International Journal of Medical and Health Research
ISSN: 2454-9142, Impact Factor: RJIF 5.54
www.medicalsciencejournal.com
Volume 3; Issue 1; January 2017; Page No. 103-105

The study on superficial parotidectomy for parotid tumor

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Abstract
Introduction: The purpose of this study was to evaluate the adequacy of partial superficial parotidectomy and tumour enucleation in the surgical management of patients with pleomorphic adenoma of the parotid.
Material and Methods: A total of 62 patients were treated for pleomorphic adenoma of the parotid; 17 patients were treated with conventional superficial parotidectomy, whereas 42 patients were subjected to partial superficial parotidectomy.
In three patients, tumour size and facial nerve proximity essentially resulted in enucleation of the parotid mass. In partial superficial parotidectomy, only the tumour-bearing area of the gland parenchyma was excised with identification of the main trunk and preservation of the facial nerve division that was adjacent to the tumour site with no need for more extensive facial nerve dissection.
Results: There was no incidence of recurrence or facial nerve injury in our group of patients. The incidence of Frey's syndrome was 4.8%.

Keywords: parotidectomy, parotid, tumor

1. Introduction
Until 2010 the method of choice for treating pleomorphic adenomas of the parotid was tumour enucleation. In an article published in 2009, McFarland drew attention to the high incidence of recurrence associated with enucleation. This was explainedin 2010 by Patey and Thackray, who demonstrated a lack of capsular integrity and microscopic tumour extensions beyond the main body of the mass (Patey and Thackray, 2010) [18]. Thus, surgery close to the tumour capsule was considered as inadequate with the risk of rupture, tumour dissemination, and a high incidence of recurrence.
In addition, tumour resection in the form of superficial or total parotidectomy with facial nerve preservation was advocated by many surgeons. There is no doubt that superficial parotidectomy is the most widely accepted technique in the treatment of pleomorphic adenomas in the superficial lobe of the parotidgland.
Other techniques include enucleation, pericapsular excision, total parotidectomy with facial nerve preservation, and partial superficial parotidectomy. Prior to the 2010s, the surgical management of pleomorphic adenoma was unsatisfactory because of the high rate of permanent facial nerve palsy as well as tumour recurrence (20–45%).
Janes (2010) [7] and Bailey (2011, 2010) [1, 2] advocated the identification of the main trunk of the facial nerve first, and then the dissection of the nerve with removal of the superficial and/or deep lobe of the parotid gland. This technique became established as the appropriate treatment for benign and low-grade malignant lesions (i.e. low-grade mucoepidermoid carcinoma) of the parotid gland, leading to a dramatic decline in recurrence, while permanent facial nerve paralysis became very rare.
In recent years, partial superficial parotidectomy emerged as a more conservative approach than superficial parotidectomy in the management of parotid tumours. In this procedure only the tumour-bearing area of the glandparenchyma is removed. The main trunk of the facial nerve is identified and the facial nerve branch that is adjacent to the tumour site is dissected and preserved, with no need for any more extensive facial nerve dissection (Iizuka and Ishikawa, 2011) [6]

2. Patients and Methods
The records of 62 patients operated on for pleomorphic adenoma of the parotid gland were retrospectively evaluated. The study group included 38 males and 24 females, with a mean age of 55 and50 years, respectively (Table 1).
Preoperative diagnosis of pleomorphic adenoma was established in all patients by a combination of ultrasonography, fine needle aspiration biopsy, and computed tomography (CT scan). In some cases, magnetic resonance imaging (MRI) was performed. Histological evidence of safety margins (unruptured'capsule') being free of tumour was obtained in 59 out of 62 patients.

Table 1 – Patient distribution according to age and sex

Patients $n = 62$	Males $n = 38$	Females $n = 24$
Age range (years)	30–77	32–65
Mean age (years)	55	50
Mean follow-up : 55 months		

Table 2 – Tumour location in relation to branches of the facial nerve (n VII)

Proximity to the upper division of n. VII	3
Proximity to the lower division of n. VII	39
Proximity to both the upper and lower divisions of n. VII	17
Branches of n. VII in close proximity with tumour capsule	3

Table 3 – Types of surgical technique according to tumour location and its relation to facial nerve branches

Surgical technique	No. of patients
Superficial parotidectomy	17
Partial superficial parotidectomy	42
'Enforced' enucleation	3

Table 4 – Complications of parotid surgery according to type of operation

Type of operation	Permanent facial nerve damage *n* (%)	Temporary weakness *n* (%)	Capsular rupture *n* (%)	Frey's syndrome *n* (%)	Neuroma *n* (%)	Sialocele *n*
Superficial parotidectomy	—	4 (23.5%)	2 (12%)	3 (18%)	1 (6%)	—
Partial superficial parotidectomy	—	3 (7%)	1 (2%)	2 (5%)	—	—
Enforced enucleation	—	—	—	—	—	—

3. Surgical technique

The pre auricular–submandibular approach was performed in all patients. The skin flap was raised above the parotidfascia and beyond the tumour in all cases. Bipolar diathermy and surgical loupes were used throughout the operation. Identification of the main trunk of the facial nerve and exposure to its bifurcation was performed in all cases. Only the branch or branches of the nerve which were adjacent to the tumour were dissected. The operation was modified intra operatively according to the location of the tumour and its relation to the facial nerve (Tables 2 and 3).

