The Journal of Laryngology & Otology (2010), ***124***, *975–979*.

doi:10.1017/S0022215110001088

Main Article

Selective fine needle aspiration of parotid masses. FNA should be performed in all patients older than 60 years

S M Kieran, M McKusker, I Keogh*, C Timon

Abstract

Objectives: The exact role of fine needle aspiration in the pre-operative assessment of patients presenting with parotid masses is controversial. Some surgeons propose that fine needle aspiration be performed only selectively in those patients with likely malignant disease, whilst others recommend it for all patients presenting with such a mass. Intuitively, one would expect older patients to be more likely to suffer from primary malignant parotid tumours and secondary deposits of malignant skin tumours. Therefore, we hypothesised that older patients with a parotid mass should undergo fine needle aspiration regardless of their medical history.

Design: We retrospectively reviewed 197 consecutive parotidectomies to test this hypothesis.

Results: One hundred and twenty-one patients (61.4 per cent) were diagnosed with benign disease, whilst 76 (38.6 per cent) were diagnosed with malignant disease. Eighty-three per cent of patients aged 60 years or younger had benign disease, as opposed to 35.6 per cent of patients aged more than 60 years. Malignant disease occurred more commonly in patients older than 60 years (odds ratio 8.962, 95 per cent confidence interval 4.607–17.434).

Conclusion: In patients with a parotid mass, fine needle aspiration should be performed on all those aged 60 years or older.

Key words: Parotid Neoplasms; Needle Biopsy; Cytology; Age

Introduction

The role of fine needle aspiration (FNA) in the pre-operative evaluation of patients presenting with parotid masses is controversial. Some surgeons advocate it in all patients, whilst others are selective, performing FNA only on those patients likely to have malignant parotid disease. However, for those surgeons who use FNA selectively, the current patient selection guidelines do not take account of the patient's age.

The fundamental argument against performing FNA in all patients is that the majority of parotid masses are benign. This fact is enshrined in the '80 per cent rule', a common teaching aphorism which states that 80 per cent of salivary gland neoplasms occur in the parotid, 80 per cent of these are benign, and 80 per cent of these benign lesions are pleomorphic adenoma on histological diagnosis.

This topic is a controversial one, with conflicting international recommendations. The Scottish Intercollegiate Guidelines Network makes the non-parotid-specific recommendation (level D grade of recommendation) that 'fine needle aspiration cytology should be used in the investigation of head and neck masses'.[1] Meanwhile, the American Head and Neck Society guidelines on the pre-operative assessment of patients with parotid masses state that 'FNA is useful when a parotid tumour is likely to be metastatic in nature'.[2] However, despite these guidelines, the question of how to identify those patients with lesions 'likely to be metastatic in nature' remains unanswered. Cohen *et al.* reviewed their large institutional experience of salivary gland malignancy, and suggested groups of patients who should undergo FNA if a selective policy is to be practised.[3] Namely, FNA should be performed in patients with: (1) a history of head and neck skin or aerodigestive tract malignancy; (2) a history of non-head-and-neck solid tumours; and/or (3) a parotid mass of suspected non-salivary origin.

Intuitively, one would expect that older patients presenting with a parotid mass would be more likely to have both malignant and metastatic pathology. Therefore, we designed a study to assess how age affected the distribution of benign, malignant and metastatic parotid pathology, and to determine whether selective usage of FNA is appropriate in older patients.

From the Department of Otolaryngology, Head and Neck Surgery, Royal Victoria Eye and Ear Hospital, Dublin, and the *Academic Department of Otolaryngology, National University of Ireland, Galway, Ireland.
Accepted for publication: 12 February 2010. First published online 25 May 2010.

Methods

A retrospective review was performed of all parotidectomies performed by a single surgeon (CT) over an eight-year period (1998 to 2006). Surgery was performed in one of three institutions. Patients were identified from a prospectively maintained head and neck surgery database. Clinical and pathological data were obtained by reviewing clinical charts, operative records and histopathology reports. Patients were excluded if data were incomplete, or if they presented with a parotid mass but did not undergo surgical excision. The surgical procedure performed and the extent of parotidectomy (superficial versus total) were based on the surgeon's description of the procedure in the operative note. Each patient's age was recorded as that on the day of surgical intervention.

