Osteoid osteoma of the femur: CT-guided percutaneous radiofrequency ablation

Clinical History:

A 27 year old male was referred to our department with 7 months history of lasting left thigh pain.

Imaging Findings:

A 27 year old man was referred to our department for persistent pain in the region of the left quadriceps muscle with onset 7 months before; symptoms worsened at night interfering with sleep and receded completely following low-dose NSAID administration. An ultrasound (US) examination was performed, showing an 8-mm nodule-shaped irregularity of the cortex of the middle portion of the left femoral diaphysis, without any significant alteration of the surrounding soft tissues. Subsequently, an MRI examination was performed showing an intracortical nodule characterized by low signal intensity relative to muscle on T1-weighted images with iso/hypointensity on T2-weighted images. Oedema of the quadriceps muscle adjacent to the lesion was apparent on STIR images, while after intravenous administration of paramagnetic contrast material, marked, early, and steady enhancement of the central part of the nodule (called the nidus) was detected, consistent with the diagnosis of osteoid osteoma. CT-guided percutaneous radiofrequency ablation (RFA) of the lesion was planned. Preliminary diagnostic CT scan for lesion localization confirmed the osteolytic structure of the osteoid osteoma, containing a small calcified core corresponding to the nidus. The RFA procedure was carried out under patient sedation through an 18-gauge probe with retractable hooks, delivering RF energy inside the lesion for four minutes at target temperature. After treatment, complete and stable remission of pain was obtained. A control US examination performed ten days later showed bone scarring with minimal perilesional hematoma.
Discussion:

Osteoid osteoma (OO) is a usually small (typically less than 2cm), benign neoplasm of the bone, characterized pathologically by a central portion named nidus. It occurs more frequently in male adolescents and young adults, and its predilected sites are the appendicular skeleton (especially the femur) and, more rarely, the axial skeleton. When long bones are affected, OO usually has a metaphyseal or diaphyseal location, while the epiphyses are less frequently involved. Diagnosis is suggested by clinical findings and is confirmed by imaging modalities such as conventional X-ray, CT, and MRI. OO often requires ablation due to the intense continuous pain that it may cause, which usually persists during night, increases following alcohol intake, and tends to recede after NSAID administration. RFA is a relatively novel technique for mini-invasive treatment of OO, representing a valid and safer alternative to surgery with fewer complications. Patients’ recovery after RFA is complete and almost immediate with substantially lower costs compared with traditional surgical therapy.

Differential Diagnosis List: Osteoid osteoma treated with CT-guided RFA.

Final Diagnosis: Osteoid osteoma treated with CT-guided RFA.

References:


Figure 1

Description: US examination shows an 8-mm nodule-shaped irregularity of the cortex of the middle portion of the left femoral diaphysis (asterisks). The cortical profile is remodelled and the periosteum is lifted outward. Origin:
**Figure 2**

*a*

**Description:** T1-weighted image shows hypointense nodule-shaped lesion located in the outer portion of the cortex. **Origin:**
**Description:** On axial STIR image the lesion is hyperintense with edema of the surrounding muscle.

**Origin:**


Description: On sagittal STIR image the lesion is hyperintense with edema of the surrounding muscle. The signal intensity of the remaining bone included in the field of view is normal. Origin:
**Description:** T1-weighted image after intravenous administration of gadolinium chelate shows enhancement of the lesion and the surrounding muscle. **Origin:**
Description: Signal-intensity-versus-time plot shows rapid and intense contrast medium uptake of the lesion (1) followed by slow wash-out, compared with nearby cortex (2) and non-edematous muscle (3). Origin:
**Description:** Preprocedural axial CT image shows focal lysis of the outer aspect of the femoral cortex with calcified central core (nidus). **Origin:**
Description: Preprocedural reformatted sagittal CT image shows focal lysis of the outer aspect of the femoral cortex with calcified nidus. The remaining cortex included in the field of view is normal. Origin:
Figure 4

Description: CT-guided insertion of the RFA needle inside the lesion. Origin:
Description: CT image obtained immediately after RFA showing wedge-shaped osteolysis in the ablation site. Origin:
Figure 5

Description: Control US examination performed ten days after RFA shows bone scarring (asterisk) with minimal perilesional hematoma (rectangle). Origin: