

Clinico-pathological profile of parotid gland tumors at a tertiary care center in North India

ABSTRACT

Aim of the Study: The objective of this study was to know the various types of parotid tumors and their clinical presentations, surgical management, and post-operative outcome.

Material and Methods: Data of 102 patients assessed from hospital records who underwent parotid surgery between the years 2013 and 2018 were obtained. Parameters included age, sex, socio-demographic profile, presenting complaints, examination findings, and cytopathology. Surgical techniques, post-operative complications such as a facial scar, retro-mandibular and pre-auricular depression, facial palsy, Frey's syndrome, and numbness over the ear lobule were analyzed.

Result: Out of a total of 102 patients, 54.0% of patients were male, and 45.1% were female. The mean age of patients was 33.30 ± 13.87 years ranging from 7 to 65 years. The most common clinical presentation was swelling in the parotid region (95.1%), and associated symptoms with swelling were pain (17.5%), facial palsy (4.9%), discharging sinus (4.9%), and ulcerative lesions (1%) at the time of presentation. Pleomorphic adenoma was the most common benign neoplasm (76.5%), followed by Warthin's tumors (2.9%). Mucoepidermoid carcinoma was the most common malignant neoplasm (3.9%). After parotid surgery, 35% of patients had a sensory impairment or hypoesthesia of the ear lobule, and 23.28% had temporary facial nerve weakness. 5.0% of patients had permanent facial weakness, and 2.06% of patients had weakness of the marginal mandibular nerve.

Conclusion: Pleomorphic adenoma and mucoepidermoid carcinoma are the most common benign and malignant tumors, respectively, and parotidectomy is the treatment of choice, depending on the tumor location. Successful treatment depends on early diagnosis and histopathological and radiological investigations. Sensory impairment and temporary facial nerve paralysis are the most common post-operative complications, which are minimized by proper knowledge of anatomy and meticulous dissection of the facial nerve during parotid surgery.

Keywords: Modified Blair's incision, parotid tumors, parotidectomy, pleomorphic adenoma

INTRODUCTION

The parotid gland accounts for 70% to 80% of all salivary gland neoplasms with its malignant component. It accounts for 1% to 2% of all head and neck malignancies.^[1] According to the World Health Organization (WHO), the main benign histologic types include pleomorphic adenoma, Warthin's tumors, myoepithelioma, basal cell adenoma, and oncocytoma. In contrast, malignant tumors include mucoepidermoid carcinoma, adenoid cystic carcinoma, carcinoma ex pleomorphic adenoma, acinic cell carcinoma, myoepithelial carcinoma, adenocarcinoma, and basal cell carcinoma.^[2] The most common benign tumor is pleomorphic adenoma, which has a prevalence of 45% to 80%, followed by Warthin's tumors with 10%.

Mucoepidermoid and adenoid cystic carcinoma are common malignant tumors with 30% and 25%, respectively.^[3] Clinically,

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the most common presentation of pleomorphic adenoma is a slowly growing, solitary, firm, mobile nodular mass that is painless on palpation. Rapid growth, pain, facial palsy, and ill-defined margin are indications of malignancy. Fine-needle aspiration cytology (FNAC), with or without ultrasound-guided techniques, can also be helpful as a complementary diagnostic test, especially when malignant changes or unusual changes in pleomorphic adenoma are suspected.

FNAC helps to differentiate between benign and malignant tumors, but it does not establish the definitive histological diagnosis.^[4] Incisional biopsy is contra-indicated in parotid tumors as it can cause neoplastic implantation leading to recurrence. Superficial parotidectomy with facial nerve preservation is the treatment of choice for parotid tumors as 90% of tumors are located in the superficial lobe. In 1805, George Mc Clellan did his first parotidectomy because of cancer. Later radical surgeries, including facial nerve resection, indicated malignant neoplasms.^[5] The procedure is most typically performed with different approaches, and variation naturally depends on the type of disease. Cosmetic and functional outcomes are significant for patients undergoing parotidectomy as they can affect their quality of life and psychological well-being.

