J. Maxillofac. Oral Surg. (Oct-Dec 2012) 11(4):407–410
DOI 10.1007/s12663-012-0349-7

CLINICAL STUDY

Safety of Extracapsular Dissection in Benign Superficial Parotid Lesions

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Received: 28 November 2011 / Accepted: 7 February 2012 / Published online: 4 April 2012

Abstract
Introduction The current practice for removal of clinically benign superficial parotid lesions is an appropriate superficial parotidectomy with a cuff of normal parotid tissue for complete pathological clearance. This technique requires the identification of the facial nerve at the main trunk and dissection of the segment of the facial nerve deep to the lesion. The reported major complications of this procedure include temporary or permanent facial nerve weakness, Frey's syndrome and salivary leaks. In order to avoid these complications, a local extracapsular dissection technique can be utilised in the management of small inferiorly located benign lesions of the parotid gland.
Methods A retrospective case note review was performed for all parotidectomies between 2004 and 2009 in Addenbrooke's Hospital, Cambridge by the senior authors.
Results A total of 172 cases were identified out which 46 underwent an extracapsular dissection. The average size of these lesions was 1.9 cm (0.9–2.4 cm) with all universally located inferior or posterior to the angle of the mandible. The pathologies were 14 pleomorphic adenomas, 24 Warthin's tumours, 6 lymphangiomas and 2 simple cysts. There were no post-operative facial nerve weaknesses, Frey's syndrome or salivary leaks within the extracapsular dissection group. The median follow-up of these patients were 4.6 years (2–6 years) with 6 patients lost to follow-up. No recurrences have been noted in the cohort at follow-up.

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Keywords Parotidectomy · Pleomorphic adenoa · Warthins · Extracapsular dissection · Facial nerve

Introduction

The management of benign superficial parotid lesions has evolved over time from simple enucleation to a total parotidectomy with facial nerve preservation to what would currently be practiced in the majority of centres in the form an appropriate superficial parotidectomy with facial nerve dissection [1–3]. The evolution of this practice had centred around the avoidance of recurrence following enucleation to avoiding the complications of a complete and in many cases unnecessary total facial nerve dissection of all its arborisations. The decision to excise these parotid lesions are often made on multiple factors including obtaining a definitive histological diagnosis, suspicion of malignancy, growth of the lesion or associated discomfort as well as patient preference for removal.

It has been recognised that the majority of benign parotid lesions are located in the inferior part of the gland [4]. Some are located exclusively within the tail of the gland. The pathologies of these lesions vary but are most commonly cystadenoma lymphomatosum (Warthin's tumours) or pleomorphic adenomas. The marginal mandibular branch of the facial nerve has a variable course from the inferior bifurcation of the main trunk of the facial nerve to the mimetic muscles of the lower lip. It is this branch that has to be dissected from its origin to beyond the tumour if a formal nerve identification approach is utilised in the removal of the mass within the parotid tail. The length to diameter ratio of the marginal mandibular nerve and its long course have attributed to the high reported rate of temporary and sometimes permanent nerve palsy with

Table 1 Pathology of parotid lesions excised by extracapsular dissection ($n = 46$)

	Final Pathology	Pre-operative needle biopsy correct	Non-diagnostic needle biopsy	Needle biopsy prediction of malignancy
Warthin's tumours	24	18	6	0
Pleomorphic adenoma	14	13	1	0
Lymphangioma	6	4	2	0
Simple cysts	2	0	2	0

dissection related injury [5]. Although a large percentage of these recover, the short-term and unfortunately some long-term palsies can have profound impacts on a patient's quality of life especially in the setting of an apparent small and innocuous lesion [6, 7].

The extracapsular dissection technique was first popularised by Hancock who demonstrated this to be a safe and effective method of removal of selected parotid lesions with no significant recurrence rates and a complete avoidance of nerve palsy and Frey's syndrome associated with a formal nerve dissection [8, 9]. We utilised a similar approach in the management of small, mobile and pathologically benign lesions of the inferior part of the parotid gland.

