

The Value of Arteriography in the Management of Aneurysmal Bone Cyst

Luis Alonso de Santos, M.D.¹, and John A. Murray, M.D.²

¹ Department of Diagnostic Radiology, and

² Section of Orthopedics, Department of Surgery, The University of Texas System Cancer Center, M.D. Anderson Hospital and Tumor Institute, Houston, Texas, USA

Abstract. The value of arteriography in the management of aneurysmal bone cyst is demonstrated in three cases in which the most vascular area of the tumor was the earliest and/or only one to recur. The prognostic value of arteriography is postulated.

Key words: Aneurysmal bone cyst — Bone tumors — Arteriography in bone tumors — Tumor recurrence.

The value of arteriography in the diagnosis and management of bone tumors has been previously covered in the literature [8, 10, 12]. The value of arteriography is not in attempting a tissue diagnosis, but mainly in assessing the extent of disease, in defining the optimal point of biopsy, in mapping the local vascular anatomy preoperatively, and in some selected cases, in separating benign from malignant disease and inflammatory from neoplastic processes.

The arteriographic features of aneurysmal bone cysts have been described previously in a limited number of cases [6, 8, 13]. The purpose of this article is not to describe the arteriographic features of aneurysmal bone cysts, but rather to describe our experience with three cases in which arteriography was useful in predicting tumor behavior.

Material and Methods

Among 27 cases of aneurysmal bone cysts evaluated and treated at M.D. Anderson Hospital and Tumor Institute from 1950 to 1975, six had arteriography as part of their workup. Three of these patients were not treated with radical surgery, and their clinical

course after curettage or curettage and bone packing was available for evaluation. All three patients had a recurrence from one to seven years after the initial therapy.

Arteriography was performed in all cases by the percutaneous Seldinger technique. Contrast was injected using a pressure injector and films obtained sequentially with a mechanical film changer at a rate of 2–3 per second for the arterial phase and one per second for the capillary and venous phases.

Case Reports

Case I

A 15-year-old white male presented with a history of five months of progressive left buttock pain after a fall. No mass was palpable, but an X-ray examination revealed an expansile lesion of the left ischium (Fig. 1A). An arteriogram demonstrated a moderate to hypovascular lesion in the ischium, but a prominent capillary blush was seen in the lower lateral aspect of the tumor (Fig. 1B). The lesion was treated with curettage and bone packing, but recurred one year later (Fig. 1C). The area of recurrence began at the point of maximal vascularity as demonstrated by arteriography. Radical ischial resection was performed.

Case II

A 30-year-old female was seen with two year history of low back pain. A pelvic mass detected by rectal examination prompted a laparotomy. An aneurysmal bone cyst was demonstrated and the lesion was curetted (Fig. 2A). One year later she presented with progressive symptoms. X-ray films revealed a recurrence (Fig. 2B), and an arteriogram demonstrated vascularity only in the right lateral aspect of the lesion (Fig. 2C). The lesion was curetted again. Sequential follow-ups demonstrated an enlarging mass in the right lower pelvis. X-ray examination revealed an obvious recurrence in the right lower aspect of the lesion (Fig. 2D). This area corresponded with the vascular region demonstrated by the arteriogram. Aggressive curettage of this region produced good results, and the patient is presently asymptomatic.

Case III

A 28-year-old male was referred to M.D. Anderson for possible recurrence of an aneurysmal bone cyst seven years after the initial therapy (Fig. 3A). A pelvic mass was noted, and further curettage revealed recurrent disease. Five years later the patient presented with severe pain in the right leg and urinary retention.

Address reprint requests to: Luis Alonso de Santos, M.D., Department of Diagnostic Radiology, M.D. Anderson Hospital and Tumor Institute, Houston, TX 77030, USA

A large pelvic mass was present by physical examination, and X-ray examination demonstrated a very large lytic lesion in the sacrum (Fig. 3B). After two consecutive surgical procedures, the mass became sclerotic and stable (Fig. 3C). Over the next twelve

months the tumor recurred inferiorly (Fig. 3D). An arteriogram demonstrated intense vascularity in this region.

The patient refused surgery and a cordotomy for pain control was performed. After discharge, he was lost to follow-up.

