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Treatment of parotid gland tumors in Latvian Oncological Center

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SUMMARY

A total of 268 patients were treated for parotid gland lesions at department of Head and Neck Surgery of Latvian Oncological Center between 1996 and 2000, and the results were analyzed retrospectively. The objective was to analyze the incidence and factors associated with facial nerve dysfunction after different types of parotidectomies with facial nerve dissection and to compare the changing attitudes towards the pathology and surgical treatment in order to better define prevention and management of pleomorphic adenoma recurrences. Limited superficial parotidectomy was the commonest operation performed in 143 patients. Other procedures were complete superficial parotidectomy in 11%, total radical surgery in 10 patients and enucleation in 20 patients. Neck node dissection was done in 9 patients. In 4 patients (6%) paresis was observed after limited superficial parotidectomy, in 10 patients (16%) after complete superficial parotidectomy, in 18 cases (28%) after near - total (subtotal) parotidectomy and in 32 patients (50%) after total parotidectomy. Recurences after the surgical treatment of benign diseases were observed in 12 patients (5.2%). Overall 5-year survival for all stages and histologic types was 58 %.

Key words: parotid gland tumors, parotidectomy, facial nerve dysfunction.

INTRODUCTION

Tumors of the salivary gland are rather uncommon and represent 2-3% of head and neck neoplasms (7; 9; 12). The parotid gland is the most common site of major salivary gland tumors, and the palate the most common site of minor salivary gland tumors. Approximately 20% to 25% of parotid tumors, 35% to 40% of submandibular tumors, 50% of palate tumors, and 95% to 100% of sublingual gland tumors are malignant (18; 21; 22). Early stage low-grade salivary gland tumors are usually curable by adequate surgical resection alone. Large bulky tumors or high-grade tumors carry a poorer prognosis and may best be treated by surgical resection combined with postoperative irradiation (9; 10; 19). Salivary gland neoplasms represent the most complex and diverse group of tumors encountered by the head and neck oncologist. Their diagnosis and management is complicated by their relative infrequency. Salivary gland tumors carry a wide spectrum of histopathological forms because of the diversity of cell types harbored in the glands. Saliva production is the end product of the acinar cells, ductal cells, and myoepithelial cells; any of these cells may produce either benign or malignant tumors. The close anatomical proximity of the facial nerve and of structures related to the deep lobe complicate surgical management.

The aim of the study.

The significance of the study was to analyze the different types of salivary gland tumors, the modalities of treatment given, and their varied outcomes in relation with morbidity, prognosis, and survival rate. The objective was to analyze the incidence and factors associated with facial nerve dysfunction after different types of parotidectomies with facial nerve dissection. The real issue of parotid surgery for pleomorphic adenoma is its risk of recurrence. The aim of this study was to compare the changing attitudes towards the pathology and surgical treatment in order to better define prevention and management of pleomorphic adenoma recurrences.

MATERIALS AND METHOD.

A total of 268 patients were treated for parotid gland lesions at department of Head and Neck Surgery of Latvian Oncological Center between 1996 and 2000, and the results were analyzed retrospectively. The patients were between 17 and 78 years of age (mean, 46.5 years), and 124 were male and 144 were female. Pleomorphic adenoma was the most common benign tumor affecting the parotid gland (Table 1.).

Malignant tumors had been treated in 40 patients. Mucoepidermoid cancer is the most common parotid malignancy (Table 2.). In 3 patients metastatic tumors in parotid gland were diagnosed. Of the 3 metastatic tumors there were 2 squamous cell carcinomas and 1 malignant melanoma. All of metastasis originated in the skin of head

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Table 1. Benign conditions of parotid gland.

Condition	No. of occurrences
A. Tumors	
Pleomorphic adenoma	153
Monomorphic adenoma	36
Adenolymphoma	21
Oncocytoma	1
Haemangioma	3
Lipoma	
B. Tumorlike diseases	
Benign lymphoepithelial lesions	3
Chronic sialadenitis	3
Sialadenosis	1
Cyst	4
Total	**228**

and neck region.

The tumors were retrospectively staged using UICC guidelines from the clinical, scan, operative and histological data. The median size of the tumors at presentation was 5cm diameter (range 1-15 cm). The distribution of patients according to the stage is shown in figure 1.16 patients had I stage tumors, 13 patients - II stage, 8 patients had III stage disease and 3 - IV stage disease.

