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Preoperative arterial embolization in heterotopic ossification: a case report

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Abstract We report a case of preoperative embolization in a 64-year-old patient suffering from total stiffness of the right hip joint due to heterotopic ossification following brain injury and pertrochanteric fracture of the right femur. A previous attempt of operative treatment could not be performed successfully due to bleeding complications. After the embolization of the correlating hypervascularisation, the surgical procedure was redone and finished with good result and minimal bleeding complications during the operation and a tolerable drop of the haemoglobin concentration postoperatively.

Key words Heterotopic ossifications · Ectopic bone formation · Therapy · Arthrolysis

Introduction

Heterotopic ossification is a well-described entity in literature, frequently treated by orthopaedic surgeons [4, 6]. It is described as a typical condition following hip and brain injuries [5, 7, 9, 10]. The observed hypervascularisation is seen as part of the mechanism resulting in heterotopic ossifications [1, 2, 8, 12, 13].

Case report

A 64-year-old male was admitted to our institution for arthrolysis of the right hip joint. He presented ankylosis and flexion contraction at the position of 20°, Booker degree 4 (Fig. 1) [3]. The previous history included a severe brain injury and a pertrochanteric fracture of the right femur following a bicycle accident 5 years ago. An attempt at the arthrolytic procedure 1 year previously failed due to excessive bleeding in the suspicious field.

Angiography was performed under sterile conditions from the left femoral artery using seldinger technique. The right internal iliac artery was selectively accessed, introducing a 4-F pigtail catheter (Tempo 4, Cordis, Johnson&Johnson) in a cross-over manoeuver. Angiographically an area with increased vascularization was visualised, corresponding to the heterotopic calcification (Fig. 2). Both bizarre vascular formations and micro-aneurysms were detected. The vessels with the heterotopic calcification originated from the *A. glutea* superior and minor branches (Fig. 3).

After insertion of a 5-F Cobra-2 catheter (Optitorque, Termuno, Tokyo, Japan) the vessels were occluded with a dura fragment

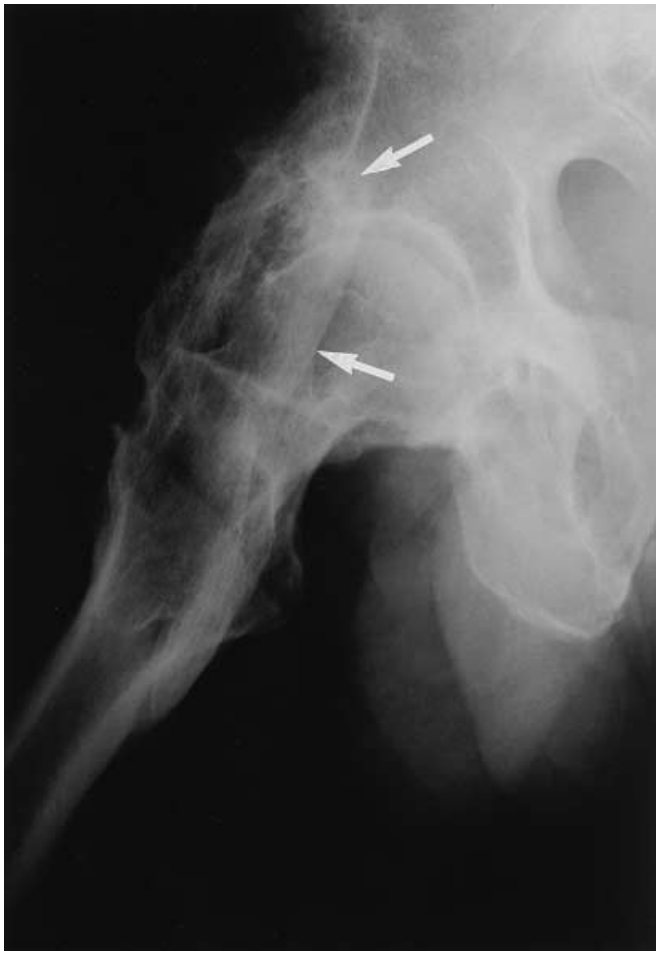

Fig. 1 Conventional radiograph of the hip joint, demonstrating the massive heterotopic bone formation *(arrows)*, causing total stiffness of the right hip joint

