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Research Article

Prospective Analysis of Parotid Gland Tumors: Clinicopathological Patterns and Outcomes

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Abstract: ***Introduction:*** Parotid gland tumors are a diverse group of salivary gland neoplasms with varying clinical, histopathological, and therapeutic outcomes. They represent the most common site for salivary gland tumors, encompassing both benign and malignant types. This study aimed to assess the clinicopathological patterns and outcomes of parotid gland tumors. ***Methods:*** This was a prospective study conducted at the Department of Otolaryngology-Head & Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh on the clinicopathological patterns, treatment outcomes, and complications of parotid gland tumors. A total of 110 patients diagnosed with parotid gland tumors and treated from October 2010 to October 2014 were included. Statistical Package for Social Sciences (SPSS) version 22.0. ***Result:*** The highest incidence in the 21–40 age group (36.4%) and a slight female predominance (M: F ratio 1:1.1). Benign tumors accounted for 59.1% of cases, with pleomorphic adenoma being most common (45.5%), while malignant tumors comprised 40.9%, led by mucoepidermoid carcinoma (18.2%). Painless swelling was the most frequent clinical feature (63.6%), predominantly seen in benign tumors, whereas malignancies often presented with painful swelling (25.5%), facial nerve weakness (18.2%), and skin fixation or lymphadenopathy. Surgical resection alone had a 77.3% success rate. Common complications included seroma (16.4%) and facial nerve injury (15.5%), with recurrence noted only in malignant cases (5.5%). ***Conclusion:*** Surgical resection in benign tumours and surgical resection combined with adjuvant therapy in malignant parotid tumours provided favourable outcome, although complications such as facial nerve injury and seroma were noted. These findings underline the importance of early diagnosis, appropriate surgical intervention, and the role of adjuvant therapies in managing malignant parotid tumors.
Keywords: Parotid Gland, Clinicopathological Pattern, Pleomorphic adenoma, Facial nerve.

INTRODUCTION

The parotid gland, the largest of the salivary glands, plays a vital role in salivation and is anatomically and functionally distinct from other salivary glands. Tumors of the parotid gland are relatively uncommon, constituting about 3% of head and neck neoplasms. They exhibit a wide range of clinical, histological, and biological behaviors, ranging from more common benign lesions to malignant tumors, which are less frequent but clinically significant due to their aggressive nature and potential complications [1]. Benign tumors, particularly pleomorphic adenomas, account for the majority of parotid gland tumors, representing about 60–80% of cases [2]. Warthin's tumor, another common benign neoplasm, is strongly associated with smoking and typically affects males more frequently than females [3]. Among malignant tumors, mucoepidermoid carcinoma and adenoid cystic carcinoma are the most prevalent types, with the former often presenting with a more favorable prognosis [4]. Age and gender distribution of parotid gland tumors varies, with a peak incidence observed in middle-aged adults. Benign tumors are slightly more common in females, whereas malignant tumors show no significant gender predilection [5]. The clinical presentation of these tumors, whether benign or malignant, is influenced by their size, location, and invasiveness. Painless swelling is the hallmark feature of benign tumors, while malignant tumors often present with pain, facial nerve weakness, or skin changes, reflecting their aggressive behavior and propensity to invade local structures [6]. The clinical diagnosis of parotid tumors poses a challenge due to their heterogeneous nature and overlapping clinical features. Imaging studies, such as ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI), play a crucial role in

