

Technical note

Real time MRI-guided excision and cryo-treatment of osteoid osteoma in os ischii—a case report

Sigmund Skjeldal¹, Finn Lilleås², Gunnar Follerås¹, Anna Elisabeth Stenwig¹, Eigil Samset², Terje Tillung² and Erik Fosse²

¹The Norwegian Radium Hospital, Ullernchausseen 70, NO-0316 Oslo, Norway, ²The Interventional Centre, the National Hospital, University of Oslo

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A 36-year-old electrician had not been able to work during the last 8 months due to intense pain in his left buttock. Plain radiographs were normal, but scintigraphy, MRI and CT indicated an osteoid osteoma in the left tuber os ischii. The patient was given spinal anesthesia, and placed in a 0.5T GE Signa SP/i open MRI (General Electric, Milwaukee, USA) (Figure 1). With the patient in decubitus position, a surface coil was attached and the nidus located. A biopsy needle was placed in the center of the lesion, using an optical tracking system integrated in the magnet gantry, for placement of the needle. A 4 mm cylinder was cored out and fixed in formaldehyde for histologic examination which confirmed the diagnosis osteoid osteoma. Then a 3 mm cryo probe (Galil Medical, Haifa, Israel) was placed centrally in the lesion (Figure

2). 4 cycles (1/2–2 min) with cooling to -180°C interrupted by passive thawing were used. Control MRI showed the defect after the biopsy. The patient was pain-free one day after the operation, soon resumed full-time work, and had no symptoms 1 year later.

Discussion

Most osteoid osteomas can be removed with minimal invasive techniques. CT-guided biopsy and thermocoagulation is effective with few complications (De Berg 1995, Towbin et al. 1995). CT scanning can be used in any part of the skeleton, but is not available for real time imaging. It gives a rather limited working-space for the surgeon, and therefore the patient has to be moved in and out of the gantry. The working-planes are restricted, but the most important disadvantage is the high dose of radiation in young patients who are usually seen between the ages of 10 and 20 years (Mirra et al. 1989). Alternative techniques such as ultrasound and MRI should therefore be considered. MRI-guided cryo surgery of the liver is safe in experimental studies (Klotz et al. 1997) and we have some experience with MRI-guided cryo treatment of liver lesions in animals and patients and find this to be a safe, controlled procedure. In dense bone which often surrounds the nidus, MRI may give a low resolution, but this was not a problem in our patient. In some patients a CT scan



Figure 1. Surgery in the MRI scanner (Signa SP, General Electric). Field strength: 0.5T, vertical gap: 60 cm.

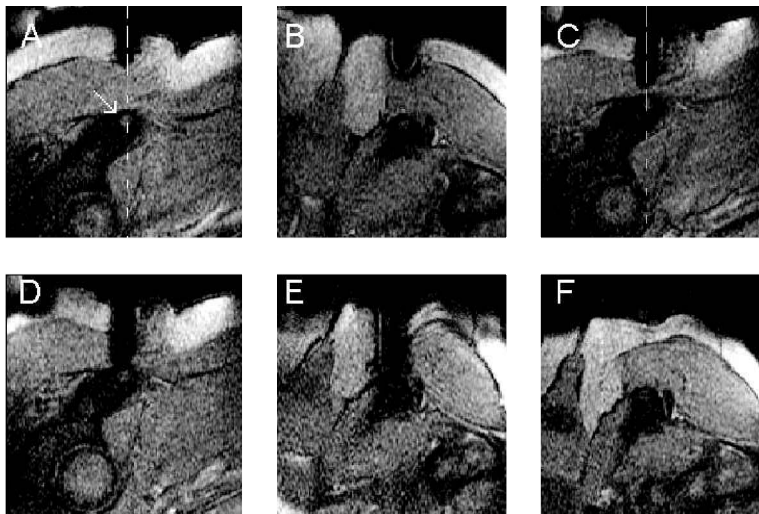


Figure 2. Real time MR images. A-D: insertion of the needle. The arrow indicates the osteoma. E: Cryo ablation. F: After treatment. Image acquisition was 5 sec/image, using a Spoiled GRASS pulse sequence with 40 ms repetition time, 10 ms echo time and 7 mm thick slices.

should also be done to avoid diagnostic errors (Assoun et al. 1994), and future patients should probably have a diagnostic investigation in the actual MRI scanner before anesthesia and invasive treatment are performed.

Heating or freezing can be used to destroy the nidus. Most reports describe the use of radio frequency ablation probes. The bone destruction seldom extends more than 10 mm when heating the lesion (Tillotson et al. 1989). In our case, we preferred repeated freezing due to the close relation to the sciatic nerve. By real-time MRI monitoring during the freezing process, the iceball can be followed during the procedure and thus control the extent of tissue destruction thereby controlled. In our case we detected no freezing of the soft tissue. We have no other experiences with the extent of necrosis in the bone after such procedures. In the Signa SP open MRI, the surgeon works in a 60-cm vertical gap, thus freedom of movement is limited.

On the other hand, MRI can give excellent visualization of frozen tissue during the cryo procedure. Due to the crystallization of water molecules, the frozen region can be seen as a region of signal void.

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