

Main Article

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Corresponding author:

Federico Valsecchi;

Email: dr.federicovalsecchi@gmail.com

The extracapsular dissection technique in the management of benign tumours of the parotid gland: our experience in 194 patients

Fabiana Allevi¹, Patrizia Borzi¹, Federico Valsecchi¹ , Marco Cucurullo¹, Federico Bolognesi¹, Dimitri Rabbiosi² and Federico Biglioli¹

¹Maxillofacial Surgery Department, San Paolo Hospital, University of Milan, Milan, Italy and ²Maxillofacial Surgery Unit, Ospedale di Circolo e Fondazione Macchi, University of Insubria, Varese, Italy

Abstract

Objective. The indications for and approaches to extracapsular dissection for parotid gland benign tumours are debated in the literature. This study retrospectively evaluates a single site's short- and long-term results with a standardised extracapsular dissection approach to benign parotid tumours.

Methods. A retrospective review of a single institution's records identified cases with extracapsular dissection as the primary surgery for non-recurrent benign parotid tumours. A total of 194 eligible patients were identified (124 women and 70 men, age 47.75 ± 15.62 years). Pre-, intra- and post-surgical data were reviewed for complications and recurrences.

Results. Histology reported pleomorphic adenoma in 165 patients, Warthin's tumour in 28 patients and both in one patient. Mean follow up was 36 ± 16 months (range, 12–84 months). The incidences of complications following extracapsular dissection were temporary ($n = 13$) and permanent ($n = 0$) facial nerve dysfunction, Frey's syndrome ($n = 1$) and recurrences ($n = 5$). These rates align with prior literature.

Conclusion. This case series shows how a standardised approach to extracapsular dissection for benign parotid tumours yields favourable results, supporting a progressive change of strategy towards reduced invasiveness.

Introduction

Parotid gland tumours constitute 3–4 per cent of all head and neck tumours and 80–85 per cent of all salivary gland tumours. Approximately three-quarters of them are benign. The most common type is pleomorphic adenoma, followed by Warthin's tumour.¹

Parotid surgery is challenging: the number of relevant structures encountered in the parotid region is remarkable (facial, auriculotemporal and great auricular nerve, external carotid artery, Stensen's duct). The complications of parotid surgery are mainly related to these structures. The most common complications are facial palsy and recurrence.² Immediate complications include facial nerve dysfunction, anaesthesia or hypoesthesia of the earlobe, bleeding, seroma, sialocele, fistulae, infection, skin flap necrosis and deformity. Late post-operative complications may include persistent or permanent facial nerve dysfunction, Frey's syndrome, persistent or permanent anaesthesia or hypoesthesia of the earlobe, tumour recurrence, soft tissue deficit and pathological scars.² Intra-operative opening of the pseudocapsule of pleomorphic adenomas has traditionally been held to increase the risk of recurrence.³

Facial nerve dysfunction is considered 'temporary' when complete spontaneous resolution occurs within 4 weeks and 'persistent' when complete spontaneous resolution occurs but takes a longer time after the onset of the facial nerve dysfunction itself (more than 4 weeks, with major improvement within the first 8 months and complete resolution within 24 months). The nerve dysfunction is considered 'permanent' when complete spontaneous resolution does not occur by 24 months and facial palsy/paralysis needs therapy to restore facial symmetry and movement.

Early work found a high rate of recurrences because of enucleation.^{4,5} Partial parotidectomy reduced tumour recurrence to as low as 2 per cent and became the gold-standard technique by the mid-20th century.⁶ However, the potential drawbacks of that technique include facial nerve dysfunction, Frey's syndrome and aesthetic deficit.

In 2003, McGurk *et al.* described extracapsular dissection as an alternative to superficial parotidectomy that reduced morbidity without oncological compromise.⁷ Extracapsular dissection involves the meticulous dissection of the tumour immediately outside the tumour capsule, preserving and not formally identifying and dissecting the facial nerve. In a meta-analysis, Albergetti *et al.* documented lower rates of temporary facial nerve injury and Frey's syndrome in extracapsular dissection compared to superficial parotidectomy.⁸ In 2017, Brennan *et al.* validated extracapsular dissection as a safe alternative to parotidectomy.⁹ In 2020, Bär *et al.* showed a lower incidence of temporary

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facial nerve injury and Frey's syndrome in extracapsular dissection compared to superficial parotidectomy, with the same incidence of permanent facial nerve injury compared to superficial parotidectomy.¹⁰ Martin *et al.* found reduced recurrence rate, reduced facial nerve injury and Frey's syndrome rates, and reduced operation time in extracapsular dissection compared to the other techniques.¹¹ In 2021, Schapher *et al.* documented the lowest complication rates in extracapsular dissection, with no higher risk of recurrence than parotidectomy.¹²

This study describes observations and outcomes for 194 patients who underwent extracapsular dissection surgery between 2014 and 2020.

