AMYLOID BONE CYSTS OF THE FEMORAL NECK

IMPENDING FRACTURES TREATED BY CURETTAGE AND BONE GRAFTING

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We performed curettage and bone grafting of amyloid cysts of the femoral neck in five patients on long-term haemodialysis. All had hip pain on weight-bearing. The duration of haemodialysis before the operation averaged 15 years and the average age of the patients was 53 years.

All the large cystic lesions were located in the anterosuperior quadrant of the femoral neck. At operation, they were found to consist of fibrous tissue containing amyloid deposits. Postoperatively, all five patients had painless hips and the grafts had incorporated into the bone defects.

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In patients treated by haemodialysis for more than ten years amyloidosis is common (Brown, Arnold and Gower 1986; Hauglustaine et al 1986) and may give rise to bone cysts in the corpus, humeral head, femur and patella (Gielen et al 1990). Pathological fracture of the femoral neck due to a cyst causes serious morbidity (DiRaimondo et al 1986; Heller et al 1989; Campistol et al 1990; Kurer, Baillod and Madgwick 1991), but there have been no previous reports of the operative treatment of amyloid cysts in the femoral neck before fracture occurs. We describe successful curettage and bone grafting of such cysts in patients with amyloidosis.

PATIENTS AND METHODS

From 1986 to 1992, we treated impending fractures of the femoral neck due to amyloid bone lesions in five patients who had been undergoing haemodialysis for chronic renal failure. There were three men and two women, all leading relatively active lives. The mean duration of haemodialysis before operation was 15 years (9 to 19) and the mean age of the patients was 53 years (44 to 58).

The indications for operation included: a lesion 2.5 cm or larger in size; one destroying 50% or more of the femoral cortex; or one causing pain on weight-bearing (Fidler 1973; Harrington 1982). All patients had had radiographs of hands, wrists, shoulders, spine and pelvis; CT scans of the hip and scintigraphy had been performed in four and MRI in three.

Each patient was dialysed on the day before the operation and prophylactic antibiotics were given routinely. The hip was approached through an anterior incision and a T-incision of the capsule, which was always thickened around its attachment to the intertrochanteric line of the femur. In all cases there was a mass of fibrous tissue filling the bone lesion in the femoral neck. Thorough curettage was performed. Two patients were found to have interlinked cystic lesions in the head and the neck. The articular cartilage of the femoral head appeared to be intact in all cases. After curettage the bone defect was filled with autogenous graft taken from the iliac crest, which could be seen to be free from cystic lesions on the pelvic radiograph. Specimens were collected of the anterior capsule, the synovium, and the curetted lesion.

Dialysis was not resumed for at least 36 hours after the operation because of the danger that the mandatory heparinisation would cause bleeding from the wound. Suction drains were removed 36 hours after operation, and partial weight-bearing with crutches was allowed after three weeks. The use of crutches was recommended for three months after surgery.

RESULTS

Preoperatively, all the patients complained of increasingly severe pain on weight-bearing. Their radiographs all showed bone lesions in the anterosuperior part of the femoral neck and a normal joint space (Fig. 1). The longitudinal diameter of the cysts averaged 3.2 cm (2.7 to 4.0). In the four patients who had 99m Tc-diphosphonate scintigraphy, there was a slightly increased uptake at the site of the bone lesion (Fig. 2). Three of the five patients...
Preoperative (a) anteroposterior and (b) lateral radiographs of a 44-year-old man after nine years on haemodialysis. There is a large cystic lesion in the anterosuperior quadrant of the left femoral neck.

*Fig. 1a*  
*Fig. 1b*  

Also had a smaller lesion in the same area of the contralateral hip and in two of these three patients, axial CT showed another lesion within the femoral head of the affected hip (Fig. 3). MRI showed bone destruction in the lesions with decreased T1-weighted signal intensity. T2-weighted sequences showed no areas of high signal intensity which would have suggested the presence of malignant tumour or infection: lesions were of low signal intensity on all imaging sequences (Fig. 4).

The biopsy specimens of the anterior capsule, the synovium, and the curettings showed amyloid deposits in all patients.

Postoperatively, there were no major complications, and no infections or pathological fractures. At a mean follow-up of 2.1 years (2 to 7) the radiographs showed good incorporation of the grafted bone (Fig. 5). No patient had discomfort or pain on daily activity.

Four of the patients had pain and stiffness of the shoulder joint; all of them had had previous surgery for carpal tunnel syndrome, and three had the characteristic appearances of destructive spondyloarthopathy (Kuntz et al 1984).

**DISCUSSION**

The radiograph of a normal adult hip often shows a well-delineated, round or oval radiolucency in the anterosuperior femoral neck, sometimes called the ‘herniation pit of the femoral neck’ (Pitt et al 1982). The appearance is thought to be caused by herniation of soft tissues through
erosions or perforations of the surface of the neck from pressure of the overlying capsule (Pitt et al 1982). In our series, amyloid bone cysts were always located at this site. Amyloid infiltration appears to lead to intrasosseous erosions and the tissue can invade pre-existing subchondral bone cysts through any defects (Gielen et al 1990; van Ypersele de Strihou et al 1991).

Other musculoskeletal manifestations of amyloidosis include carpal tunnel syndrome, pain and stiffness in the shoulder, and destructive spondyloarthropathy (Brown et al 1986; Bardin et al 1987; Muñoz-Gomez et al 1987; Kurer et al 1991; Naito et al 1992). All our patients had at least one of these disorders.

Radionuclide bone scans may help in the early diagnosis of amyloid bone cysts (Grateau et al 1988), and DiRaimondo et al (1986) reported slightly increased uptake in the femoral neck and acetabulum of two haemodialysis patients with large cystic lesions; both subsequently sustained pathological femoral neck fractures. We have had similar findings with diphosphonate scintigraphy.

It is important to differentiate an amyloid bone cyst from aseptic necrosis of the femoral head because many patients on maintenance haemodialysis for chronic renal failure have had prolonged corticosteroid treatment. MRI may be the best single method for differential diagnosis. Amyloid deposits in bone have low signal intensity on both T1- and T2-weighted images (Naito et al 1992), whereas areas of aseptic necrosis show a characteristic ‘double line sign’ of high signal intensity inside a low-intensity peripheral rim on T2-weighted images (Mitchell et al 1987).

Lesions in the femoral neck may grow rapidly in some haemodialysis patients (Fig. 6), but the pattern of development and rate of progress have not yet been elucidated. It seems that pathological fractures will ultimately occur in nearly all these patients, requiring internal fixation or prosthetic replacement. The poor bone quality associated with chronic renal failure and amyloidosis has been reported to result in nonunion in more than half of the patients after internal fixation (Kurer et al 1991; Naito et al 1994), and prosthetic replacement has a high incidence of postoperative infection and loosening (Naito et al 1994).

Benign cystic bone lesions in non-uraemic patients heal well after curetage and bone grafting, and our study suggests that this is also successful for amyloid bone cysts in haemodialysis patients. Increasing pain and radiographic criteria suggesting an impending fracture (Fidler 1973; Harrington 1982) justify prophylactic surgery. Fidler (1973) reported that a lesion of a long bone...
Involving 50% or more of the cortex carried at least a 50% chance of spontaneous fracture.

We have previously reported the use of bone graft from a femoral head already affected with massive amyloid cysts to fill a cystic lesion of the acetabulum (Naito et al 1994); most of the grafted bone was absorbed postoperatively. In the present series, we used bone from the iliac crest, shown radiographically to be clear of amyloid cysts and obtained much better incorporation of the graft.

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REFERENCES