The histological diagnoses of the parotid malignancies based on the WHO International Classification (12). Pleomorphic adenoma consist of epithelial and connective tissue components in varying degrees. Microscopically, benign mixed tumors are characterized by variable, diverse, and structural histologic patterns. They frequently have growth patterns of sheets, strands, or islands of spindle and stellate cells, with occasional predominating myoid configuration. Histopathological characteristics of pleomorphic adenomas, especially of capsular alterations like thin capsule areas, capsule-free regions, satellite nodules, and pseudopodia in the different subtypes were analyzed in 126 consecutive patients. Warthin tumor (ie, papillary cystadenoma lymphomatosum, cystic papillary adenoma, adenolymphoma) is well encapsulated when located in the parotid and contains multiple cysts. Histologically, it has a heavy lymphoid stroma, and aciniform epithelial cells line the cystic areas with papillary projections. Monomorphic adenomas is composed of cells predominantly of one type. Because of the absence of connective tissue changes, monomorphic adenoma has been separated from mixed tumors. In 1952, Godwin proposed the term benign lymphoepithelial lesion (BLL) to cover a group of diseases known as Sjögren's syndrome, Mikulicz's disease, chronic punctate sialadenitis. Histologically, the lesion

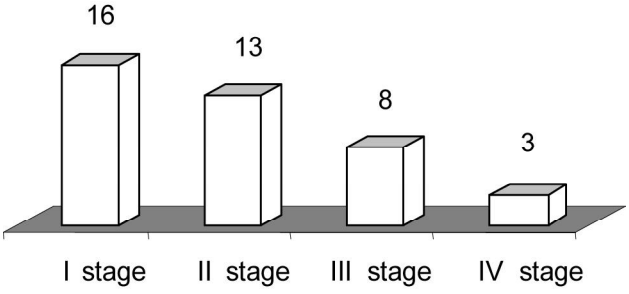

Fig. 1. The distribution of patients according to the stage

Table 2. Histological diagnoses of primary parotid malignancies

Tumor type	No. of patients
Mucoepidermoid carcinoma	12
Adenoid cystic carcinoma	6
Adenocarcinoma	4
Acinic cell carcinoma	2
Ca in pleomorphic adenoma	8
Undifferenciated carcinoma	5
Metastatic tumors	3
Total	**40**

is composed of a diffused, well-organized lymphoid tissue and lymphocytic interstitial infiltrate with obliteration of the acinar pattern. Mucoepidermoid carcinoma is a malignant epithelial tumor that is composed of various proportions of mucous, epidermoid (squamous), intermediate, columnar, and clear cells, and often demonstrates prominent cystic growth. Mucoepidermoid carcinomas are graded as low-grade, intermediate-grade, and high-grade. Adenoid cystic carcinoma (formerly known as cylindroma) is a slow-growing but aggressive neoplasm with a remarkable capacity for recurrence. Morphologically, 3 growth patterns have been described: cribriform (classic), tubular, and solid (basaloid). The tumors are categorized according to the predominant pattern. The cribriform pattern shows epithelial cell nests that form cylindrical patterns. The tubular pattern reveals tubular structures that are lined by stratified cuboidal epithelium. The solid pattern shows solid groups of cuboidal cells. Acinic cell carcinoma (also known as acinic cell adenocarcinoma) is a malignant epithelial neoplasm in which the neoplastic cells express acinar differentiation. Adenocarcinoma is a salivary gland carcinoma that shows glandular or ductal differentiation but lacks the prominence of any of the morphologic features that characterize the other, more specific carcinoma types. Malignant mixed tumors includes 3 distinct clinicopathologic entities: carcinoma ex pleomorphic adenoma, carcinosarcoma, and metastasizing mixed tumor.

In majority of cases parotid gland tumors manifested as a painless mass in the parotid region (Table 3.). In 16 cases (5,9%) palpable cervical lymphadenopathy was observed. In 40 (14,9%) patients tumor presented as a parapharyngeal mass and were deep lobe tumors. Preoperative facial nerve palsy was present in 3 patients. The new onset of pain (6,7%), facial nerve weakness, and paresthesias are indicators of possible underlying malignancy. Trismus usually represented invasion to the masseter or pterygoid muscles, skin involvement, or fixation to the mastoid tip, which were also signs of malignancy.

