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# Postoperative complications after removal of pleomorphic adenoma from the parotid gland: A long-term follow up of 297 patients from 2002 to 2016 and a review of publications

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## Abstract

Pleomorphic adenomas are rounded, lumpy, capsulated lesions that are more common in women. They are typically benign, but can be associated with malignancy in a minority of cases (such as carcinoma ex pleomorphic adenoma), between 3% - 12% of the time, according to available data. The purpose of our study was to evaluate clinical outcomes in patients with benign parotid gland tumours after extracapsular dissection (ECD) or superficial parotidectomy (SP). We made a retrospective study of 297 patients who had had benign tumours of the parotid gland, and had been referred to our department from 2002 – 2016 to have either procedure. We measured the statistical differences between the two techniques (evaluated recurrence rate and complications) with the chi squared test. The chosen level of statistical significance was  $p < 0.05$ . Median (range) follow-up time was 43 months (25–168) months. Haematoma and hypoesthesia were significantly more common after SP than after ECD (8.9% compared with 7.7%, and 16.8% compared with 5.6%, respectively). Transient facial nerve injury, Frey syndrome, and facial paralysis were significantly more common after SP than after ECD (23.6% compared with 1.5%, 6.7% compared with 1% and 6.7% compared with 0%, respectively). ECD had the advantage of reduced operating time, lower morbidity and lower recurrence rate, and could be considered the treatment of choice for pleomorphic adenoma of the parotid gland up to (3 cm) which are mobile and sited in the superficial lobe of the parotid gland.

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**Keywords:** pleomorphic adenoma; extracapsular dissection; superficial parotidectomy

## Introduction

Tumours of the salivary glands are not common, and generally comprise 2% - 4% of neoplasms in the head and neck.<sup>1</sup> Three-quarters of them are benign, and most originate in the parotid gland (70%). Among them, pleomorphic adenoma is by far the most common benign epithelial lesion (81%),

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50% -70% are salivary tumours, and cystoadenolymphoma or Warthin tumour account for about 25%.<sup>2</sup>

Pleomorphic adenomas, also known as “benign mixed tumours”, are rounded, lumpy, capsulated lesions that are more common in women, and most are found in adulthood. They are typically benign, but can be associated with malignancy in a minority of cases (such as carcinoma ex-pleomorphic adenoma), between 3% - 12% of the time, according to available data.<sup>2</sup>

Surgical treatments for benign parotid gland neoplasms began with enucleation in the late 1800s, but during the late 1900s, technical procedures were changed to remove the mass with a portion of surrounding normal parotid gland tissue, to avoid recurrence, but in doing so created an increase in complications.<sup>3</sup> Parotid gland surgery remains challenging, because there is no consensus on treatment, but the two most common techniques are extracapsular dissection (ECD), and superficial parotidectomy (SP).<sup>1,4</sup> Although the numbers for recurrence after these techniques are acceptable,<sup>5</sup> dissection of the facial nerve and its branches for removal of parts of the gland can lead to complications postoperatively that are not acceptable for the treatment of a benign lesion. Typical complications of parotid gland surgery include: defective wound healing; wound infections; dehiscence; hypertrophic scars; seromas; haematomas; sialocoeles; salivary fistulas; anaesthesia and paraesthesia around dermal incisions or the area supplied by the great auricular nerve; temporary and permanent facial paresis; Frey syndrome; and gustatory sweating.<sup>6</sup>

The aim of our study was to compare the results of ECD and SP, to reduce complications and recurrence. We analysed our data in terms of the success of treatment, amount of complications, and recurrence, on a large series of patients (297), with long-term follow up.

## Methods

We carried out a retrospective study of all patients who had had benign tumours of the parotid gland, and had been referred to our department from 2002 - 2016. We collected general information (age, sex, coexisting conditions), as well as specific clinical data. Bimanual palpation of the glands and neck were done to obtain a characterisation of the localisation, dimension, mobility, and tension related to the effect of the mass. Clinical assessment of facial nerve function was made preoperatively according to House and Brackmann criteria.<sup>6</sup> Ultrasound scan (US), computed tomography (CT) or magnetic resonance imaging (MRI), or both, and fine-needle cytology were carried out in all patients preoperatively.