MATERIAL AND METHODS

The study was conducted in a tertiary care center. Quantitative and qualitative data of patients such as age, sex, socio-demographic profile of patients, symptoms or presenting complaints, initial local examination findings, (FNAC) cytopathological data, a procedure performed depending upon pre-operative diagnosis, selected surgical technique, post-operative complications occurred (such as a facial scar, retro-mandibular and pre-auricular depression, facial palsy, Frey's syndrome, numbness over the ear lobule), follow-up period, and histopathological data of 102 patients assessed from hospital records that underwent parotid surgery between years 2013 and 2018 were obtained. The results were analyzed using SPSS software. The study has been approved from the institutional ethical committee vide ECR/262/Inst/UP/2013/RR-16/168A/ethics/19 dated 08-03-19.

OBSERVATIONS AND RESULTS

There were 54.9% of male patients, and 45.1% were female. The maximum number of parotid tumor patients was in the age group 20–30 (35.2%), followed by 30–40 (19.6%), and the minimum was in the age group >50 (11.8%). The mean age of patients was 33.30 ± 13.87 years ranging from 07 to 65 years [Table 1].

The most common clinical presentation was swelling in the parotid region (95.1%); other presentations were parotid fistula, local pain, or inflammation. The left parotid was involved in 58.8% of cases than the right side (41.1%) [Table 2]. The association between clinical presentations with a side of the presentation was non-significant. There were associated symptoms with swelling such as pain (17.5%), facial palsy (4.9%), discharging sinus (4.9%), and ulcerative lesions (1%) at the time of presentation [Table 3].

Presentation according to cytopathology

Cytopathology reveals that pleomorphic adenoma was the most common benign neoplasm (76.5%), followed by mucoepidermoid carcinoma (3.9%). Warthin's tumors were reported in 2.9% of the patients. FNAC was inconclusive in 8.8% of patients [Table 4]. The presence of carcinoma was not associated with age.

Presentation according to histopathology

Some discrepancy was present between the cytopathology and histopathology reports. Tumors which were diagnosed as pleomorphic adenoma or tumors with inconclusive cytopathology reports got diagnosed as other variants of parotid neoplasm [Table 5]. However, no association was observed between age and histopathology reports of tumors.

Surgical Procedures

Superficial parotidectomy was performed in 71.4% (n = 84), followed by total parotidectomy (21.4%) and partial superficial parotidectomy in 7.1% of patients. To prevent Frey's syndrome, sternocleidomastoid flap was used to cover the exposed facial nerve fibers.

Table 1: Distribution of patients according to age in years

	No.	%
Age in years		
<20	15	14.7
20-30	36	35.2
30-40	20	19.6
40-50	19	18.6
>50	12	11.8
Mean±SD	33.30±13.87 years	

Table 2: Distribution of cases according to their clinical presentation

Presentation	Left		Right		Total	
	No.	%	No.	%	No.	%
Parotid fistula	2	(40) [3.3]	3	(60) [7.1]	5	(100) [4.9]
Swelling in parotid region	58	(59.8) [96.7]	39	(40.2) [92.9]	97	(95.1) [100]
Total	60	(58.8) [100]	42	(41.2) [100]	102	(100) [100]

Row (%) Column [%]. Fisher's Exact test (0.40, $\alpha/2=0.025$)

Post-operative complications

After parotidectomy, 35% of patients had a sensory impairment or hypoesthesia of the ear lobule. 23.28% had temporary facial nerve weakness, 5.0% had permanent facial weakness, and 2.06% of patients had weakness of the marginal mandibular nerve. 5% of patients had facial palsy at the presentation, so they were excluded. 17.64% of patients had Frey’s syndrome, 13.72% had dry mouth, and 12.7% (n = 102) patients had pain at the operated site [Table 6].

DISCUSSION

Salivary gland tumors are uncommon neoplasms accounting for 2–6.5% of the head neck tumors. The incidence of parotid gland tumors has increased in recent years. In the present study, 102 patients were evaluated. Patients were from 07 to 65 years of age with a median age of 33.30 ± 13.87 years. Most patients were from 20 to 30 years (35.2%), followed by 30 to 40 years (19.6%).

According to various studies, benign tumors are more common in the younger age group. Males (54.9%) were affected more than females (45.1%), with a ratio of 1.2:1, consistent with the other studies.