Methods

A retrospective review of case notes was performed of all parotidectomies performed by the senior authors between 2004 and 2009. All patients with malignant pathologies were excluded for analysis as we did not utilise the extracapsular technique for malignant lesions. A pre-operative ultrasound was obtained for all lesions to confirm anatomical location. Patients included for analysis in this series all had pre-operative needle biopsies.

All parotidectomies were performed with facial nerve monitoring. In the removal of lesions larger than 3 cm and all lesions located above the mandibular ramus, the facial nerve was identified at the main trunk utilising well published landmarks. In the selected patients with benign mobile lesions <3 cm located inferior or posterior to the mandible, an extracapsular dissection technique was used.

Results

A total of 172 cases were identified of which 46 cases were performed utilising extracapsular dissection. These lesions were present in 31 males and 15 female patients with a median age of 72 (range 51–87). The average diameter, measured by pre-operative ultrasonography, of the lesions removed by extra-capsular dissection was 2.3 cm (range 0.9–2.8 cm). All the lesions were noted pre-operatively to be freely mobile over the sternomastoid. A pre-operative ultrasound and biopsy was performed in all lesions. The pathologies of the lesions removed together with their pre-operative biopsies are outlined in Table 1. The ability of a needle biopsy to positively predict the absence of malignancy was 100% in the series. It also demonstrates that needle biopsies are generally more accurate in solid tumours such as pleomorphic adenomas compared to cystic lesion where it is more difficult to obtain a sufficient sample of the epithelial wall. The median follow up duration was 4.6 years (range 2–6 years) and 6 patients were lost to follow-up. The technique had no post-operative complications.

Discussion

In the latter half of the twentieth century, the minimum recommended approach to parotid neoplasia changed. Patey and Thackray reported in the British Journal of Surgery that the standardisation of parotidectomy techniques had revolutionised surgery of the parotid glands [10]. The recommendation that the standard operation for parotid tumours lateral to the facial nerve should be superficial conservative parotidectomy. These authors were of the opinion that the most important factors responsible for the recurrence of primary mixed tumours were incomplete excision and implantation. The technique of enucleation or subtotal removal was cautioned against as recurrence was observed in 23–31% of patients treated in this way [3]. They rejected multiplicity of tumour foci as a significant factor.

The justification for superficial parotidectomy with facial nerve dissection was the prevailing surgical concept that the best means of protecting the nerve was complete dissection and exposure of the nerve.

Our results demonstrate that local capsular dissection of inferiorly located benign parotid lesions is safe and avoids many of the complications of facial nerve dissection [11–13]. It is imperative to emphasise that the capsular dissection technique is different to the enucleation of parotid lesions which involves a "shelling out" of the lesion.

Local extracapsular dissection performed with a slow and precise bloodless technique with the aid of facial nerve neuromonitoring allows these aforementioned lesions to be removed with a cuff of normal parotid tissue without capsular breach [14].

It is also important for us to emphasise the different approach taken for pleomorphic adenomas and Warthin's tumours. During the excision of a pleomorphic adenoma which had a location and size suitable for an extracapsular technique, we ensured that a cuff of normal tissue was excised with the tumour. Often the facial nerve was identified deep to the mass. In the excision of Warthin's tumours, we did not attempt to take a cuff of tissue with the mass.

It is thus vitally important at this juncture to re-emphasise the importance of a pre-operative biopsy. We did not utilise this technique for any malignant lesion excision as it is in our opinion oncologically unsound due to inability to remove a sufficiently large cuff of normal parotid tissue to ensure adequate margin and the inability to remove multifocal tumours. Our pathological ability to predict this absence of malignancy was 100% in our series and hence there were no conversions from an extracapsular technique to a formal parotidectomy.

