Controversies in the Management of Metastatic Bone Disease

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Metastatic bone disease (MBD) is a significant issue in orthopaedic surgery. Extrapolation of cancer registries incidence and mortality data indicates that greater numbers of people are living with cancer. Both breast and prostate cancers - common tumours with MBD potential - have increasing incidence, yet mortality is reducing, reflecting a potential cancer burden in an ageing population.

Presenting with a fracture is not an automatic passport to surgery. However, the decision to operate is easier, usually to palliate, than whether to prophylactically operate on an asymptomatic, intact lesion. The decision-making process involves an understanding of the behaviour of the primary tumour, the likely prognosis and the location of the lesion and its risk of pathological fracture. The prognosis is usually relatively good in metastatic breast, renal, prostate and thyroid cancers. Virtually all other lesions have a poorer prognosis. Mirels’ score can be helpful but it should be applied with caution, as it lacks specificity. Further important predictive considerations are age, coexisting extra osseous disease, previous radiotherapy, and comorbidities.

Further important predictive considerations are age, coexisting extra osseous disease, previous radiotherapy, and comorbidities. It is difficult to accurately predict life expectancy, consequently, there has been increasing interest in developing a quantifiable measure of prognosis via biochemical markers. In many tumour groups an attempt has been made to determine their prognosis with inflammatory markers and other tumour specific data. Low haemoglobin and albumin or high C-reactive protein, urea, alkaline phosphatase, calcium, and platelets suggest a poorer prognosis. Unfortunately, these parameters have limited use in guiding management in patients with functionally debilitating disease.

Of minimal scientific value, but no less relevant is ‘the end of bed test’. Will the patient tolerate major surgery? Does the patient want to undergo surgery? In metastatic disease the end of the bed...
test can be misleading. When comparing an elderly patient with multiple comorbidities and an osteoporotic neck of femur fracture to a patient with metastasis – the patients with the metastasis often appear healthier. However, the cancer patients’ physiologic reserve and therefore their ability to cope with the trauma of the surgical insult are more important. The blood indices and trend in these are a valuable indicator. In the presence of visceral disease the reserve and ability to compensate is poor and therefore operative outcomes are less predictable.

Decisions are often made remotely without reviewing or including the patient. Nevertheless, the patient is central to the decision-making process and therefore should be integral to the discussion. The surgeon who would undertake the procedure, ideally one with an MBD subspecialty interest, should review the patient.

Work-up
Surgery following fracture is more challenging to the surgeon and the patient, with increased mortality and morbidity. On the other hand in patients who have an intact lesion, the decision whether to operate, or not, is challenging, as surgery has risks which need to be balanced against potential benefits.

Metastatic disease is common in the proximal femur, and the patients are often admitted as an emergency with a neck of femur fracture. The tariff uplift for getting to theatre in less than 36 hours can be counterproductive in these patients. The importance of the NICE guidelines in optimising outcomes in standard NOF patients is recognised, and although the effect on MBD patients is not yet quantified, there is concern that some patients will undergo substandard surgery in the rush to get them to theatre. The potential consequence for patients where malignancy is present is a missed diagnosis due to inadequate pre-operative investigation, or inappropriate surgery performed as a result of the lack of availability of an experienced surgeon. There is no medical urgency for theatre. Investigate, discuss and plan with the patient and their family.

The standard work-up for these patients includes; plain radiographs and MRI of the whole bone, to plan the implant and approach. A biopsy should be considered where doubt remains. A CT scan of the chest, abdomen and pelvis is indicated if the primary is unknown.

What technique/implant?
Metastatic bone disease patients can be divided into three groups:
1. Unwell pre-morbid
2. Solitary metastasis
3. The ‘unknowns’

For Group 1, patients have a time-limited prognosis and the MBD guidelines recommend conservative management if life expectancy is less than six weeks. The end of the bed test, with routine investigations/imaging is valuable in this group, facilitating decision making with the patient and family. Although surgery is used to palliate, it can also trigger a medicalised death. Therefore, development of links with local hospices and palliative care is recommended to support these patients without the need for surgery (Figure 1).

Patients with a solitary metastasis must be treated with caution, and the team should consider referral to a Bone Tumour Centre, as some patients with a solitary metastasis have a prolonged disease free interval when the tumour is excised, particularly breast and renal metastases. Solitary bone lesions should be biopsied to exclude a primary bone tumour that can be treated with curative intent (Figure 2).
Group 3, the ‘unknowns,’ are more difficult. They are often patients with a known history of malignancy. Expected survival and implant choice are key: arthroplasty / endoprosthesis or internal fixation with or without augmentation. Excision of the tumour and reconstruction may be indicated in those in whom lengthy survival is expected, whereas if a shorter survival is expected bracing, medical management or internal fixation may be appropriate. The oncologist should be consulted early and non-surgical management options such as hormonal, targeted therapies (e.g. denosumab) and radiotherapy may be offered for disease control.

There is an increasing body of evidence to support the use of replacement (Figure 3), rather than internal fixation in lower limb lesions. Upper limb lesions differ to lower limb lesions. In the lower limb there are effective solutions with arthroplasty and endoprostheses (EPR), resulting in good function and a similar surgical risk to internal fixation. However, in the shoulder, the functional outcome is significantly worse with EPR than after internal fixation. Furthermore, the demands on internal fixation are less; therefore in the upper limb internal fixation is more frequently used for metastatic bone disease.

Replacement can include standard implants, long-stemmed or revision type prostheses or EPR. Nevertheless arthroplasty has problems, such as infection and cost. These need to be balanced against the risk of multiple operations if a suboptimal implant is chosen as a consequence of surgeon preference/experience rather than evidence based modern oncological surgery.

Throughout this article we have referred to the MBD team. The BOA guidelines state that ‘all hospitals should have an orthopaedic MBD lead’. This is in recognition of the number of patients with MBD in general orthopaedic units, where specialist tumour advice is not available. A number of Trusts are developing their MBD service, which should improve the outcome for this group of patients. As the subspecialty develops we would hope to see investment into the multidisciplinary team, with specialist nursing, radiology, histopathology, and multidisciplinary input from oncology, haematology, palliative care, and orthopaedics.

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References
References can be found online at www.boa.ac.uk/publications/JTO or by scanning the QR Code.
References


