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Review

Tumours of the foot and ankle

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HIGHLIGHTS

- Sarcomas are rare tumours and particularly rare in the foot and ankle region.
- Bone and soft tissue tumours in the foot and ankle region can present as a painless or painful mass and maybe as incidental finding.
- The complex anatomy of the foot and ankle region makes any surgery challenging, particularly limb salvage in cases of malignant tumours.
- Clinicians should follow the basic principles for investigations of any lump in this region and refer them on to a specialist unit if there is any doubt.
- All these lesions should be managed in a designated bone tumour unit for optimum outcome.

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ABSTRACT

Sarcomas are rare tumours and particularly rarer in the foot and ankle region. The complex anatomy of the foot and ankle makes it unique and hence poses a challenge to the surgeon for limb salvage surgery. Other lesions found in the foot and ankle region are benign bone and soft tissue tumours, metastasis and infection.

The purpose of this article is to discuss the relevance of the complex anatomy of the foot and ankle in relation to tumours, clinical features, their general management principles and further discussion about some of the more common bone and soft tissue lesions. Discussion of every single bone and soft tissue lesion in the foot and ankle region is beyond the scope of this article.

Contents

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1. Introduction

It is estimated that sarcomas comprise 0.2% of all tumours and only 2% of all the sarcomas arise in the foot and ankle region [1]. Tumours are reasonably common in the foot and ankle region but based on just clinical examination it is difficult to distinguish benign from malignant lesions. This can lead to the inadvertent "whoops procedure" necessitating further treatment due to lack of surgical clearance, high risk of local recurrence and metastasis due to the rich vascular and lymphatic network in this region [2,10]. Negligence in clinical workup and awareness of some common tumours in this region along with abiding by the general management principles of any lump would reduce error.

2. Anatomy

The foot is a unique anatomic structure with many critical functional units in close proximity. The unique feature of this region is the presence of small bones, small epiphysis, thin cortices, muscles being arranged in various layers in very close proximity to each other and lack of fascial barriers. Because of these features there is early bone destruction which along with the high vascular and lymphatic network makes wide excision very challenging for the surgeon and amputation may be the only safe option.

3. Clinical presentation

The commonest presentations of any tumour in the foot and ankle region are pain and a lump [7]. Certain tumours are common in particular age groups and this helps in narrowing down the diagnosis along with specific location within the bone.

Pain at rest should be considered a worrying feature and sometimes its response to a particular analgesic, non-steroidal anti inflammatory drugs, can point to a specific diagnosis (Osteoid osteoma). Because of the complex and tight anatomical structure of this region, any lump would be expected to declare itself early in the disease process, particularly over the dorsal aspect of the foot due to the relative scarcity of soft tissues in comparison to the plantar side.

Occasionally, a lump may have been present and dormant for many years but it suddenly starts growing or become symptomatic, in which case the physician should be alerted to the possibility of malignancy. Any change in a pigmented lesion should also be investigated properly as melanomas are not uncommon in this region [11]. Occasionally tumours in this region can present with neurological symptoms and this maybe a clue to its extent and location.

A detailed past medical history is also relevant as metastasis and secondary sarcomas (radiation induced) can also occur in this region. Acrometastasis from primary lung cancer are reported to be common but a study published from the senior authors institution suggests infra diaphragmatic cancers to be a more common cause [7].

4. Physical examination

A systemic approach to the examination of the foot and ankle region should be adopted. Comparison should be made with the contralateral side where possible. The commonest findings would be a lump, tenderness, pain on movement of the involved joints, sensory or motor neurological deficit and occasionally a deformity. The site, size, depth, consistency, tenderness, trans illumination and pulsatility of soft tissue lumps, adherence to joints and tendons should be evaluated. Although rare in sarcomas, but loco regional lymph nodes should be palpated. In case of any neurological symptoms, a detailed neurological examination should be conducted along with examination of the spine.

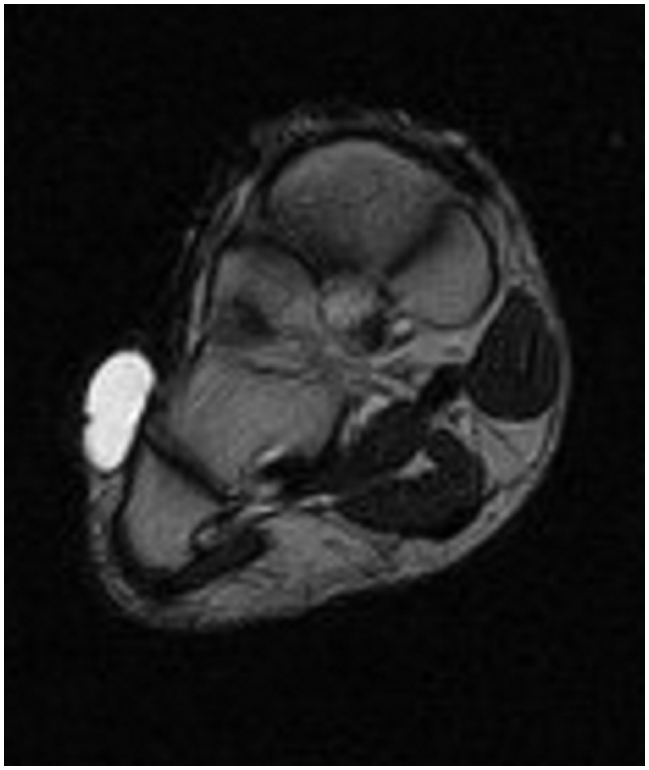

Fig. 1. Axial views of MRI scan demonstrating a ganglion of the dorsum of foot.

5. Management

The standard work up for any foot and ankle disorder will include an anteroposterior, lateral and oblique weight bearing radiograph. This is relatively cheaper, easily available and yields a lot of information. Bony and joint destruction in case of aggressive tumours is easily visible along with an outline of soft tissue lesions. Calcification within a soft tissue lump can point to a synovial sarcoma [12].

A well demarcated lesion in the bone with no significant cortical reaction or destruction will generally point towards a more benign lesion along with a narrow zone of transition and homogeneity. To gain further 3 dimensional detail about the bony architecture, CT scan is the investigation of choice particularly in cases where a surgeon would consider limb salvage surgery.

In order to assess the soft tissues, Ultrasonography and MRI scans are the investigations of choice. The former investigation is cheap, quick and easily available but its major drawback is operator dependence. Furthermore, it can also demonstrate the vascularity of the lesion.

Magnetic resonance scan provides extensive details about both soft tissue and osseous lesions including extent of tumour, constituents, anatomical relationship with other important structures and bony oedema. Infection and stress fractures can also be ruled out with this modality if there is a suspicion based on history and other investigations. A detailed history provided to the radiologist prior to the scan can aid them in obtaining the best sequences to obtain the diagnosis.

Nuclear medicine bone scans are performed in cases where metastasis are considered and also in the case of a known primary with no known previous metastasis. As a standard work up for any sarcoma, a chest X-ray or CT scan of the chest is also