

Selective Arterial Embolisation in Aneurysmal Bone Cysts

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Summary. *The treatment of three cases of aneurysmal bone cyst by selective arterial embolism is described. Two cases had involvement of the pelvis and one of the knee. The 2-year follow up has been promising. Radiologically the lesion has been arrested with increased density of the cyst wall and intra-cystic trabecular new bone formation. Pain relief has been complete and up to now no surgical treatment has been required.*

Résumé. *Présentation de l'évolution clinique et radiologique de trois cas de kyste osseux anévrysmal, deux localisés au bassin et le troisième au genou, traités par embolisation artérielle sélective. Les résultats, avec 2 ans de recul, sont encourageants. Radiologiquement la lésion paraît stabilisée avec densification des parois et apparition de travées d'os nouveau à l'intérieur du kyste. Les douleurs ont complètement disparu et jusqu'à présent aucun geste chirurgical n'a été nécessaire.*

Key words: *Aneurysmal bone cyst, Embolisation, Pelvis, Knee, Bone tumours*

Introduction

Aneurysmal bone cysts are a tumour-like lesions of bone whose clinical, radiological and histological characteristics are well known [6, 8, 13, 14]. Their pathogenesis is still debatable [1, 6, 8, 10, 13, 14, 20] and treatment is not always successful [4, 5, 15, 21]. The site and rapid progression of the tumour may create diagnostic and therapeutic problems [4, 5, 12, 15, 21]. Where feasible the

treatment of choice is resection "en bloc" [5, 12, 21]. Curettage, bone grafting and cryosurgery have a recurrence rate from between 10% to 68% [1, 5, 12, 17]. Radiotherapy is indicated in special cases or after repeated recurrence but complications such as growth plate damage [11], and late sarcomatous change [3, 6, 15] may occur. Recently Dick et al. [7] have used adjuvant arterial embolisation in 6 children with primary benign bone tumours of the spine and pelvis, utilising techniques already applied in other fields of medicine [2, 9, 16], prior to surgical treatment of the lesion.

The successful results reported in the literature [2, 7, 9, 16], together with our own experience in other fields of intra-arterial embolisation, encouraged us to treat three large aneurysmal bone cysts, two involving the pelvis and one the tibia. We present the results of these cases managed without the need for surgery.

Material and Methods

Between 1978 to 1980 three patients with aneurysmal bone cysts, two involving the pelvis and one the proximal tibia, were treated by selective intra-arterial embolisation (SAE), according to Hilal and Michelsen's technique. They used Gelfoam only but we have also used Lyodura and Latex.

Angiography with selective arterial embolisation was repeated in all cases, at 30 days in the first and third and at 60 days in the second.

The clinical and radiological diagnoses of aneurysmal bone cysts were confirmed by computerized axial tomography with densitometry and puncture biopsy [19].

Case Reports

Case 1

F.V., a 22-year-old female, married, with one daughter, presented with a 2-year history of left sided low back pain, sciatica and limping which had not responded to medical treatment. On admission the patient was noted to have a painful mass in the left sacro-iliac region with limitation of movement in the left hip. A radiograph revealed an expansile lesion of the sac-

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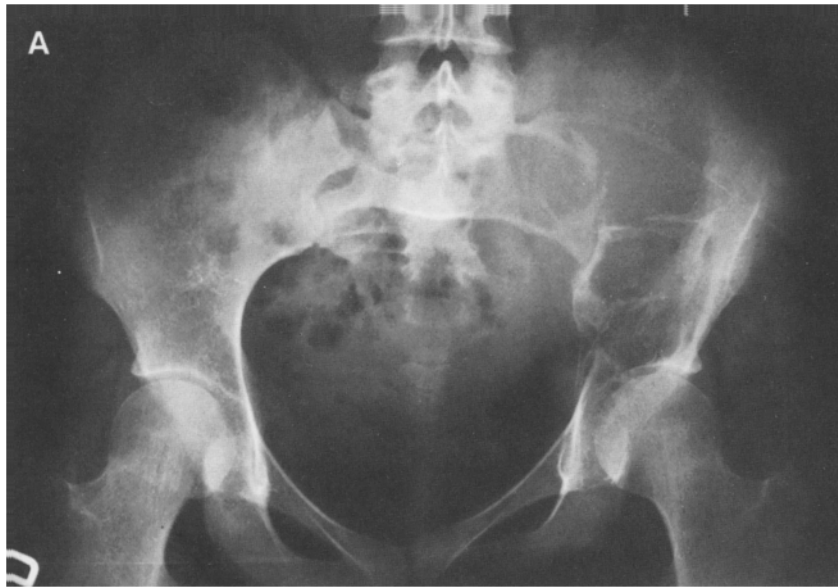