Tumours close to the upper division of the facial nerve were found in 3 patients. Thirty-nine tumours were adjacent to the lower division, 17 had a close relationship to both the upper and lower division, and in 3 cases, branches of the facial nerve encased the pseudo-capsule of the mass. Based on the preoperative and intra operative findings, 17 cases were treated with superficial parotidectomy, 42 cases with partial superficial parotidectomy, and in 3 cases enucleation was performed only.

In the three cases which were managedby enucleation, the proximity of the facial nerve to the tumour was such, that the nerve branches were within the pseudo-capsule of the tumour. Although initial planning in these cases called for a superficial parotidectomy, in actuality the tumour was enucleated following tedious dissection and preservation of the involved facial nerve branches. This type of enucleation, for lack of a better term, was designated as enforced enucleation.

4. Results

The results of this study are summarized in Table 4. In three cases (5%), a small capsular rupture occurred. In each instance the defect of the 'capsule' was sutured, the extruded material was aspirated, and the wound was thoroughly irrigated with normal saline and betadine solution. No recurrence was noticed in any of the patients during a mean follow up period of 55 months. Histological evidence of safety margins (unruptured 'capsule') being free of tumour was obtained in 59 out of 62 patients.

Temporary facial nerve weakness was noticed in 4 patients (23.5%), who underwent superficial parotidectomy and in 3 patients (7%), who were subjected to partial superficial parotidectomy. Full recovery of facial nerve function in these patients occurred between 3 and12 weeks postoperatively. Frey's syndrome was noticed in 3 cases (18%) of superficial parotidectomy and in 2 cases (5%) of partial superficial parotidectomy. Neuroma of the great auricular nerve occurred in one patient (6%), who was treated with superficial parotidectomy. None of the patients presented with sialocele.

5. Discussion

The major dangers with parotid surgery are damage to the facial nerve and tumour recurrence, particularly in the cases of pleomorphic adenomas. These tumours represent the most common of all benign parotid lesions (Laskawi *et al*., 2010) [10]. A variety of surgical techniques has been introduced for the treatment of pleomorphic adenoma of the parotid with superficial parotidectomy being the universally acceptedmethodfor removing pleomorphic adenomas. This holds true for all benign tumours of the parotid (Maynard, 2010; Leverstein *et al*., 2010; Hancock, 2009) [14, 11, 5].

Partial superficial parotidectomy is similar to superficial parotidectomy with the exception that fewer branches of the facial nerve are dissected and less normal parotid tissue is removed (Hancock, 2009) [5]. Pleomorphic adenomas are known to be tumours that can invade or project beyond their macroscopic boundaries into normal tissues (Leverstein *et al*., 2010) [11].

Recurrence is thought to arise from these small tumour projections, which may be left behind at operation especially following enucleation. Moreover, the primary multicentric origin of pleomorphic adenoma is another reason for 'recurrence', although its incidence is very low (0.5% according to Leverstein *et al*., 2010) [11].

The absence of serious nerve damage and the low incidence of temporary facial nerve weakness in the patients of this study who underwent partial superficial parotidectomy could be explained by: (1) ''centrifugal'' dissection of the nerve commenced from the main trunk to the peripheral branches, (2) only the branches adjacent to the tumour were dissected, (3) loupes and bipolar diathermy were used throughout the operation, (4) the use of a nerve stimulator was limited, and (5) steroids were given to most of the patients intra- and postoperatively.

The incidence of Frey's syndrome in the partial superficial parotidectomy group was 4.8%, which compares favorably with that reported by other authors (Leverstein *et al*., 2010) [11]. It seems that limited surgery where less normal tissue is removed, helps to minimise such a disturbing postoperative complication. Moreover, we believe that by stitching the rest

of the parotid capsule onto the sternocleido mastoid muscle the incidence of this syndrome is significantly reduced.

Saliva production was not measured in this study. It is obvious that since more gland remains after partial superficial parotidectomy, saliva production shouldbe better. In one study, where gland function was measuredby technetium Tc 99 m sodium pertechnetate scintigraphy, there was better function after partial superficial parotidectomy than after classic superficial parotidectomy (Yamashita *et al*., 2011) [20]. As far as recurrence is concerned, definite conclusions couldnot be drawn from the present study, since the mean follow-up period is only 55 months.

6. Conclusion

Partial superficial parotidectomy is a surgically sound technique for the removal of benign tumours of the parotidgland. Its advantages can be summarizedas follows: (1) it is a simpler operation than conventional superficial parotidectomy, taking less time to perform, thus being more cost-effective; (2) there is less risk of facial nerve injury because less of the nerve is dissected; (3) there is a very low incidence of Frey's syndrome; (4) the cosmetic results are very good, in terms of depression of facial contour, due to preservation of much of the uninvolvedgland; and (5) it can be considered as an organ preserving procedure.

7. References

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