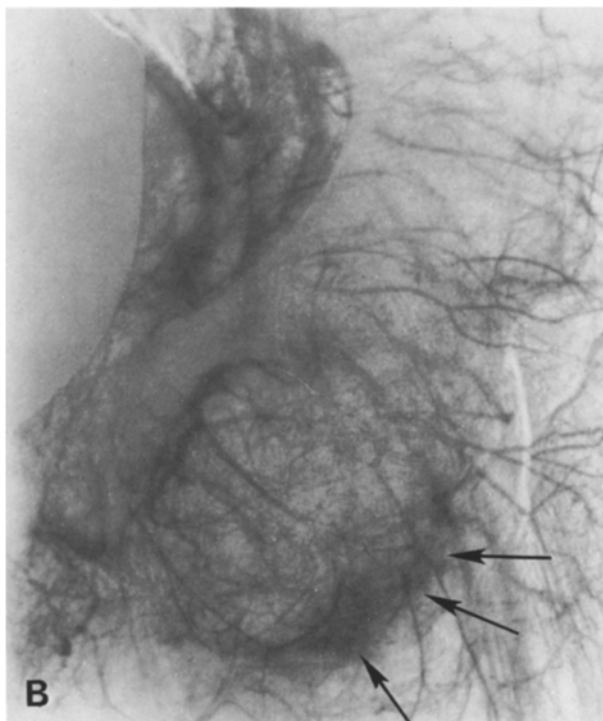


Fig. 1A-C. Recurrent aneurysmal bone cyst in 15-year-old male. **A** Initial plain film examination demonstrates expansion of ischium with no visible matrix. **B** Selective iliac arteriogram reveals only moderate vascularity but an area of capillary blush (arrows) more intense than the rest of the lesion is seen in the lower lateral aspect. **C** Twelve months later progressive destruction of bone chips with further expansion indicates recurrence (arrows). Recurrence was identified first in the area of vascularity

Discussion

Aneurysmal bone cyst is a benign primary lesion of bone that, although classically grouped with the primary bone tumors, probably does not represent a true neoplasm [1]. Radiographically this is a rather characteristic lesion. It is more frequent in the extremities, but a considerable number arise in the axial skeleton [2-4, 7, 9, 11]. They frequently present as an expansile lesion with no visible calcified matrix. The tumor commonly extends into the soft tissues, and is delineated by a very thin shell of cortical bone [9]. Clinically this is a tumor of childhood with 90% of the lesions in patients below the age of 25 years [3, 4, 7].

