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Parotidectomy in Cape Town – a review of pathology and management

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Summary

Background. The spectrum of parotid disease in southern Africa has not previously been reported.

Methods. A review of all parotidectomies performed by a single surgeon over a period of 10 years (1994 - 2004) in Cape Town, South Africa, is presented. Data were collected from a retrospective chart review.

Results. One hundred and ninety-nine parotidectomies were performed and 196 pathology reports were reviewed. Pleomorphic adenoma was the most common benign tumour and metastatic cutaneous squamous cell carcinoma (SCC) was the most common malignancy. Warthin's tumour had an equal gender distribution. Forty-five per cent of parotid tumours in males were malignant. The sensitivity, specificity and accuracy of fine-needle aspiration cytology (FNAC) in diagnosing malignancy were 73%, 98% and 94% respectively.

Conclusions. In South African males almost half of parotid tumours are malignant. Warthin's tumours are less common in Africa than in the West, and did not show a male preponderance. FNAC is a highly reliable method of excluding malignancy.

The standard treatment for parotid tumours is parotidectomy (partial or total) with sparing of the facial nerve whenever possible. The spectrum of parotid neoplasms requiring parotidectomy has been reported extensively in the European and American literature.[1,2] There have been a few reports of pathology seen in some parts of Africa,[3-6] but the spectrum of parotid disease in southern Africa has not been reported.

Parotidectomy is most commonly performed for benign tumours, of which pleomorphic adenoma and Warthin's tumour are the most common. The disease spectrum differs in the African population compared to that of the West, with an increased ratio of malignant to benign tumours in Africa, and Warthin's tumours occurring less commonly.[3-6] Metastatic cutaneous squamous cell carcinoma (SCC) has been shown to be a common cause of parotidectomy in the Australian population.[7,8] South Africa also has a high incidence of skin cancer, and would presumably reflect this in its spectrum of parotid disease.

The extent of preoperative investigation for parotid tumours is a controversial issue, as fine-needle aspiration biopsy may be unhelpful, and radiological investigation, especially for benign tumours, often does little to add to the diagnosis and management.

Facial palsy is the most important and disfiguring consequence or complication following parotidectomy. Studies have shown that immediate facial nerve dysfunction following parotid surgery is common (46%), but that permanent dysfunction is uncommon (4%).[9] The reported incidence of long-term dysfunction is higher in revision cases and with extended (subtotal or total) parotidectomy.[10]

This study details the experience of the second author (J.J.F.) with parotid surgery over the past 10 years.

Objectives

The study aimed to: (*i*) review the University of Cape Town experience with parotidectomy; (*ii*) report on the histology of parotid disease requiring parotidectomy; (*iii*) discuss special investigations in the management of parotid disease; and (*iv*) describe the consequences and complications following parotidectomy.

Materials and methods

A retrospective review was done of all parotidectomies performed under the care of one ENT (ear, nose and throat) surgeon (J.J.F.). These operations were done over a period of 10 years (1994 - 2004) at Groote Schuur Hospital, Cape Town. Surgery done in both the private and public health sectors was included in the review. At the University of Cape Town all parotidectomies are performed by the Division of Otolaryngology. Data were collected from a retrospective chart review.

Results

Between 1994 and 2004, 199 parotidectomies were performed on 197 patients. Two patients had bilateral parotidectomies. The clinical records of 7 patients were incomplete.

Pathology

Histological results were available for 196/199 parotidectomies (Table I). Tumours were benign in 119 patients (61%)

TABLE I. HISTOLOGY OF PAROTID DISEASE (*N* = 196)

Histological findings	No.	%
Benign disease (*N* = 119)		
Pleomorphic adenoma	83	42
Warthin's tumour	16	8
Monomorphic adenoma*	7	3
Lipoma	5	3
Benign lympho-epithelial lesions	4	2
Neurofibroma	2	1
Lymphangioma	2	1
Malignant disease (*N* = 53)		
Metastatic cutaneous SCC	12	6
Muco-epidermoid carcinoma	9	5
Cutaneous melanoma	8	4
Acinic cell carcinoma	8	4
Lymphoma	3	2
Adenoid cystic carcinoma	3	2
Primary SCC	2	1
Undifferentiated carcinoma	2	1
Metastatic oral cavity SCC	2	1
Metastatic maxillary sinus SCC	1	0.5
Malignant fibrous histiocytosis	1	0.5
Adenocarcinoma	1	0.5
Retinoblastoma	1	0.5
Non-neoplastic disease (*N* = 24)		
Chronic sialadenitis	10	5
Parotid trauma	4	2
Sialosis	3	2
Branchial cyst	2	1
Tuberculosis	1	0.5
Castleman's disease	1	0.5
Sarcoidosis	1	0.5
Myofibroblastic proliferation	1	0.5
Fatty infiltration	1	0.5