Fig. 1 A and B. *Case 1.* **A** The radiograph shows a large lytic lesion involving the left ilium and sacrum. **B** Computerised axial tomography of the pelvis reveals destruction of the left ilium with extension into the soft tissues and sacrum



ro-iliac region (Fig. 1 A), which was confirmed on computerised axial tomography (Fig. 1 B). The diagnosis of aneurysmal bone cyst was substantiated by puncture biopsy and angiography (Fig. 2A and B).

The lowest left lumbar artery and the superior and inferior gluteal arteries were embolised with Gelfoam and the left deep circumflex iliac artery with Lyodura. Simultaneous angiography revealed occlusion of the embolised branches (Fig. 2 C). Thirty days later a repeat angiogram revealed re-vascularisation of the superior and inferior gluteal artery tributaries, embolised by Gelfoam, and a new anastomosis supplied by the third lumbar branch which had not been demonstrated at the initial angiogram.

These branches were re-embolised with Lyodura and the final angiogram showed complete occlusion of the anastomosis.

Seven months later the pain had disappeared and the patient started partial weight bearing. A radiograph then showed new bone formation with new trabeculae in the cyst cavity, confirmed by iodate contrast radiography. Two years later the patient had no pain and was walking normally. A radiograph revealed a large amount of intra-cystic new bone formation in the sacrum and in the superior portion of the cyst. In particular the integrity of the inferior portion had been restored (Fig. 3).

Case 2

A.G., a 6-year-old boy, gave a history of increasing pain and a limp for two months. On examination there was a flexion contracture of the left hip. Radiographic examination revealed a

