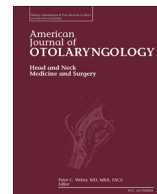


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American Journal of Otolaryngology–Head and Neck Medicine and Surgery

journal homepage: www.elsevier.com/locate/amjoto

The extent of surgery for benign parotid pathology and its influence on complications: A prospective cohort analysis

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ARTICLE INFO

Article history:

Received 11 September 2017
Available online xxx

Keywords:

Parotid
Facial nerve
Pathology

ABSTRACT

Background: The surgical management of benign parotid tumors is aimed at complete extirpation of the mass with preservation of facial nerve function. There is a relative paucity of literature pertaining to complications after benign parotid surgery and related risk factors. We aim to critically review the outcomes following treatment of benign parotid pathology when surgery entailed either complete superficial parotidectomy (CSP), partial superficial parotidectomy (PSP) or extracapsular dissection (ECD).

Material and methods: This is a review of prospectively collected data of all parotidectomies performed between June 2006 to June 2016 for histologically-proven benign pathology of the parotid. Median follow-up time was 31.6 weeks.

Results: A total of 101 parotidectomies were carried out on 97 patients (40 CSP, 56 PSP and 5 ECD). Pleomorphic adenoma (48.4%) and Warthin's tumors (32.7%) were the most common pathologies. Temporary facial weakness occurred after 7 operations (6.9%). Facial weakness was permanent in 4 cases (3.9%). The rates of sialocele and salivary fistula were 4.9% and 0.9%, respectively. Only one patient (0.9%) developed Frey Syndrome postoperatively. No significant associations between extent of parotid surgery and postoperative facial nerve dysfunction ($p = 0.674$) or wound complications ($p = 0.433$) were observed. Univariate analyses for potential contributing factors such as advanced age, smoking status, tumor location or histology did not demonstrate any increased risk with developing postoperative complications.

Conclusion: Partial superficial parotidectomy was associated with low rates of morbidity to the facial nerve and surgical wound. The results were comparable to complete superficial parotidectomy. We recommend offering patient partial superficial parotidectomy where appropriate and this is in line with the current trend of minimising surgical dissection, thereby potentially decreasing the risk of short-term and long-term complications.

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1. Introduction

There exists a number of treatment options in relation to extent of surgery in the management of benign parotid tumors [1,2]. The degree of parotid resection and facial nerve dissection is often dictated by the size, location and preoperative diagnosis of the tumor. An important consideration in parotid surgery is achieving complete excision of the pathology, preservation of the facial nerve and avoidance of postoperative complications such as salivary fistula, hematoma, Frey Syndrome and sialocele [3–5].

The incidences of complications are varied; postoperative facial nerve weakness or paralysis can affect up to 40% of patients, and most are transient and recover over time [6,7]. Similarly, the incidences of

Frey Syndrome and sialocele have been reported to be in the range of 3 to 15% and 1 to 25%, respectively [6,8–11]. The reasons for the diverse reported rates were likely multifactorial; extent of surgery, differences in techniques and pathology as well as robustness of data collection have all been implicated [5,12–14].

We evaluated the outcomes associated with the extent of parotidectomy in the treatment of benign parotid pathology at our institution. We also assessed the incidences of, and risk factors for, developing postoperative facial weakness and wound complications. This helps to inform preoperative patient counselling and future surgical management, as well as document the experience of an ENT department in a secondary care center.

2. Materials and methods

After obtaining institutional ethics committee approval, data was retrieved from a prospectively maintained database of all parotid operations performed by the senior author (SS) since 2006. The study

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conformed to ethical standards outlined in the Declaration of Helsinki. The database contained information on patient baseline characteristics, fine-needle aspiration cytological diagnosis, histopathological diagnosis, extent of surgery, surgical complications as well as pre- and postoperative facial nerve function. Demographic and clinical data collected include age at time of surgery, gender, ethnicity, length of follow-up and smoking status. Inclusion criteria were parotid surgery for the treatment of histologically proven benign pathology. Patients were excluded if the final histological diagnosis following parotidectomy showed a malignant neoplasm. Tumor with parapharyngeal extension was excluded.

The types of operation were classified as follows: complete superficial parotidectomy (removal of all parotid tissue lateral to the plane of facial nerve), partial superficial parotidectomy (any procedure in which less than the full superficial lobe of parotid was dissected) and extracapsular dissection (resection of tumor with a cuff of parotid parenchyma without formal identification of facial nerve). Surgery was performed as per standard protocol as described earlier [4]. Drains were routinely placed and removed when 24-hour output is less than 25mls. Internal dressing material such as oxidized cellulose was not used.

The incidences of postoperative complications (facial weakness, wound breakdown, Frey's Syndrome, salivary fistula and sialoceles) were recorded in the database prospectively by the authors. Patients were usually evaluated daily until their hospital discharge. Outpatient review was usually held in a fortnight and the majority of patients would also be seen again at 3, 6 and 12 months. Definitions of complications were summarized in Table 1.