*Includes basal cell adenoma.
SCC = squamous cell carcinoma.

and malignant in 53 (27%) The ratio of benign to malignant tumours was 2.25:1. Twenty-four patients (12%) had non-neoplastic disease.

Sixty-nine per cent of neoplasms were benign. Pleomorphic adenoma (42%) and Warthin's tumour (8%) were the most common benign tumours, and accounted for 70% and 13% of benign parotid tumours respectively. One patient had bilateral Warthin's tumours and underwent bilateral parotidectomy. Four patients had benign lympho-epithelial lesions. Three of these patients were HIV-negative and the lesions were unilateral. One HIV-positive patient underwent parotidectomy for cosmetic reasons. The lesions recurred and bilateral low-dose radiotherapy was given. Other lesions included 2 lymphangiomas and 2 neurofibromas. One case was a 20-year-old girl with neurofibromatosis type 1, and a plexiform neurofibroma of the parotid gland. She had a 14-year history of a right parotid mass, which was particularly disfiguring. The plexiform neurofibroma of the parotid was removed by superficial parotidectomy with sparing of the facial nerve.

Thirty-one per cent of tumours were malignant. Metastatic cutaneous SCC was the most common malignancy and accounted for 22% of parotid malignancies. Metastatic melanoma accounted for 15% of parotid malignancies. Primary parotid malignancies accounted for 16% of parotid tumours. Muco-epidermoid carcinoma accounted for 30% of primary parotid malignancy, followed by acinic cell carcinoma (27%), lymphoma (10%), adenoid cystic carcinoma (10%) and primary SCC (7%). There were 3 lymphomas, 2 primary parotid SCCs and 1 undifferentiated carcinoma. There were no cases of carcinoma ex-pleomorphic adenoma.

Age

The age distribution of patients undergoing parotidectomy is summarised in Table II. The age difference between patients with benign and malignant disease, both primary and metastatic, was statistically significant. Benign tumours occurred at a mean age of 45 years, while malignant tumours occurred at 57 years.

Gender

The gender distribution for specific tumours is given in Table III. Parotidectomies were performed in 118 females (59%) and 81 males (41%). Benign tumours occurred more commonly in females and malignant tumours more commonly in males. Primary parotid malignancies were more common in females and metastatic malignancies more common in males. Pleomorphic adenoma, Warthin's tumours and muco-epidermoid carcinoma occurred with similar frequency in males and females. Metastatic SCC was more common in males,

TABLE II. AGE OF PAROTIDECTOMY PATIENTS

Pathology	No.	Age (yrs) Range	Mean	Compared with benign
All cases	**194***	**6 - 93**	**47.9**	
Benign	**117***	**18 - 93**	**45.2**	
Malignant	**53**	**6 - 84**	**57.3**	***p* = 0.0001**
Primary	**28**	**13 - 78**	**53.6**	***p* = 0.0163**
Secondary	**25**	**6 - 84**	**60.8**	***p* = 0.0001**

*Age not known for 2 patients.

TABLE III. DISTRIBUTION OF MOST COMMON TUMOURS BY GENDER (*N* = 172)

