Introduction

Bone secondary is the commonest cause of skeletal tumour. The incidence is likely to increase, as cancer patients now survive longer. It will become one of the major medical and social problems in the future. Morbidity is substantial, and includes pain, fracture, neurological deficit and forced immobilization. Currently, the goal of management in most cases is palliation of pain and restoration of functional status. Patients are encouraged to stay in the community. The aim can only be achieved by the collaboration of all specialties taking care of these cancer patients.

Principles of management of bone secondaries

Pain, pathological fracture, cord and cauda equina compression, hypercalcaemia and bone marrow suppression are some of the common sequelae of bone secondaries. Theoretically, we should search for preventive measures to minimize the chance of new deposition and offer curative treatment whenever possible. Bisphosphonates¹, the potential candidate to prevent the new occurrence of skeletal metastasis, may have its role in breast cancer, multiple myeloma and prostate cancer. There are still a number of unsolved issues such as the best time to treat, optimal doses, duration of treatment.

Generally speaking, once patient develops bone metastasis, the prognosis is grave. Whether complete resection of solitary metastasis will improve the survival or provide cure is quite controversial. Special situations, such as solitary bone secondary from renal cell carcinoma², curative wide resection may help (after resection of solitary metastasis, the expected five-year survival rate is 35%). Recently, the life expectancy of oncology patients has improved considerably because of advances in treatment. In future, aggressive resection and reconstruction of bone metastases may give better outcome in certain diseases and patient groups. Therefore, the prognosis of bone metastases as defined by the primary or other characteristics (e.g. from breast or from lung, single or multiple) is a very important point in treatment planning. However, we should be aware that the prognosis may change as time goes on.

Up to present, palliation is still the mainstay of management of bone metastases. Hence, the general condition of patient, patient's symptoms, patient's life expectancy and currently available modalities such as irradiation, hormonal therapy, chemotherapy, drugs (analgesics, bisphosphonate) and options of orthopaedic treatment should all be taken into consideration in planning of patient management.

The Role of Orthopaedic Surgeons

When a patient is diagnosed as having bone metastasis with unknown primary, the histology of the bone lesion is essential in identification of the primary. This can be obtained by either closed needle biopsy under image guidance or by open biopsy. For multiple bone lesions, the most accessible site with least risk of complication is chosen for biopsy. Sometimes histological diagnosis may be necessary and not to be omitted in patients with a known primary³. By just assuming the lesion coming from the known primary site one may miss the diagnosis. We did encounter a patient with history of cervical cancer suffering from bone secondaries from another primary lung cancer. Another patient with history of lymphoma had pathological fracture of femur. It was later confirmed to be osteogenic sarcoma. We recommend that histological diagnosis should be obtained in all doubtful cases.

Pain in bone secondaries is a major source of suffering for these terminally ill patients⁴. Pain can be related to the tumour expansion, inflammation, nerve irritation or biomechanical problem. Irradiation certainly has its role in some of these aspects. In case of biomechanical weakening of bone, surgical stabilization for both fracture and impending fracture is one way to palliate symptoms.
Palliative Medicine Doctors' Meeting

Surgical decompression with or without stabilization may decrease the tumour load and decompress the nerves. With intensive palliative measures, patients may have better quality of life, require less opioid, and even resume their pre-morbid function and social life.

Orthopaedic surgeons also have a role in management of the acute complications such as cord and cauda equina compression. Urgent surgical decompression to release the cord and nerves may improve the functional recovery.

Individualised care plan

In most patients, bone metastasis are not life threatening. Some patients can survive for quite some time if there are no concomitant visceral deposits. Pain and biomechanical insufficiency account for the inconvenience in the activity and daily living. Treatment plan should aim at pain relief and restoration of function and social life. If possible, patient should remain in the community.

To achieve this target, the treatment plan should be formulated individually. All factors including the disease characteristics, patient’s performance status, symptoms, psychology, patient’s preference and surgeon’s competence should be carefully balanced. Other options of currently available modalities such as irradiation, hormonal therapy, chemotherapy drugs (analgesics, bisphosphonates), and choices of orthopaedic treatment have to be considered at the same time.

The prognosis of bone secondaries varies considerably, depending on the site and histology of primary growth. Patients with bone metastasis from breast cancer have an overall five years survival of 22%; and that from prostatic cancer was 30%. On the other hand, median survival in lung cancer with bone secondary is only three months and in renal cell carcinoma is 12 months (5 years survival in excised solitary lesion of renal cell carcinoma in 35%). In the past, a life expectancy of three months was required to justify any surgical procedure. Unfortunately, there is no good predictor to tell the outcome accurately. Tachdjian reported that seven of eleven terminally ill patients being treated conservatively survived more than three months. One patient survived more than one year. Currently, more aggressive surgical approach is accepted to improve patient mobility and nursing care. On the other hand, poor general condition (including multiple visceral metastasis) may have detrimental effect on the anaesthetic fitness. The functional restoration has to be balanced against the high operation related morbidity and mortality.

