Eur Arch Otorhinolaryngol (2010) 267:131–135
DOI 10.1007/s00405-009-0980-1

HEAD AND NECK

Parotidectomy: the timing of post-operative complications

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Received: 19 December 2008 / Accepted: 30 March 2009 / Published online: 1 May 2009

Abstract We evaluated the timing of complications following parotidectomy. We performed a 119-patient retrospective case series analysis over a 12-year period (1994–2006) and investigated timing of post-operative complications. 38% of temporary facial nerve palsies resolved within 1 month, 78% within 3 months and all recorded resolved within 7 months. Tumour recurrence, ranged from 5 months to 9 years post-surgery with a median of 5 years. Salivary fistula formation ranged from 3 to 45 days post-surgery with a median of 11.5 days. The development of Frey's ranged from 20 days to 22 months, median 11 months. This information can better inform clinicians and those patients undergoing parotidectomy.

Keywords Parotidectomy · Facial nerve · Salivary fistula · Frey's

Introduction

Parotidectomy is performed for benign and malignant diseases of the parotid gland. Post-operative complications following parotidectomy are well documented and include complications such as facial nerve paresis or paralysis, salivary fistula, Frey's syndrome, infection, and recurrence of the tumour.

Parotid gland surgery complications can affect quality of life and are potentially disfiguring. The factors associated with post-parotidectomy facial palsy are still poorly understood, surgical technique and histology seem to be important. The rate of temporary facial nerve palsy ranging from 9 to 100% and permanent paralysis being 0–29% [1, 2]. What is not so clear from the literature is when these complications arise and resolve. The present study was undertaken to determine the timing of post-operative complications following parotid surgery.

Materials and methods

This study was a retrospective case series analysis of all patients who underwent parotidectomy in a UK district general hospital between 1994 and 2006. The surgeons were either consultants or specialist registrars under direct supervision from the consultant.

All patients had undergone parotidectomy for benign and malignant tumours at Warwick Hospital. The management strategy was documented for each patient, either superficial, deep lobe, or total parotidectomy and whether radiotherapy was used.

Patients were gathered from an electronic database logging each surgical procedure as a finished consultant episode. Notes were requested and reviewed for all patients having undergone parotid surgery. The patient-related data included age, gender, histological diagnoses, procedure type, and complications with timings. Data analysis was carried out by the Clinical Effectiveness Department. Statistical analyses performed included the Fisher exact test. A P value of ≤ 0.05 was considered statistically significant.

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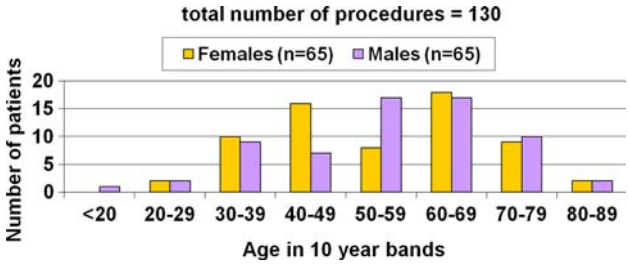
Table 1 Age (at procedure) and gender



Results

One hundred and fifty-five procedures were accounted for by 147 patients. 28 patients were excluded because they had undergone parotid duct surgery or parotid biopsy but not a parotidectomy. 119 patients underwent 130 parotidectomies during the study period. Age ranged from 16 to 88 years, with a median age 66.5 years, the number of procedures carried out on male and female patients was equal (Table 1).

The follow-up ranged from 1 month to 11 years with a median of 9 months. Facial nerve palsy, 1 (0.77%) permanent and 55 (42.3%) temporary. 38% of temporary facial nerve palsies resolved within 1 month, 78% within 3 months and all recorded resolved within 7 months. Seven patients (5.4%) had a recurrence, range 5 months to 9 years post-surgery with a median of 5 years. Salivary fistula formation (7.7%) ranged from 3 to 45 days post-surgery with a median of 11.5 days. The development of Frey's (7.7%) ranged from 20 days to 22 months, median 11 months.

One hundred and twenty-six patients had a surgical resection alone, four patients received surgical resection and post-operative radiotherapy, and ten patients underwent revision parotid surgery. 120 patients underwent superficial parotidectomy, three deep lobe parotidectomy and seven total parotidectomy. 124 procedures were performed for benign disease and six for malignant disease. Malignant histology subtypes:

- basaloid adenocarcinoma,
- squamous cell carcinoma,
- cystadenocarcinoma
- poorly differentiated neuroendocrine carcinoma,
- acinic cell carcinoma,
- adenoma with oncocytic metaplasia.

Table 2 gives an overall view of numbers of complications. Disease has been divided into benign and malignant. Surgical technique, whether superficial or total parotidectomy and secondary (re-do) procedures are divided.