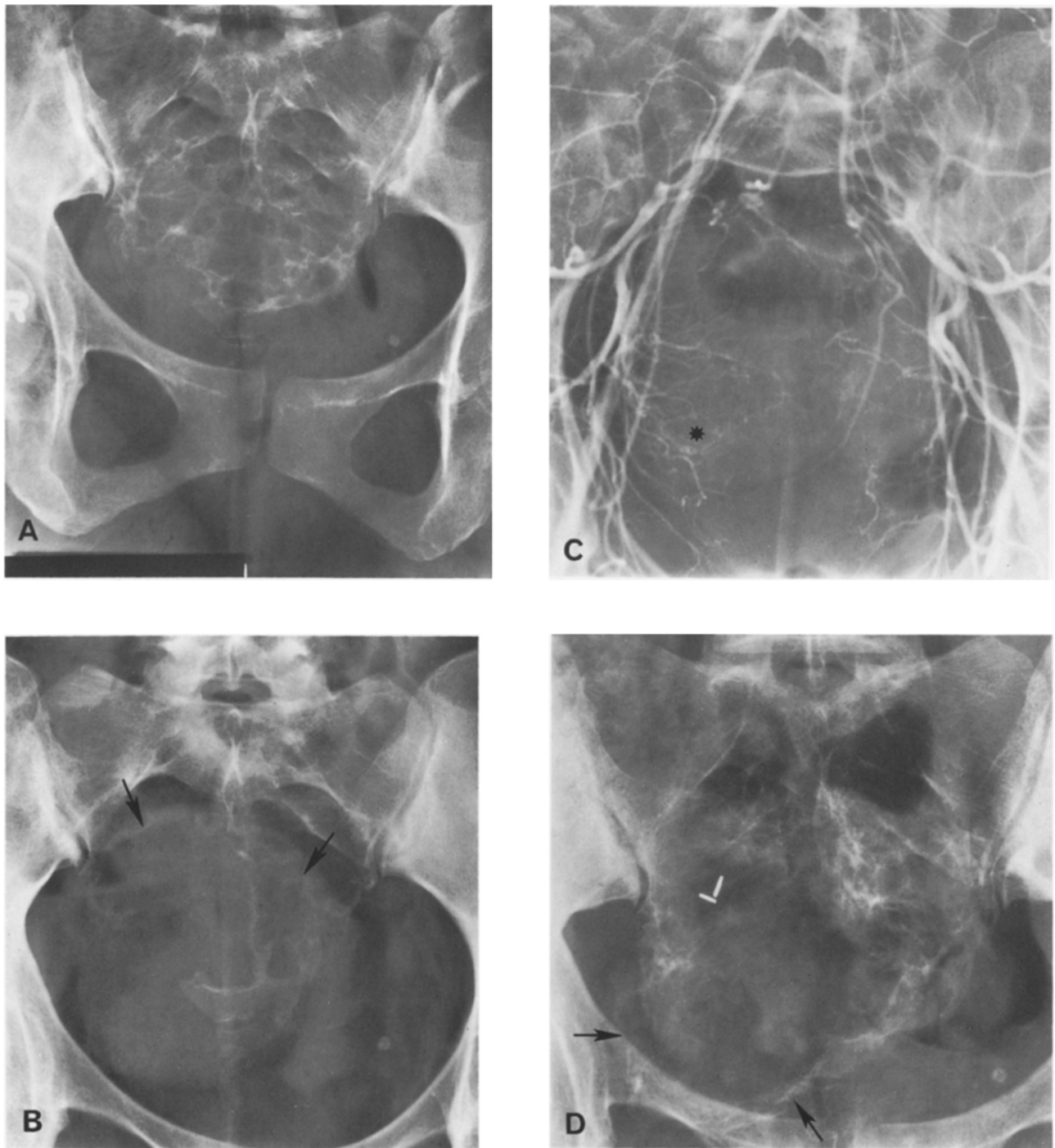


Fig. 2A–D. Aneurysmal bone cyst of sacrum. **A** Initial X-ray demonstrates an area of destruction in right lower aspect of sacrum. **B** Recurrent disease with lytic destruction of a large area of sacrum (*arrows*) is demonstrated one year later. **C** Arteriogram. Injection at aortic bifurcation reveals vascularity only in the lateral inferior aspect of the area of destruction (*star*). **D** Follow-up. Further recurrence after second surgical procedure occurred at vascular region only (*arrows*)

From the management point of view, it is a rather difficult entity due to (1) the not infrequent pathologic features resembling a malignant neoplasm, particularly telangiectatic osteosarcoma, and (2) the high inci-

dence of clinical recurrence from 25–47% depending on the series and the treatment applied, but always related with incomplete removal [3, 5, 11].