Exclusion criteria were: diagnosis of a malignant lesion or other benign lesion different from pleomorphic adenoma, either before or after operation; any grade of facial nerve dysfunction preoperatively; patients who had been lost at regular follow up and; those who were being treated for relapse.

According to the categories developed by Quer et al,<sup>7</sup> we used ECD for all cases of a single, mobile, lesion of 3 cm or less in diameter (Quer's Category I) that were located superficially within the lateral lobe of the parotid gland, that had been diagnosed as benign preoperatively.

We used parotidectomy for tumours with a diameter of 3 cm or less that were sited deep in the parotid lobe (Quer's Category II), or those that were larger than 3 cm in diameter (Quer's Category III-IV).

All patients had regular follow up, and complications were documented immediately postoperatively, during their stay in hospital, and at each subsequent follow-up visit.

This study was approved as an “exempt study” by the Institutional Review Board at the University Federico II of Naples. This investigation observed the Declaration of Helsinki on medical protocol and ethics.

## Operative technique

### *Extracapsular dissection*

We considered ECD to be the selective resection of a tumour with safe margins. In particular, the surgeon made a skin incision that converted to a modified Blair incision, which is a modification of the facelift technique. It is done to reduce the aesthetic impact of the surgical scar, and allows careful dissection of the tumour, and respects and preserves the capsule, with no identification of the facial nerve. In this technique only the area of the gland that involves the tumour is removed with a margin of 1.5 cm.

### *Superficial parotidectomy*

SP is the removal of the superficial parotid lobe with complete nerve dissection. The skin incision starts with a modified Blair technique from the preauricular region and extends up to the internal margin of the tragus, reaches the ear lobe, and then goes on posteriorly for 2-3 cm on the mastoid. The superficial muscular aponeurotic system is raised, and the greater auricular nerve is identified and preserved. The common trunk of the facial nerve, after its identification, is dissected, isolated, and controlled by means of faradic stimulation. After the removal of the tumour, haemostasis is confirmed, the fascial planes are stitched, and the skin is closed with non-resorbable sutures.

## Statistical analysis

Statistical calculations were done with the aid of SPSS (version 17.0). The statistical differences between the two techniques relating to evaluated recurrence rate and complications were measured with the chi squared test. Probabilities of less than 0.05 were accepted as significant.

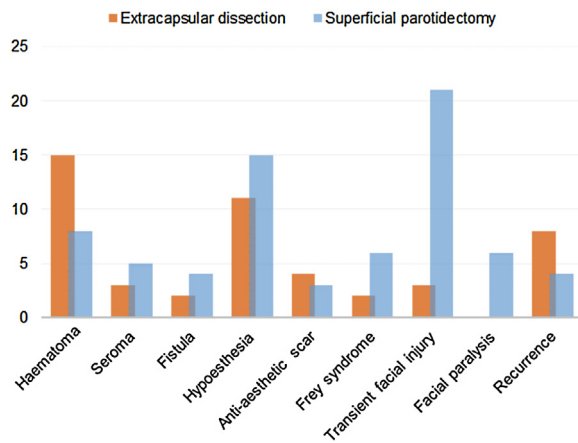


Fig. 1. Postoperative complications after extracapsular dissections and superficial parotidectomies.

## Results

From 2002 to 2016, the diagnosis of pleomorphic adenoma was given in 297/441 patients who had had benign parotid tumour surgery (67%).

Among these, 14 patients were excluded from this study because of irregular follow up or because they had evidence of facial nerve palsy even before operation. For this reason, we enrolled 283 patients (154 female and 129 male) aged between 26 and 79, mean (SD) age 52 (10.6) years.