Benign parotid tumors are more common than malignant tumors. In the present study, pleomorphic adenoma was the most common benign tumor (76.5%). In comparison, mucoepidermoid carcinoma was the most common malignant neoplasm (3.9%), followed by adenoid cystic carcinoma (2.9%), consistent with other studies.^{6,7}

The most common clinical presentation was slow-growing swelling in the parotid region (95.1%), which was painless in 71.1% of patients [Figure 1]. Associated symptoms were a pain in 17.5%, facial palsy in 4.9%, discharging sinus in 4.9%, and ulcerative lesions in 1% of the patients. The left parotid gland was more commonly (58.9%) involved than the right parotid gland (41.1%).

Table 3: Clinical presentation of swelling

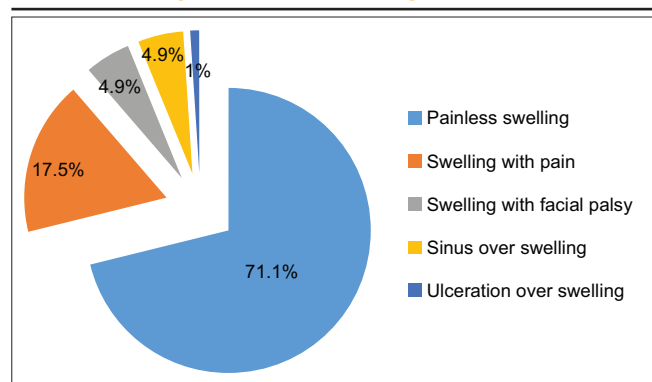


Figure 1: Parotid swelling

Table 4: Distribution of cytopathology (FNAC) with age

FNAC	Age					Total
	<20	20-30	30-40	40-50	>50	
Pleomorphic adenoma	10 (66.7) [12.8]	30 (83.3) [38.5]	14 (70) [17.9]	15 (78.9) [19.2]	9 (75) [11.5]	78 (76.5) [100]
Mucoepidermoid carcinoma	0 (0) [0]	0 (0) [0]	1 (5) [25]	2 (10.5) [50]	1 (8.3) [25]	4 (3.9) [100]
Warthin’s tumors	1 (6.7) [33.3]	1 (8) [33.3]	0 (0) [0]	1 (5.3) [33.3]	0 (0) [0]	3 (2.9) [100]
Adenoid cystic carcinoma	0 (0) [0]	0 (0) [0]	1 (5) [33.3]	0 (0) [0]	2 (16.7) [66.7]	3 (2.9) [100]
Benign cystic lesion	1 (6.7) [33.3]	1 (2.8) [33.3]	0 (0) [0]	1 (5.3) [33.3]	0 (0) [0]	3 (2.9) [100]
Acinic cell carcinoma	0 (0) [0]	0 (0) [0]	1 (5) [100]	0 (0) [0]	0 (0) [0]	1 (1) [100]
Carcinoma ex pleomorphic adenoma	0 (0) [0]	0 (0) [0]	1 (5) [100]	0 (0) [0]	0 (0) [0]	1 (1) [100]
Inconclusive	3 (20) [33.3]	4 (11.1) [44.4]	2 (10) [22.2]	0 (0) [0]	0 (0) [0]	9 (8.8) [100]
Total	15 (100) [14.7]	36 (100) [35.3]	20 (100) [19.6]	19 (100) [18.6]	12 (100) [11.8]	102 (100) [100]

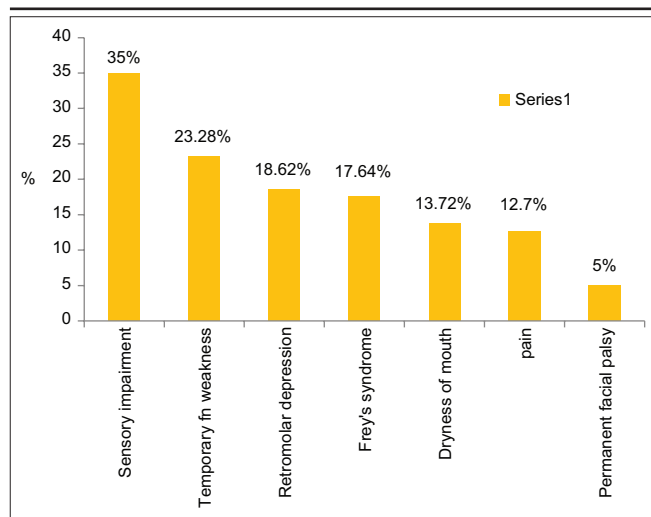
Row (%) Column [%]. Chi-square test (0.249, α/2=0.025)