Parotid lesions were classified as either benign or malignant, based on the final pathology report. Patients presenting with a parotid mass but ultimately diagnosed as having a non-neoplastic condition were included in the 'benign' category. The primary site of metastatic disease was based on the patient's clinical history of prior malignancies, and on histological interpretation of metastatic disease within the parotid.

Data were collated on an Excel spreadsheet proforma (Microsoft Excel 2003; Microsoft, Redmond, Washington, USA). Comparisons were made between two groups, those with a final diagnosis of benign disease and those with malignant disease. In particular, the age distribution of patients in both groups was assessed both graphically and statistically. Student's *t*-test for independent samples was used to assess the means of parametric groups data. The chi-square test was used to assess for differences in proportions. Odds ratios are presented together with the corresponding 95 per cent confidence intervals (CIs). All statistical analysis was performed using Analyse-It software (Analyse-It Ltd, Leeds, UK).

Results

Patients

One hundred and ninety-seven patients were identified during the review period: 111 males (56.3 per cent) and 86 females (43.7 per cent). Patients' ages ranged from five to 90 years, with a mean of 55.3 years (95 per cent CI 52.6–58.0). Forty-seven patients (23.9 per cent) were described as undergoing parotidectomy, 41 (20.8 per cent) superficial parotidectomy, 36 (18.3 per cent) total parotidectomy, 49 (24.8 per cent) parotidectomy combined with neck dissection, 19 (9.6 per cent) parotidectomy as part of a temporal bone resection, two (1 per cent) revision parotidectomy and three (1.5 per cent) open parotid biopsy.

A wide spectrum of pathology was found in patients' parotid masses (Table I). One hundred and twenty-one patients (61.4 per cent) had benign disease whilst 76 (38.6 per cent) had malignant disease. The majority of procedures were performed for one of three disease processes: pleomorphic adenoma (60 patients, 30.5 per cent), metastatic squamous cell carcinoma of the skin (25 patients, 12.7 per cent) and Warthin's tumour (20 patients, 10.2 per cent). Thirty-six (18.3 per cent) patients underwent parotidectomy for metastatic cutaneous malignancy (25 had squamous cell carcinoma and 11 malignant melanoma).

Patient age

The mean patient age was 55.3 years (95 per cent CI 52.6–58). For those patients diagnosed with a benign process, the mean age was younger, at 47.6 years (95 per cent CI 44.4–50.9) (Figure 1a). For those patients with malignant disease, the mean age was 67.5 years (95 per cent CI 64.3–70.5), with the majority of tumours occurring in older patients (Figure 1b). This corresponds to a difference in mean age of 19.9 years, comparing patients with benign and malignant pathology (95 per cent CI 15.1–24.7; $p < 0.0001$). Patients with metastatic skin malignancies to the parotid were also older on average, with a mean age of 70.6 years (95 per cent CI 66.1–75.0) (Figure 1c), compared with patients with other parotid neoplasms ($p < 0.0001$). There was no statistically significant difference between the mean age of patients with malignant metastatic disease (mean 64.6 years, 95 per cent CI 60.1–69.4), compared with primary parotid malignancy ($p = 0.0704$).

The incidence of benign parotid histology was calculated after excluding patients beyond a certain age threshold. Results are shown in Figure 2. In patients aged less than 63 years, the incidence of benign disease was 80 per cent.

Based on this result, we recalculated using 60 years as a simpler threshold age. Of the 107 patients aged 60 years or less, 89 (83.2 per cent) had benign disease whilst only 18 (16.8 per cent) had malignant disease. Of the 90 patients aged more than 60 years, 32 (35.6 per cent) had benign disease and 58 (64.4 per cent) had malignant disease. Comparison of the ratios of benign to malignant disease for the two age groups showed a statistically significant difference ($p < 0.0001$). Patients older than 60 years of age were more likely to have malignant disease than those aged 60 years or less (odds ratio 8.9, 95 per cent CI 4.6–17.4). In addition, patients over 60 years of age were more likely to have parotid skin malignancy metastases, compared with younger patients (odds ratio 14.2, 95 per cent CI 4.9–42.2).

