MINIMALLY INVASIVE SURGERY FOR OSTEOID OSTEOMA OF THE PROXIMAL FEMUR

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Seven patients with osteoid osteoma of the proximal femur were treated by percutaneous excision of the nidus. The combination of preoperative localisation by tomography and intraoperative localisation by image intensifier resulted in a curative procedure with minimal bone resection in all cases, although a second operation was required in one patient.

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The proximal femur is the common site for osteoid osteoma and the diagnosis is often delayed (Kumar et al. 1984). Extracapsular tumours do not always present with the classical features of night pain relieved by aspirin and radiological confirmation of a lytic nidus surrounded by sclerosis. Intracapsular lesions are even more variable, often presenting with the clinical and radiological features of an inflammatory synovitis (Alani and Bartal 1987).

In the proximal femur the traditional surgical approach of _en bloc_ resection may require bone grafting, with or without internal fixation, and growth disturbance or fracture may ensue. Access to intracapsular lesions for surgical resection may also be difficult.

Since 1987 we have used a percutaneous technique for the excision of osteoid osteomas in the proximal femur and we now report seven consecutive patients treated in this way.

PATIENTS AND METHODS

Between 1987 and 1990 seven patients were referred to Musgrave Park Hospital with the clinical and radiological findings of osteoid osteoma of the proximal femur. There were four boys and three girls and their ages ranged from 4 to 18 years. The presenting symptom in all patients was hip pain. Five had mainly night pain and in four aspirin gave relief. Five patients also limped intermittently.

On physical examination, all patients had slight or moderate restriction of hip movement and five patients had atrophy of the proximal thigh muscles of more than 1 cm.

The delay between referral to hospital and correct diagnosis varied from zero to seven months. Previous diagnoses included irritable hip, Perthes' disease, slipped upper femoral epiphysis and behavioural disorder. All patients had taken some analgesics and six had had at least one course of non-steroidal anti-inflammatory drugs. Three patients had taken large doses of analgesics and one of these was at risk of nephropathy.

The diagnosis was clear on the presenting radiographs in three patients. In another three subtle changes were present which became more obvious with time and in the remaining patient no radiographic abnormalities could be detected retrospectively. Triple-phase 99mTc methyldiphosphonate bone scans were performed in four patients. In two with intracapsular lesions there was a slightly increased uptake of isotope in a diffuse pattern; in the other two with extracapsular lesions there was a focal increase in uptake.

All patients had had hypocycloidal tomography before surgical exploration and this showed two intracapsular lesions in the femoral neck, two on the intertrochanteric line and three adjacent to the calcar.

Operative technique. The technique is illustrated by the image intensifier thermographic prints in Figure 1. With the patient on a fracture table under general anaesthesia the proximal femur is examined in the anteroposterior and lateral planes by a high-resolution image intensifier (Siremobile 4: Siemens, London, UK). Magnification and adjustment of contrast are often required to see the nidus clearly in both planes. If the lesion is reasonably central on the lateral projection, a direct lateral approach is made to the proximal femur through a 1 to 2 cm skin incision. A 2.0 mm Kirschner wire is then introduced into the nidus by an air drill, under image-intensifier

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control. A 6 to 8 mm Meunier bone biopsy trephine is advanced manually along the guide wire, across the nidus and into the sclerotic bone on the far side of the lesion. It is usually possible to remove a complete cylinder of bone with the nidus visible within it on macroscopic examination. The cavity within the bone is then enlarged by a high-speed burr to remove any remaining nidus. Finally, the extent of the resection can be visualised by injection of a water-soluble contrast medium (Urografin 290: Schering AG, Germany).

The incision is infiltrated with local anaesthetic and closed with a fine absorbable subcuticular suture. The patient is mobilised on the first postoperative day, and protected weight-bearing with crutches is advised for four weeks.

If a lesion on the intertrochanteric line is eccentrically located on the lateral view then a direct anterior approach is made as described above. A skin crease incision 2 cm long is made 1 to 2 cm below the anterior superior iliac spine. The interval between tensor fascia lata and sartorius is opened and small retractors are placed at right angles to the skin incision. The guide wire is inserted from a direct anterior position. On the thermograph the guide wire in the nidus looks like an arrow in the centre of a target (Fig. 2d).