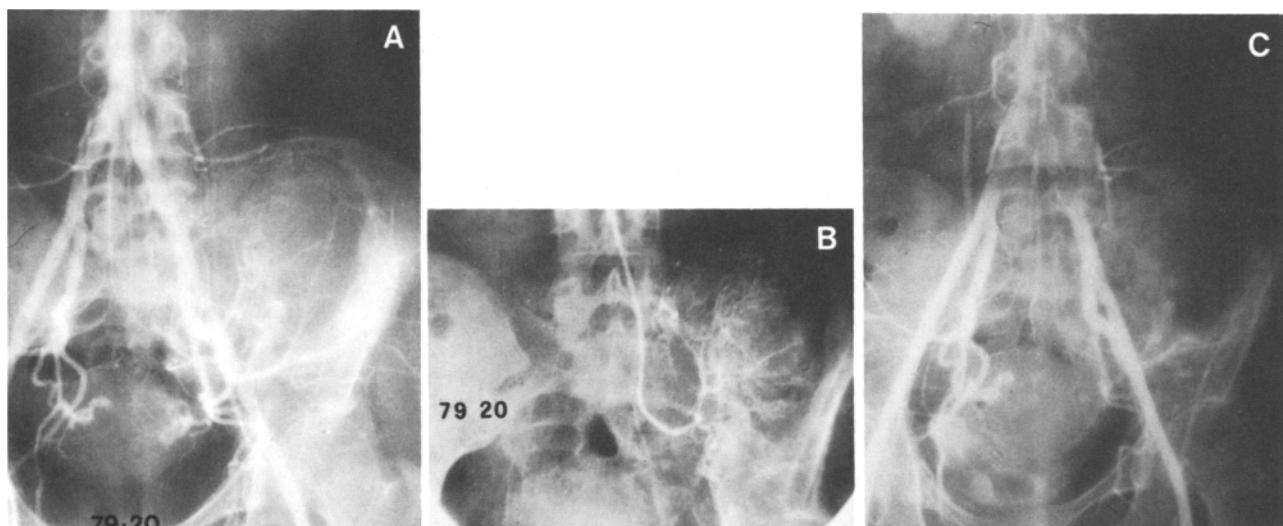


Fig. 2 A–C. *Case 1.* **A** Angiography reveals increased vascularity and vessel diameter in the left pelvis. **B** Selective angiography of the superior gluteal artery shows the abnormal circulation of the cyst. **C** Post-embolisation (cf. Fig. 2 A)

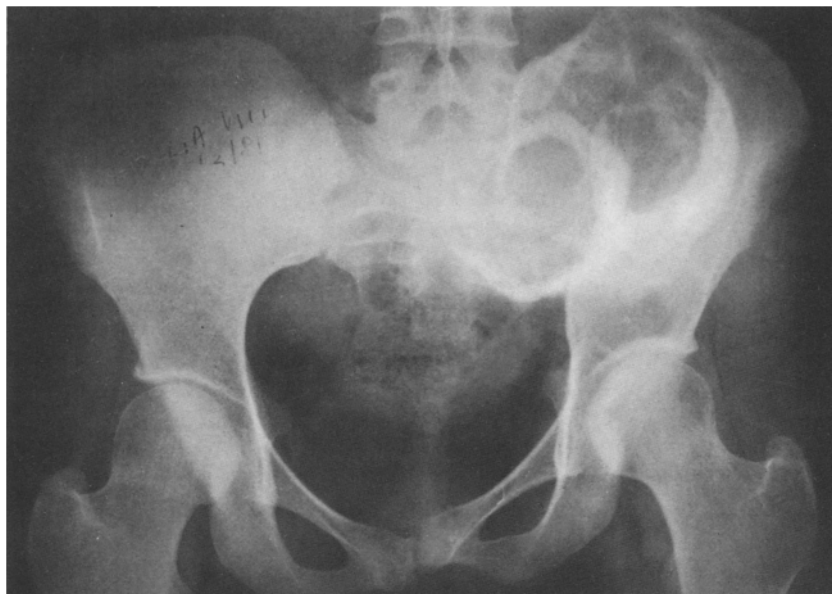


Fig. 3 *Case 1.* Two years after treatment there is no evidence of recurrence

lytic expansile lesion of the acetabulum. The diagnosis of an aneurysmal bone cyst was confirmed on puncture biopsy.

Three weeks later the flexion deformity and hip pain had increased. A further radiograph revealed a rapid increase in the size of the cyst (Fig. 4 A), confirmed on computerised axial tomography (Fig. 4 B). Angiographic examination showed a large vascular mass involving the ilium, ischium and pubis supplied by the left hypogastric artery (Fig. 5 A) and, particularly, by its obturator branch (Fig. 5 B). The venous phase was shorter than on the right side. The tributaries of the left hypogastric and common femoral arteries were embolised with Gelfoam and Lyodura (Fig. 5 C).

Two months later an arteriogram showed re-vascularisation of some of the tributaries of the hypogastric artery and these were re-embolised with Latex particles. Six months later the patient was painfree and had a full range of movement at the hip with a normal gait. The radiograph taken then show-

ed a large amount of intra-cystic new bone formation. At follow-up 18 months later there was no sign of recurrence of the cyst (Fig. 6).

