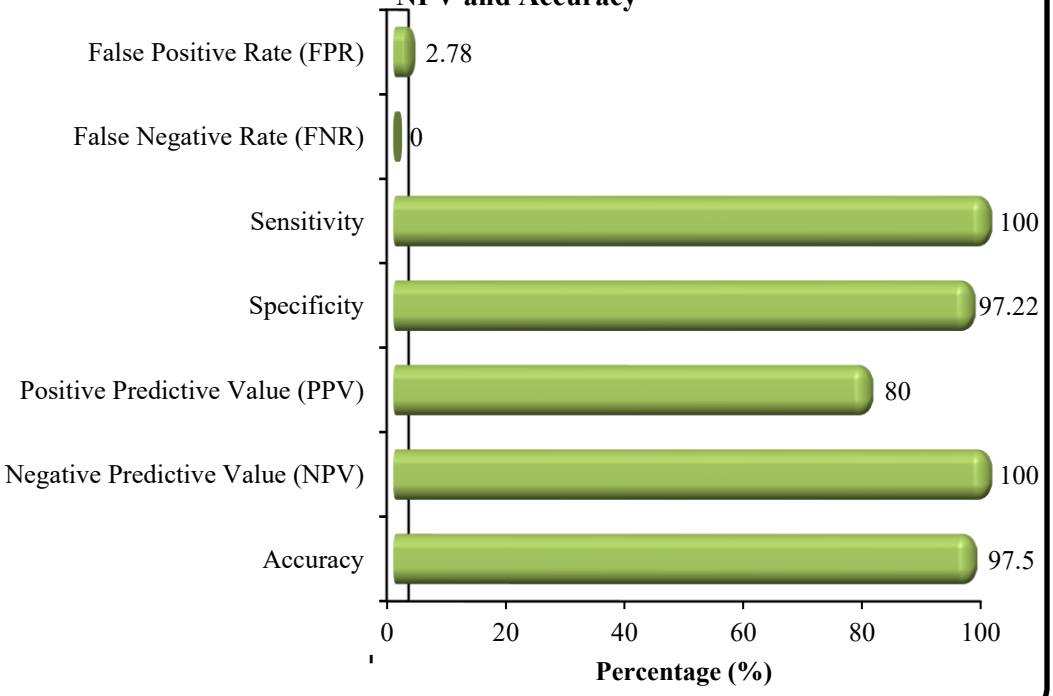
Figure-10: FNAC and HPE Correlation



Statistics:

- ➔ False Positive Rate (FPR) : 2.78%
- ➔ False Negative Rate (FNR) : 0.00%
- ➔ Sensitivity : 100.00%
- ➔ Specificity : 97.22%
- ➔ Positive Predictive Value (PPV) : 80.00%
- ➔ Negative Predictive Value (NPV) : 100.00%
- ➔ Accuracy : 97.50%

Figure–5.18: Showing FPR, FNR, Sensitivity, Specicity, PPV, NPV and Accuracy



4 patients (10%) went through postoperative chemoradiation, 36 patients (90%) didn't need postoperative chemoradiation. 4 malignant cases on HPE were Mucoepidermoid Carcinoma, Epithelial Myoepithelial Carcinoma, Hodgkin's Lymphoma and Clear Cell Carcinoma. Out of 4 patients who required chemoradiation, 4(10%) patient of Mucoepidermoid Carcinoma, Epithelial Myoepithelial Carcinoma, Hodgkin's Lymphoma and Clear cell carcinoma showed up at 1 month, 3(7.5%) except Epithelial Myoepithelial Carcinoma at 2 months and at 3 months. Out of 36 who did not require post-op chemoradiation, 30(75%) showed up 1 month, 6(15%) at 2 months and 1(2.5%) at 3 months. Patients with malignant tumors underwent chemoradiation. At the end of 3 months of follow-up patient did'nt show any disease recurrence

DISCUSSION

Salivary gland tumors were discovered in individuals of all ages, ranging from as young as 4 years old to as old as 72 years old in our study. Mean age of presentation was 37.55 ± 17.42years (Table 1). Out of 40 patients, majority of them i.e, 11 patients (27.50%) were in the 4th decade ie., 31-40 years age group. Desai et.al.,(10) found that the most prevalent age range was 31-40 years old, much like our study. Vuhahula EA et.al.,(11) found average age of individuals with tumou rs of Salivary glands was 38.1 years, which closely matched the findings of our study.