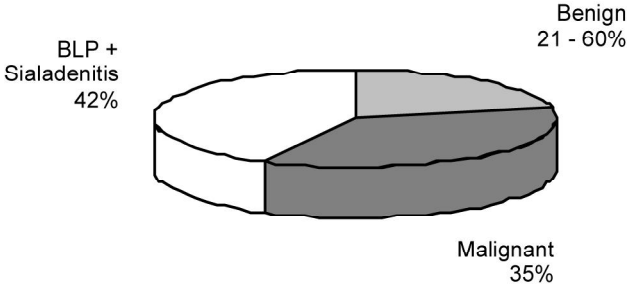

Fig. 2. Frequence of facial paresis depending on pathology

Table 3. Clinical features of parotid malignancies at presentation

Feature	No. of patients*	% of total
Parotid mass or lump	227	84%
Fixity (skin or deep)	51	19%
Lymphadenopathy (clinically)	16	5.9%
Pain	18	6.7%
Facial nerve palsy	3	1.1
Tumor fungation	4	1.4%

*a number of patients presented with more than one feature

Table 4. The operative procedures performed

Operations	No. performed
Enucleation	20
Limited superficial parotidectomy	143
Complete superficial parotidectomy	10
Near – total (subtotal)	80
Total parotidectomy	10
Radical parotidectomy	2
Neck dissection	11

The preoperative evaluation was largely clinical. 198 patients were investigated prior to treatment by fine - needle aspiration cytology. The definitive histopathological diagnosis was compared with preoperative FNAC diagnosis. The aspirates were performed by members of surgical team managing the patient or by radiologist using ultrasound guidance. The aid of an experienced cytologist is a prerequisite in this case. FNAC specimens were divided into four categories: TP (true positives) - cytological malignancy confirmed by histology; FP (false positives) - cytological malignancy not confirmed by histology; TN (true negatives) - benign by cytology confirmed by histology; FN (false negatives) – benign by cytology not confirmed by histology. Sensitivity and specificity were calculated in percentages according to the formulas (Weinberger 1992; 23). 80 patients had CT scannings, 147 patients had ultrasonography and 23 patients had MRI. 10 patients were treated with external beam irradiation because associated medical problems precluded general anesthesia. Surgical resection is the mainstay of treatment for parotid malignancies; limited operations such as enucleation are contraindicated because of the higher risk of recurrence and facial nerve damage (6; 13). Radical surgery with post-operative adjuvant radiotherapy was used in advanced malignant lesions (8 patients) or when resection remained incomplete (2 patients). Localised tumors (within the superficial lobe of the parotid gland) were resected with surrounding layer of normal parotid tissue. In the present study this procedure is termed limited superficial parotidectomy to differentiate it from the complete superficial parotidectomy used for for sialadenitis. During this operation not all the facial nerve branches were completely dissected. Complete superficial parotidectomy (ie, removal of all parotid tissue lateral to the plane of the facial nerve) was used in cases of sialadenitis. This involved complete dissection of all the branches of the facial nerve. Near-total (subtotal) parotidectomy was used in the treatment of some patients with sialadenitis and also for patients with tumors extending to the plane of the facial nerve. This operation entailed initial complete removal of the superficial lobe, dissecting all of the nerve branches. Then the deep lobe tissue was either removed piecemeal, in the case of sialadenitis, or, in the case of deep lobe tumor, the neoplasm was carefully delivered between the branches of the nerve.

Limited superficial parotidectomy was the commonest operation performed in 143 patients. Other procedures were complete superficial parotidectomy in 11%, total radical surgery in 10 patients and enucleation in 20 patient earliest in the series. Neck node dissection was done in 9 patients (Table 4.)

Postoperative evaluation of facial function was performed. Facial nerve function was assessed on the first postoperative day and at 1 month and 6 months after the parotidectomy. Postoperative complications and further management were recorded. The data was collected and reviewed from the records of all the patients. Overall survival rates, overall local control rates and overall regional control rates were analysed.