Impending fracture

All bony metastasis causes weakening of bone bio-mechanically. If the risk of fracture is high, prophylactic fixation is preferred and elective operation can be arranged. The patient will be well prepared by our experienced anaesthetist. An emergency operation to fix the fracture will force surgeon to operate in uncontrollable situation and patient may be unfit for anaesthesia. The morbidity and mortality rate is definitely higher. On the other hand, we do not want to do unnecessary operations for patients who have minimal risk of fracture.

Mirels scoring system (Fig. 1) is one way to predict the likelihood of fracture in long bone in six months when patients received irradiation only. Scores are rated according to the type of lesion, its site and size, and the pain arises. For a total score 10 or above, the risk of fracture will be 82%. For a score of 9, the risk will be 33%. For a score of 8, risk will be 15%. For a score of 7 or below, the risk will become less than 5%. Therefore, it may be justified to fix all long bone secondaries with score >8. The specificity and sensitivity as examined by Damron was 35% and 91% respectively.

<table>
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<tr>
<th>Variable</th>
<th>Site</th>
<th>Pain</th>
<th>Lesion</th>
<th>Size</th>
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<tbody>
<tr>
<td></td>
<td>Upper limb</td>
<td>Lower limb</td>
<td>Peri-trochanteric</td>
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<tr>
<td>Score</td>
<td>Mild</td>
<td>Moderate</td>
<td>Functional</td>
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<td>1</td>
<td>Blastic</td>
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<td>Lytic</td>
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<td>2</td>
<td>&lt; 1/3</td>
<td>1/3 – 2/3</td>
<td>&gt; 2/3</td>
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Figure: Mirels Scoring System
Options of Orthopaedic Treatment

Some patients can be managed by relatively simple conservative management. This is the treatment of choice for pain free lesions in the upper limb, which are not weigh bearing. External support such as self-removable brace may be fabricated in some patients. Cumbersome orthosis is functionally not acceptable.

Metallic implants to fix the broken or weakened bone include internal plates or nails. Interlocking nail having the advantage of splinting the whole bone (load sharing) is for most of diaphyseal lesions. Plate is better for the two ends of the bone. Sometimes, the joint or the subarticular area are involved. Prosthesis replacement such as total knee and hip replacement is used. In addition, we may consider complete curettage of the tumour to decrease tumour load. The defect so created is then filled up with cement. However the overall benefit is not yet proven.

If we aim for curative treatment as in solitary bony secondary from renal cell carcinoma, wide resection with mega-prosthesis or strut allograft replacement may be considered. However, this approach can only be applied to a very small number of patients.

There are some new percutaneous techniques. Percutaneous cementation to fill the defect under image guided is best for acetabular, vertebral or other subarticular lesions. The instilled cement shares some of the load and palliates the symptom. Embolization may be useful in some vascular lesions such as renal cell carcinoma. It is also an essential part in the pre-operative preparation of renal cell carcinoma patient. Radiofrequency is another percutaneous mean to produce thermo-coagulation. Up to this moment, it is not very popular as the first line care. Definitely, it has its role in some irradiation resistant cases.

Finally, amputation may be considered in some patients with very debilitating symptoms but in poor general health. Amputation is safer than some major reconstructive procedures.

Summary

1. Management of bone secondaries necessitates the corporation of all related specialties namely orthopaedic surgeon, radiotherapist, oncologist, physician, anaesthetist and others. In the future, there may be preventive ways to minimize the new deposition of bone metastasis.

2. Biopsy may be required for certain situation.

3. Most of the time, we can only offer palliative care. Wide resection type of curative care is usually reserved for specific area, for example, solitary bone secondary from renal cell carcinoma.

4. The treatment goal is to alleviate pain and to resume function and social activities. Patient should be encouraged to stay in the community. Patient care should be individualized.

5. As life expectancy may be difficult to predict, currently, we would like to fix all fractures if patient is fit for surgery.

6. For impending fracture, we can apply Mirels scoring system to guide our plan for operation.

7. Options of treatment include conservative care with splint, percutaneous cementation or radiofrequency, open curettage and cementation, operative metallic implant fixation, wide resection with megaprosthesis replacement and amputa

Reference