Of these, we did extracapsular dissection in 194 patients, and superficial parotidectomy in 89. Median (range follow-up time was 43 (25–168) months. Postoperative complications are summarised in Fig. 1.

A chi squared test was also calculated between two groups (complications YES / complications NO) and the operations. A p value of <math><0.00001</math> was found with this test, which was significant ( $n = 283$ ;  $\chi^2(9) = 104.39$ ,  $p < 0.001$ ; likelihood ratio ( $\chi^2(9) = 108.11$ ,  $p < 0.001$ ).

Transient facial nerve injury, hypoaesthesia, Frey syndrome, and facial paralysis were significantly more common after superficial parotidectomy than after extracapsular dissection (23.6% compared with 1.5%, 16.8% compared with 5.6%, 6.7% compared with 1% and 6.7% compared with 0%, respectively) (Observation frequencies, Fig. 2 A-D and Table 1).

## Discussion

Pleomorphic adenoma is a slow growing, usually demarcated, and mobile tumour that occurs more commonly in older women. It constitutes about 40%–60% of benign salivary gland tumours sited in the superficial parotid gland lobe in about 80% of patients.<sup>2</sup>

The most relevant structural components of this kind of lesion are the capsule, parenchyma, and stroma. Many authors have described parenchyma-rich and stroma-rich

Table 1

Comparison of extracapsular dissections and superficial parotidectomy. Data are number (%).

Complication	Extracapsular dissection (n = 194)	Superficial parotidectomy (n = 89)	p value
Haematoma	15 (7.7)	8 (8.9)	0.719
Seroma	3 (1.5)	5 (5.6)	0.055
Fistula	2 (1)	4 (4.49)	0.060
Hypoaesthesia	11 (5.6)	15 (16.8)	0.002
Prominent scar	4 (2)	3 (3.3)	0.510
Frey syndrome	2 (1)	6 (6.7)	0.007
Transient facial injury	3 (1.5)	21 (23.6)	<0.001
Facial paralysis	0	6 (6.7)	<0.001
Recurrence	8 (4.1)	4 (4.49)	0.886

subtypes. The capsule is usually 0.015–1.75 mm thick, and is thicker in parenchyma-rich tumours than stroma-rich ones.<sup>2</sup>

The close association between the gland and the facial nerve, and the considerable prospect of recurrence, has shaped surgical techniques for parotid gland neoplasms over the years.<sup>8</sup>

Parotid surgery for pleomorphic adenoma has been developed considerably in the past century, passing from enucleation of the tumour to parotidectomy, which was associated with more complications.<sup>9,10</sup> Surgical experience and familiarity with the complex anatomy of the facial nerve and other adjacent vascular and neural structures are strictly required to avoid complications, particularly when the anatomy could have been altered by inflammation, lesions, previous operations or radiation treatments, or both. The choice of the most appropriate treatment in the excision of the parotid gland is essential, as is intraoperative identification and preservation of the pseudocapsule that surrounds the lesion.<sup>11</sup>

Generally, the choice of treatment is intended to avoid postoperative complications. Major advances in surgical techniques have shifted the focus from recurrence and facial nerve damage to the management of other outcomes, such as damage to the great auricular nerve and Frey syndrome.<sup>12</sup>

ECD is a technique that involves a total excision of a benign parotid tumour that is surrounded by healthy glandular tissue, with safe margins and complete nerve dissection. Previous publications have shown that limited ECD does not result in an increased incidence of recurrence.<sup>13</sup>

In 1993, Dallera et al showed their results after 71 patients with pleomorphic adenoma who had ECD with a recurrence rate of 5.4%.<sup>14</sup> In 1996, McGurk et al found no difference in recurrence between patients who had ECD and that recorded in those who had SP.<sup>15</sup> In their meta-analysis of 2014, Foresta et al emphasised that in patients with unilateral pleomorphic adenoma (of less 3 cm in diameter) ECD was a viable approach in consideration of successful outcomes and safety.<sup>13</sup> In 2015, Mantsopoulos et al proposed and focused attention on the possibility of a minimally-invasive approach for ECD, because of the considerable reduction in operating time.<sup>16</sup>