In summary, although patients older than 60 years of age accounted for only 45.7 per cent of all patients presenting with a parotid mass, 76.2 per cent of malignancies occurred in this age group.

Discussion

Traditional medical teaching states that 80 per cent of salivary gland neoplasms occur in the parotid, 80 per cent of these are benign, and approximately 80 per cent of these benign lesions are diagnosed as pleomorphic adenoma. Due to the overall rarity of salivary gland tumours, precise population data on the incidence and distribution of pathology are scarce; however, the classic 80 per cent approximation is corroborated by those population studies available.[4,5]

https://doi.org/10.1017/S0022215110001088 Published online by Cambridge University Press

TABLE I

HISTOLOGICAL DIAGNOSES OF PATIENTS PRESENTING WITH PAROTID MASS

Pathology	Pts (*n*)
Metastatic malignancy	
SCC, skin primary	24
SCC, primary unknown	8
SCC, aerodigestive tract primary	4
SCC, metastatic spindle cell carcinoma	1
Malignant melanoma	11
Primary malignancy	
Adenocarcinoma (NOS)	5
Salivary duct carcinoma	2
Lymphoma	4
Marginal zone B cell lymphoma*	4
Acinic cell carcinoma	3
Mucoepidermoid carcinoma	3
Basal cell carcinoma	2
Adenoid cystic carcinoma	1
Carcinosarcoma ex-pleomorphic adenoma	1
Chondrosarcoma ex-pleomorphic adenoma	1
Sarcoma of peripheral nerve origin	1
Neuroendocrine carcinoma of parotid	1
Total malignancies	76
Benign lesions	
Pleomorphic adenoma	60
Warthin's tumour	20
Chronic sialadenitis	9
Lipoma	7
Basal cell adenoma	3
Myoepithelioma	3
Lymphoepithelial cyst	3
Normal gland	3
Recurrent pleomorphic adenoma	2
Haemangioma	2
Lymphangioma	2
Inclusion cyst	2
Masseter haemangioma	1
Cat scratch disease	1
Cystic hygroma	1
Radiation changes	1
Tuberculosis	1
Total benign lesions	121

*Previously termed maltoma. Pts = patients; SCC = squamous cell carcinoma; NOS = not otherwise specified