Tumour type	Male (*N* = 64)	Female (*N* = 108)	*p*-value
Benign (*N* (%))	**35 (55)**	**84 (78)**	**0.0002**
Malignant (*N* (%))	**29 (45)**	**24 (22)**	**0.0002**
Primary parotid malignancy	**12 (41)**	**18 (75)**	**0.0069**
Metastatic parotid malignancy	**17 (59)**	**6 (25)**	**0.0069**
Benign (*N* (%))	**35 (55)**	**84 (78)**	
Pleomorphic adenoma	**23 (66)**	**60 (71)**	**0.2676**
Warthin's tumour	**5 (14)**	**11 (13)**	**0.8572**
Malignant primary salivary (*N* (%))	**29 (45)**	**24 (22)**	
Muco-epidermoid	**5 (17)**	**4 (16)**	**0.4761**
Acinic cell	**2 (7)**	**6 (25)**	**0.0336**
Malignant metastasis (*N* (%))	**29 (45)**	**24 (22)**	
Metastatic squamous cell carcinoma	**12 (41)**	**3 (13)**	**0.0102**
Metastatic cutaneous melanoma	**5 (17)**	**3 (13)**	**0.3156**

while melanoma had an equal gender distribution. An important observation is that 45% of parotid tumours in males were malignant, either primary or metastatic. Data on ethnicity were incomplete so no analysis was done in this regard.

Preoperative investigations

Preoperative investigations are listed in Table IV. Many of these investigations were done by referring physicians, and would not have been requested by the primary surgeon. Trucut biopsy was generally reserved for patients with locally advanced disease that would necessitate either facial nerve or extensive local resection.

Fine-needle aspiration cytology (FNAC)

The most important answer that FNAC should provide for the surgeon is whether the mass is benign or malignant. FNAC was done in 112 (57%) patients, principally by the referring doctors. Specimens were reported as being 'inadequate/indeterminate' in 45/112 cases (40%). There was one false-positive diagnosis of malignancy, with a Warthin's tumour misdiagnosed as muco-epidermoid carcinoma. Three false-negatives for malignancy (4%) were 2 monomorphic adenomas diagnosed as high-grade muco-epidermoid carcinoma and acinic cell carcinoma, and a benign cyst diagnosed as acinic cell carcinoma. The diagnostic accuracy of 'adequate' FNAC samples is summarised in Table V. The sensitivity and specificity in diagnosing malignancy were 73% and 98% respectively. The accuracy in diagnosing benign and malignant tumours was 94%.

Morbidity

One hundred and ninety-two patient folders were reviewed for surgical morbidity (Table VI). Frey's syndrome was not evaluated as patients were not recalled, and without direct questioning the incidence would probably be underreported.

TABLE IV. PREOPERATIVE EXAMINATIONS (*N* = 196)

Investigation	No.	%
Fine-needle aspiration cytology	**112**	**57**
Computed tomography	**73**	**37**
Ultrasound scan	**37**	**19**
Open biopsy	**19**	**10**
Trucut biopsy	**14**	**7**

One facial nerve branch (0.5%) had been divided inadvertently. It was primarily repaired and the patient made a full recovery at 6 months. The other permanent palsies (*N* = 18) occurred after intentional sacrifice of the nerve as it was involved with the tumour. In 4 cases of benign disease, 1 of which was for recurrent pleomorphic adenoma, facial nerve branches (marginal mandibular (*N* = 3), superior division (*N* = 1)) were sacrificed. The superior division was repaired with a greater auricular nerve graft, the mandibular branches were not repaired. Facial nerve resection, either complete or partial, was required in 29% (8/28) of primary parotid carcinoma and 24% (6/25) of metastatic malignancy. Facial nerve resection was done in 100% of primary SCC, 50% of undifferentiated, 38% of muco-epidermoid and 25% of acinic cell carcinomas.

Procedures

The procedures performed are presented in Table VII. Flaps were required in 10 patients (radial forearm, antero-lateral thigh, and rectus abdominus free microvascular flaps, and latissimus dorsi pedicled flap).

TABLE V. FINE-NEEDLE ASPIRATION CYTOLOGY (FNAC) IN PAROTID TUMOURS (*N* = 67)

	Pathology		
FNAC	Malignant	Benign	Total
Malignant	**8**	**1**	**9**
Not malignant	**3**	**55**	**58**
Total	**11**	**56**	**67**

TABLE VI. CONSEQUENCES AND COMPLICATIONS OF PAROTIDECTOMY (*N* = 192)

Consequences/ complications	*N*	%
Facial nerve palsy	**84**	**44**
Temporary palsy	**65**	**34**
Benign disease	**49**	**26**
Malignant disease	**16**	**8**
Permanent palsy	**19**	**10**
Benign disease	**4**	**2**
Malignant disease	**15**	**8**
Wound infection	**9**	**5**
Seroma	**6**	**3**
Haematoma	**6**	**3**
Salivary fistula	**4**	**2**