Patients were followed up at six-monthly intervals to assess pain relief, bone healing and the resolution of the reactive changes in the proximal femur. The mean follow-up was 3 years 2 months (2 to 5 years).

RESULTS

In six patients the postoperative radiographs showed complete removal of the nidus. In five of these, histopathological examination confirmed the presence of the nidus of an osteoid osteoma. In the sixth the nidus was not seen but the tissue was consistent with reactive bone at the periphery of an osteoid osteoma.

There was one failure of the primary procedure. This was in a patient with a lesion situated within the anterior cortex on the intertrochanteric line (Fig. 2). Despite two attempts, the sclerotic bone around the nidus deflected the trocar and the nidus was deroofed but not excised. This patient had partial relief of pain for three months. Because of the return of pain a second procedure was performed via an anterior approach. On this occasion complete excision of the nidus was confirmed radiologically and by histopathology, and pain relief was lasting.

Rehabilitation was rapid and uncomplicated. There were no fractures and by six weeks patients had returned to unrestricted activities, including sport.

Radiographs showed rapid healing of the operative defects. In the younger patients the reactive changes in the proximal femur had resolved within 12 to 24 months.
In older patients, with lesions at the calcar, reactive sclerosis persists (Fig. 3).

At a minimum follow-up of two years no patient has pain or persisting radiological evidence of an active nidus.

DISCUSSION

Recent reports in the literature emphasise two principles in the management of osteoid osteoma of the proximal femur. These are the need for accurate radiological

Once the approximate site of the lesion has been found by plain radiography or isotope scan, the nidus can usually be clearly defined by CT or hypocycloidal linear tomography. We prefer tomography because the coronal plane cuts are similar to the intraoperative image-intensifier views. It is more difficult, in our experience, to relate the sagittal plane CT cuts to the surgical plane. An alternative is to place a guide wire into the nidus under CT control immediately preoperatively (Steinberg, Coumas and Breen 1990) or intraoperatively (Doyle and King 1989). Intraoperative localisation can also be performed with radioisotopes and an intraoperative radiation probe or with tetracycline fluorescence (Colton and Hardy 1983; Ayala et al 1986). These methods have been recently reviewed and criticised by Marcove et al (1991).

We suggest that our method is more applicable for most surgeons. The technique is similar to that of Iceton and Rang (1986) who described its use in the excision of an osteoid osteoma of the distal femoral epiphysis. Since then, a modified core decompression technique has been described for the excision of a lesion in the femoral neck (Carter 1990).

The use of the fracture table and the C-arm for anteroposterior and lateral radiographs is familiar to all orthopaedic surgeons and the equipment is widely available. We would stress, however, that the image intensifier must give a high-resolution image, have good contrast control and be fitted, preferably, with magnification facilities. If there is any doubt about the ability of the equipment to visualise the nidus we carry out a preliminary screening procedure before the patient is anaesthetised.

Despite the small surgical specimen, histopathological examination was diagnostic in six patients although only after a second operation in one. This is similar to the diagnostic yield from more extensive surgery. The patient in whom a nidus was not demonstrated had complete relief of pain and resolution of the secondary radiographic changes at follow-up. Because of the small tissue sample and the possibility of missing the active lesion we suggest that the procedure be reserved for those lesions in which there is little diagnostic doubt. Careful clinical and radiological follow-up is mandatory.

Medical management of osteoid osteoma in surgically difficult sites has recently been advocated as an alternative to high-risk surgery (Kneisl and Simon 1992) but our patients' symptoms were not controlled by non-steroidal drugs, even when combined with other analgesics. We suggest that, for many children, minimally invasive surgery is preferable to prolonged medication and incomplete control of symptoms. When a child's sleep is regularly disturbed by night pain, family life can be seriously disrupted.

The advantages to the patient of a minimally invasive procedure, with small scars and rapid mobilisation, are obvious. Osteoid osteoma is a benign, self-limiting lesion and we should strive not to make the cure worse than the disease.

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REFERENCES


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