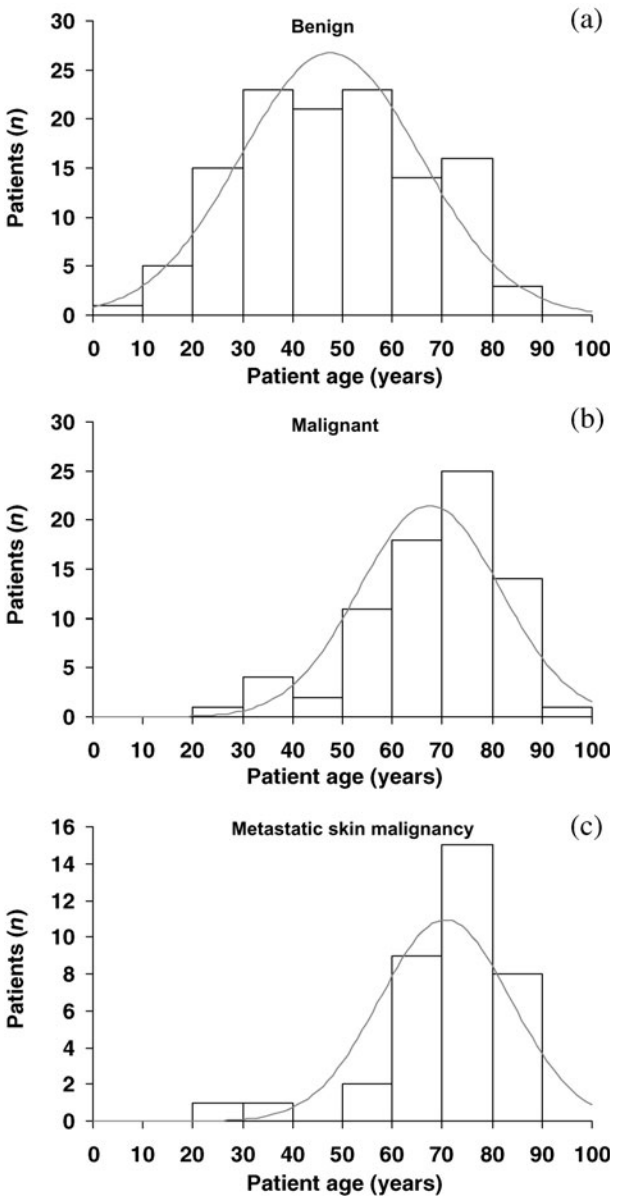

FIG. 1

Age distribution of patients presenting with a parotid mass, for (a) benign disease (mean, 47.6 years), (b) malignant disease (mean, 67.5 years) and (c) metastatic skin malignancy (mean, 70.6 years). The continuous line represents the normal plot.

Parotidectomy with histological examination remains the 'gold standard' for parotid mass assessment. The role of FNA in the investigation of patients with parotid masses is controversial. Some surgeons perform the procedure in all such patients, while others use it only selectively.[3,6] Those who perform FNA for all patients presenting with a parotid mass believe it to be beneficial in certain clinical scenarios, such as patients with metastatic or malignant disease, for whom pre-operative diagnosis enables appropriate counselling regarding the extent of surgery (including the risk of facial nerve sacrifice) and the exact surgical plan (particularly whether selective neck dissection will be performed). Fine needle aspiration may also permit the diagnosis of conditions best managed by non-operative means, such as lymphoma; and in those patients with high perioperative risk, due to concomitant medical morbidities. Further support for universal FNA of parotid masses comes from a recent study showing that a pre-operative diagnosis of malignancy (based on parotid mass FNA) may result in a more complete surgical resection.[7]

The principal argument against performing FNA for all parotid lesions is that almost all patients will ultimately require a parotidectomy for diagnosis, and that, based on the 80 per cent rule, the majority of lesions are expected to be benign and will be adequately treated by parotidectomy. In addition, cytological interpretation is difficult, requiring an experienced cytopathologist with an interest in salivary gland disease. This diagnostic challenge may potentially result in a delay in diagnosis.[8]

The reported sensitivity and specificity of FNA in the diagnosis of parotid lesions vary from 69 to 96 per cent, while its reported sensitivity and specificity in the diagnosis of malignant lesions range from 57 to 88 per cent and from 86 to 100 per cent, respectively.[3,9–18] Furthermore, if insufficient tissue is

https://doi.org/10.1017/S0022215110001088 Published online by Cambridge University Press

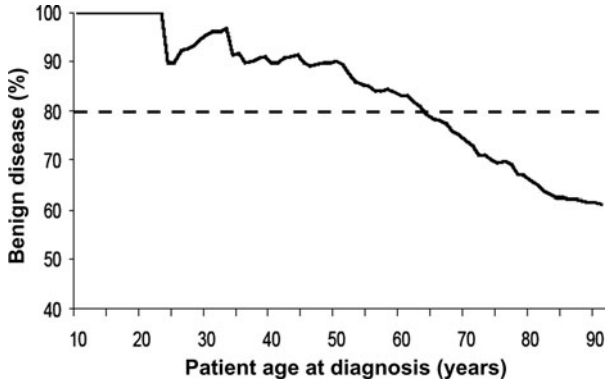

FIG. 2

Patients' incidence of benign disease, compared with all parotid pathology, versus patient age at diagnosis. In patients aged 63 years of age or less at diagnosis, 80 per cent of parotid masses had a benign histological diagnosis.

aspirated the procedure will need to be repeated, potentially causing further delay. Finally, parotid gland FNA is not without complications, with reported cases of parotitis and haematoma formation (which in turn make surgical dissection more difficult).[19]