Discussion

The incidence of parotid disease in the literature is estimated at 3 - 4 /100 000/year.[11,12] We present a review of the experience of a single surgeon (J.J.F.) with parotid surgery over a 10-year period in a southern African setting. In our series parotidectomy was most frequently performed in the 4th decade for benign disease and the 5th decade for malignant disease. Parotid malignancies occurred at a mean age of 57 years, which is similar to the findings of a large series of 1 432 patients reported by Renehan *et al.*[2] in the UK. This differs from findings from central Africa where parotid tumours, both benign and malignant, occurred predominantly in the 3rd decade of life.[3-6]

Benign neoplasms

Benign tumours occurred more commonly in females, and malignant tumours more commonly in males. Benign tumours comprised 69% of the parotid neoplasms, and pleomorphic adenoma and Warthin's tumour accounted for 48% and 9% of parotid tumours. Warthin's tumour occurred with similar frequency in males and females. This differs from all previous publications, which reported Warthin's tumour to be predominantly a male disease, occurring 2.2 - 7 times more frequently in males.[2,9,10] Warthin's tumours are very rare in other African series.[3-6] They accounted for 0/82 parotid tumours in a series from Tanzania.[3] Warthin's tumours accounted for 9% of parotid tumours in our series, which is much less than the 15 - 22% reported in most Western series.[1,2,8,11,12]

Malignant neoplasms

Malignant tumours accounted for 31% of parotid tumours. However 45% of parotid tumours in males were malignant, either primary or metastatic. Table VIII compares our results with parotid malignancies in 3 other settings (USA, Australia and Africa).[1,3,7]

Studies from Uganda and Tanzania reported malignancy in 46% and 47% of salivary gland tumours respectively.[3,4] In most Western series parotid malignancies make up only 11 - 28% of parotid tumours.[1,2,11,12] The exception is Australia where 44 - 48% of parotid tumours are malignant.[7,8] A large proportion of these tumours are metastatic malignancy (75% of parotid malignancy), with cutaneous malignancy (SCC and melanoma) being most common.

Cutaneous metastases

Metastatic malignancy accounted for 45% of parotid malignancy in our series. Metastatic cutaneous SCC (22%) was the most common malignant tumour. It is predominantly a male disease, occurring 5 times as frequently as in females in our study. This would be in keeping with the male preponderance of SCC of the skin in South Africa.[13] Cutaneous melanoma accounted for 15% of malignant tumours. A high incidence of cutaneous malignancy as a reason for parotidectomy has been reported in the Australian literature.[7,8] O' Brien in Sydney,[7] and Bora *et al.*[8] in Brisbane, reported cutaneous SCC in 46% and 48% of malignant tumours. Melanoma accounted for 25% and 7% in the same series.

Primary malignancy

In our series, muco-epidermoid carcinoma was the most common, followed by acinic cell carcinoma, lymphoma and adenoid cystic carcinoma. In other African series malignancies were dominated by muco-epidermoid and adenoid cystic

TABLE VII. TYPES OF PAROTIDECTOMY, ADDITIONAL SURGERY (*N* = 197)

Procedure	Number	%
Partial parotidectomy	**152**	**77**
Total parotidectomy with sparing facial nerve	**24**	**12**
Total parotidectomy with partial facial nerve resection	**17**	**9**
Total parotidectomy with total facial nerve resection	**4**	**2**
Neck dissections	**27**	**14**
Free/pedicled flaps	**10**	**5**
Temporal bone resection	**4**	**2**
Maxillectomy	**2**	**1**

TABLE VIII. COMPARISON OF MALIGNANT TUMOURS IN 4 COUNTRIES

	Cape Town, South Africa	Mayo Clinic, USA[1*]	Sydney, Australia[7]	Makerere, Uganda[3†]
Parotidectomies (*N*)	**196**	**1 360**	**1 107**	**82**
Malignant (%)	**31**	**17**	**44**	**46**
Common malignancies (%)	**Cutaneous SCC 23 MEC 17 Melanoma 15**	**MEC 27 Acinic 15 ACC 12**	**Cutaneous SCC 47 Melanoma 25 MEC 5**	**ACC 29 MEC 21**

