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Research Article

Parotid Tumours: A Conservative Investigative and Surgical Approach

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Abstract

Background: The extent of preoperative investigations for parotid tumours and whether a partial or total parotidectomy should be performed for malignancy remain controversial. In developing countries, limited access to special investigations and their affordability requires careful consideration when investigating parotid tumors.

Aims: This study assesses whether a conservative investigative and surgical approach to parotid malignancies with adjuvant radiation therapy in selected patients is associated with acceptable local control and survival rates.

Methods: A retrospective observational audit was conducted on patients undergoing parotid surgery for parotid masses, by a single surgeon, between 1st January 2004 and 31st December 2012. Outcome measures included local tumour control and five-year disease-specific survival, calculated via Kaplan-Meier analysis.

Results: Three hundred and forty-seven parotidectomies were performed for parotid masses between 2004 and 2012. Fifty-three primary parotid malignancies were diagnosed (15%) and were followed up for a mean of 56.6 months postoperatively. Adopting a conservative investigative and surgical approach to primary parotid malignancies was associated with a local tumour control rate of 92.5%.

Conclusions: A conservative investigative and surgical approach with adjuvant radiation therapy in select patients is associated with excellent local control with primary parotid malignancy.

Keywords: Cancer; Malignancy; Parotid partial parotidectomy; Recurrence; Superficial parotidectomy; Survival; Total parotidectomy

List of Abbreviations: HNC: Head and Neck Cancer; LMIC: Low- And Middle-Income Countries; FNAC: Fine Needle Aspiration Cytology; CT: Computed Tomography; MRI: Magnetic Resonance Imaging; AFHNS: African Head and Neck Society; AJCC: American Joint Committee On Cancer

Introduction

Head and Neck Cancer (HNC) is essentially a Developing World disease with 67% of HNC and 82% of HNC deaths occurring in Low- And Middle-Income Countries (LMICs) [1]. The incidence of HNC in developing countries is expected to increase significantly by 2030 [2]. In LMICs, limited access to special investigations and their affordability requires careful consideration when evaluating head and neck tumours as many patients in LMICs pay out of pocket for their healthcare and bear a significant risk of financial catastrophe from HNC; an 8-country cohort study of adults in Southeast Asia found that 30% of participants with cancers of the oral cavity and pharynx incurred financial catastrophe [3]. The extent of preoperative investigations for parotid tumors and whether a partial or total parotidectomy should be performed for malignancy remain controversial. Accurate preoperative diagnosis of salivary gland malignancy is challenging. Clinical suspicion of malignancy includes prior skin cancers of the face, rapid growth, pain, fixation to adjacent anatomical structures, facial nerve dysfunction, trismus

and cervical lymphadenopathy. However, none of these findings are pathognomonic of parotid malignancy, which often presents simply as a parotid mass. Experienced cytologists can distinguish benign from malignant salivary tumours on Fine Needle Aspiration Cytology (FNAC) in only 79% of cases; to precisely diagnose a histological type is less reliable [4]. FNAC results of parotid lesions should therefore be interpreted with caution and treatment decisions cannot be based solely on FNAC. Many LMICs have no/limited access to cytology services, and quality of reporting of salivary gland cytology may be uncertain [5]. Imaging, including ultrasound, Computed Tomography (CT scan), and Magnetic Resonance Imaging (MRI) may assist to define tumour extent and its relationship to adjacent anatomical structures, as well as to identify regional and distant disease. However, imaging does not confirm malignancy, diagnose histological subtypes of tumours or predict tumour behaviour. Access to specialised imaging (CT, MRI) is also restricted in LMICs [5], and patients often pay out of pocket for such services. Even though intraoperative frozen section pathology correlates well with permanent section pathology (sensitivity 98.5%; specificity 99%) [6] , frozen section pathology is also often not available to surgeons in LMICs [5].