Our study found that older patients presenting with parotid masses were more likely to have malignant disease. Patients with a malignant parotid mass were on average 20 years older than those with a benign mass. In our patient population, the assumption that 80 per cent of parotid lesions are benign was only true for patients younger than 60 years. We found that 64.4 per cent of patients older than 60 years had malignant disease. Whilst this finding seems logical, we wish to use it to emphasise that the majority of patients older than 60 years who present with a parotid mass will ultimately be diagnosed with a malignant condition. Therefore, these patients will probably benefit from pre-operative diagnosis of malignancy. Hence, we propose that if a surgeon wishes to perform pre-operative FNA on only selected patients, age should be an important consideration, and that a selective approach is not appropriate in patients older than 60 years.

The overall incidence of benign disease in our study was 61 per cent, lower than expected. This finding is probably due to the fact that our institution is a tertiary referral centre for head and neck malignancy, and therefore treats a higher than expected number of patients with metastatic cutaneous carcinoma to the parotid gland. Other tertiary referral centres have also found an unexpectedly high rate of malignancy.[3]

Metastatic cutaneous malignancies to the parotid gland have an estimated incidence of 0.1 to 10 per cent; in some populations, these represent the commonest type of parotid malignancy.[20] The vast majority of such metastases are from squamous cell carcinoma, followed by malignant melanoma. We found a similarly high rate of metastatic disease in our parotidectomy patients, of 19.2 per cent. Patients with metastatic skin malignancies in the parotid gland were older, with a median age of 74 years; of our 36 patients with metastatic skin disease to the parotid, only four (11.1 per cent) were aged 60 years or less. This finding supports the role of FNA in older patients or those with a history of head and neck cutaneous malignancy, in order to maximise pre-operative identification of malignant disease.

- **The role of fine needle aspiration cytology in the pre-operative evaluation of patients presenting with parotid masses is controversial**
- **This study found that older patients were more likely to suffer from primary malignant parotid tumours or secondary deposits of malignant skin tumours, compared with younger patients**
- **Fine needle aspiration should be performed in all patients presenting with a parotid mass who are aged 60 years or older**

The rationale for selective performance of parotid mass FNA is based on maximising the identification of malignant and metastatic disease, whilst not delaying diagnosis in those patients with a benign process. Previous guidelines published by Cohen *et al.* proposed that FNA be performed selectively in patients with: (1) a history of head and neck or aerodigestive tract malignancy; (2) a history of non-head-and-neck solid tumours; and/or (3) suspected non-salivary pathology.[3] However, we feel that these guidelines should be amended to incorporate the need for FNA in any patient aged 60 years or more presenting with a parotid mass.

To clarify, we emphasise that we do not wish to discourage the use of FNA in patients younger than 60 years. Rather, we recommend that all patients older than 60 years who present with a parotid mass should undergo mandatory FNA, regardless of whether the local policy specifies selective or universal FNA.

Conclusion

This study demonstrated that parotid gland malignancy (both primary and metastatic) occurred more commonly in older patients. We recommend that, regardless of local protocol, a policy of universal FNA should be advocated in all patients aged 60 years or more who present with a parotid mass. Furthermore, the previously suggested guidelines for selective FNA of parotid masses should be amended to ensure that all patients aged 60 years or more undergo FNA during their initial investigation.

References

1 Scottish Intercollegiate Guidelines Network. *Diagnosis and Management of Head and Neck Cancer*. Scottish Intercollegiate Guidelines Network: Edinburgh, 2006;8
2 American Head and Neck society. Practice Guidelines: Parotid. In: http://www.headandneckcancer.org/clinicalresources/docs/parotid.php [23 April 2010]

https://doi.org/10.1017/S0022215110001088 Published online by Cambridge University Press

3 Cohen EG, Patel SG, Lin O, Boyle JO, Kraus DH, Singh B *et al*. Fine-needle aspiration biopsy of salivary gland lesions in a selected patient population. *Arch Otolaryngol Head Neck Surg* 2004;**130**:773–8
4 Pinkston JA, Cole P. Incidence rates of salivary gland tumours: results from a population-based study. *Otolaryngol Head Neck Surg* 1999;**120**:834–40
5 Eveson JW, Cawson RA. Salivary gland tumours. A review of 2410 cases with particular reference to histological types, site, age and sex distribution. *J Pathol* 1985;**14**:51–8
6 Alphs HH, Eisele DW, Westra WH. The role of fine needle aspiration in the evaluation of parotid masses. *Curr Opin Otolaryngol Head Neck Surg* 2006;**14**:62–6
7 Lin AC, Bhattacharyya N. The utility of fine needle aspiration in parotid malignancy. *Otolaryngol Head Neck Surg* 2007;**136**:793–8
8 Batsakis JG, Sueige N, el-Nagger AK. Fine needle aspiration of salivary glands: its utility and tissue effects. *Ann Otol Rhinol Laryngol* 1992;**101**:185–8
9 Al-Khafaji BM, Nestok BR, Katz RL. Fine-needle aspiration of 154 parotid masses with histologic correlation: ten-year experience at the University of Texas M. D. Anderson Cancer Center. *Cancer* 1998;**84**:153–9
10 Postema RJ, van Velthuysen ML, van den Brekel MW, Balm AJ, Peterse JL. Accuracy of fine-needle aspiration cytology of salivary gland lesions in the Netherlands Cancer Institute. *Head Neck* 2004;**26**:418–24
11 Zbaren P, Schar C, Hotz MA, Loosli H. Value of fine-needle aspiration cytology of parotid gland masses. *Laryngoscope* 2001;**111**:1989–92
12 Lurie M, Misselevitch I, Fradis M. Diagnostic value of fine-needle aspiration from parotid gland lesions. *Isr Med Assoc J* 2002;**4**:681–3
13 Cajulis RS, Gokaslan ST, Yu GH, Frias-Hidvegi D. Fine needle aspiration biopsy of the salivary glands: a five-year experience with emphasis on diagnostic pitfalls. *Acta Cytol* 1997;**41**:1412–20
14 Zbaren P, Nuyens M, Loosli H, Stauffer E. Diagnostic accuracy of fine-needle aspiration cytology and frozen section in primary parotid carcinoma. *Cancer* 2004;**100**: 1876–83
15 Seethala RR, LiVolsi VA, Baloch ZW. Relative accuracy of fineneedle aspiration and frozen section in the diagnosis of lesions of the parotid gland. *Head Neck* 2005;**27**:217–23
16 Contucci AM, Corina L, Sergi B, Fadda G, Paludetti G. Correlation between fine-needle aspiration biopsy and histologic findings in parotid masses: personal experience. *Acta Otorhinolaryngol Ital* 2003;**23**:314–18
17 Balakrishnan K, Castling B, McMahon J, Imrie J, Feeley KM, Parker A *et al*. Fine needle aspiration cytology in the management of a parotid mass: a two centre retrospective study. *Surgeon* 2005;**3**:67–72
18 Stow N, Veivers D, Poole A. Fine-needle aspiration cytology in the management of salivary gland tumors: an Australian experience. *Ear Nose Throat J* 2004;**83**:128–31
19 Bahar G, Dudkiewicz M, Feinmesser R, Joshua BZ, Braslavsky D, Popovtzer A *et al*. Acute parotitis as a complication of fine-needle aspiration in Warthin's tumor. A unique finding of a 3-year experience with parotid tumor aspiration. *Otolaryngol Head Neck Surg* 2006;**134**:646–9
20 Van Lierop AC, Fagan JJ. Parotidectomy in Cape Town – a review of pathology and management. *S Afr J Surg* 2007;**45**: 9/6–8

Address for correspondence:
Mr Stephen Kieran,
Department of Otolaryngology, Head and Neck Surgery,
Royal Victoria Eye and Ear Hospital,
Adelaide Rd, Dublin 2, Ireland.

E-mail: skieran@rcsi.ie

Mr S Kieran takes responsibility for the integrity of the content of the paper.
Competing interests: None declared