Facial nerve function was evaluated postoperatively. Patients who had preoperative facial nerve weakness were excluded from the final analysis. Patients were asked to lift their eyebrows, screw their eyes shut, show their teeth and pucker their lips. The status of the facial nerve function was recorded in a trichotomous manner (normal/weak/paralyzed) for each branch (temporal, zygomatic, buccal, marginal mandibular and cervical). In patients with facial weakness or paralysis, time to recovery was documented. Permanent facial paralysis/weakness was diagnosed if it persisted for >1 year.

Potential predictors for postoperative complications such as age, smoking status, tumor size, location and histology as well as extent of resection were recorded and analyzed.

2.1. Statistical analysis

Continuous variables were subjected to Skewness and Kurtosis measures to determine normality. Differences between the different operation types were analyzed with the Kruskal-Wallis test and 1-way analysis of variance. Chi-square test was used to test association for categorical data. Risk factors for wound complications were assessed using logistic regression analysis. Two-sided p values < 0.05 were considered significant. Statistical analysis was performed using SPSS software version 21.0 (SPSS, Inc., Chicago, Ill).

Table 1
Definition of complications.

Complication	Definition
Facial nerve dysfunction	Any facial weakness or paralysis after surgery. Temporary facial nerve dysfunction is defined as weakness or paralysis that has a complete recovery within 1 year. Permanent facial nerve dysfunction is defined as weakness or paralysis that persisted beyond 1 year.
Sialocele	Collection of saliva or serous fluid at the parotid bed which persisted over 2 weeks
Salivary fistula	Abnormal communication between the skin and parotid bed, through which saliva is discharged
Infection	Redness, swelling, warmth and pain over surgical site, often with fever and associated purulent discharge
Hematoma	Bleeding or collection of blood within the surgical site
Frey syndrome	Localised sweating over the surgical site in relation to gustation

3. Results

From June 2006 to June 2016, 97 patients underwent a total of 101 parotidectomies for histologically proven benign pathology of the parotid. Four patients underwent bilateral surgeries. Two patients had revision surgery with previous surgery performed elsewhere. Mean length of hospital stay was 1.73 days (0–6) and mean follow-up duration was 31.58 weeks (2–76). Fine needle aspiration cytology (FNAC) was performed in all but one patient (99%). Seventeen FNAC were inconclusive. The sensitivity and specificity of FNAC for benign parotid tumors were 83.4% and 97.6%, respectively. Baseline characteristics and surgical factors were summarized in Table 2.

Extent of surgery can be summarized as follows: complete superficial parotidectomy (CSP; 40 cases, 39.6%); partial superficial parotidectomy (PSP; 56 cases, 55.5%) and extracapsular dissection (ECD; 5 cases; 4.9%).

3.1. Postoperative facial nerve function

Clinically no patient had any facial nerve weakness preoperatively. Two patients who underwent CSP had deliberate sacrifice of the buccal branch of the facial nerve to allow complete extirpation of the tumor; both patients did not develop any perceptible facial weakness postoperatively.

In total, 11 patients (10.9%) had postoperative facial nerve dysfunction immediately after the surgery. Four of the eleven patients (36.36%) had persistent facial nerve dysfunction at time of last visit with no signs of function recovery. The remaining seven patients had complete recovery with no residual weakness seen at time of last consultation. All seven patients had weakness of marginal mandibular branch of facial nerve.

Isolated lower lip/marginal mandibular branch weakness was noted in 9 patients and paralysis in 1 patient. No patient had deliberate sacrifice of the marginal mandibular branch. Median time course of recovery for patients with postoperative marginal mandibular weakness was 35.7 ± 10.5 weeks.

Only 1 patient had facial nerve dysfunction isolated to a single branch other than the marginal mandibular branch. This patient had a pleomorphic adenoma located in the preauricular region and underwent a PSP. Postoperatively, there was weakness of the temporal branch of the facial nerve. This patient was followed up for 45 weeks and no recovery of function was observed. The patient and surgeon elected to manage this complication conservatively.

Table 2
Summary of demographics and surgery-related factors.

Characteristics	Number (%)
Age, median (range), year	58 (18–86)
Gender	
Male	47 (46.5)
Female	54 (53.5)
Ethnicity	
Caucasian:Maori:other	69:30:2
Extent of surgery	
Superficial parotidectomy	40 (39.6)
Partial superficial parotidectomy	56 (55.4)
Extracapsular dissection	5 (5.0)
Histological diagnosis of tumor	
Pleomorphic adenoma	49 (48.4)
Warthin's tumor	33 (32.7)
Reactive lymph node	7 (6.9)
Lymphoepithelial cyst	3 (3.0)
Basal cell adenoma	3 (3.0)
Lipoma	2 (2.0)
Oncocytoma	2 (2.0)
Solitary fibrous tumor	1 (1.0)
Vascular malformation	1 (1.0)
Mean follow-up (weeks)	31.58

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