Clinical analysis of salivary gland tumors and their treatment methods: An experience in treatment of 154 cases

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Abstract

Objectives: The aim of this study was to evaluate the treatment plan methods used in the treatment of different type & site of salivary gland tumors.

Materials and Methods: This study represents the experience of author in surgical treatment of 154 patients who were admitted in the clinic of maxillofacial surgery in the Babylon teaching hospital during the period May 2004- October 2010 for surgical treatment of salivary gland tumors. The clinical finding; distribution of patients according to the histology & the site of origin is summarised. Analysis of different types of surgical procedures that used with others possible treatment & recurrent rate were done.

Result: There were 82 females (53.2%) & 72 (46.8%) males. The average age of patients was 48.5 years. Parotid gland tumors represent 55.2% (85 patients), submandibular gland 20.7% (32 patients) & minor salivary glands 24% (37 patients). Malignant tumors represent 42.2%, mostly in submandibular & minor salivary glands while 57.7% were benign mostly in the parotid gland.

Conclusions: Early diagnosis correlated with careful treatment plan selection depends on histopathology, staging and type of tumor leads to good prognosis of salivary gland tumors. When possible a conservative resection of the malignant tumor is recommended.

Keywords: *salivary glands, neoplasm, parotidectomy, submandible gland, parotid gland.*

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Introduction:

Salivary glands divided into major salivary glands that include the parotid glands, submandibular and sublingual and the minor salivary glands. Salivary gland neoplasms represent less than 1% of all tumors, and 3-5% of all head and neck neoplasm[1].

Despite the incidences vary according to the literature, 67% - 84% of the neoplasms start in the parotid, 10% - 23% in the submandibular gland and the other rest cases in the sublingual gland and in the minor salivary glands. Ninety-five percent of salivary gland tumors occur in adults and rarely occur in children[2]. The most common benign mesenchymal tumor in children is the haemangioma, whereas the most common benign epithelial tumor in adults is the pleomorphic adenoma[3]. The majority of salivary neoplasms originate in the parotid gland, while minor salivary gland and submandibular gland neoplasms are much less common. True primary tumors of the sublingual gland are quite unusual[4].

Histologic classification

Epithelial Neoplasms

I. **Benign**:

a) Mixed salivary tumor or pleomorphic adenoma
b) Adenolymphoma or warthin's tumor
c) Oncocytoma
d) Monomorphic adenoma

II. **Malignant:**

a) Primary carcinoma
   - Mucoepidermoid carcinoma.
   - Adenoid cystic carcinoma.
   - Adenocarcinomas.

b) Secondary carcinoma – direct invasion from skin or from other organs involved lymph nodes[4,5].

Pleomorphic Adenoma

Represent 70% of all parotid tumors (90% occur in the superficial lobe), 50% of all submandibular tumors and 45% of minor salivary gland tumors most commonly occur on the lateral palate, but only 6% of sublingual tumors. It is uncommon in children slow-growing, painless and firm mass. Histologically; pleomorphic adenomas show incomplete encapsulation with pseudopod extensions. These features account for recurrence rates varying from 20% to 45% after simple enucleation[6]. Appropriate surgical therapy requires resection with an adequate margin of normal tissue surrounding the tumor. Rarely, pleomorphic adenoma can metastasize and yet remain benign histologically[7].

Pleomorphic adenomas are surrounded by a pseudocapsule, beyond which there are numerous microscopic extensions. This is one reason that surgeons in the United States have avoided simple enucleation of these tumors, fearing an increase in local recurrence. Such recurrences are typically evident within 5 years of excision, but a significant proportion may occur 10 years or more following excision[8,9].

Warthin's tumor

A benign tumor occurs almost exclusively in the parotid gland. It has been reported prominently in whites. The incidence rate is higher than that of salivary gland cancer, but is lower than that of benign mixed tumors (pleomorphic adenoma) and its malignant transformation is rare[10].

As the second most frequent type of tumor found in the salivary gland, Warthin's tumor accounts for 14-30% of all tumors found in the parotid gland, it recurs in less than 2%, and only 1% develops into malignant tumors. Therefore; the treatment principle is tracked after conservative excision, and it was curable with enucleation[11]. A research concluded that parotidectomy was required to reduce the recurrence rate since Warthin's tumor is likely to be bilateral and multicentric[6].

Malignant tumors

Mucoepidermoid Carcinoma

Most common parotid malign tumors (15% of the parotid tumors) and the second most frequent in the submandibular gland[2]. Histologically mucoepidermoid carcinoma divided into low, intermediate and high-grade tumors. The treatment chosen depends on the surgical margins and evaluation of intra-parotid lymph nodes. If they are free, the deep lobe and the cervical lymph nodes wouldn't need complementary treatment, while if they are affected, the treatment with a wide approach must be carried out[12].