* Metastatic cancers were not included.
† Includes all salivary gland tumours.
MEC = muco-epidermoid carcinoma; ACC = adenoid cystic carcinoma, SCC = squamons cell carcinoma; Acinic = acinic cell carcinoma.

carcinoma.[3-6] It is possible that the incidence of lymphoma might increase with the AIDS pandemic in southern Africa. In Australia, primary malignant tumours were dominated by adenocarcinoma and muco-epidermoid carcinoma.[7,8] In Europe and the USA the most common parotid malignancies are muco-epidermoid, adenoid cystic or acinic cell carcinoma.[1,2,11,12]

Preoperative investigations

Preoperative special investigations of a parotid lump should only be requested if this is likely to change management. In the developing world setting one also needs to consider pathology such as tuberculosis and HIV-related parotid disease.

In benign disease radiological investigation may distinguish a tumour in the deep lobe from one in the superficial lobe, and it may help to distinguish solid from cystic lesions, but other than this radiological investigation is of little benefit. We employ computed tomogaphy (CT) and magnetic resonance imaging (MRI) to assist with: surgical planning in clinically malignant tumours (fixity, pain, VIIn weakness, trismus), facial nerve paralysis to assess extension along the fallopian canal, patients with suspected extension to parapharyngeal space, and to determine the extent of recurrent pleomorphic adenoma. The high incidence of imaging studies in benign disease in our study can be attributed to the fact that non-ENT specialists requested most of these before referral.

We employ FNAC only when a diagnosis of malignancy might change our surgical approach, e.g. suspected cutaneous metastatic disease, as such patients require elective neck dissection,[7] when facial nerve sacrifice might be required, or when a non-surgical diagnosis such as tuberculosis, sarcoidosis or lymphoma is considered. The low yield (60%) of material suitable for cytological diagnosis is likely to be due to poor training and sampling technique. The accuracy of FNAC in predicting whether a mass is benign or malignant ranges from 81% to 98%.[14-18] The accuracy in our series was 94%. Crucially, the specificity of excluding a malignant tumour was 98%. This is in keeping with the results reported by Chan *et al.*,[14] Seethala *et al.*[15] and Frable and Frable.[16] We do trucut biopsies for inoperable tumours where a malignancy is suspected irrespective of the FNAC result. In our series of 14 trucut biopsies the diagnosis of malignancy was correct in all cases.

Facial nerve

Facial nerve palsy is the major postoperative morbidity associated with parotidectomy. In benign disease postoperative temporary facial palsy has been reported at 46 - 63%.[19-21] The reported rate of permanent paralysis with benign disease is 3 - 4%.[2,19-21] In malignant disease the incidence of permanent facial palsy has been reported to be as high as 36%.[2] In our series temporary facial palsy occurred in 34% of benign disease, and the rate of permanent palsy (selected branches only) was 3% for benign disease and 8% for malignant disease. There was only one inadvertent facial nerve (frontal branch) injury; this was recognised and immediately repaired with good outcome. The other permanent palsies occurred when facial branches were intentionally sacrificed because of tumour involvement.

We do not advocate routine use of a facial nerve monitor. We use the facial nerve monitor only for revision parotid surgery or for massive tumours when the normal anatomical landmarks of the facial nerve might be obscured. We always use operating loupes (x 2.5), and avoid muscle paralysis. It is useful to stimulate the trunk of the facial nerve at conclusion of surgery to confirm that the nerve and its branches are all intact, and to be able to reassure the patient with postoperative facial weakness that it is temporary.

Conclusions

In conclusion: (*i*) almost half of parotid tumours are malignant, either primary or metastatic, in South Africa (males), Africa and Australia; (*ii*) Warthin's tumours are less common in Africa than in the West, and in our series did not show a male preponderance; (*iii*) adequate sampling for FNAC is operator-dependent and is likely to improve with training; (*iv*) FNAC is a highly reliable method of excluding malignancy; and (*v*) routine facial nerve monitoring is unlikely to improve facial nerve preservation rates in the hands of a surgeon versed in the surgical anatomy of the facial nerve.

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