Six patients (5%) had a recurrence that required further surgery. Histology revealed pleomorphic adenoma in all cases. Timing of recurrence ranged from 9 months to 9 years

- 9 months
- 1 year
- 5 years (two patients)
- 7 years
- 9 years

One (0.77%) patient developed a permanent facial nerve palsy this was evident immediately post-operatively, total parotidectomy for basaloid adenocarcinoma. 55 (42.3%) patients had temporary facial nerve palsy, 53 (96.4%) of which were recorded within 24 h, one patient (0.77%) developed a temporary palsy after 24 h and for only one patient the timing was not recorded.

Thirty eight percent of temporary facial nerve palsies resolve within 1 month, 78% within 3 months and all recorded within 7 months (Table 3). Resolution was not recorded in two patients as they were followed up in another hospital.

A facial nerve stimulator was used in the majority of cases but showed no significant advantage in preventing facial nerve palsy (Table 4).

We postulated that delay to surgery may have made surgery more challenging with a larger lesion and therefore increased rate of facial nerve palsy. There is no significant

Table 2 Complications related to disease and operative procedure

	Bleeding	Infection	Facial nerve palsy (temp)	Facial nerve palsy (perm)	Frey's syndrome	Salivary fistula
Benign disease (n = 118)						
Superficial (n = 111)	4 Primary (1 returned to theatre)	7 (All minor)	42	0	9	10
Total (n = 7)	1 (Returned to theatre	0	6	0	1	0
Malignant disease (n = 6)						
Superficial (n = 3)	0	0	3	0	0	0
Total (n = 3)	1 Primary (no return to theatre)	0	2	1	0	0
Secondary operative procedures (n = 6)						
Superficial (n = 6)	0	0	2	0	0	0

Table 3 The duration of temporary facial nerve palsy

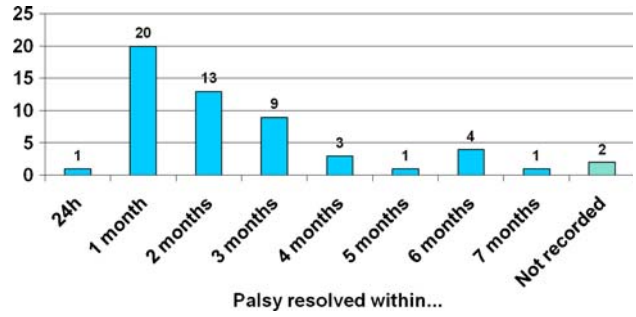


Table 4 Facial nerve palsy—incidence related to use of nerve stimulator

	Number with facial palsy	Number with no facial palsy	Rate (%)
Use of nerve stimulator ($n = 76$)	31	45	40.8
No nerve stimulator ($n = 54$)	24	30	44.4

Fisher's exact test, the two-tailed $P = 0.72$

Table 5 Facial nerve palsy—incidence related to delay from clinic to procedure

	Number with facial palsy	Number with no facial palsy	Rate (%)
Procedure performed within 1 year from clinic appointment	50	66	43.1
Procedure performed later than 1 year from clinic appointment	6	8	42.9

Table 6 Facial nerve palsy—incidence (i) related to deep lobe and total parotidectomy, (ii) following radiotherapy

	Number with facial palsy	Number with no facial palsy	Rate (%)
Deep lobe Parotidectomy ($n = 3$)	3	0	100
Total parotidectomy ($n = 7$)	6	1	86
Following radiotherapy ($n = 4$)	2	2	50

difference in rate of facial nerve palsy if the procedure was performed within 1 year or after 1 year following the clinic appointment. Fisher's exact test, the two-tailed $P = 1.00$ (Table 5).

The few patients undergoing deep lobe or total parotidectomy had higher rates of facial nerve palsy. There was also an increased rate in those having post-operative radiotherapy (Table 6).

Other complications included:

Bleeding: 6 (4.6%) patients, all occurred within 24 h
Infection: 7 (5.4%) patients
Salivary fistula: 10 (7.7%) patients
Salivary cyst: 1 (0.77%) patient developed 1 month after surgery
Frey's syndrome: 10 (7.7%) patients

Formation of salivary fistula ranged from 3 to 45 days with a median of 11.5 days.

There was a surprisingly large range for onset of Frey's syndrome, from 20 days to 22 months, the median being 11 months. These figures were recorded in patient case notes by reviewing doctor.

Discussion

Knowledge of risks helps focus improvements through technological advancement and surgical technique to improve outcome following parotid surgery. Surgeons continue to endeavour to minimise the risk of complications resulting from parotidectomy [3].