Materials and methods

Patients

This retrospective study examined 194 patient records from the Department of Maxillofacial Surgery of San Paolo Hospital, Milan, Italy. All patients underwent extracapsular dissection to treat benign parotid gland tumours between 2014 and 2020.

Only patients on their first parotid surgery with a definitive histopathological diagnosis of pleomorphic adenoma and/or Warthin's tumour were included. The minimum follow up was one year. Exclusion criteria included techniques different from extracapsular dissection, a definitive histopathological diagnosis other than pleomorphic adenoma or Warthin's tumour, the surgery was performed for a relapse of previous parotid tumour surgical removal or follow up shorter than one year.

All participants signed an informed consent agreement for medical research before treatment. Video-photographic material was recorded in all patients with prior written patient consent.

Surgical technique

Before surgery, all patients underwent a clinical examination and diagnostic workup. The workup included an ultrasound scan, magnetic resonance imaging (MRI) with contrast and fine needle aspiration cytology (FNAC) under ultrasound guidance. All patients had an indication to proceed with surgical treatment for the suspicion of benign parotid tumours. Badger *et al.* noted that despite the support for extracapsular dissection in superficial lobe parotid tumours, there were no objective criteria for case selection. They found that a minimum fascia-tumour distance of less than 3 mm was sensitive, specific and accurate in predicting successful extracapsular dissection.¹³ Furthermore, a staging system that could facilitate clinical decision-making and the comparison of results in the surgical treatment of benign parotid tumours was proposed by Quer *et al.* in 2017,¹⁴ therefore, in this study, patients were retrospectively selected if they were found to be operated by extracapsular dissection technique in our centre and if in possession of all pre-operative documentation such as ultrasound, FNAC, MRI.

Expert surgeons of the maxillofacial surgery department performed all surgical treatments. Antibiotic prophylaxis with amoxicillin-clavulanate (2 g) was administered 1 hour before surgery. Extracapsular dissection was performed under general anaesthesia. Patients were placed supine with their heads turned away from the affected side. Neither curare

nor local anaesthetics were used, which allowed surgeons to check facial nerve function.

The eye on the affected side was lubricated and closed. Incisions were marked with a sterile pen. Epinephrine was injected locally to reduce intra-operative bleeding. The face was covered with a transparent dressing to allow the affected side's eye, nose and mouth to be fully visualised for movement monitoring without risk of contamination. Magnification and facial nerve monitoring were used in some cases.

An endaural skin incision was performed.¹⁵ The incision continued posteriorly for a variable distance in the temporal, retroauricular and sometimes cervical regions. The dissection proceeded in the plane immediately above the superficial musculo-aponeurotic system layer (Figure 1). The skin flap was raised, the circumference of the tumour was marked with ink and a cruciate incision was marked over the surface. The legs of the cruciate incision extended 1 cm beyond the edge of the tumour. A blunt dissection was performed through the parotid gland using bipolar forceps. The direction of the dissection was parallel to the facial nerve fibres so that if a branch of the facial nerve is encountered, it would not be transected. The blunt dissection proceeded around the periphery of the tumour to allow any branch of the facial nerve to be discerned clinically or through the continual nerve monitor. No parotid parenchyma was diathermised or cut unless the surgeon could see through the tissues. These precautions reduced the risk of facial nerve damage (Figure 2).

Four artery clips were applied to the parotid fascia at the centre of the cruciate incision to retract the parotid fascia and draw the underlying parotid tissue away from the tumour. This tension allowed tissue planes to appear, which helped direct the line of dissection. The tension can also reduce rates of capsule rupture and tumour spillage. Next, the tumour was gradually separated from the underlying parenchyma.¹⁶ The superficial musculo-aponeurotic system layer was sutured to prevent Frey's syndrome (Figure 3). A suction drain was placed over the parotid fascia. Finally, the skin incision was closed with a multilayer suture.

Post-operative outcomes

Three to four days after surgery, the patients were discharged. In the absence of post-operative complications, the standard follow up included an ultrasound scan and clinical evaluation



Figure 1. Surgical dissection proceeding in the plane immediately above the parotid fascia (superficial musculo-aponeurotic system) layer. The superficial musculo-aponeurotic system is exposed and then dissected.

