A ten year retrospective study into the mortality and morbidity benefits achieved by prophylactic stabilisation of skeletal metastases

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Introduction: Skeletal metastases are an increasing sequela for patients with a wide range of neoplastic lesions owing to increasing incidence of cancer. The diagnosis of a skeletal metastasis is, however, at present a terminal diagnosis representing uncontrolled tumour dissemination. The metastatic destruction of the bone reduces its load bearing capabilities resulting initially in micro fracture and then progressing to the principle complication that of complete loss of cortical integrity. In this study we examine the population suffering a complication of skeletal metastasis in terms of mortality and morbidity in the form of major fractures. We compare the result of patients who underwent surgical stabilization as a result of a fracture through a metastatic lesion to those who underwent prophylactic surgery to stabilization of a weakened bone.

Materials and Methods: This is a retrospective study of all patients within the Cardiff centre who underwent an operation for a metastatic bone lesion over a 10 year period from Jan 1994–2004 (n=140). The patients were identified using pathological records created when samples were sent at the time of the operations. The patients were all followed up for a minimum of 24 months. The demographics of the patients were collected and a detailed analysis of the primary tumour, the surgical procedure, the mobility, and survival of the patients was undertaken. The patient’s data was then cross referenced with the database at the regional cancer centre Velindre Cardiff and the post operative radiotherapy treatment regimens patient’s data was then cross referenced with the database at the regional cancer centre Velindre Cardiff and the post operative radiotherapy treatment regimens.

Results: Demographics: Of the 140 patients studied breast cancer represented the most common cause for skeletal metastasis 37.9%, followed by prostate and lung primaries 14.3% each. Myeloproliferative disorders, encompassing all the myelomas and lymphomas, accounts for 11.4% of cases with renal cancers being the smallest group individually studied 7.9%. Analysis of the survival results show that patients suffering from breast cancer had a survival advantage postoperatively (p=0.046) while lung cancer patients had a survival disadvantage (p=0.029). An increased latent period between the primary tumour being diagnosed and diagnosis of a metastasis showed a survival benefit postoperatively (p=0.008), whilst age above the mean (63.5 years) was detrimental (p=0.010 following metastasis diagnosis, p=0.028 postoperatively).

Mortality and morbidity: Patients who underwent prophylactic surgical stabilization had a significant survival advantage compared to those stabilized following a fracture (p=0.002)(fig 1). The morbidity postoperatively, defined by the patient’s functional mobility, also shows the benefits of prophylactic stabilization with significantly improved mobility when compared to the mobility following fracture stabilization (p=0.033). It has also been shown that there is a significant postoperative survival benefit for those patients who were able to regain mobility. Fig 2 shows these differences and table 1 below shows the significant differences in survival between patients who regained unaided mobility compared to the other less mobile patients.

Adjuvant treatments: Analysis of the survival in patients who underwent post operative radiotherapy showed that there was a significant survival difference depending on the number of sessions completed. Those who had 5 or less sessions did significantly worse (p=0.005) while those who had between 11 and 20 radiotherapy session did significantly better (p=0.015).

Discussion: Our results show a significant survival benefit of prophylactic fixation rather than fixation following fracture (p=0.002). This is in line with previous studies1,2,3 which have tended to look at specific bones. As surgery for metastatic lesions is a palliative procedure a major aim in surgery is to allow the patient to mobilise pain free postoperatively. We have, for the first time in a large number study, shown that there is a survival benefit for patients who are able to mobilize following surgery and if prophylactic stabilization was undertaken patients were significantly more mobile postoperatively (p=0.033). There were some significant differences in survival to patients who underwent radiotherapy, with those undergoing the fewest radiotherapy sessions having a poorer outcome. These results may be skewed by the effects of lead time bias, and also poor performance status patients tend to be offered fewer fractions.

For patients with skeletal metastases, despite improvements in care, the prognosis is usually of a slow and often painful decline. Surgical and radiotherapy treatments are a way of controlling symptoms and maintain independence. These patients are often difficult to manage and a multidisciplinary team approach including the wishes of the patient produce the most positive outcomes. This study suggests that prophylactic stabilization of a metastatic lesion may improve both life expectancy and functional ability postoperatively.


Table 1: Mean survival following surgery with different postoperative mobility

<table>
<thead>
<tr>
<th>Function</th>
<th>Number</th>
<th>Survival following surgery (yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unaided</td>
<td>71</td>
<td><em>p</em>&lt;0.05</td>
</tr>
<tr>
<td>Aid</td>
<td>16</td>
<td>0.58</td>
</tr>
<tr>
<td>Transfer</td>
<td>18</td>
<td><em>p</em>&lt;0.001</td>
</tr>
<tr>
<td>Bed Bound</td>
<td>24</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Fig 1 Survival following prophylactic surgery compared to surgery following fracture

Fig 2 Survival following surgical fixation dependent on functional ability