In our study, 60% were female and 40% were male with Salivary Gland tumours(SGTs). Ratio of female to male is 1.5:1 indicating a higher prevalence of females (Table 2). Bommareddy et.al.,(12) found there is similar female preponderance having a 1.6:1 female to male ratio that is comparable. Ansari et.al.,(13) found a 1.9:1 female to male ratio in their study. Of the patients, 25 (62.50%), had involvement of the PG making it the site most commonly affected. In 12 patients (30%), the SMG was affected. One patient (2.50%) had SG involvement. Whereas, 2 patients (5%) had MiSG involvement (Table 3). Lawal et.al.,(14) found in his study, the most frequent location was the PG, accounting for 41.4% of cases, with MiSGs following at 30%, then the SMG at 11.9%, and the SG at 1.7%. Spiro et.al.,(15), found the most of cases arose in the PG accounting for 70% and Bommareddy et.al.,(16), also found the PG involvement in tumours to be most common, constituting 90.38% of the cases.

In our study, Pleomorphic adenoma accounted for 26 cases, making it the most common pathology (65.00%). There were two cases of each of the following four pathologies: Leiomyoma, Haemangioma, Myoepithelioma, and Epithelial Myoepithelial Carcinoma (5%). The remaining tumours, which included Clear Cell Carcinoma, Hodgkin's lymphoma, Mucoepidermoid Carcinoma, and Basal cell Adenomas, each had one instance (2.50%) (Table 4). Lawal et al(14) found in his study found PA is responsible for 40.9% of all salivary gland neoplasms and 88.0% of benign cases. Kizil et.al.,(17) similarly found the most prevalent histological type (45.3%) across all locations was PAs, which also made up 47.3% of all parotid tumours and two-thirds (64.5%) of benign tumors. The two most prevalent malignant tumours in his study were Mucoepidermoid carcinoma and Adenoid cystic carcinoma.

Asghar et.al.,(18)found, most frequent benign tumour is PA(43.8%), which is followed by Warthin tumour (5.47%). The most frequent malignant tumour encountered as a whole (23.28%) and of parotid gland was Mucoepidermoid carcinoma .

In our study, PA was the benign tumour most frequently found in the PG and overall it was the most common. PA was observed in 15 (60%) cases in the parotid, 9 (75%) in the SMG, 1 (100%) in the SLG, and 1 (50%) in the MiSG of the hard palate. Two cases (8%) of Haemangioma and Warthin's tumour were identified in the PG. Leiomyoma was found in 2 cases (8%) of which 1 (4%) in the PG and 1 (8.33%) in the SMG. Likewise, one instance of myoepithelioma (4%) in the PG and one case (8.33%) in the SMG were reported. One (4%) instance of Basal Cell Adenoma was found in the PG. Two cases (8%) of epithelial myoepithelial carcinoma were found in the parotid. There was one instance of Clear Cell Carcinoma of the PG (4%) and one case (8.33%) of Hodgkin's lymphoma of the SMG with 1 case (50%) of MEC of the MiSG(Table 5). Kizil et al(17) in his study found PAs accounted for 47.3% of all PG tumours and 60.3% of benign parotid tumours. In the SMG, PA formed over 90% of benign tumours and were also highly prevalent there. PA accounted for 58.5 percent of all SGTs of the hard palate and 62.5 percent of all tumours of the soft palate, respectively. Almost exclusively, Warthin Tumours were found in the parotid gland. 20.0% of malignant parotid gland tumours were MEC. This was the most prevalent type of malignancy.