RESULTS

Fine needle aspiration cytology was performed in 73,8% patients. TP (true positives) category were estimated in 24% of cases; FP (false positives) in 4,74% of cases; TN (true negatives)in 67,19% of cases; FN (false negatives) category in 3,16% of cases. According to formulas (Weinberger 1992; 23) calculated sensitivity and specificity rates were 88,7% and 93,4%. Of the 11 patients with a primary salivary malignancy of the parotid gland a total of 5 patients had misleading FNAC report that is a benign diagnosis was suggested. Results were

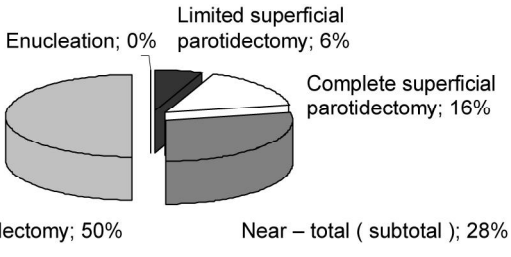

Fig. 3. Frequence of facial paresis depending on surgical procedure

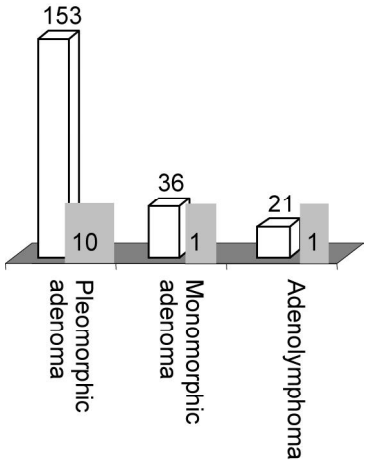

Fig. 4. Recurrences of benign tumors*
*Number of recurrences in grey.

allocated to the misleading group when the epithelial elements present were reported as benign but the tumor present proved to be malignant, and where the cytopathology was reported to be malignant but the tumor proved to be benign. FNAC is accurate in the identification of pleomorphic adenoma, it is less accurate in correctly identifying uncommon pathological entities, in particular the primary salivary gland malignancies arising in the parotid. In our series, 40 patients had malignant parotid gland neoplasms, and 9 patients had cervical lymph node metastasis at the time of presentation. Facial nerve paralysis was noted in 3 cases. Postoperative facial paresis was observed in 64 patients. In patients group with tumorlike diseases (BLP + sialadenitis 7 patients) in 3 patients (42%), in 47 patients (21,6%) with benign tumors and in 14 patients (35%) with malignant tumors (Figure 2.) Transient facial nerve paresis was observed in 34 patient (53%) and it usually resolved within 3-18 weeks after surgery. Direct trauma to the nerve, devascularization, or postoperative nerve inflammation is believed to cause paresis.

Postoperative facial paresis wasn't observed after enucleations. In 4 patients (6%) paresis was observed after limited superficial parotidectomy, in 10 patients (16%) after complete superficial parotidectomy, in 18 cases (28%) after near - total (subtotal) parotidectomy and in 32 patients (50%) after total parotidectomy (Figure 3.). The most common dysfunction was paresis in a single nerve branch (44.3%), in particular, the marginal mandibular branch. Total parotidectomy was associated with a significantly higher incidence of facial nerve dysfunction during the first postoperative period (50.5% at day 1 and 34.7% at month 1) than superficial parotidectomy (16% at day 1 and 10.9% at month 1)

Recurences after the surgical treatment of benign diseases were observed in 12 patients (5,2%). Most frequently recurrences appeared in cases of benign mixed tumor (10 patients). In 8 cases of these enucleations were performed. In one case limited superficial parotidectomy and in one case near total parotidectomy were performed. In one patient recurrence developed after surgery due to monomorphic adenoma when enucleation of tumor was performed. One more recurrence developed after enucleation due to adenolymphoma (Figure 4).