Because of the above diagnostic limitations, tumour histology is often unknown prior to surgery, and a diagnosis of malignancy is made following histopathological examination of the parotidectomy specimen. It is however debatable whether prior knowledge of malignancy of a mobile parotid mass should change the type of parotid surgery [4]. While some favour conservative resection of a malignant tumour by partial parotidectomy, others favour total parotidectomy [6-8]. The rationale for total parotidectomy for superficial lobe parotid malignancy is to address occult deep lobe nodal metastases, which have been demonstrated to occur in a significant number of patients [9-11]. Some also advocate total parotidectomy for metastases to the parotid gland e.g. from skin cancers. Retrospective studies suggest that metastasis to the parotid managed with superficial parotidectomy is associated with higher local recurrence rates than those treated more aggressively [12-17]. Therefore, in order to improve local control, total parotidectomy has been advocated when deep lobe nodal metastases are likely (high grade parotid malignancy, metastasis to any intraparotid lymph nodes or regional cervical metastases) [17]. The argument against such an approach is that local recurrence is rare [18] and that adjuvant radiation therapy is likely to address residual microscopic disease in deep lobe lymph nodes [19,20].

Either neck dissection or radiation therapy can be employed for patients with significant risk of occult metastases [4]. Unlike surgeons practicing in developed countries, those working in limited resource settings must be circumspect about what investigations to request to ensure that scarce diagnostic resources are used appropriately, and patients do not suffer a financial catastrophe.

The last author (JJF) employs a conservative approach both to investigations and radicality of parotid surgery. This approach is reflected in the African Head and Neck Society (AfHNS) Clinical Practice Guidelines for Parotid tumours and cancers in Developing Countries and Limited Resource Settings: https://developingworldheadandneckcancerguidelines.com/african-head-neck-society-afhns-clinical-practice-guidelines-for-parotid-tumours-and-cancers-in-developing-countries-and-limited-resource-settings/

Aims

This study sought to determine whether a limited, conservative preoperative workup and conservative surgical approach to parotid malignancies, as practiced at the authors' institution and as recommended in the African Head and Neck Society (AfHNS) Clinical Practice Guidelines for Parotid Tumours and Cancers in Developing Countries and Limited Resource Settings, yields acceptable local control and survival.

Materials and Methods

A retrospective observational audit was conducted on patients >13 years-of-age undergoing parotid surgery by a single surgeon (JJF) at Groote Schuur (public) and Kingsbury (private) Hospitals in Cape Town, South Africa between 1st January 2004 and 31st December 2012.

Parotid neoplasms were managed by a limited diagnostic workup and a conservative surgical approach. Parotidectomy was performed without radiological or cytological investigations, unless they were considered likely to change the surgical approach or render tumours inoperable. Consequently, imaging was generally reserved for patients with facial nerve weakness, likely invasion of local structures (fixed tumors, trismus or skin involvement), suspected deep lobe involvement, or extension to the parapharyngeal space. FNAC was employed when the parotid mass was likely a metastasis from skin or conjunctival cancers, when malignancy was suspected and radical surgery (e.g. resection of overlying skin or facial nerve) was entertained, when cervical lymphadenopathy was present or when lymphoma or an infective cause (e.g. tuberculosis) formed part of the differential diagnosis.

Primary parotid neoplasms were generally excised via partial superficial parotidectomy *i.e.* the mass was resected with a small cuff of parotid tissue if possible. The deep lobe of the parotid gland was only excised when tumour involved the deep lobe. The facial nerve was routinely identified and branches adjacent to the mass were exposed and preserved, unless invaded by tumour. If definitive histology confirmed malignancy, patients were not offered completion total parotidectomy. Adjuvant radiation therapy was administered to selected patients (previous incision biopsy; tumour spillage; advanced stage (T3/4) disease and for adverse histological findings i.e. high-grade malignancy, positive resection

margin, perineural or vascular invasion and >2 nodal metastases or extracapsular spread).

