The benefits of on-site cytology with ultrasound-guided fine needle aspiration in a one-stop neck lump clinic

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ABSTRACT

INTRODUCTION In the National Institute for Health and Clinical Excellence (NICE) guidance on cancer services published in 2004, it was recommended that specialist clinics should be set up for the assessment of patients with neck lumps, structured in a similar way to one-stop breast lump clinics with a cytopathologist present and preferably ultrasound guidance. The aim of this study was to audit the performance of ultrasound-guided fine needle aspiration (FNA) with on-site cytology in a one-stop neck lump clinic at The Royal Liverpool University Hospital.

PATIENTS AND METHODS Data were collected between November 2008 and May 2009 (7 months). Details of the adequacy rate for the FNA were recorded and whether multiple passes were required. The likely adequacy rate if ultrasound guidance was not available was also calculated.

RESULTS A total of 274 patients were included in the audit. Of these, 227 (83%) patients required a single pass for adequate diagnostic material. Of the remaining, 45 (16%) required two passes and 2 (1%) required three passes. The overall sample inadequacy rate was 11 of 274 (4%). From these results, it could be predicted that, if immediate cytological evaluation was unavailable, the inadequacy rate would have been 41 of 274 (15%).

CONCLUSIONS This audit has illustrated the benefits of a one-stop clinic with on-site cytology in providing a rapid diagnostic head and neck cancer service.

KEYWORDS

Head and neck neoplasms – Diagnosis – Audit – Biopsy-fine needle

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Fine needle aspiration (FNA) cytology is an established initial investigation for lesions in the head and neck because it is cost effective, quick to perform, carries a low morbidity, is acceptable to patients and has high diagnostic accuracy.^{1–4} The cost effectiveness and diagnostic accuracy of FNA can be increased by using ultrasound guidance, but this can be improved further by having a cytologist in the clinic to assess the samples, allowing an immediate repeat aspirate to be taken if required.^{5–8}

Recommendations for improving head and neck cancer services entitled *Improving outcomes in head and neck cancers* were published by the National Institute for Health and Clinical Excellence (NICE) in November 2004.⁹ This document, which came into force in 2008, recommends the establishment of specialist clinics for optimum management of patients with neck lumps. Such clinics are to be structured in a similar way to one-stop breast lump clinics with a cytopathologist present and preferably ultrasound

guidance. The recommendations do acknowledge that significant cost implications are associated with the establishment of such rapid access clinics, which were estimated to be £20,000 per clinic per year. At the same time, all trusts providing cancer care are striving to comply with the cancer waiting time targets introduced by the Department of Health in the NHS *Cancer Plan 2000*¹⁰ and revised in the *Cancer Reform Strategy 2007*.¹¹ These include a 2-week standard from urgent general practitioner (GP) referral to first hospital assessment, a 31-day standard from diagnosis/decision to treat to first treatment and a 62-day standard from urgent GP referral to first treatment.

With the current waiting time initiatives, one-stop clinics with on-site cytology benefit both the patient and the trust by reducing time from referral to diagnosis, thereby helping to comply with national cancer targets and avoiding repeat visits for the patient.

Table 1 Ultrasound-guided FNAs performed between November 2008 and May 2009 with analyses of consequence of not having immediate cytological evaluation

	1 pass	2 pass	3 pass	Overall
Total number of samples thought to be adequate	227	45	2	274
Found inadequate on final report	4	6	1	11
Percentage	2%	11%	50%	4%
Potentially inadequate without on spot microscopy	4	35	2	41
Percentage	2%	78%	100%	15%

The Royal Liverpool University Hospital has run a one-stop neck lump clinic based on the framework recommended by NICE since 2006. The aim of this study was to audit our performance, comparing our adequacy rate with published figures and to assess the effect of immediate cytological assessment.

Patients and methods

Data were collected between November 2008 and May 2009 (7 months) from two clinics: (i) a dedicated one-stop neck lump clinic run by a consultant ENT surgeon, consultant radiologist and consultant cytopathologist; and (ii) a clinic run in a similar way by an endocrine surgeon receiving patients with possible thyroid pathology. In addition to this, some patients deemed to be less urgent were given appointments for ultrasound-guided FNA and these were also included in the audit. All the lumps were evaluated with ultrasound using a Toshiba scanner by one of two experienced consultant radiologists and a trainee registrar under direct supervision of a consultant. The majority of FNAs were performed under ultrasound guidance, unless the lesions were very superficial and could be sampled more easily by palpation. All the FNAs were performed by the cytopathologist using an aspirating technique, prepared by an experienced technician and then immediately examined by the cytopathologist. In the majority of cases, the aspirate was performed with a 21-G needle, although for some small or very superficial lesions a 25-G needle was used. For the purpose of our study, only FNAs performed under ultrasound guidance were considered during data collection.

All data were collected retrospectively from the radiology and pathology results on the hospital intranet. The number of passes required to obtain an adequate sample was recorded contemporaneously for each of the patients, making a note of the reason for the additional passes. The final cytology report was then checked to assess the overall inadequacy rate. A sample was considered inadequate when the final report indicated there was insufficient material for adequate diagnosis.

Results

A total of 274 patients were included in the audit and the results are summarised in Table 1, of these, 227 patients required a single pass for adequate diagnostic material (83%). Of the remaining 47 patients, 45 (16%) required two passes and two (1%) required three passes. Of the 45 patients who needed two passes, 34 (76%) required a second pass because the first sample was inadequate, two (4%) required a second pass to obtain additional material for immunocytochemistry and eight (18%) required two passes because one pass was to aspirate cyst contents for symptomatic relief rather than for diagnostic purposes. Both aspirates were inadequate in one case (1%) but a third pass was not attempted due to technical difficulty. Two of 274 patients required three passes because the first two aspirates were inadequate.

More than three passes were not attempted in any patient because either the procedure was considered technically challenging and further attempts were also likely to be non-diagnostic, or because a diagnosis was reached with sufficient confidence using the combined expertise of the radiologist and the pathologist.

On review of the final pathology report, four of 227 patients where one aspirate was initially thought to be satisfactory, were reported as inadequate (2%; Fig. 1). Six of the 45 cases where two aspirates were initially thought to be satisfactory, were reported as inadequate (11%) and one of two where three aspirates were initially thought to be sufficient, were reported as inadequate (50%). This gave us an overall sample inadequacy rate of 11 out of 274 (4%) patients.

The results were then analysed further to assess the likely inadequacy rate if on-the-spot cytological evaluation was not available (Fig. 2). In the absence of immediate cytological evaluation, two of 274 patients where three aspirates were required would have come back as inadequate. From the 45 cases where two aspirates were obtained we excluded two cases where extra tissue was obtained for immunocytochemistry and eight cases where cysts were aspirated to

dryness. The remaining 35 of 45 aspirates would have come back as inadequate if there was no immediate cytological evaluation. In addition, four of 227 cases where one aspirate was obtained would also have been inadequate. This would have given an inadequacy rate of 41 of 274 (15%) cases. The presence of on-site cytological evaluation reduced the number of inadequate samples from 41 to four which amounted to a significant 90% drop in number of inadequate samples.

From this, it is clear that without immediate cytological evaluation, if a single aspirate was performed routinely, 225 of 274 patients would have had sufficient material to assess

morphology, but two of these would not have had material required for necessary immunocytochemistry to be performed. If two aspirates were performed routinely, 263 of 274 patients would have had sufficient material aspirated with potentially additional material for immunocytochemistry, but 225 patients would have had unnecessary second aspirates performed.

Discussion

The term head and neck cancer covers a wide range of cancers which have shown an increase in registration rate over the last three decades. Taking into account regional variations, the incidence of head and neck cancer ranges between 8–15 per 100,000 in England and Wales.⁹ Evidence suggests that delay in diagnosing the cancer has been a major factor in the poorer survival rates in the UK compared with some other countries in Europe.¹²

NICE published its recommendations for improving head and neck cancer services in November 2004, providing comprehensive advice focusing on the commissioning of services, relevant to all trusts providing head and neck cancer services in the UK.⁹ The document recommends establishment of specialist neck lump clinics based on the format of one-stop breast clinics and advocates FNA of all suspicious neck lumps for tissue diagnosis.

Ultrasound is well established as a primary investigation for patients presenting with a lump in the neck^{1–6} and a tissue diagnosis of cancer is mandatory prior to treatment initiation.

