In recent years there has been significant improvement in the prognosis for patients with bone metastases due principally to advances in chemotherapy and hormonal treatment. This has been most marked for patients with carcinoma of the breast and prostate. In the UK, approximately 9000 women with breast cancer develop bone metastases of whom more than one-fifth will survive more than five years, often requiring repeated palliative intervention and treatment. Whenever possible, orthopaedic intervention should be prophylactic, but this requires a high level of awareness among the breast-care team, and a commitment on the part of orthopaedic surgeons.

The aims of surgery are to relieve pain and restore function. The procedure should provide immediate stability, the surgeon must assume that the fracture will not unite and fixation should aim to last for the lifetime of the patient.

Anecdotal evidence suggests that the orthopaedic management of bone metastases in the UK remains variable in quality, and that access to an orthopaedic opinion by oncologists, breast surgeons and others treating these patients is often limited.

A recent study by O'Donaghue, Howell and Walls on women with bone metastases from breast carcinoma, showed that when clinical review by an orthopaedic surgeon would have been appropriate, it was requested in less than 50% of cases. Against this background, a multidisciplinary working party under the chairmanship of Hugh Bishop, FRCS, Consultant General and Breast Surgeon in Nuneaton and Secretary of the BASO Breast Specialty Group, was set up in 1997 to establish guidelines for the management of metastatic bone disease in breast cancer in the UK. These are not proscriptive but attempt to outline clearly the type of multidisciplinary approach which is required for these patients.

The orthopaedic surgeon has three main roles in the management of these problems: (a) to undertake prophylactic fixation of metastatic deposits when there is a risk of fracture; (b) to stabilise or reconstruct after pathological fracture; and (c) to decompress the spinal cord and nerve roots and/or stabilise the spine.

The axial skeleton is the commonest site for bony metastases although most of those on which surgical intervention is carried out involve the femur, humerus or acetabulum. A pathological fracture is a disaster for such patients; if in the lower limb it results in loss of mobility, and in the upper removes independence and the ability to care for themselves.

In the appendicular skeleton the fractures are low-energy injuries, the degree of soft-tissue damage is generally small and extensive formation of haematoma rarely occurs. When fracture is likely to occur prophylactic fixation should be performed before the administration of radiotherapy. It is essential to have a reliable method of predicting the risk of pathological fracture. The observations of Fidler have given rise to the generally accepted opinion that when 50% of a single cortex of a long bone, as seen in any radiological view, has been destroyed, pathological fracture is almost inevitable. Avulsion of the lesser tuberosity is an indication of imminent hip fracture. In 1989, in an effort to provide a more reliable and reproducible measure of the risk of pathological fracture, Mirels devised a scoring system which is now widely used in the USA and is a useful aid to management. This simple classification was again outlined by Aaron in 1997. Lesions are scored out of three according to the site, the degree of pain, their size and the radiological appearance. For scores of nine or above, the risk of fracture is high and prophylactic fixation should be carried out before radiotherapy.

Surgical techniques. These are well established although clinical evidence suggests that they are still sometimes ignored. Load-bearing, rather than load-sharing, devices are preferred and in the diaphysis of long bones, intramedullary nailing is the procedure of choice with locking screws used when appropriate and major bone defects filled by methylmethacrylate. Apart from a solitary renal metastasis, the spread of tumour cells within the medulla by nailing is acceptable, but the entire bone should subsequently be included in postoperative radiotherapy. In the upper limb, particularly in the forearm where stresses are relatively low, plate fixation and augmentation with cement can be highly effective.
The management of fractures about the hip differs significantly from that of purely traumatic injuries. Speed of surgery is less important than preoperative planning and a full medical and radiological assessment should be made initially. There is no virtue in undue delay but these patients are almost always haemodynamically stable, and have not been subject to significant trauma. They can be nursed comfortably on bed rest or traction for several days while appropriate investigations are carried out. When destruction is limited to the femoral neck or head, a cemented hemiarthroplasty or total joint replacement is recommended as a primary procedure. Devices such as the dynamic hip screw are rarely indicated as they have a high rate of failure. Radiographs of the entire femur must be obtained before operation to exclude more distant disease as far as possible and long-stemmed implants may be used to reduce the risk of subprosthetic fracture. Extensive proximal femoral destruction is only treatable by endoprosthetic replacement, while periacetabular lesions should be reconstructed using threaded rods, reinforcement rings, bone cement and other techniques as described by Harrington. Patients with a life expectancy of less than six weeks rarely gain useful benefit from major reconstructive surgery, but the decision regarding any individual case must be taken by the breast-care team. Postoperative radiotherapy should be considered in all cases, once initial wound healing has occurred.

When is biopsy necessary? If there is the slightest doubt as to the nature of the pathology, and in particular when there is a solitary bony lesion, further investigations including scintigraphy, MRI and percutaneous bone biopsy should be carried out before definitive surgery. Nailing of a lesion of a long bone which proves to be a primary bone tumour is a disaster, spreading tumour cells throughout the marrow cavity, and often precluding limb-salvage surgery. Patients with a solitary renal metastasis have a good prognosis if the lesion is treated as a primary neoplasm. Referral to a regional centre is recommended.

Cost benefit. Prompt and appropriate surgical management of bony metastases is highly cost-effective, although controlled prospective trials to demonstrate this are difficult to construct, and probably unethical. The cost of surgery and of specialised implants is recovered within days if previously immobile patients can mobilise, or dependent patients become able to care for themselves. Inadequate orthopaedic treatment often leads to a need for costly revision surgery with increased suffering and potential complications.

Service delivery. The mechanism for delivery of an effective service for the orthopaedic management of bony metastases need not be complex or costly. At least one orthopaedic surgeon within each trauma team should be identified as the ‘lead clinician’ with responsibility for metastatic disease of the appendicular skeleton. The organisation of spinal services should also be addressed locally. Patients admitted to hospital with actual or imminent pathological fractures should be reviewed by that clinician or team during the next working day and a plan of management agreed. Complex cases, those involving a possible primary sarcoma, or requiring endoprosthetic, acetabular or custom surgery, need to be discussed with the supraregional orthopaedic oncology centre since concentration of experience improves clinical outcomes.

The lead clinician should take part in a weekly multidisciplinary clinical conference with the breast surgeon, medical oncologist, radiologist and other relevant personnel to review cases for which surgical intervention may be indicated. Combined clinics or parallel clinics may also be considered if the workload is sufficient. These are not essential, however, and may not always be an effective use of clinical time.

Purchasers of health care should require clear evidence that an appropriate strategy for the management of these patients is in place when allocating contracts for both trauma and cancer services, in order to provide a high-quality and timely service in line with the principles of the Calman-Hine Report. Orthopaedic surgery has much to offer cancer patients in terms of quality, and sometimes quantity of life. It is hoped that the recommendations of the working party will be widely debated among orthopaedic surgeons, and if they are acted upon a significant contribution to cancer services will have been made.

References