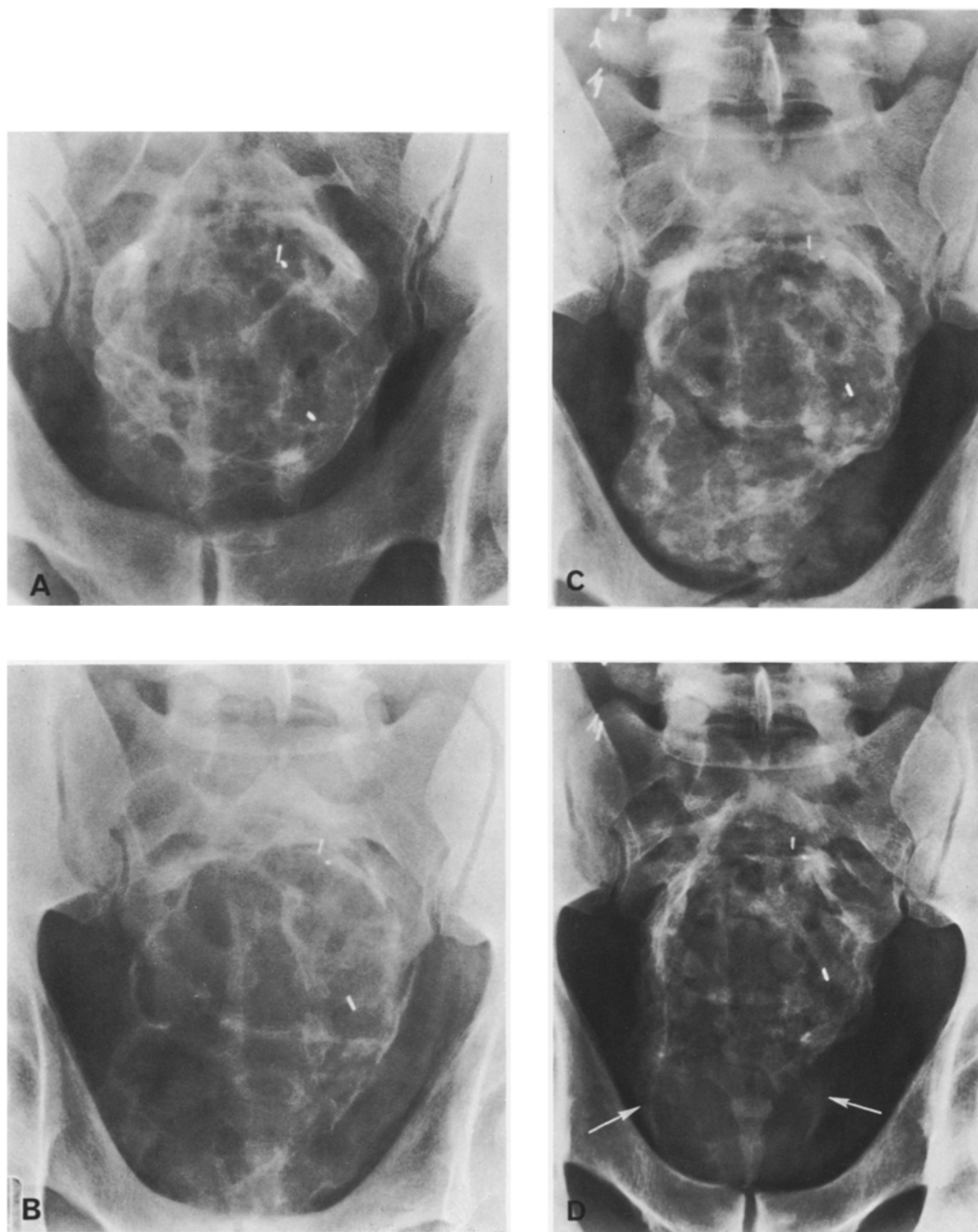


Fig. 3A–D. Recurrent aneurysmal bone cyst of sacrum. **A** Initial film at M.D. Anderson Hospital reveals stable changes after surgical curettage. **B** Recurrence of tumor five years after previous study. **C** Sclerotic stable changes after curettage. **D** Tumor recurrence. Areas of lytic destruction are indicated by arrows



Fig. 3E. Arteriogram. Low aortic injection. High degree of vascularity is present in area of recurrence

Arteriographically, this is almost always a hypovascular lesion that presents not infrequently as areas of capillary blush interspersed with areas of no vascularity. It has been suggested that these areas represent pools of slow circulating blood, but this is not certain. The relation of arteriography and the behavior of aneurysmal bone cyst has not been reported in the literature to the best of our knowledge. Recently an attempt has been made to correlate the mitotic index and pathologic aggressiveness with the clinical course and the rate of recurrence in this process [7].

In three of our cases in whom arteriography was performed as a part of the patient evaluation, some localized areas of the tumor appeared more vascular. In one case somewhat tortuous vessels were seen in one side of the tumor; and in the other two cases numerous small vessels with a prominent capillary blush were seen in localized peripheral areas of the lesions. Because of the anatomic location (two sacral and one large ischial lesion) only curettage and/or bone packing were performed initially. These three tumors recurred somewhere along their clinical course. The initial area of recurrence was only at, or predominantly at, the previously demonstrated vascular areas indicating some relationship between vascularity and aggressiveness.

Arteriography appears, therefore, to have a dual role in the evaluation of aneurysmal bone cysts. First it is useful in the preoperative diagnosis as a means of differentiating aneurysmal bone cysts from more aggressive lesions, when pathologically or radiographically in doubt, since osteosarcoma and other aggressive lesions such as giant cell tumor bone are frequently extremely vascular with abundant tumor vessels. Second, in predicting the future behavior of the tumor since the more vascular areas appear to have a more aggressive course and tend to be the areas of earlier recurrence. It is therefore suggested that when dealing with aneurysmal bone cysts in locations where complete excision is not possible, arteriography should be performed preoperatively. This will help in the clinical management by directing attention to the more vascular areas in order to treat these areas with a more aggressive approach as well as in the postoperative course, since these areas should be carefully evaluated for signs of early recurrence.

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