FNA for head and neck tumours was first described in the 1930s by Martin *et al.*¹³ Over the last half century, clinician-performed palpable FNA gradually fell into disrepute in favour of ultrasound-guided FNA performed under direct visualisation.^{7,14–16} Palpable FNAs are associated with high inadequacy rates primarily due to poor needle position, lesion inhomogeneity and poor aspiration.¹⁷ This leads to delay in definitive diagnosis and treatment initiation which has profound implications for trusts trying to meet national cancer targets. Ultrasound provides information on the site of origin and characteristics of the lump. It is an ideal technique for targeting FNAs as it provides real-time images with accurate delineation of the target and adjacent anatomical structures. Targeting areas of interest within the lump, avoiding necrotic and cystic areas, is easily achieved. Ultrasound also provides the opportunity of sampling impalpable lesions.

A recently published, randomised, controlled trial looking at ultrasound-guided surgeon-performed FNA reported an inadequacy rate of 16%. Ultrasound guidance resulted in a statistically significant advantage for thyroid tissue sampling; however, no significant advantage was seen in case of lymphatic and salivary tissue.¹⁸

The FNA can be performed by a radiologist, a trained clinician, or a pathologist. A cytopathologist in the clinic is considered to be the gold standard;^{1,6,19,20} in addition, it has been shown that the diagnostic yield of the FNA is higher when the person interpreting the slides is the same as the person performing the procedure.¹ It gives the cytopathologist the benefit of better correlation of the clinical situation, imaging findings and microscopic findings. Appreciation of the clinical context in which material is being reported is recognised as being essential in avoiding diagnostic errors in FNA assessment.²¹ An immediate provisional diagnosis can be given in most cases or, if necessary, a repeat aspiration can be performed.^{5,6} This includes taking specimens for other relevant investigations such as immunocytochemistry which would otherwise have to be done at another appointment.^{7,8}

However, such a set-up is expensive, with a pathologist currently costing approximately £81 per hour in the UK and a specialist cytology technician costing £20 (based on NHS mid-point salary costs); in addition, in many centres there are insufficient cytology resources to provide an on-site FNA service performed by a cytopathologist.⁷ Alternatives include the provision of an experienced cytology technician for preparing the slides in the clinic which plays a significant role in increasing rates of accuracy and adequacy.²² This reduces the costs and may allow some assessment of adequacy, but immediate reporting to support a 'one-stop' service is not possible.

The overall inadequacy rate in this study was 4%. This is similar to figures published by authors running a similar one-stop clinic elsewhere.^{7,18,25,24} Our figures compare very favourably with some of the published figures of inadequacy rates for ultrasound-guided head and neck lesions where the FNAs were performed by clinicians using ultrasound guidance.²⁵⁻²⁷ Although one of the reports²⁶ has the benefit of on-site cytological evaluation, the inadequacy rate achieved remained 15%. Figures similar to ours were reported from set-ups where the FNA samples were obtained either by a cytopathologist or a combined radiologist and cytopathologist approach. Such figures highlight the importance of establishing clinics where the cytopathologist not only interprets the slide but also performs the FNA.¹

Our analysis of a 90% reduction in the number of inadequate samples with on-site cytology also compares well with work done by others.^{7,14,15}

The current NHS targets for cancer management are 62 days from urgent GP referral to first treatment and 51 days from diagnosis/decision to first treatment. With a maximum of 2 weeks allowed from referral to first consultation, this can leave as little as 17 days for diagnosis. Even with a 'one-stop clinic', the definitive ultrasound and cytology results are unlikely to be available for discussion

at a multidisciplinary team meeting in less than a week. If on-site cytology were not available, 15% of the patients sampled in this study would have required repeat biopsy, resulting in another 1 week delay at least. This would leave very little time for any further tests or imaging for staging, should this be required within the time set by the targets. Specialist cytology services are not available in all hospitals, but the results of this audit suggest that on-site cytology for head and neck oncology clinics is desirable for an optimal service. Where there is a limitation of available cytological expertise, it may be advisable to consider centralising these clinics into those hospitals which can provide on-site cytology services.

Conclusions

This audit has illustrated how a one-stop head and neck cancer clinic with integral on-site cytology can improve the diagnostic service to patients and can also benefit Trusts in helping them to achieve the referral to treatment targets for cancer patients.

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