68 pleomorphic adenomas were classified as stroma-rich type, 25 as cell-rich-type, and 20 as classical subtype. 94% of all tumors showed areas with very thin capsules. Stroma-rich tumors showed the greatest regions of very thin capsules. These tumors exhibited focal absence of encapsulation in 69% of the tumors. 10% of the cell-rich and 45% of the classical subtype tumors also presented capsule-free areas. This study was a retrospective chart review of 40 patients treated for malignant parotid tumors. The median follow-up was 5.1 years (range, 3 - 11 years). The 5 - year disease-specific survival rates for stage I ; II and III/IV were 96%, 61% and 17% respectively ($P < 0.0001$). Overall 5-year survival for all stages and histologic types was 58 %. Locoregional recurrence occurred in 37% of surgery-only 11% of surgery plus radiotherapy, and 15% of radiotherapy-only patients. Regional lymphatic metastasis is a subject of considerable importance in relation to malignant salivary gland tumors. 5,9 % of patients presented with palpable nodal metastases. Histologically confirmed positive neck was found in 53% of all cases. Highest incidence of 60 % was found in undifferentiated carcinomas, however also mucoepidermoid tumors showed a rate of 23 %. All 3 patients with facial nerve paralysis caused by malignancy have nodal metastasis at the time of diagnosis. These patients have an average survival of 2.7 years and a 5 - year survival of 16%. Distant metastasis is predictive of a poor prognosis, and it occurred in 5 patients (15%). In 3 (50 %) of patients with adenoid cystic carcinoma developed distant metastasis.

DISCUSSION

Parotid glands are the largest salivary glands in man and frequently are involved in disease processes. Approximately 25% of parotid masses are nonneoplastic, whereas the remaining 75% are neoplastic. The most common presentation is a painless, asymptomatic mass. More than 80% of patients present because of a mass existing in the cheek. Approximately 30% will relate pain associated with the mass, although most malignancies are painless. Pain most likely indicates perineural invasion, which greatly increases the suggestion of malignancy. Of these patients, 7-20% present with facial nerve paralysis, which almost never accompanies benign lesions and indicates a grave prognosis. Approximately 80% of patients with facial nerve paralysis have nodal metastasis at the time of diagnosis (3). The sensitivity of FNAC procedure is greater than 95% in experienced hands (4; 5; 8; 15). However, only a positive diagnosis should be accepted, with negative results indicating the need for further attempts at obtaining a histologic diagnosis, including repeat fine needle aspiration. The results of the fine needle aspiration provide a histologic diagnosis and assists in preoperative planning. Sonography may be beneficial in that benign lesions are of lower density and have smaller caliber blood vessels (1; 2; 11; 15). However, determination of a cystic component may be misleading, because cystic degeneration may occur as a result of necrosis at the avascular center of a malignancy. CT scan and MRI have become invaluable tools in the evaluation of parotid malignancies. MRI demonstrates the mass in greater contrast than CT scan, but CT scanning provides better detail of the surrounding tissues. These imaging studies may identify regional lymph node involvement or extension of the tumor into the deep lobe or parapharyngeal space. CT scan criteria for lymph node metastasis include any lymph node larger than 1-1.5 cm in greatest diameter, multiple enlarged nodes, and nodes displaying central necrosis (17; 20). Most tumors of the parotid, approximately 90%, originate in the superficial lobe. Superficial parotid lobectomy procedure is appropriate for malignancies confined to the superficial lobe, those that are low grade, those less than 4 cm in greatest diameter, tumors without local invasion, and those without evidence of regional node involvement (9; 10; 16; 22). Indications for radiation include tumors more than 4 cm in greatest diameter, those of high grade, tumor invasion of local structures, lymphatic invasion, neural invasion, vascular invasion, tumor present very close to a nerve that was

spared, tumors originating in or extending to the deep lobe, recurrent tumors following re-resection, positive margins on final pathology, and lymph node involvement (9; 10; 14; 16; 21).

CONCLUSIONS

Benign and malignant epithelial parotid tumours can be diagnosed by their clinical presentation supplemented with FNAC. Superficial parotidectomy is the operation of choice. Facial nerve can be saved in total conservative parotidectomy for benign tumour in deep lobe and early malignant tumour. Radical parotidectomy followed by radiotherapy and in selected cases neck node dissection are the recommended procedures for advanced malignant parotid tumours. Hypocellular pleomorphic adenomas often have a thin capsule and constitute the most frequently encountered subtypes of recurrence. Pseudopodia are considered as an additional risk of recurrence. Therefore, in our opinion, enucleation or local dissection of the pleomorphic adenoma can not be a sufficient surgical treatment in cases of pleomorphic adenomas. Stage is statistically significant prognostic factors for survival. The addition of irradiation to surgery did not improve overall survival but did reduce locoregional recurrence and improve local failure-free survival.

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