Adenoid Cystic Carcinoma

The second most common salivary glands malign tumor and corresponds to 10% of the neoplasms[2]. Morphologically, three growth patterns have been described: cribriform or classic pattern; tubular; and solid or bracelet pattern. The tumors are categorized according to the predominant pattern[13]. This neoplasm typically develops as a slow growing swelling in the preauricular or submandibular region. Pain and facial paralysis frequently develop during the course of the disease and are likely related to the associated high incidence of nerve invasion. The treatment methods include complete surgical resection and postoperative radiation therapy. The sacrifice of the facial nerve may be necessary due to perineural invasion[14].

Carcinoma ex-pleomorphic adenoma

Carcinoma ex-pleomorphic adenoma, also known as carcinoma ex-mixed tumor, is a carcinoma that shows histological evidence of arising from or in a benign pleomorphic adenoma. This neoplasm occurs primarily in the major salivary glands[15,16]. Surgery is currently the primary treatment for Carcinoma ex-pleomorphic adenoma[17].

Materials and Methods:

Patients& methods

Surgical treatment of 154 salivary gland tumors is recorded in this study (Babylon teaching hospital, maxillofacial department) during the period from May 2004 to October 2013. The diagnosis of salivary gland tumors was based on clinical examination, histological examination by FNAB (fine needle aspiration biopsy) which had an important role in treatment planning most of the cases, ultrasound, computed tomography & magnetic resonance imaging. The details of patients were recorded, including the age, sex, clinical features, location of tumor and the histopathological examination result. Treatment plan selection for each case, and the local recurrence that may occur during follow-up of study period were also included.

Treatment plan selection

Pleomorphic adenomas

Treatment of parotid pleomorphic adenomas (Fig. 1) was complete surgical excision with a surrounding margin of normal tissue, i.e., superficial parotidectomy with facial nerve preservation (Fig. 4). For large or deep-lobe parotid tumor, the treatment was by lower lip split incision and mandibulotomy approach (Fig. 6).

Preservation of the posterior branches of the great auricular nerve is possible in most of the cases. Wide local excision for minor & submandibular salivary gland tumors was dependent in the treatment of all such cases.

Simple enucleation of these tumors is associated with high local recurrence rates and the rupture of the capsule and tumor spillage in the wound is increase the risk of recurrence.

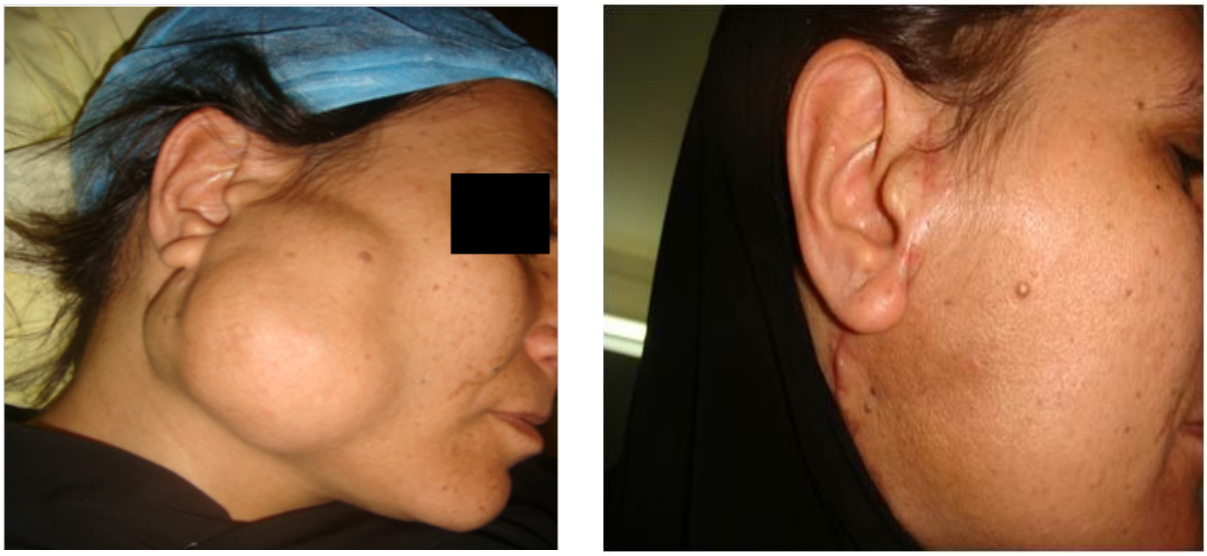

Figure 1: Clinical view of a pleomorphic adenoma located in the parotid gland; pre& post-operative superficial parotidectomy.