McGurk et al. one of the original proponents of the extracapsular dissection technique, reported a series of 380 patients treated with extracapsular dissection compared to standard superficial parotidectomies in 95 patients. Recurrence was observed in 2% of each group with median follow up of 12.5 years [14]. They emphasised once again that extracapsular dissection did not equate to enucleation. It requires careful dissection of the tumour outside the capsule, and does not require prior identification of the facial nerve with reported cure rates similar to those for superficial parotidectomy. The incidence of injury to the facial nerve was similar to or less than that observed following superficial parotidectomy. The incidence of cosmetic defects and subsequent Frey's syndrome were remarkably improved. In particular, postoperative Frey's syndrome was recorded in 38% of patients following superficial parotidectomies and in 5% following extracapsular dissection.

Frey's syndrome occurs due to the aberrant regeneration of autonomic nerve fibres destined for the parotid gland to the subcutaneous sweat glands. During a formal superficial parotidectomy, the raw surface of the deep gland and the facial nerve is exposed to the subcutaneous layer and hence the direct contiguity of the autonomic nerve allows this aberrant regeneration to occur. When an extracapsular technique is utilised such a large raw surface exposure does not occur and this is our postulated explanation for the significant lower rate of Frey's syndrome in both our and other reported studies. In addition to this, we routinely suture the parotid capsule at the end of the resection to "fill in" the defect created by the resection. This, in our opinion, exposes an even smaller surface for aberrant regeneration, a factor which reflects in the absence of Frey's in our treatment group.

Multiple studies have now demonstrated that the facial nerve can be weak post-operatively despite anatomical and neurophysiological confirmation of its integrity due to factors including traction, devascularisation or the conduction block due to diathermy current during flap elevation [15, 16]. The gross anatomical preservation of the nerve can still result in weakness as seen by a report which demonstrates that up to 23% of patients have a lower number of functional motor units in the orbicularis oris despite clear preservation [17]. In the clinical scenario of a small and apparently innocuous lesion, the quality of life implications of such a weakness can be significant given the unpredictability of a temporal course of recovery. Hancock and Witt in separate studies utilising the same extracapsular dissection further corroborate these findings but also emphasise that the crucial issue is one of surgical experience rather than technique per se that correlates with recurrence rates and complications [8, 18]. We would caution against the "occasional" parotid surgeon from embarking on this technique as one would have to be flexible in converting to a technique of formal facial nerve identification should difficulties be encountered. It should also be emphasised that parotid surgery no matter which technique is utilised be performed with adequate neuromonitoring to reduce the incidence of facial nerve paresis [19].

The move away from total superficial parotidectomy towards a more "appropriate parotidectomy" have been

Table 2 Method of removal, lesion characteristics and complications ($n = 46$)

	Extracapsular dissection
Number	46
Mean size (diameter in cm)	2.3 (0.9–2.8)
Location	
Superior division identified	0
Inferior division identified	0
Above mandible ramus	0
Below mandibular ramus	46
Rupture of capsule	0
Transient facial nerve weakness (<6 months)	0
Permanent facial nerve weakness	0
Frey's syndrome	0
Salivary leaks	0
Recurrence	0

published with groups arguing that complete superficial parotidectomy is unnecessary for treatment of benign, localised parotid tumours [20, 21]. A limited superficial parotidectomy in the management of benign parotid tumours has similarly published efficacious results with very low morbidity and recurrence rates.

We argue that this concept of an "appropriate parotidectomy" could be thus extrapolated one step further for lesions <3 cm located in the tail of the gland or certainly below the angle of the mandible. The overall aim of parotid surgery in these lesions would be to remove the lesion adequately, minimise complications of surgery and avoid long term recurrence. Our results validate that all these aims can be achieved via a local extracapsular dissection technique. The follow-up data of 4.6 years would confirm that at least to a medium term the recurrence rates are comparable between both techniques with avoidance of facial nerve injury and Frey's syndrome (Table 2).

Conclusion

The extracapsular technique of parotid surgery can be applied safely to benign parotid lesions located in the inferior portion of the gland with similar efficacy and lower complication rates.

Conflict of interest None.

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