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Femoral metastatic fractures treated with intramedullary nailing

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Abstract Between 1993 and 1998, 49 consecutive patients with impending or complete pathological fractures of the femur due to metastatic bone disease were treated with intramedullary nailing. Twenty-four were treated with a long Gamma nail and 32 with an AO nail with a cephalomedullary spiral blade. Both implants gave a good functional result with relief of pain and improved mobility with no difference in morbidity between either group ($P>0.05$).

Résumé Entre 1993 et 1998, 49 patients présentant une fracture du fémur imminente ou complète à cause de métastases osseuses ont été traités avec des enclouages. 24 ont été traités avec des enclouages Gamma, et 32 avec des enclouages AO avec la lame spirale. Le résultat fonctionnel était bon dans les deux groupes sans différence de morbidité ($P>0.05$).

Introduction

In metastatic disease of the femur intramedullary nailing with neck fixation is often indicated as the neck and proximal femur are commonly involved [3]. We compared the use of the reamed long Gamma nail and the unreamed AO femoral nail with a spiral blade in the treatment of pathological lesions due to metastatic femoral bone disease at The Chelsea and Westminster and Charing Cross trauma units over a 5-year period, in conjunction with The Royal Marsden Regional cancer center.

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Patients and methods

From 1993 to 1998, 56 consecutive intramedullary femoral stabilisations were performed in 49 patients for pathological fractures due to metastatic bone disease (Table 1). The number of impending and complete fractures were similar in both groups with 13 impending and 11 complete fractures treated with the reamed Gamma nail (Fig. 3), and 19 impending and 13 complete fractures treated with the unreamed AO nail (Fig. 1).

The commonest primary sites were the breast and prostate in the majority of patients. Impending metastatic fractures were defined according to the radiographic criteria described by Harrington [2], or where persistent pain with evidence of a radiological destructive lesion was present. A multidisciplinary approach to pre-operative assessment and follow-up was performed as many of these patients were referred from the regional cancer unit. Of the 32 impending fractures, 14 had pre-operative radiotherapy. All the remaining patients who survived longer than 10 days were considered for post-operative radiotherapy once the surgical wounds had healed.

No venting was performed at the time of operation and distal locking screws were inserted depending on the type and site of the metastatic disease.

Results

Gamma nail group

Two patients who underwent unilateral nailing for complete fractures had fat embolism resulting in death within 72 h of surgery. This diagnosis was confirmed at post-

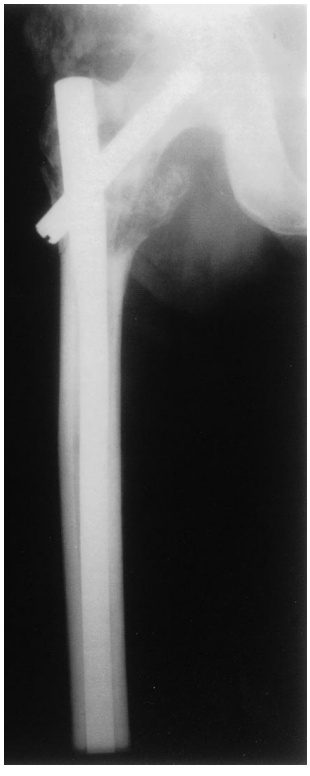
Table 1 Characteristics of the patients

	Gamma-group	AO-group
No. of patients	20	29
No. of nailings (bilateral)	24 (4)	32 (3)
Age (median)	64 years.	57 years.
Female:male ratio	14:6	19:13
Median survival (months)	4	4.5
No. of cardiac arrests	None	1
No. of fat embolism syndrome	2	1

Fig. 1 Radiograph showing an AO unreamed femoral nail with spiral blade for a proximal metastatic femoral lesion

Fig. 2 Radiograph showing breakage of a spiral blade at 7 months post-stabilisation in the same patient

Fig. 3 Radiograph showing a reamed long Gamma nail



mortem in both cases. A further two patients died within 10 days of operation due to disseminated intravascular coagulation and bronchopneumonia. There was one breakage of a reamer, but no implant failures.