Patient records were reviewed for demographic information, type of parotid surgery, final histology, whether adjuvant radiation therapy was administered or not, duration of follow-up, and locoregional control. Patients and families were contacted telephonically to inquire about most recent disease status. Five-year disease specific survival, measured from time of surgery to last follow-up or death, was calculated using the Kaplan-Meier method. Primary and secondary parotid malignancies were analysed separately. The principal outcome measure to assess adequacy of the type of parotid surgery performed was local tumour control rate. Patients diagnosed with parotid lymphoma were excluded from the analysis of the malignant group, as parotid surgery had been purely diagnostic.

Results

Three hundred and forty-seven parotidectomies were available for analysis. Benign neoplasms were diagnosed in 60% (210 of 347 parotidectomies; pleomorphic adenoma accounted for 74% of benign lesions), and non-neoplastic lesions accounted for 14% (47 cases).

Malignancy was diagnosed in 26% of parotidectomies (90 cases); 53 were primary parotid malignancies, accounting for 15% of all parotidectomies. Mucoepidermoid carcinoma was the most common primary malignancy, followed by acinic cell carcinoma and carcinoma ex pleomorphic adenoma (Table 1). Secondary parotid malignancy/metastatic disease (non-salivary gland origin) was diagnosed in 37 patients, accounting for 11% of parotidectomies. Lymphomas were excluded from the analysis.

Histology	Number
Mucoepidermoid carcinoma	17
Acinic cell carcinoma	12
Carcinoma ex pleomorphic adenoma	8
Adenoid cystic carcinoma	3
Adenocarcinoma	4
Salivary duct carcinoma	3
Primary squamous cell carcinoma	2
Undifferentiated carcinoma	2
Hybrid carcinoma	1
Clear cell carcinoma	1
Total	53

Table 1: Primary parotid malignancies/malignancies of salivary gland origin.

In the primary parotid malignancy group, mean patient age was 49.5 years (14-87 years) and male-to-female ratio was 1.8:1. Tumours were clinically staged according to the American Joint Committee On Cancer (AJCC) Tumor/Node/Metastasis (TNM) Cancer Staging Manual, 6th or 7th edition. Seventy-two percent of tumours were either T2 or T3 (Table 2).

T-stage	%
T1	17%
T2	42%
T3	30%
T4	11%

Table 2: AJCC TNM T-staging of primary parotid malignancies at surgery.

Thirty partial superficial parotidectomies (57%), 6 superficial parotidectomies (11%) and 17 total parotidectomies (32%) were performed. Forty-two patients (79%) received postoperative radiation for the reasons previously mentioned. Mean postoperative follow-up was 56.6 months (5-134 months). The local tumour control rate was 92.5%, and disease specific 5-year survival was 68%. Mean time-to-recurrence in 4 patients (7.5%) that developed local recurrence was 7 months (6-8 months). Local recurrence occurred in two cases of high-grade mucoepidermoid carcinoma (superficial parotidectomies), one case of carcinoma ex-pleomorphic adenoma (total parotidectomy) and one case of hybrid carcinoma (total parotidectomy). All 4 cases had positive resection margins and received adjuvant radiotherapy. Three patients with adenoid cystic carcinoma had pulmonary metastases at the time of surgery and were alive at follow-up 5-62 months after surgery (mean 35 months).

Secondary, non-salivary parotid malignancy/metastatic disease (excluding lymphoma) was diagnosed in 37 patients, accounting for 11% of all parotidectomies (Table 3). The mean age at surgery was 64.2 years (26-84 years) and male-to-female ratio was 3.1:1. Partial superficial parotidectomies were performed in 17 cases (46%), superficial parotidectomies in 11 cases (30%) and total parotidectomies in 9 cases (24%). The mean duration of follow-up was 41.1 months (1-95 months). Six patients (16.2%) developed local tumour recurrence, with a mean time-to-recurrence of 8.3 months (2-15 months). Local tumour control was therefore achieved in 83.8%.

Histology	Number
Squamous cell carcinoma	17
Melanoma	12
Basal cell carcinoma	4
Neuroendocrine carcinoma	1
Undifferentiated carcinoma	1
Basal cell adenocarcinoma	1
Thyroid papillary carcinoma	1
Total	37

Table 3: Secondary/metastatic parotid malignancies (excluding lymphoma)/malignancies of non-salivary gland origin.

Discussion

Surgeons practicing in limited resource settings must be circumspect about what investigations to request to ensure that scarce diagnostic resources are appropriately used, and that patients do not suffer financial catastrophe. Hence an intelligent, incremental diagnostic approach for parotid tumours is required as outlined in the African Head and Neck Society (AfHNS) Clinical Practice Guidelines for Parotid Tumours and Cancers in Developing Countries and Limited Resource Settings [21].

The results of our study indicate an excellent local control rate (92.5%) utilising this conservative diagnostic and surgical approach to malignant primary parotid tumours: primary tumour is resected by partial parotidectomy, with total parotidectomy reserved for deep lobe tumours; adjuvant radiotherapy is administered in cases with previous incision biopsy, tumour spillage, advanced local disease (T3/4), adverse histological findings of high-grade parotid malignancies, positive tumour resection margins, perineural or vascular invasion and multiple/>2 lymph node metastases or extracapsular spread. Our excellent local control rate mirrors that of Erovic, Shah et al. who reported a local control rate of 94.4% employing a similar approach to parotid malignancy. Their cohort was significantly larger than ours and follow-up was longer [18]. Our 5-year disease-specific survival rate of 68% compares favorably with results published by other major centers (Table 4).

Author	Year of Publication	5yr Disease Specific Survival (%)
Godballe et al.	2003	52
Spiro	1986	55
Harbo et al.	2002	57
Vander Poorten et al.	1999	59
Vander Poorten et al.	2003	62
Spiro et al.	1989	63
Cape Town	2018	68
Kane et al.	1991	69
Vander Poorten et al.	2009	69
Poulsen et al.	1992	71
Lima et al.	2005	72
Frankenthaler et al.	1991	75
Leverstein et al.	1998	75
Therkildsen et al.	1998	76
Spiro & Wang	1993	77
Reneham	1999	78

Table 4: Modified from Vander Poorten VML. Parotid carcinoma: Current diagnostic workup and treatment. Indian J Surg Oncol 2010; 1(2):96-111 [4].

Our local control rate of 83.8% for metastases to the parotid gland also compares favourably with those reported in the literature ranging from 56-89% following various extents of parotidectomy surgery [12-16].

In their 2010 and 2016 reviews of parotid carcinoma, Vander Poorten et al. highlight the difficulty in comparing outcomes reported by major centers [4]. Study populations differ widely with regards to age and gender, comorbidities, salivary gland involved, grade and stage of disease managed, percentage high grade tumors, tumour histology, treatment regimens and periods of treatment, patient inclusion criteria and lengths of follow-up. In addition, the WHO Classification and AJCC Cancer Staging systems applied to parotid tumours have been modified from time to time. This may partly explain the wide variation in five-year disease-specific survival rates for primary parotid malignancies of 53-82% [4].

Conclusions

While we acknowledge the shortcomings of comparing our oncological outcomes with the results of other authors, our excellent local control rates support a conservative surgical

approach for patients with parotid neoplasms, both benign and malignant, if adjuvant radiation therapy can be offered to high-risk patients. Adopting such a conservative surgical approach also means that preoperative investigations directed at determining whether a tumour is benign or malignant may be reserved for selected cases only when outcomes of investigations are likely to modify the type of surgery to be performed e.g. previous facial skin cancers (superficial/total parotidectomy), facial nerve involvement, extension to the parapharyngeal space, or extension of tumor to surrounding tissues (trismus, skin). However, when adjuvant radiation is not available (as in many LMICs), it could be argued that patients with high-risk malignant tumors may have to be returned to the operating room for a completion total parotidectomy to secure better margins and to clear occult intraparotid nodal metastases, as well as to surgically address the neck as outlined in the African Head and Neck Society (AfHNS) Clinical Practice Guidelines for Parotid Tumours and Cancers in Developing Countries and Limited Resource Settings.

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