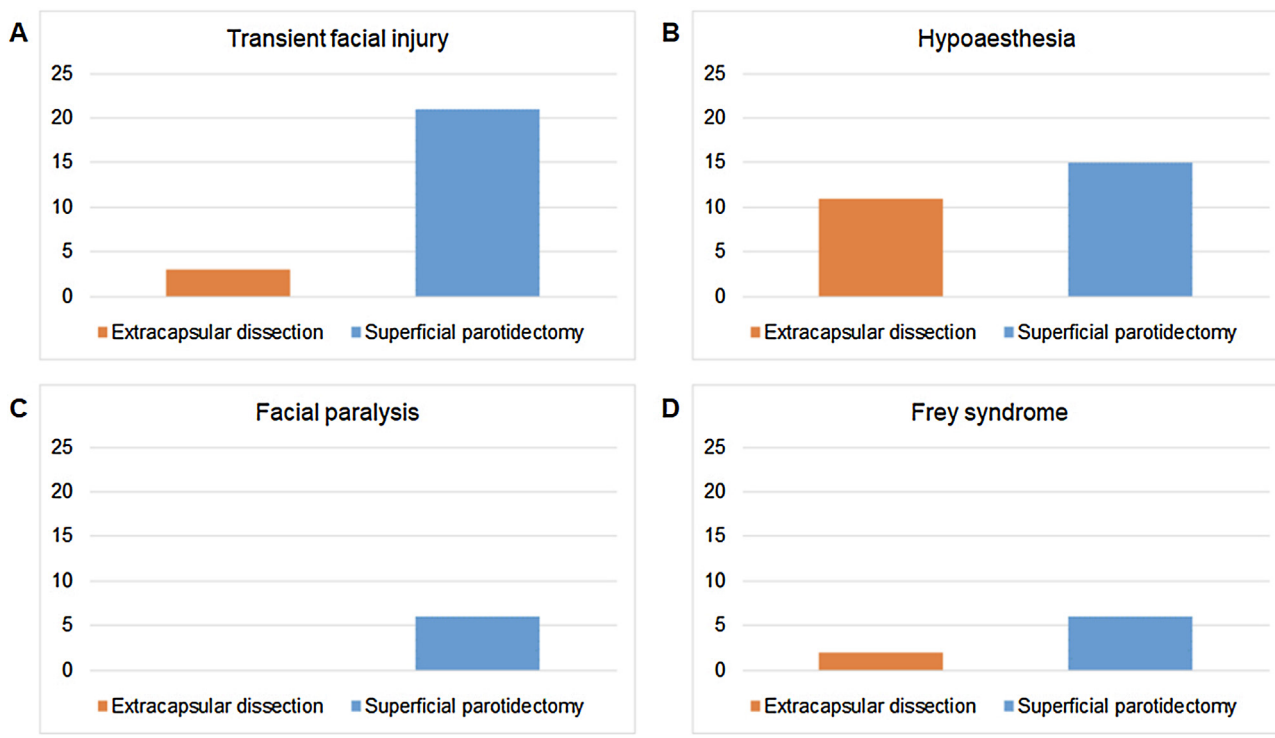


Fig. 2. Comparison between observation frequencies related to the following postoperative complications: (A) Transient facial nerve injury; (B) Hypoaesthesia; (C) Facial paralysis; (D) Frey syndrome.

Albergotti et al<sup>17</sup> showed that ECD has a similar recurrence rate as SP with few surgical complications. ECD was done in most cases of mobile tumours that were sited in the superficial lobe of the parotid, and with diameters of less than 3 cm, (2–2.5 cm).<sup>18</sup> McGurk<sup>15</sup> reported a reduction of incidence of Frey's syndrome from 32% in cases treated by SP, to 5% in ECD. Shehata et al<sup>19</sup> showed that ECD is associated with reduced operative time, low morbidity, and shorter hospital stay, confirming that this kind of technique seems to be safe in trained hands.