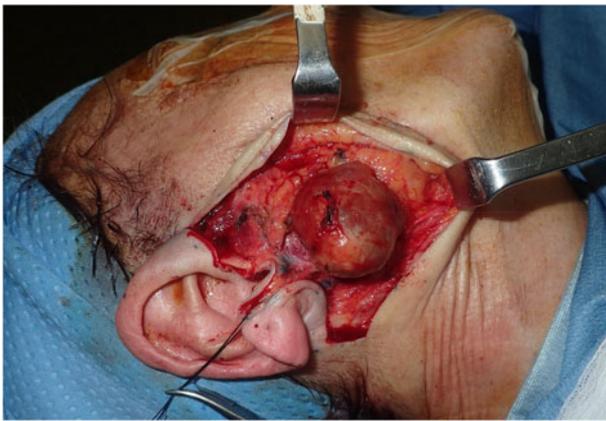


Figure 2. Extracapsular dissection of a benign tumour of the parotid gland: the tumour is identified and separated from the glandular parenchyma.

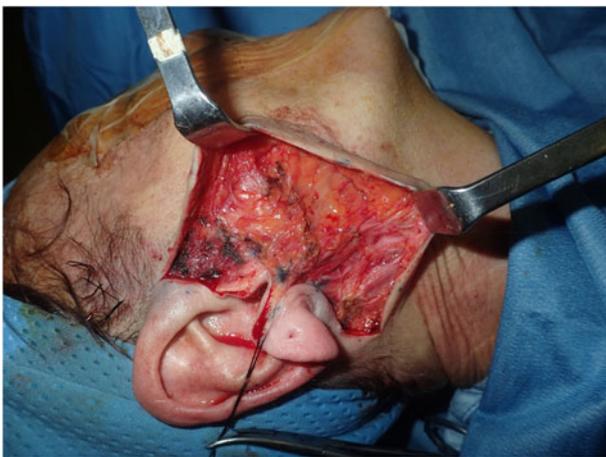


Figure 3. Suture of the superficial musculo-aponeurotic system performed at the end of the tumour removal.

every six months for the first year after surgery, then once a year for the following four years.

Follow-up data were gathered from the hospital management software for those patients who came to our centre for follow-up visits or ultrasound imaging. There were clinical and radiological post-operative evaluations of 172 patients. For patients referred to other centres or who could not be found in our system, follow up included telephone contact that followed a precise and ordered set of questions that required valid answers. These 22 patients reported no clinical signs of relapse on self-examination of the parotid area or on evaluation by their general practitioner.

Results

There were 124 women (63.92 per cent) and 70 men (36.08 per cent) in this study. Pleomorphic adenoma was found in 165 patients (85.05 per cent), Warthin's tumour in 28 patients (14.43 per cent) and both in 1 patient (0.52 per cent). The mean follow up was 36 months (range, 12–84 months).

We observed no intra-operative complications. In the first 4 weeks after surgery, 6 patients developed haematoma (3.09 per cent), 3 developed seroma (1.55 per cent), 1 developed infection of the surgical field (0.52 per cent) and 1 developed cutaneous fistula (0.52 per cent). There were 31 patients with temporary anaesthesia or hypoesthesia (15.98 per cent) of the earlobe, the ipsilateral hemiface or the mandibular region.

Table 1. Rate of complications among patients involved in the study

Complications	Number of patients	Rate (%)
Intra-operative	0	0.00
Early post-operative (within 4 weeks)		
– Haematoma	6	3.09
– Seroma	3	1.55
– Infection	1	0.52
– Fistula	1	0.52
– Temporary facial nerve injury (complete spontaneous recovery within 4 weeks)	13	6.70
– Temporary anaesthesia/paraesthesia	31	15.98
Late post-operative (4 weeks after surgery)		
– Persistent facial nerve injury (complete long-term recovery within 24 months)	2	1.03
– Permanent facial nerve injury (partial or no long-term recovery)	0	0.00
– Persistent anaesthesia/paraesthesia	17	8.76
– Frey's syndrome	1	0.52
– Recurrence	5	2.58

Of these, 17 patients experienced persistent anaesthesia or hypoesthesia (8.76 per cent) of the great auricular nerve areas that lasted more than 4 weeks, and completely and spontaneously healed within 1 year.

There were 13 patients with temporary facial nerve dysfunction (6.70 per cent), which recovered spontaneously in less than 4 weeks in 11 cases; in 2 cases (1.03 per cent), the facial nerve dysfunction persisted for more than 4 weeks. Of these 2 cases, 1 facial paresis resolved shortly within 1 year after surgery; the other patient had complete paralysis that required further evaluations at our clinic during 20 months after surgery, then spontaneous recovery of facial function, with excellent restoration of facial movements. This patient experienced an aberrant regeneration of facial nerve fibres; this regeneration led to synkinesis and hypertonus of the middle third of the face, which was treated with botulinum toxin and physical therapy starting from 12 months after surgery until 20 months after surgery, with excellent improvement of synkinesis and muscular hypertonus (Table 1). These cases were considered persistent facial nerve dysfunction because late facial (within 24 months) nerve function restoration was obtained.