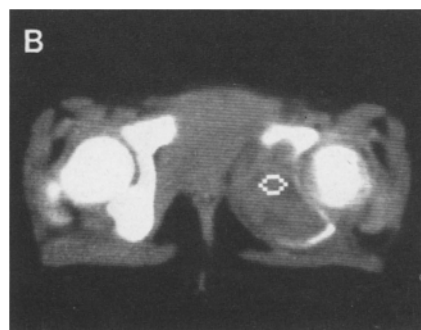
Case 3

M.P., a 30-year-old female, gave a 4-year history of pain in the right knee. One year after her first symptoms she was treated surgically. The biopsy revealed an aneurysmal bone cyst. A year later the patient underwent further operation for recurrence of the cyst, and radiotherapy (4000 R.) was administered in view of the return of symptoms and the expansion of the cyst.

On admission to our Clinic she was walking with crutches. Examination revealed a large firm mass at the right knee. Tenderness, warmth and joint stiffness were noted. A prominent sub-cutaneous venous anastomosis was present. The radiograph showed a large osteolytic area in the sub-articular por-



Fig. 4 A and B. *Case 2.* **A** The plain radiograph reveals a large osteolytic area of the left acetabulum. **B** Computerised axial tomography shows compression of the pelvic organs and a blood-filled cyst is demonstrated by computerised densitometry of the cyst contents



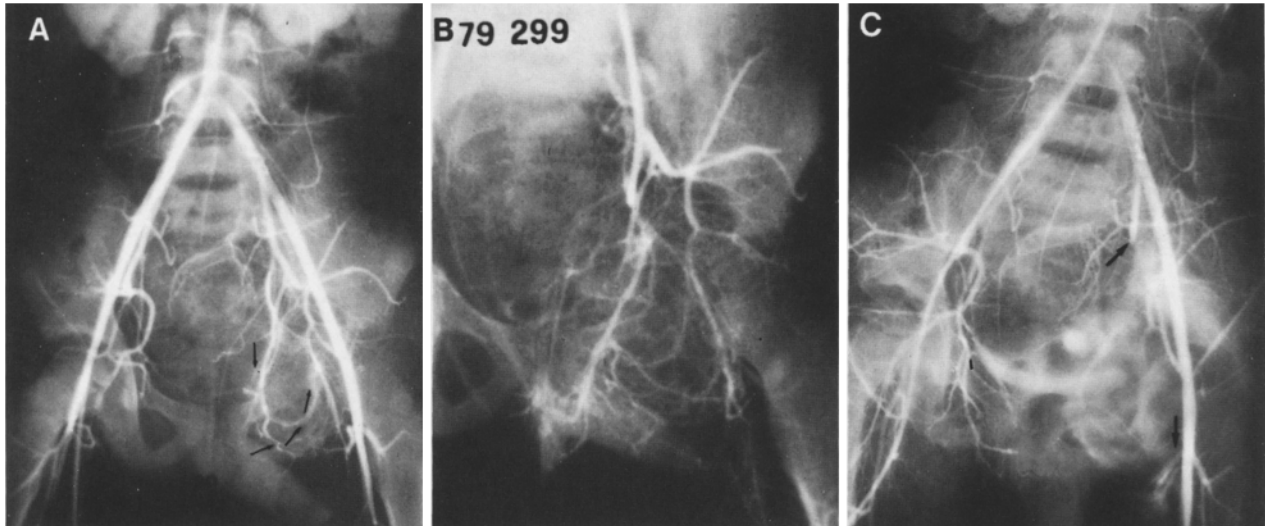


Fig. 5 A–C. Case 2. **A** The angiogram demonstrates the abnormal blood supply to the tumour from the left hypogastric artery and in particular from its obturator branch (*arrows*). **B** Selective angiography demonstrates a highly vascular tumour of the acetabulum. **C** The post-embolisation film demonstrates the arterial block (*top arrow*)