Table 5: Distribution of tumors according to histopathology and age

Histopathology	Age					Total
	<20	20-30	30-40	40-50	>50	
Pleomorphic adenoma	12 (80) [16]	30 (83.3) [40]	14 (70) [18.7]	12 (63.2) [16]	7 (58.3) [9.3]	75 (73.5) [100]
Mucoepidermoid carcinoma	1 (6.7) [7.7]	1 (2.8) [7.7]	3 (15) [23.1]	6 (31.6) [46.2]	2 (16.7) [15.4]	13 (12.7) [100]
Warthin's tumors	0 (0) [0]	1 (2.8) [25]	1 (5) [25]	1 (5.3) [25]	1 (8.3) [25]	4 (3.9) [100]
Acinic cell carcinoma	0 (0) [0]	1 (2.8) [50]	1 (5) [50]	0 (0) [0]	0 (0) [0]	2 (2) [100]
Adenoid cystic carcinoma	0 (0) [0]	0 (0) [0]	0 (0) [0]	0 (0) [0]	2 (16.7) [100]	2 (2) [100]
Benign cystic lesion	1 (6.7) [50]	1 (2.8) [50]	0 (0) [0]	0 (0) [0]	0 (0) [0]	2 (2) [100]
Mammary analog secretory carcinoma	0 (0) [0]	1 (2.8) [100]	0 (0) [0]	0 (0) [0]	0 (0) [0]	1 (1) [100]
Myoepithelioma	0 (0) [0]	0 (0) [0]	1 (5) [100]	0 (0) [0]	0 (0) [0]	1 (1) [100]
Neurofibroma	1 (6.7) [100]	0 (0) [0]	0 (0) [0]	0 (0) [0]	0 (0) [0]	1 (1) [100]
Rhabdomyosarcoma	0 (0) [0]	1 (2.8) [100]	0 (0) [0]	0 (0) [0]	0 (0) [0]	1 (1) [100]
Total	15 (100) [14.7]	36 (100) [35.3]	20 (100) [196]	19 (100) [18.6]	12 (100) [11.8]	102 (100) [100]

Row (%) Column [%]. Chi-square test (0.149, $\alpha/2=0.025$)

Table 6: Post-operative complications



Most of the tumors are located in the superficial lobe of the parotid gland, where benign tumors are more common. The surgical treatment of parotid tumors depends on the type and size of the tumor. The treatment of choice for benign parotid tumors is parotidectomy with preservation of the facial nerve; thus, it is the most commonly performed surgery. The post-operative complications of parotid tumors are very diverse. In the present study, 35% of patients had a sensory impairment or hypoesthesia of the ear lobule. 18.62% of patients had depression at the surgical site (pre-auricular or retro-mandibular region). 17.64% of patients had Frey's syndrome, 13.72% had dry mouth, and 12.7% had pain at the

operated site. Among all the complications, facial nerve palsy has a very significant emotional and functional impact on patients.^[8] Stretching of the nerve is the most probable factor which causes impairment of micro-circulation and metabolic block, leading to transient facial palsy. The incidence of transient facial palsy ranges from 30% to 65%, whereas permanent dysfunction lies between 3 and 6%.^[9] In the present study, 23.28% of patients had temporary weakness and 5% had a permanent facial weakness, of which 2.06% had weakness of the marginal mandibular nerve. Marshall *et al.*^[10] reported in their study that the rate of transient facial nerve weakness was 24.4%, whereas the rate of weakness was 1.9% for permanent palsy. Similarly, Mehle *et al.*^[11] reviewed the post-operative results of 256 patients over 15 years and reported that 46.1% had transient facial nerve palsy, whereas 3.9% of patients developed permanent dysfunction.