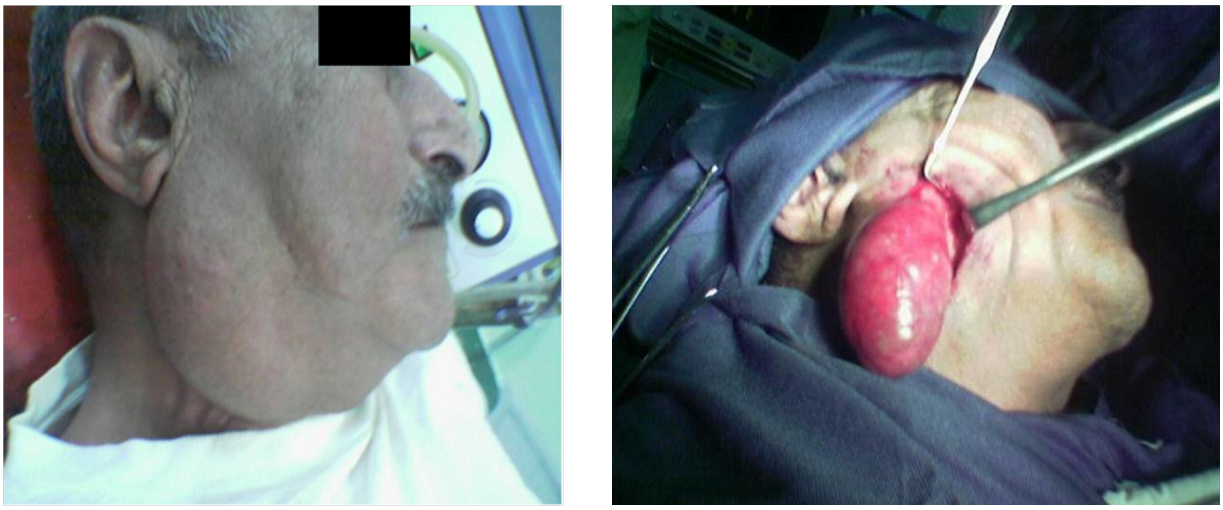

Figure 2: Clinical & Surgical enucleation of Warthin's tumor located in the parotid gland

Figure 3: Clinical & surgical resection of adenoid cystic carcinoma located in the submandibular gland

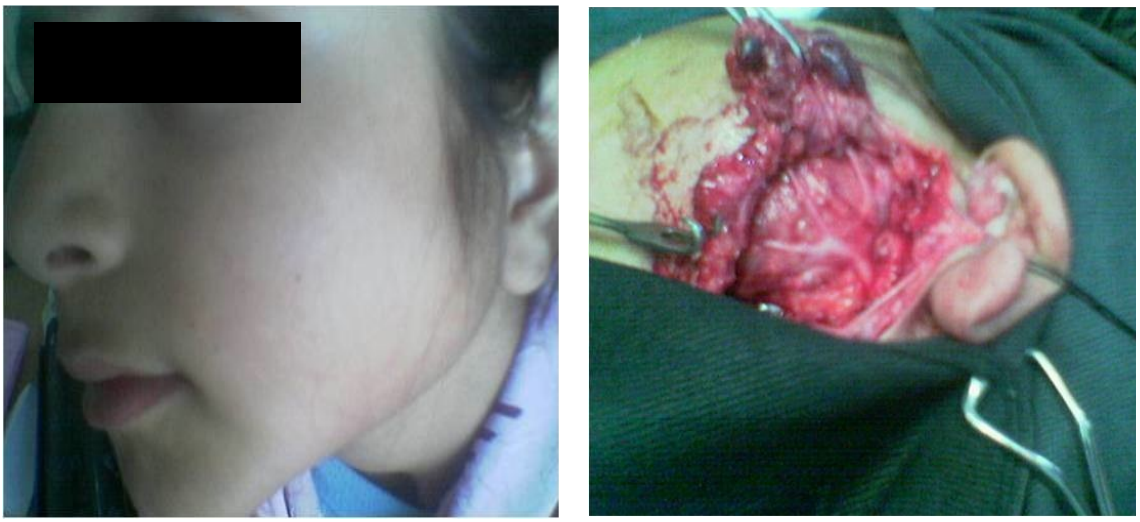

Figure 4: Clinical & Surgical identification and preservation view of facial nerve in superficial parotidectomy and resect tumors in deep lobe of parotid gland