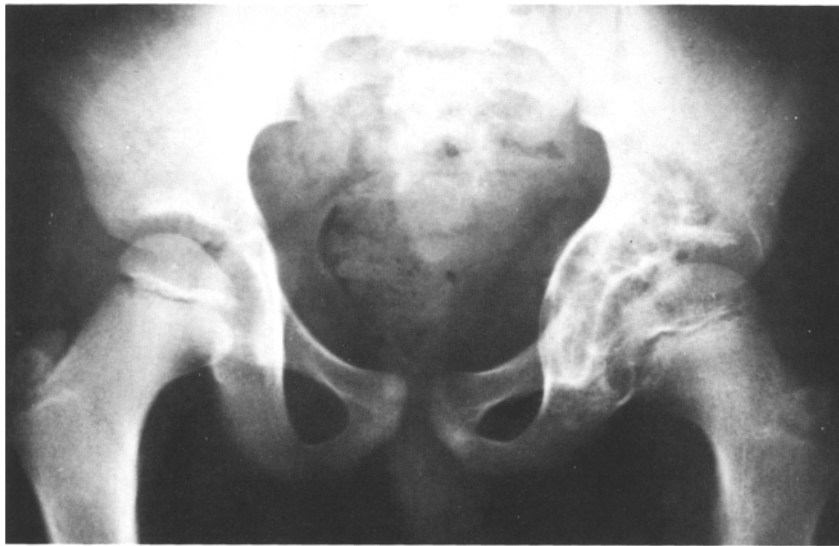


Fig. 6. Case 2. Eighteen months after treatment. Notice the difference compared with Fig. 4 A: there is almost complete ossification of the cyst wall, particularly in the iliac and pubic portions

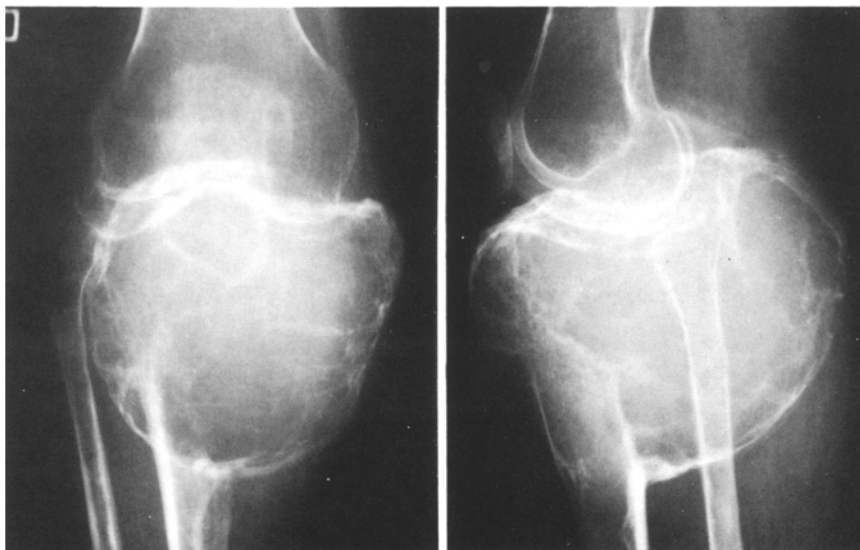


Fig. 7. Case 3. The plain radiograph shows an expansile lesion of the right tibia treated on two occasions by surgery and once with radiotherapy