In our study, 35 of these tumours (87.50%) were benign, while 5 of the tumours (12.50%) were malignant, yielding a benign to malignant ratio of 7:1, according to FNAC(TABLE-6). Kizil et.al.,(17) found of all SGTs, 70.2% were categorised as benign and 29.8% as malignant. In the PG, SMG, and MiSGs, the corresponding malignancy rates were 21.5%, 40.0%, and 56.7%. In the study by Ansari et.al.,(19),malignant cancers accounted for 31.6% of cases, whereas benign tumours accounted for 68.4% of cases; the ratio was 2.16:1. Benign and malignant tumours often manifested between ages 41.3 and 47, respectively.

In our study, the most frequently performed surgical procedure was Superficial Parotidectomy in 19 of the patients (47.5%). Next most common surgical procedure performed was Submandibular Gland Excision in 12 of the cases (30%). Total Parotidectomy was done for 3 patients(7.5%).Wide Local Excision of Mass was done in 2 patients (5%). Sclerosing agent was given in 2 haemangioma patients (5%). Total Conservative Parotidectomy was done for 1 patients (2.5%). Sublingual Gland excision was done for 1 patient (2.5%) (Table 7). Study by Kaczka et al(20), tumour Enucleation was the most often used surgical technique for benign parotid tumours (88.4% of cases), with the use of other techniques being less common. In our study, Facial Nerve Palsy was seen in 5 patients (12.5%). Hypoaesthesia of the ear lobule and post-auricular skin was seen in 3 patients (7.50%). Marginal Mandibular Nerve injury was seen in 2 patients (5%). Infection at the surgical site occurred in 2 (5%), of the patients who had Superficial Parotidectomy. Salivary Fistula, Seroma and Skin Flap Necrosis were the post-operative complications found in 1 patient each (2.50%) (Table 8). Dhanraj et.al.,(21) too in his study found 5 instances (20%) had temporary facial palsy, and 1 case (4%), persistent facial palsy.

Kaczka et.al.,(22)found, the most common early postoperative problems were hematoma, fistula development, and seventh nerve palsy, which affected the marginal mandibular branch. Laskawiet.Al.,(23) in his study found 4% of patients developed persistent parotid fistula following parotidectomy.

In our study, On FNAC 5 Salivary gland tumours came out to be Malignant and 35 benign. On HPE 4 salivary gland tumours were Malignant and 36 were Benign. False Positive Rate (FPR) of FNAC is 2.78%, False Negative Rate(FNR) is 0.00%,Sensitivity is 100.00%, Specificity is 97.22%, Positive Predictive Value (PPV) is 80%,Negative Predictive Value (NPV) is 100.00%,Accuracy is 97.50% (TABLE–10).

Maahs et al(24) in his study found 90.9% and 87.1%, respectively as the sensitivity and specificity of FNA.
Byars et al(25) in his study reported 247 salivary gland lesions' FNAC cytologic results. He stated that the detection of malignant tumours had an 87.8% sensitivity and a 98% specificity rate, respectively.

CONCLUSION

From our study of "Surgical Management and Outcome of Patients with Salivary Gland Tumours in a Tertiary Care Centre" we arrive at the following conclusions:

The small size is attributable to the rarity in Head and Neck region Salivary Gland Tumours. SGTs occurred predominantly in Females and 4th decade of life was the commonest age group of presentation. Benign tumours were in majority. The most frequent benign tumour and Salivary gland tumour overall was Pleomorphic Adenoma. Parotid gland involvement was most commonly seen. Thorough clinical examination and FNAC were adequate for pre-operative diagnosis. Surgery was the preferred treatment option and the most frequently carried out surgical procedure was Superficial Parotidectomy. If the tumour was malignant, patients also received chemotherapy and radiation therapy after surgery. Following Superficial Parotidectomy, the most frequent complications was facial nerve palsy. Most of the patients returned for their follow-up appointments in the first month after surgery, but this number decreased in the second and third months. No instances of recurrence were noted.

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