Other complications included hypersensitivity around the scar (2.58 per cent), keloid formation (0.52 per cent) and tinnitus (0.52 per cent).

In five patients, a recurrence occurred (2.58 per cent). In three cases, the tumour was a pleomorphic adenoma; in two cases, it was a Warthin's tumour. The mean time lapsed from surgery to tumour recurrence was 29.42 months (range, 7.07–62.70 months).

Discussion

The clinical benefits of extracapsular dissection over superficial parotidectomy for benign parotid neoplasms continue to be debated. In the past few decades, several studies have contributed data supporting extracapsular dissection as an alternative to superficial parotidectomy. Our findings were also promising.

Among patients enrolled in the present study, 85.05 per cent presented with pleomorphic adenoma, 14.43 per cent presented with Warthin's tumour and 0.52 per cent presented with both pleomorphic adenoma and Warthin's tumour. The incidence of salivary gland tumours varies greatly from study to study, with substantial differences in the incidence and type of salivary gland tumours according to geographical area. Our data are consistent with inter-study epidemiological data variability, confirming its validity and contributing to the knowledge on the epidemiology of benign parotid tumours.

A primary outcome of this investigation was complications. Case selection and data collection differences prevent a reliable, homogeneous comparison of complication rates among studies. Limitations that can affect the validity of such comparisons include selection, performance, detection, attrition and reporting biases.¹⁷ However, the available data provide useful context for our findings. Mantsopoulos *et al.* examined the existing arguments against extracapsular dissection and presented their 16-year experience. Their analysis could not justify the arguments against correctly indicated extracapsular dissection and showed that increased performance of this modality is associated with excellent oncologic and functional outcomes.¹⁸ Both temporary and permanent facial nerve dysfunction rates are lower in extracapsular dissection than in superficial parotidectomy.^{19–25} The present study was consistent, showing a rate of temporary (6.70 per cent) and permanent (0 per cent) facial nerve dysfunction consistent with literature outcomes. Furthermore, the mean recurrence rate of 2.58 per cent in this study is consistent with the rate proposed in the literature.

- Benign parotid tumour surgical techniques are a challenge
- Parotid gland tumours constitute 3–4 per cent of all head and neck tumours
- Classical surgical approaches to parotid tumours have high rates of complications
- Extracapsular dissection represents a valid alternative to classical approaches, with a low rate of recurrence and complications, and high efficiency outcomes

One argument against extracapsular dissection is the possibility that a parotidectomy may become necessary. For this reason, one of most the important factors to consider in extracapsular dissection is the surgeon's experience. All surgeons performing extracapsular dissection must be experienced and capable of performing multiple variations of the parotid operation.¹⁹ The possibility of this occurring is low, however. As large tumours tend to alter parotid space anatomy significantly, extracapsular dissection poses the same technical challenges as a superficial parotidectomy. Therefore, the possibility that the resection of the mass may include a few parotid remnants (thus requiring a move from an extracapsular dissection to a parotidectomy) remains more of a theoretical matter than a practical one.²⁶

Given the high specificity of fine needle aspiration for diagnosing malignancy, the risk of unexpected malignancy is extremely low. In these few cases, extracapsular dissection's conservative approach does not hinder performing a radicalisation should the final histology require it (e.g. for high-grade tumours).²⁷ There are few reports in the literature using extracapsular dissection to treat benign neoplasms localised in the deep lobe of the parotid gland.²⁸ This investigation found no cases of extracapsular dissection that needed to be switched to complete resection, which is consistent with the literature.

Conclusion

Superficial parotidectomy is still widely used to treat benign parotid tumours. An opinion against extracapsular dissection was expressed by the 2020 guidelines of the French Society of Otorhinolaryngology – Head and Neck Surgery, which recommend the complete resection of the parotid pleomorphic adenomas and not extracapsular dissection.²⁹ Our findings support the mounting evidence that extracapsular dissection is a valid alternative to superficial parotidectomy, with reduced complication and recurrence rates, and a favourable risk-over-benefit ratio. With the present study, a strategy change towards reduced invasiveness in parotid surgery for benign tumours was possible and had encouraging functional and aesthetic results. Avoidance of facial nerve dissection with the extracapsular dissection technique is feasible, safer and faster than with superficial parotidectomy.

Competing interests. None declared

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