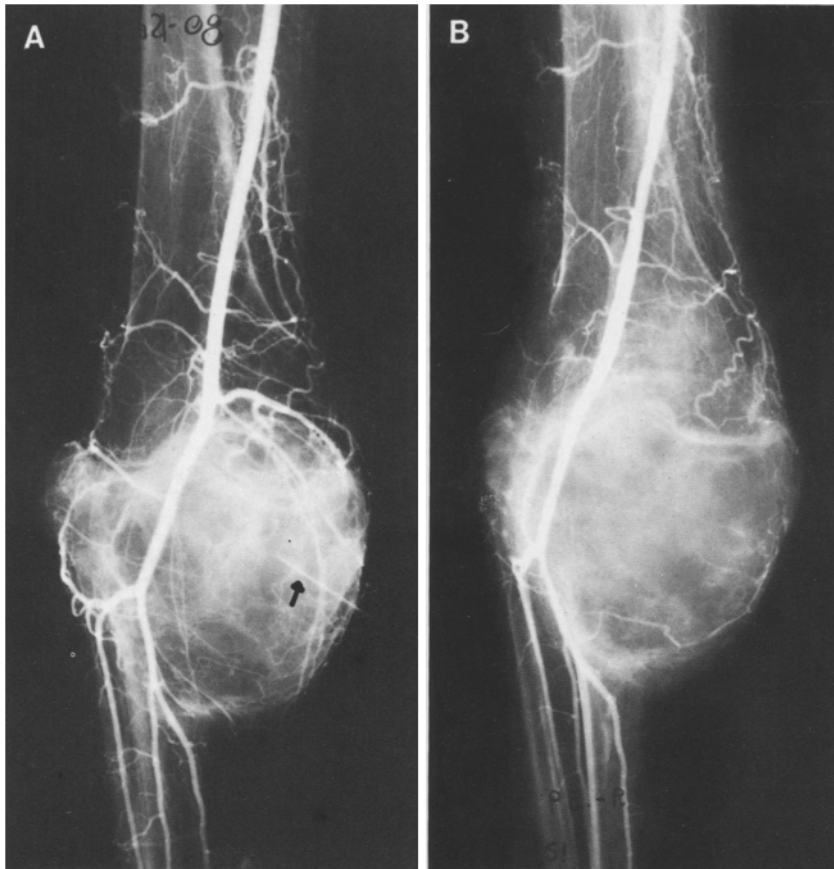


Fig. 8 A and B. *Case 3.* **A** Angiography demonstrates the “cobweb” arterial anastomosis surrounding the lesion. The arrow demonstrates the needle inserted into the cyst to measure its internal pressure. **B** Post-embolisation angiogram

tion of the tibia, compatible with an aneurysmal bone cyst, and this diagnosis was confirmed on puncture biopsy (Fig. 7). Angiography showed a wide “cobweb” circulation around the cyst (Fig. 8 A). The intra-cystic pressure was measured at 40 mmHg. The major branches were embolised with Lyodura and Gelfoam (Fig. 8 B) and a month later the other branches were embolised.

At follow-up 10 months later the patient had no pain, the volume of the mass was reduced and flexion of the knee was possible to 90°. The subcutaneous venous anastomosis had disappeared. Radiographically the cyst appeared to have been reinforced with new bone trabeculae (Fig. 9). The intra-cystic pressure was no longer measurable.



Fig. 9. *Case 3.* Ten months following treatment there is no sign of tumour recurrence and the walls of the cyst are well defined

Results

After 30 days pain was completely relieved in the first and second cases with a return to a normal range of movement at the hip. In the third case there was a decrease in volume of the cyst and loss of tenderness on palpation. There was return of movement of the right knee to 90° but beyond that flexion was blocked by contact of the femoral condyles with the posterior wall of the cyst.

Radiographs showed arrest of expansion of the cyst, increased radio density of the cyst wall and the formation of new trabecular bone within the cyst.

Discussion

Our patients presented with a tumour-like osteolytic lesion and the third had been treated previously by surgery and radiotherapy without success. The lesions were of large size with a rapidly increasing rate of bone destruction and surgical access was restricted.

The use of radiotherapy is attended by the possibility of late complication [3, 4, 11], whilst surgical treatment [5, 12, 17, 21] may be technically difficult, as in the second case. We therefore considered the use of selective arterial embolisation by procedures already proven by other authors [2, 7, 9, 16].

The results are better than we had expected. There has been a complete remission of symptoms and radiologically rapid formation of bone trabeculae. Surgery has not subsequently been required in any of the patients.

The pathogenesis of aneurysmal bone cyst is still unknown but we have found that vascular occlusion has reduced the intra-cystic pressure (Case 3). We feel that the bone trabeculae are relieved of compression and erosion by the blood and consequently the cyst can ossify.

Our experience of selective arterial embolisation is short but promising and long-term follow up is required in the treatment of aneurysmal bone cyst.

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