Figure 5: Clinical view of pre & post-operative of total parotidectomy through lateral lobectomy &post-operative radiotherapy of deep lobe mucoepidermoid carcinoma

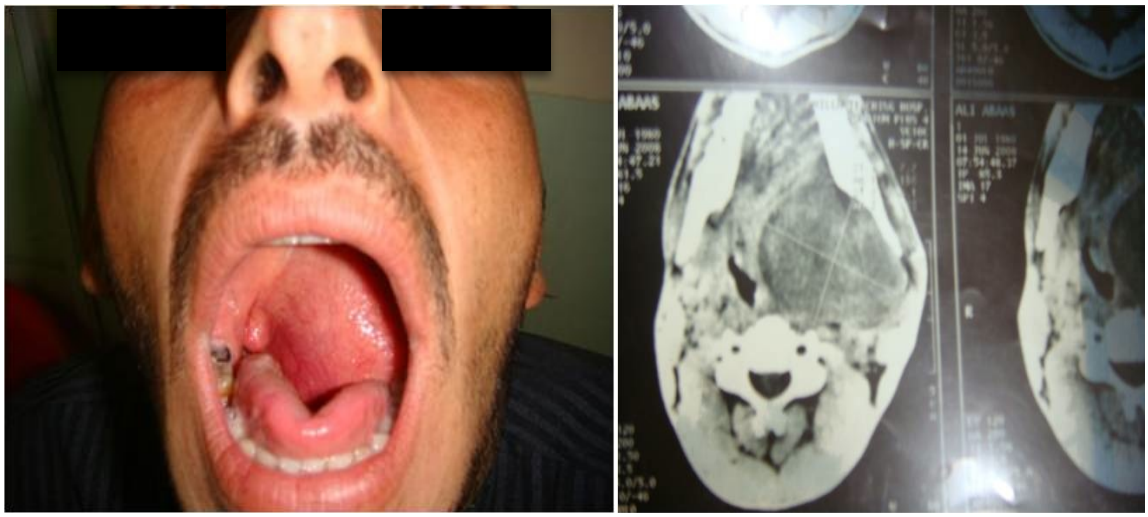

Figure 6: Clinical& axial CT scan view of large deep-lobe parotid tumor treated by lower lip split incision and mandibulotomy approach

Warthin's Tumor

Treatment is surgical resection & enucleation of the tumor may be adequate therapy, but superficial parotidectomy with facial nerve preservation is the management of choice (Fig. 2).

Malignant Neoplasm
Mucoepidermoid Carcinoma

Surgical resection with adequate, safe margin and neck dissection for the following cases:

1-High histological grade

2-Clinically palpable lymph nodes

Postoperative radiotherapy indicated for

1- Stage III or IV disease (Fig. 5).

2- Close surgical margin

Adenoid Cystic Carcinoma

Surgical treatment of adenoid cystic carcinoma includes complete surgical resection and postoperative radiation therapy. The sacrifice of the facial nerve may be necessary due to perineural invasion (Fig.3). Elective neck dissection is usually not indicated. All palatomaxillectomy defects have been accomplished by using a prosthetic obturator.

Result:

There were 82 females (53.2%) & 72 (46.8%) males (Table.1) that summarized the distribution of salivary gland tumors according to patient sex.

The age of the treated patients ranged from 10 to 79 years, but the most common age group affected by salivary gland tumor located in the fifth decade. The average age of our patients was 48.5 (Table. 2).

Parotid gland tumors represent 55.2% (85 patients), submandibular gland 20.7% (32 patients) & minor salivary glands 24% (37 patients)(Table 3). Malignant tumors represent 42.2%, mostly in submandibular & minor salivary glands while 57.7% were benign, mostly in the parotid gland (Table .3).

Pleomorphic adenoma was 66 cases that represent 42.8% of all the cases followed by Adenoid cystic carcinoma 28 cases (18%). Mucoepidermoid 25 cases (16.2%), Warthins 14 cases (9%), monomorphic 9 cases (5.8%), adenocarcinoma 7 cases (4.5%) & malignant mixed tumor 5 cases (3.2%).

Adenoid cystic carcinoma had a high recurrence rate 8 cases (4 submandibular, 3 parotid& 1 sublingual) followed by Mucoepidermoid 4 cases (3 parotid &1 submandibular). Pleomorphic adenoma recurred in 2 cases in parotid gland & adenocarcinoma. 1 case also in the parotid gland (Table. 4).

