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Outcome of image-guided biopsies: Retrospective review of the West of Scotland musculoskeletal oncology service[☆]

Kim B. Ferguson, Jennifer McGlynn, Michael Jane, David Ritchie,
Ashish Mahendra^{*}

Bone and Soft Tissue Sarcoma Service, Glasgow Royal Infirmary, 84 Castle Street, Glasgow G4 0SF, United Kingdom

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ABSTRACT

Introduction: Image-guided needle biopsy of a suspected musculoskeletal malignancy has become increasingly popular as an effective modality for diagnosis. Our aim was to determine accuracy and success rates of the image guided biopsies performed by our service.

Methods: A retrospective review of the Bone and Soft Tissue Sarcoma service database was performed to identify all patients who underwent image guided biopsy and to identify the results of such investigations. Patients who had an open biopsy or a biopsy performed at another institution were excluded from this review. A biopsy was deemed successful if a sample of the target lesion was sampled at the time of biopsy. The successful biopsies were then classified as diagnostic or non-diagnostic depending on whether the diagnosis was established from the sampled tissue.

Results: 465 of the 1181 new referrals to the Bone and Soft Tissue Sarcoma service in a 4 year period underwent biopsy. 75% (350) were image guided biopsies – 60% (281) ultrasound and 15% (69) CT guided. The rate of successful ultrasound guided biopsy was 94.7% and the rate of a successful diagnostic biopsy was 93.6%. CT guided biopsies were successful in 95.7% and were both successful and diagnostic in 79.7%.

Discussion: The rate of a successful diagnostic ultrasound biopsy within our institution reflects the reported rate within the literature. The rate of a successful diagnostic CT guided biopsy is lower however is also consistent with that reported within the literature. Low grade lipomatous lesions and chondroid lesions of undetermined malignant potential (CLUMP) are associated with a more difficult histological diagnosis on biopsy alone which is consistent with our findings. For this reason our institution has stopped performing routine image guided biopsies on these lesions. Radiological low grade lipomatous lesions are treated with marginal excision and all CLUMP lesions undergo open biopsy.

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[☆] This paper demonstrates that the published success rates of image guided biopsies are obtainable in routine practice.

^{*} Corresponding author. Glasgow Royal Infirmary, 84 Castle Street, Glasgow, Scotland, United Kingdom.

E-mail address: Ashish.mahendra@ggc.scot.nhs.uk (A. Mahendra).

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Introduction

Biopsy of a suspected musculoskeletal malignancy is of the utmost importance. It should be performed in a manner which does not jeopardise the potential surgical treatment of a soft tissue sarcoma by contaminating associated soft tissues. In 1982 Mankin proposed that all musculoskeletal biopsies should be planned carefully and performed by an institution which would proceed to definitive treatment of a potential soft tissue sarcoma.¹

Historically all biopsies were performed via an open surgical biopsy, which remains the gold standard for some. The reported accuracy of an open surgical biopsy either incisional or excisional has been reported as high as 98%.^{2,3} However needle biopsy has been shown to be an effective diagnostic modality for musculoskeletal tumours using either ultrasound or CT guidance to sample the appropriate site.^{4–6} The reported accuracy of image guided biopsy varies but is estimated as between 78 and 98.4%.^{5,6}

The aim of this retrospective review was to identify the accuracy of the image guided biopsies performed in our tertiary referral sarcoma service. New referrals to our service are discussed at a musculoskeletal radiology conference in conjunction with the musculoskeletal radiologists and orthopaedic oncology surgeons. For those patients that require a biopsy, the appropriate modality and approach is discussed between members of the multidisciplinary team. This allows for image guided biopsy to be performed in a way that does not jeopardise future surgical treatment options for the patient.

Methods

A retrospective review of the departmental musculoskeletal oncology service database was performed. This database contains data on all the new referrals to the bone and soft tissue service since its creation in 2009. It also contains information on the diagnosis, investigations, treatment and outcome of each patient.

The information held on the database and notes for each patient were reviewed to determine whether a diagnostic biopsy had been performed. If so, the type of biopsy was documented along with the pathology results. For patients who then went on to surgical excision the final pathology result was also documented. Open biopsies and patients who had biopsies performed elsewhere were excluded from the analysis. There were no cases in which a biopsy was performed in a clinic setting.

In our practice all soft tissue tumours and bony tumours with a soft tissue component undergo ultrasound guided biopsy. Bony neoplasms with no soft tissue component under CT guided biopsy. All patients considered for an image guided biopsy are discussed at the weekly Musculoskeletal Radiology Conference. In attendance at the conference is a musculoskeletal radiologist, orthopaedic oncology surgeon and an Orthopaedic Oncology Specialist Nurse. Each biopsy is discussed and planned with the approach documented. For soft tissue lesions, or bony lesions with soft tissue extension a

cut biopsy needle is used and for isolated bony lesions a trephine needle is used. All biopsies are reported by a trained musculoskeletal pathologist, who is a member of the Scottish Sarcoma Network. All sarcoma cases undergo dual reporting.

A biopsy was considered successful if tissue from the target lesion was captured and reviewed by the pathology team. A non-diagnostic successful biopsy was classified as a biopsy which had a sample of the target tissue but the diagnosis could not be established from the available sample. For our purposes, a diagnosis included the differentiation of benign from malignant lesions but also the subtype of neoplasm. If there was a discrepancy between the biopsy and surgical diagnoses then this was classified as a non-diagnostic biopsy.

Results

A total of 1181 patients were referred to the orthopaedic oncology service from January 2009 to January 2013. 465 patients underwent biopsy to determine diagnosis at our institution (39.3%). 350 patients had an image guided biopsy – 69 CT guided and 281 ultrasound guided biopsies were performed. 115 biopsies were performed surgically either an open biopsy or excisional biopsy (Fig. 1 – Cohort Diagram). In the image guided cohort, the target lesion was identified and biopsy attempted in all patients.

There were 281 ultrasound guided biopsies performed within the study period. The success rate of the ultrasound guided biopsies was 94.7%, that is 266 of the 281 ultrasound guided biopsies successfully sampled tissue from the target lesion. 9 of the unsuccessful biopsies required further intervention with either an open or excisional biopsy. Of the 266 successful biopsies 8 were considered non-diagnostic. 4 patients had a further biopsy and the diagnosis established in 2 of them. 3 patients had a different diagnosis following surgical excision (all low grade lipomatous tumours in which the biopsy). In the remaining patient the biopsy was not repeated

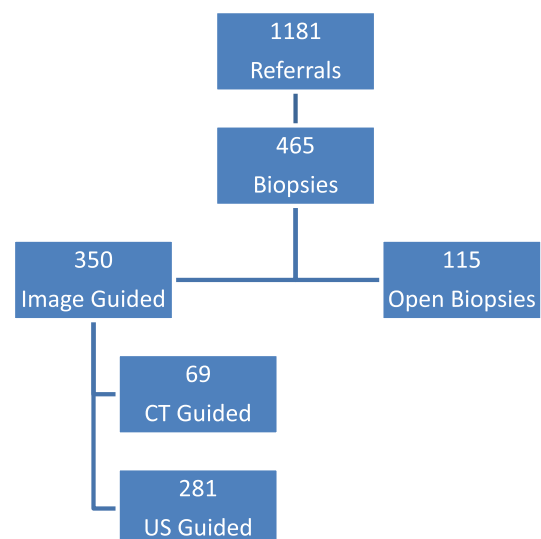


Fig. 1 – Cohort diagram.

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