The aim of the study was to determine the timing of post-operative complications following parotid surgery. The rate of temporary facial nerve palsy was 42%, with 38% of those resolving within 1 month and 78% within 3 months. Facial nerve paralysis has a significant functional and emotional impact on patients. Patients with facial nerve paralysis often complain about compromised mastication, dysphagia, drooling, poor eye closure and the social ramifications of cosmetic deformity [3]. The incidence of facial nerve palsy ranges from 30 to 65% for temporary weakness and 3 to 6% for permanent dysfunction [4]. Marshall and colleagues [5] reported a temporary facial nerve palsy rate of 24.4% and a permanent palsy rate of 1.9% in their series. Mehle and colleagues [6] reviewed the results of 256 consecutive patients who underwent parotid surgery for benign neoplasia over a 15-year period. Those authors reported that immediate facial nerve palsy occurred in 46.1% of those patients and that permanent facial nerve palsy developed in 3.9%. Guntinas-Lichius and colleagues [7] conclude that in patients undergoing parotidectomy, advanced age, long operation time, large specimen volume and prior surgery are risk factors for transient and long-term facial deficits.

This study suggests there is an increased risk of facial nerve palsy with deep lobe and total parotidectomy and with radiotherapy. Many surgeons recommend the use of intra-operative facial nerve stimulation during parotid surgery to prevent trauma to the facial nerve [3]. In our study, the use of nerve stimulator and delay to surgery were not significant.

Eight percent developed Frey's over a period of time ranging from less than a month up to 2 years, median time for onset was 11 months. Frey's syndrome is a well-known complication of parotidectomy. The clinical incidence of Frey's syndrome after parotid surgery has been reported to be as high as 53% [8]. In our series there is a low incidence which may be due to variability in doctors specifically asking about the complication at follow-up appointments.

Frey's syndrome is characterised by unilateral sweating and flushing of the facial skin in the area of the parotid gland during eating. The pathogenesis of Frey's syndrome is based on the aberrant regeneration of sectioned parasympathetic fibres, which occurs when the connection of those nerve fibres with parotid tissue has been interrupted [9]. It is unlikely that this process could occur within 1 month, therefore the diagnosis and documentation by reviewing doctor is probably inaccurate. Several procedures, not used in this study, can prevent Frey's syndrome occurring during parotidectomy. Surgical methods (thick skin flap elevation or the use of fascia lata grafts, dermal fat grafts, sternocleidomastoid muscle flaps, superficial musculoaponeurotic system flaps or temporoparietal fascia flaps [10–14]) involve interposing a barrier between the sweat glands and the exposed post-ganglionic parasympathetic nerve fibres. Asal and colleagues [14] used the sternocleidomastoid muscle flap in 12 of 24 patients, and no flap was used in the other 12 patients in their study. Those authors indicated that the result was 0% in the sternocleidomastoid muscle flap group and 50% in the non-flap group, as determined by the starch–iodine test. Casler and Conley [9] prevented Frey's syndrome using an inter-opposing flap made of superficial musculoaponeurotic system. The authors found no clinical evidence of gustatory sweating in their groups of patients. de Ru and colleagues [15] reported that five of 45 patients with Frey's syndrome did not receive that type of flap. Frey's syndrome may be related to the surgical techniques used or to the type of surgery performed.

Eight percent developed salivary fistula and at a median of 11.5 days. This unpleasant complication of parotid surgery, ranges in incidence from less than 2–14% of patients who have undergone the procedure [16, 17]. Patients in this study developing salivary fistulae resolved spontaneously although timing of resolution is uncertain. Although a number of treatments for post-parotidectomy fistula have been advocated, there is no standard therapeutic approach. Methods of treating that complication include completion parotidectomy; radiation therapy; tympanic neurectomy; the use of pressure dressings, anticholinergic medications, and the restriction of oral intake [18].

From this study we may be able to provide more accurate information to patients concerning the risks of surgery. To improve documentation, the implementation of a surgical proforma or care plan has been suggested including details on cytology, imaging, use of stimulator and postoperative House Brackmann score. There is potential to expand this study to evaluate timing of complications now that facial nerve monitoring is used routinely.

Conclusion

Complications of parotid surgery are well documented in the literature; timing of complications has been less well studied. We found temporary facial nerve palsy rate was 42%, 38% of which resolved within 1 month, 78% within 3 months and all within 7 months. The development of Frey's syndrome occurred within 2 years of surgery. The development of recurrence ranged between 5 months and 9 years. This information can better inform clinicians and those patients undergoing parotidectomy.

Acknowledgments The authors thank Hugh Cable and Richard Bickerton for contributing through allowing their results to be evaluated.

Conflict of interest statement The authors declare that they have no conflict of interest.

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