The most common histological malignant type was Adenoid cystic carcinoma, but the benign type was a pleomorphic adenoma. Higher malignant recurrent rates recorded in parotid follow by submandibular. No recurrent in all minor salivary gland tumor types. No facial trunk or branch damage recorded in all superficial & deep parotidectomy management.

Table 1: Distribution of salivary gland tumors according to the sex

SEX	No. of patients	%
MALE	72	46.8
FEMALE	82	53.2

Table 2: Distribution of salivary gland tumors according to the age

AGE	No of patients	%
10-19 yrs.	9	5.8
20-29 yrs.	17	11
30-39 yrs.	24	15.5
40-49 yrs.	31	20.1
50-59 yrs.	45	29.2
60-69 yrs.	21	13.6
70-79 yrs.	7	4.5

Discussion:

Benign neoplasms make up about 80% of parotid tumors, 50% of submandibular tumors less than 40% of sublingual and minor salivary gland tumors[3]**.** In our study result support that's as the majority of cases originated in the parotid gland.

Pleomorphic adenoma representatives (55.2%), its gross pathologic appearance was a smooth or lobulated well-capsulated tumor. Microscopically it has incomplete capsulation and trans capsular growth of tumor pseudopods; therefore during parotid surgery, the goal is to resect enough parotid tissue to give negative margins[18].

The principle of the most treatment plan was superficial parotidectomy with identification and preservation the trunk of the facial nerve to support this

Table 3: Distribution of salivary gland tumors according to histopathology

Histopathlogy	No of patients	Parotid	Submandibular	Sublingual	Minor
Pleomorphic	66	52	7	0	7
Warthins	14	14	0	0	0
Monomorphic	9	7	1	0	1
Mucoepidermoid	25	10	3	0	12
Adenoid cystic carcinoma	28	4	5	2	17
Adenocarcinoma	7	3	0	0	4
Malignant Mixed Tumor	5	4	0	0	1
Total	154	92	18	6	38

Table 4: Distribution of salivary gland tumors according to recurrence number and site

Histopathology	No of patients	No of recurrent cases	Site of recurrence
Adenoid cystic carcinoma	28	8	(4) Submandibular (3) Parotid (1) Sublingual
Mucoepidermoid	25	4	(3) Parotid (1) Submandibular
Adenocarcinoma	7	1	Parotid
Pleomorphic	66	2	Parotid

fact, but it's not always necessary to identify the trunk and all the branches especially in small tail mass excision with a safe margin.

Complete resection of the entire lateral lobe for superficial parotidectomy is necessary for large tumors but inadequate local excision or enucleation is prone to local recurrence and nerve injury[7], that confirm our result of two recurrent pleomorphic adenoma had been treated by previous surgery in other centers.

In present study enucleation of the Warthins tumor was adequate therapy as a result of follow-up during the period of study this result supported by another study[11] .

Adenoid cystic carcinoma (18%) was the most commonly encountered malignant tumor in the minor salivary glands which is agreed with others researchers [2, 12, 13]. Its appearance was typically a well-defined but not encapsulated mass that can be seen infiltrating surrounding normal tissue; therefore adequate safe margin plays an important role in the prognosis of minor salivary gland malignancy[12,19]. Our results confirmed this tendency.

Factors that have been documented by other studies as well as the current study to be associated with more aggressive disease and poor outcome include those tumors with high-grade histology, local or regional advanced disease (T3, T4) & positive margins. For such cases, the treatment plan was combined modality therapy (surgery & radiotherapy), and it's agreed with another study[20].

Tumors such as adenocystic carcinoma that have a propensity for perineural spread should also be treated along the path of the cranial nerve at risk for involvement[15] is also confirmed in this study.

Generally most of the malignant cases don't reach maxillofacial centers in the early stages due to a defect in referral system & education of people about the maxillofacial surgery as a surgical branch dealing with the treatment of such cases. Therefore; improving this system and multidiscipline approach play an important role in early diagnosis, treatment & prognosis for such cases. The site, stage & age are the most important factors affected the treatment plan selection & prognosis.

Conclusions:

The surgical principle for parotidectomy is the facial nerve preservation. Complete removal of lateral lobe is not necessary for all superficial parotid lobe tumors, the goal is clear surgical margins .while mass attached to the tail of the parotid gland may need only the marginal mandibular nerve identification and preservation. The prognosis depends on staging, facial nerve dysfunction and positive surgical margins on the final pathology report. Good prognosis of minor salivary gland malignant surgery in the palate when taken adequate safe margin as partial or subtotal maxillectomy. Complete surgical resection results in the best local control, with or without adjuvant radiation.

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