The aim of SP is to allow the removal of the benign parotid mass with adequate margins of safety parotid tissue around it. It was done in most cases that comprised larger, firmer, and more deeply-sited lesions. As reported by Patey and Thackray, complications such as Frey syndrome, haematoma, fistula, and injury to the greater auricular nerve are more commonly seen after parotidectomy than after extracapsular dissection.<sup>20</sup>

As prompted by Kadletz et al.,<sup>1</sup> regarding permanent facial palsy and recurrent disease, SP still remains the treatment of choice in terms of superior clinical outcome, even though it is more time-consuming than ECD.

From 2013 the use of endoscopic tools in maxillofacial surgery has been improved for the approach to lesions of the salivary glands.

As reported by Abbate et al<sup>21</sup> in a cadaveric study, the endoscopic approach can be an alternative to assess the accessory parotid gland.<sup>22</sup> It would be advisable to increase the

study of the endoscopic anatomy of the parotid area, to extend the surgical endoscopic indications. Chen showed his results of the aesthetic outcomes in 11 young patients who had endoscopically-assisted ECD of benign pleomorphic adenomas of the parotid gland through a postauricular sulcus approach. This technique seemed to be simple and feasible, and it achieved excellent aesthetic results.<sup>23</sup>

All the difficulties and limitations of a minimally-invasive operation may be considered, such as restricted space for manoeuvring that is associated with a limited field of visibility, the need for lengthy training, and a steep learning curve.

In conclusion, our large study enabled us to compare the advantages and weaknesses of both surgical approaches. Based on our data, we still recommend ECD as a viable alternative to SP in terms of successful outcome for tumours under 3 cm. It has confirmed the preliminary results reported in our previous study and those in a recent bibliography.<sup>23,24</sup>

Unfortunately, there are only few prospective studies on procedure-specific incidences of complications after benign parotid surgery. Predictive factors for postoperative facial dysfunction remain controversial. Ruohoalho has recently published an interesting prospective study about the complication rates and assessed risk factors of postoperative transient facial palsy. He showed that age and a long operation increase the risk.<sup>25</sup>

Nevertheless, we aim to keep our minds open to all possible innovations that will allow any new surgical approach,



not only to improve effectiveness, but also to increase the options for a minimally-invasive approach.

### Ethics statement/confirmation of patients' permission

This study was approved as an “exempt study” by the Institutional Review Board at the University Federico II of Naples. Patients' permission was not necessary.

### Conflict of interest

We have no conflicts of interest.