(Tutoplast, Dura, Biodynamics, Neunkirchen am Brand, Germany) until contrast series verified no visible perfusion of the area with the heterotopic ossification (Fig. 4) [8]. The patient was observed for 6 h post intervention without any objective or subjective side effects. The surgical procedure was successfully performed the next day. This included the removal of multi-centimeter clasp of ossification, which had led to a complete ankylosis of the hip joint. As a result of the operation, a flexion of almost 90 in the right hip could be reached. The clinical condition of the patient remained always stable. The preoperative haemoglobin concentration of 13.8 g/dl (haematocrit 40.4 %) postoperatively dropped to 10.2 g/dl (haematocrit 30.2 %). On postoperative day 2 the haemoglobin reached a minimum value of 7.9 g/dl (haematocrit 23.6 %). Two units of blood were administered to the patient. On postoperative day 4 the value increased to 10.9 (haematocrit 32 %).

Discussion

The most important factor accounting for the redress of heterotopic ossification is total hip replacement. Studies

Fig. 2 Angiography of the right superior and inferior gluteal arteries (digital subtraction angiography detail of Fig. 1). It demonstrates the hypervascularised area in projection of the hip joint *(arrows)*. Note the multiple microaneurysms *(arrowheads)*

Fig. 3 Selective angiography of the *A. glutea* superior to the corresponding hypervascularised area and the microaneuryms *(arrowheads)*

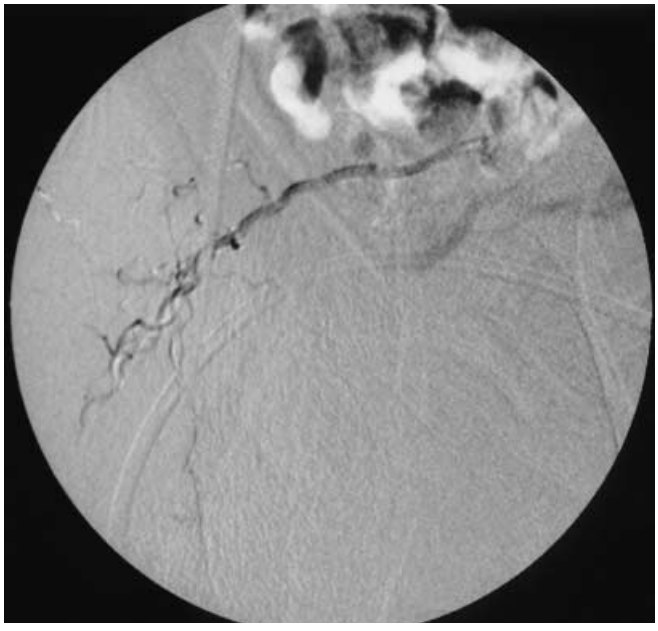

Fig. 4 Selective angiography of the corresponding hypervascularisation, post embolization with a relevant reduction of the vascular supply

reveal an incidence between 10 and 30 % during this procedure. It has to be considered that 10 % are of a more severe kind and that this corresponds in Germany to approximately 8000 patients with heterotopic ossification of the hip [2]. Arthrolysis of the hip joint of these patients is an often performed procedure by orthopaedic surgeons. Neovascularisation is an important step in the development of heterotopic ossification. However, due to this increased vascularisation, bleeding is a major and sometimes severe peri- and postoperative complication. Angiography can be a helpful tool in the diagnosis of this form of hypervascularisation. In the same session following selective probation, embolization of the supplying vessels can be performed. Embolization of the vessels in the field afflicted can reduce the amount of bleeding or, like in the case described herein, enables the surgeon to carry out the arthrolytic procedure. It is a promising measure in the prevention of excessive bleeding.

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