assessing the extent of the tumor and its relationship to adjacent structures [7]. Fine-needle aspiration cytology (FNAC) remains a cornerstone of preoperative diagnosis, providing a reliable distinction between benign and malignant tumors in most cases [8]. However, the accuracy of FNAC may vary depending on the expertise of the pathologist and the histological subtype of the tumor. Surgical resection remains the mainstay of treatment for both benign and malignant parotid tumors. Superficial parotidectomy is typically performed for benign lesions, while total parotidectomy with or without neck dissection is often required for malignant tumors [9]. Adjuvant radiotherapy is indicated for high-grade malignancies, positive surgical margins, or perineural invasion, and it has been shown to improve local control and survival rates [1]. Chemotherapy, though limited in its efficacy, is occasionally employed in advanced or recurrent cases. The success of surgical treatment is often measured by tumor control and the preservation of facial nerve function. While facial nerve injury is a well-recognized complication of parotidectomy, advancements in surgical techniques have significantly reduced its incidence [10]. Other potential complications include wound infection, seroma formation, and Frey's syndrome, a condition characterized by gustatory sweating due to aberrant nerve regeneration [11]. The prognosis of parotid gland tumors depends on several factors, including tumor type, stage, grade, and the presence of metastasis. Benign tumors generally have an excellent prognosis, with low recurrence rates following complete surgical excision. Malignant tumors, however, exhibit variable outcomes based on their histological subtype. Low-grade mucoepidermoid carcinomas have a favorable prognosis, whereas high-grade tumors and adenoid cystic carcinomas are associated with higher recurrence rates and distant metastases [12]. This study aimed to assess the clinicopathological patterns and outcomes of parotid gland tumors.

METHODS

This was a prospective study conducted at the Department of Otolaryngology-Head & Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, focusing on the clinicopathological patterns, treatment outcomes, and complications of parotid gland tumors. A total of 110 patients diagnosed with parotid gland tumors and treated from October 2010 to October 2014 were included.

Inclusion Criteria

- Patients aged ≥5 years with a confirmed diagnosis of parotid gland tumor through clinical examination, imaging, and/or fine-needle aspiration cytology (FNAC).
- Patients who underwent surgical treatment for parotid gland tumors.
- Patients willing to provide informed consent and participate in follow-up.

Exclusion Criteria

- Patients with non-parotid salivary gland tumors (e.g., submandibular, sublingual).
- Patients with recurrent parotid tumors were previously treated elsewhere.
- Patients with incomplete medical records or lost to follow-up during the study period.
- Patients unfit for surgery due to significant comorbidities or refusal of treatment.

Demographic data, clinical features, imaging results, histopathological findings, treatment details, and follow-up outcomes were recorded for all patients. Data were collected using a structured pro forma designed for this study. Ultrasound, computed tomography (CT), and/or magnetic resonance imaging (MRI) were performed to assess tumor size, location, and involvement of adjacent structures. Preoperative FNAC was conducted for histopathological diagnosis. Postoperative histopathological analysis confirmed tumor subtype and margin status. The treatment protocol for parotid gland tumors was based on tumor type and clinical presentation. For benign tumors, patients underwent superficial or total parotidectomy, depending on tumor location and size. Malignant tumors required total parotidectomy, with or without neck dissection and adjuvant therapies such as radiotherapy or chemoradiotherapy were administered based on the tumor's stage, grade, and margin status. The primary outcomes of the study focused on the incidence of various tumor subtypes, the clinical presentation, and the efficacy of the treatments provided. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 22.0. Comparative analysis was performed to evaluate differences in outcomes between benign and malignant tumors. The study was permitted by the Institutional Ethics Committee, and written informed consent was obtained from all participants.

RESULTS

Table 1: Age- and gender-wise incidence of parotid gland tumors (N=110)

Age Group (Years)	Male (n)	Female (n)	Total (n)	Percentage (%)
0–20	5	8	13	11.8
21–40	18	22	40	36.4
41–60	20	18	38	34.5
>60	9	10	19	17.3
Total	52	58	110	100

The highest incidence (36.4%) was noted in the 21–40 age group, followed by the 41–60 age group (34.5%). Tumors were less common in the extremes of age, with 11.8% in the 0–20 group and 17.3% in those above 60 years. A slight female predominance was observed, with a male-to-female ratio of 1:1.1. [Table]

Table 2: Incidence of various types of parotid tumors (N=110)