### References

- Kadletz L, Grasl S, Grasl MC, et al. Extracapsular dissection versus superficial parotidectomy in benign parotid gland tumors: the Vienna Medical School experience. *Head Neck* 2017;**39**:356–60.
- Guerra G, Testa D, Montagnani S, et al. Surgical management of pleomorphic adenoma of parotid gland in elderly patients: role of morphological features. *Int J Surg* 2014;**2**(Suppl. 2):S12–6.
- Donovan DT, Conley JJ. Capsular significance in parotid tumor surgery: reality and myths of lateral lobectomy. *Laryngoscope* 1984;**94**:324–9.
- Guntinas-Lichius O, Kick C, Klussmann JP, et al. Pleomorphic adenoma of the parotid gland: a 13-year experience of consequent management by lateral or total parotidectomy. *Eur Arch Otorhinolaryngol* 2004;**261**:143–6.
- Koch M, Zenk J, Iro H. Long-term results of morbidity after parotid gland surgery in benign disease. *Laryngoscope* 2010;**120**:724–30.
- House JW, Brackmann DE. Facial nerve grading system. *Otolaryngol Head Neck Surg* 1985;**93**:146–7.
- Quer M, Van der Poorten V, Takes RP, et al. Surgical options in benign parotid tumors: a proposal for classification. *Eur Arch Otorhinolaryngol* 2017;**274**:3825–36.
- Klintworth N, Zenk J, Koch M, et al. Postoperative complications after extracapsular dissection of benign parotid lesions with particular reference to facial nerve function. *Laryngoscope* 2010;**120**:484–90.
- Dell'AversanaOrabona G, Salzano G, Petrocelli M, et al. Reconstructive techniques of the parotid region. *J Craniofac Surg* 2014;**25**:998–1002.
- Zbären P, Stauffer E. Pleomorphic adenoma of the parotid gland: histopathologic analysis of the capsular characteristics of 218 tumors. *Head Neck* 2007;**29**:751–2.
- Carlson ER, McCoy JM. Margins for benign salivary gland neoplasms of the head and neck. *Oral Maxillofac Surg Clin North Am* 2017;**29**:325–40.
- Laccourreye H, Laccourreye O, Cauchois R, et al. Total conservative parotidectomy for primary benign pleomorphic adenoma of the parotid gland: a 25-year experience with 229 patients. *Laryngoscope* 1994;**104**:1487–94.
- Foresta E, Torroni A, Di Nardo F, et al. Pleomorphic adenoma and benign parotid tumors: extracapsular dissection vs superficial parotidectomy — review of literature and meta-analysis. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2014;**117**:663–76.
- Dallera P, Marchetti C, Campobassi A. Local capsular dissection of parotid pleomorphic adenomas. *Int J OralMaxillofacSurg* 1993;**22**:154–7.
- McGurk M, Renehan A, Gleave EN, et al. Clinical significance of the tumour capsule in the treatment of parotid pleomorphic adenomas. *Br J Surg* 1996;**83**:1747–9.
- Mantsopoulos K, Koch M, Klintworth N, et al. Evolution and changing trends in surgery for benign parotid tumors. *Laryngoscope* 2015;**125**:122–7.
- Albergotti WG, Nguyen SA, Zenk J, et al. Extracapsular dissection for benign parotid tumors: a meta-analysis. *Laryngoscope* 2012;**122**:1954–60.
- Zhang SS, Ma DQ, Guo CB, et al. Conservation of salivary secretion and facial nerve function in partial superficial parotidectomy. *Int J Oral Maxillofac Surg* 2013;**42**:868–73.
- Shehata EA. Extra-capsular dissection for benign parotid tumours. *Int J Oral Maxillofac Surg* 2010;**39**:140–4.
- Patey DH, Thackray AC. The treatment of parotid tumours in the light of a pathological study of parotidectomy material. *Br J Surg* 1958;**45**:477–87.
- Dell'AversanaOrabona G, Romano A, Bonavolontà P, et al. Tumor model for surgical simulation to assess a minimally invasive endoscopic approach for midcheek mass removal. *Surg Oncol* 2017;**26**:286–9.
- Chen WL, Fan S, Zhang DM. Endoscopically assisted extracapsular dissection of pleomorphic adenoma of the parotid gland through a postauricular sulcus approach in young patients. *Br J Oral Maxillofac Surg* 2017;**55**:400–3.
- Dell'AversanaOrabona G, Bonavolontà P, Iaconetta G, et al. Surgical management of benign tumors of the parotid gland: extracapsular dissection versus superficial parotidectomy our experience in 232 cases. *J Oral Maxillofac Surg* 2013;**71**:410–3.
- Eren SB, Dogan R, Ozturan O, et al. How deleterious is facial nerve dissection for the facial nerve in parotid surgery: an electrophysiological evaluation. *J Craniofac Surg* 2017;**28**:56–60.
- Ruohoalho J, Mäkitie AA, Aro K, et al. Complications after surgery for benign parotid gland neoplasms: a prospective cohort study. *Head Neck* 2017;**39**:170–6.