Various types of incisions for parotidectomy have been introduced in the literature for a better cosmetic outcome. In the present study, 72.54% of patients underwent resection of parotid gland tumors using modified Blair's incision, whereas an alternative incision (extended cervicomastoid incision) [Figure 2] was used in 27.45% of patients. Modified Blair's incision, which achieved broad surgical exposure [Figure 3] and was associated with more chances of post-operative scar abnormality, 39.2% (N = 74), increased cases of Frey's syndrome (21.6%) and pre-auricular depression (20.3%) compared to extended cervicomastoid incision. Extended cervicomastoid incision (N = 28) was



Figure 2: Modified Blair's incision

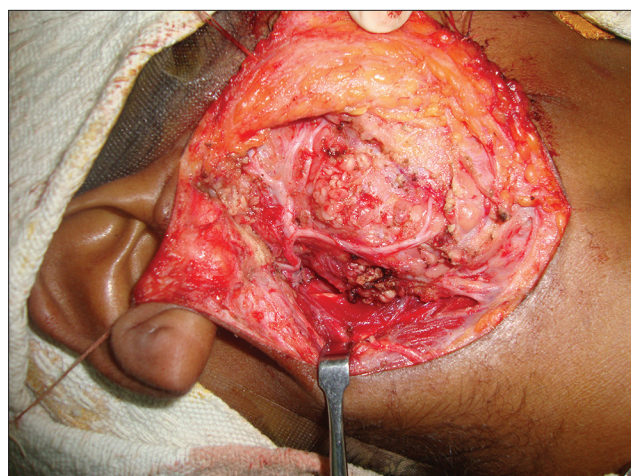


Figure 3: Facial nerve after superficial parotidectomy

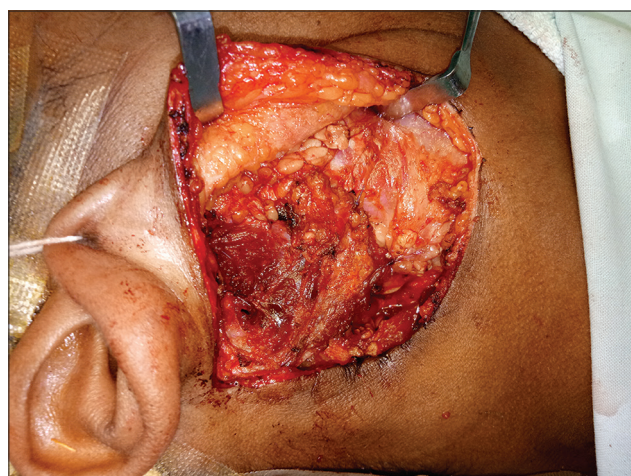


Figure 4: Sternocleidomastoid flap re-construction after parotidectomy

associated with fewer chances of scar abnormality, 32.1%. Frey's syndrome and pre-auricular depression reduced to 7.1% and 10.7%, respectively, when it was combined with SCM muscle flap. A similar study was performed by SY Kim

et al. (1999)^[12]; he concluded in his research that platysma muscle-cervical facia-sternocleidomastoid (PCS) muscle flap minimizes the deformity and contributes the leading role in patient' satisfaction following parotid surgery. The flap also helps to prevent Frey's syndrome and is not associated with increased post-operative complications [Figure 4]. A study conducted by Ciunan *et al.* (2012)^[13] concluded that parotid surgeries in benign diseases such as pleomorphic adenoma do not have high complication rates and recurrences and exhibit fewer patient sequelae of sensory impairment, Frey's syndrome, or aesthetic abnormality.

CONCLUSION

Benign parotid tumors are more common than malignant tumors. Successful treatment depends on early diagnosis and histopathological and radiological investigations. Pleomorphic adenoma is the most common pathology, and parotidectomy is the treatment of choice, depending on the tumor location. Mucoepidermoid carcinoma, the most common malignant tumor, is treated by total parotidectomy. Neck dissection depends on the tumor stage and grading. Sensory impairment and temporary facial nerve paralysis are the most common post-operative complications, which are minimized by proper knowledge of anatomy and meticulous dissection of the facial nerve during parotid surgery.

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Conflicts of interest

There are no conflicts of interest.

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