Thirteen nailings were performed for impending fractures. In 8 of these the lesion was painful but was relieved after intramedullary stabilization. In the 16 patients who survived more than 10 days after the operation, 13 maintained or improved their mobility. The mean survival in this group was 4 months from surgery.

AO unreamed nail group

Of the 4 patients who died within 10 days of operation, 1 patient with a complete fracture due to breast metastases suffered a fatal cardiac arrest during nail insertion. A post-mortem examination revealed fat embolus as the cause of death. The 3 other causes of death within this period were carcinomatosis in 2 patients and acute renal failure.

Nineteen out of 32 stabilizations were for impending fractures, 10 of which were painful. All 10 femora were relieved of pain after intramedullary nailing. In the 25 patients who survived longer than 10 days from surgery, 21 patients maintained or improved their mobility after surgery.

There was one implant failure 7 months after surgery. A 56-year-old woman with metastatic breast disease who underwent previous stabilization for an impending proximal femoral fracture presented with pain in the hip region of the operated side. Radiographs revealed breakage of the spiral blade (Fig. 2). The implant was removed and endoprosthetic reconstruction performed without complication. The mean survival in this group was 4.5 months.

Discussion

Intramedullary stabilization for both impending and complete pathological femoral fractures due to metastatic bone disease has previously been shown to give good pain control and restore function and mobility in the majority of patients [1,3].

Intramedullary nails without femoral neck support can result in a later fracture of the neck in 18% of cases due to the presence of occult disease in the neck [6]; therefore, the current mode of treatment for these lesions is an intramedullary nail with a neck supporting implant. In published series so far using the Russell-Taylor reconstruction nail there have been no reports of implant failure [1,3].

There is concern of a high incidence of intra-operative cardiac arrest during nail insertion that has been reported. Kerr et al. [4] recorded 6 cases of cardiac arrest in 26 nailings resulting in 4 fatalities with fat embolism the cause of death in 3 cases. Cardiac arrest occurred in all 3 of Kerr's patients who underwent bilateral nailing (1 under a single anaesthetic and 2 as a staged procedure). In our series 1 cardiac arrest in 56 stabilizations occurred during unilateral nailing in the unreamed AO group for a complete metastatic fracture. Peter et al. [5] have also reported a single case of cardiac arrest due to fat embolism during insertion of an unreamed nail for a metastatic fracture of the femur.

In addition to the single fatality from fat embolism syndrome in the unreamed group 2 patients died within 72 hours after reamed nailing with fat embolism syndrome confirmed at post-mortem examination in our series. There was no statistical significance in the incidence of fat embolism in either group using the paired *t*-test ($P<0.05$), but the numbers involved for statistical analysis are small. All 3 patients who died from fat embolus had complete fractures, two due to metastatic breast and one due to metastatic renal disease.

Contrary to previous reports no complications were recorded in the 7 patients who underwent staged bilateral nailing in our series, although all nailings in these 7 patients were performed for impending fractures.

The main aim of intramedullary stabilization of these lesions is to relieve pain and restore function and mobility. Pain relief was most pronounced in patients with painful impending fractures. We found no difference in either group concerning mobility or pain relief.

In this series 1 implant failure occurred in the AO group due to breakage of the spiral blade plate at 7 months after insertion of the nail, which has not been previously reported. There were no cases of implant failure with the gamma nail.

In conclusion this study showed no significant difference in morbidity associated with the use of a reamed or unreamed nail with a neck supporting implant in treating pathological fractures due to metastatic bone disease. In this large series no complications were encountered with the 7 patients who underwent bilateral nailing, but in our unit it is policy to perform a staged bilateral procedure. However we found an increased morbidity with intramedullary stabilization of complete metastatic fractures, and we feel a multidisiplinary approach to the assessment and treatment of these patients is necessary so impending fractures can be nailed 'sooner rather than later' with the associated decreased morbidity.

Statement No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article

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