Tumor Type	Benign (n)	Malignant (n)	Total (n)	Percentage (%)
Pleomorphic Adenoma	50	0	50	45.5
Warthin's Tumor	15	0	15	13.6
Mucoepidermoid Carcinoma	0	20	20	18.2
Adenoid Cystic Carcinoma	0	12	12	10.9
Acinic Cell Carcinoma	0	5	5	4.5
Other Rare Tumors	0	8	8	7.3
Total	65	45	110	100

Benign tumors constituted 59.1% of cases, with pleomorphic adenoma being the most prevalent type (45.5%), followed by Warthin's tumor (13.6%). Malignant tumors accounted for 40.9% of cases, with mucoepidermoid carcinoma being the most common (18.2%), followed by adenoid cystic carcinoma (10.9%) and acinic cell carcinoma (4.5%). Other rare malignant tumors made up 7.3% of cases. [Table 2]

Table 3: Clinical modes of presentation (N=110)

Clinical Feature	Benign (n)	Malignant (n)	Total (n)	Percentage (%)
Painless Swelling	60	10	70	63.6
Painful Swelling	3	25	28	25.5
Facial Nerve Weakness	0	20	20	18.2
Skin Fixation or Ulceration	0	15	15	13.6
Enlarged Cervical Lymph Nodes	0	10	10	9.1

The clinical presentation of parotid tumors varied significantly between benign and malignant cases. Painless swelling was the most common feature, observed in 63.6% of patients, predominantly in benign tumors (60 cases). Painful swelling was noted in 25.5% of cases, primarily associated with malignancies (25 cases). Malignant tumors also frequently presented with facial nerve weakness (18.2%), skin fixation or ulceration (13.6%), and enlarged cervical lymph nodes (9.1%). [Table 3]

Table 4: Efficacy of treatment (N=110)

Treatment Modality	Benign Tumors (n)	Malignant Tumors (n)	Total (n)	Success Rate (%)
Surgical Resection Only	65	20	85	77.3
Surgery + Radiotherapy	0	25	25	90.0
Surgery + Chemoradiotherapy	0	10	10	80.0

The treatment modalities for parotid tumors demonstrated varying levels of efficacy. Surgical resection alone was effective in 77.3% of cases, predominantly used for benign tumors (65 cases) and selected malignant cases (20 cases). For malignant tumors, combined treatment approaches showed higher success rates. Surgery with radiotherapy achieved a success rate of 90.0% in 25 patients, while surgery with chemoradiotherapy had an 80.0% success rate in 10 cases. [Table 4]

Table 5: Complications observed (N=110)

Complication	Benign Tumors (n)	Malignant Tumors (n)	Total (n)	Percentage (%)
Facial Nerve Injury	5	12	17	15.5
Infection	3	5	8	7.3
Seroma	10	8	18	16.4
Recurrence	0	6	6	5.5

Seroma was the most frequently observed complication, occurring in 16.4% of patients, with a relatively balanced distribution between benign (10 cases) and malignant tumors (8 cases). Facial nerve injury was the second most common, affecting 15.5% of patients, with a higher prevalence in malignant cases (12 cases). Infection occurred in 7.3% of patients, and recurrence was noted in 5.5%, exclusively in malignant tumors (6 cases). [Table 5]

DISCUSSION

The age distribution of parotid gland tumors in this study revealed that the highest incidence was observed in the 21–40 years age group (36.4%),

followed by the 41–60 years group (34.5%). This is consistent with previous studies that have reported peak incidences of parotid tumors in middle-aged adults [1]. A slight female predominance was noted, with a male-to-female ratio of 1:1.1, which aligns with other reports suggesting a higher frequency of parotid tumors in females [2]. Benign tumors comprised the majority of cases (59.1%), with pleomorphic adenoma being the most common subtype (45.5%), followed by Warthin's tumor (13.6%). Pleomorphic adenoma is well-documented as the most common benign salivary gland tumor, particularly affecting the parotid gland [13]. The relatively high incidence of benign tumors in this study is in line with global data, which suggests that benign tumors account for approximately 70–80% of all parotid tumors [9]. Malignant tumors accounted for 40.9% of the cases, with mucoepidermoid carcinoma (18.2%) being the most common malignancy, followed by adenoid cystic carcinoma (10.9%) and acinic cell carcinoma (4.5%). Mucoepidermoid carcinoma is the most prevalent malignant parotid tumor, characterized by its diverse histopathological features and varied clinical outcomes [14]. Adenoid cystic carcinoma, while less common, is notorious for its aggressive behavior and propensity for local recurrence and distant metastasis, particularly to the lungs and bones [15]. The occurrence of rare malignant tumors in this study, constituting 7.3%, reflects the overall diversity of parotid gland malignancies, which can be difficult to diagnose and treat due to their heterogeneity. The clinical presentation of parotid tumors varies considerably between benign and malignant lesions. Painless swelling was the most common presenting feature, seen in 63.6% of patients, particularly in benign tumors (60 cases). This finding aligns with the typical presentation of pleomorphic adenoma and Warthin's tumor, which are often painless, slow-growing, and well-defined [16]. Painful swelling, a more ominous sign, was observed in 25.5% of patients, primarily in malignant tumors. Malignant tumors in this study also frequently presented with facial nerve weakness (18.2%), skin fixation or ulceration (13.6%), and enlarged cervical lymph nodes (9.1%). These features are suggestive of tumor invasion into adjacent structures or regional metastasis, which is in line with the more aggressive nature of malignancies such as mucoepidermoid carcinoma and adenoid cystic carcinoma [1]. Facial nerve involvement is a critical prognostic factor in parotid malignancies, as it significantly affects both treatment outcomes and quality of life [17]. Surgical resection was the primary treatment modality for both benign and malignant tumors. For benign tumors, superficial or total parotidectomy was performed, with a success rate of 77.3% when surgery was the sole treatment. This high success rate reflects the generally favorable prognosis of benign parotid tumors, particularly when surgically excised with clear margins [18]. In the case of malignant tumors, adjuvant therapies were frequently required. Surgery combined with radiotherapy demonstrated a significant success rate, highlighting the importance of radiotherapy in improving local control and survival in high-grade or advanced-stage malignancies [19]. Surgery combined with chemoradiotherapy had a slightly lower success rate (80.0%), which may reflect the more aggressive nature of the tumors treated and the potential for recurrence despite combined treatment. The complications observed in this study were relatively common in both benign and malignant tumors. Seroma formation was the most frequently observed complication, occurring in 16.4% of patients, and was similarly distributed between benign (10 cases) and malignant (8 cases) tumors. This is a well-known postoperative complication following parotidectomy, resulting from fluid accumulation in the surgical site[20]. Facial nerve injury, another significant complication, affected 15.5% of patients, with a higher prevalence in malignant tumor cases. This reflects the increased difficulty in preserving the facial nerve during the resection of malignant tumors, which are more likely to involve the nerve [21]. Other complications included infection (7.3%) and recurrence (5.5%), the latter being exclusively observed in malignant tumors. The relatively low recurrence rate in this study may be attributed to the timely and appropriate use of adjuvant treatments for malignant cases.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

Benign tumors, particularly pleomorphic adenomas, were more common than malignant ones, and most patients presented with painless swelling. Surgical resection in benign tumours and surgical resection combined with adjuvant therapy in malignant parotid tumours provided favourable outcome, although complications such as facial nerve injury and seroma were noted. These findings underline the importance of early diagnosis, appropriate surgical intervention, and the role of adjuvant therapies in managing malignant parotid tumors.

RECOMMENDATION

It is recommended that early diagnosis and prompt intervention remain essential in the treatment of parotid gland tumors. Surgical resection should be considered the primary treatment for both benign and malignant tumors, with careful attention to facial nerve preservation. For malignant tumors, the use of adjuvant radiotherapy or chemoradiotherapy should be tailored to the tumor stage, grade, and margin status to optimize outcomes. Close monitoring for complications, particularly facial nerve injury and seroma, is advised. Future studies with larger sample sizes and longer follow-up periods are needed to refine treatment

protocols and improve the overall prognosis of parotid gland tumor patients.

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