Percutaneous cryoablation for a symptomatic non-ossifying fibroma. A case report

Keywords: Non-ossifying fibroma; Cryoablation; Benign bone lesion; Percutaneous

Non-ossifying fibromas (NOFs) are common benign metaphyseal bone lesions of unknown etiology that occur in children and young adults [1]. They commonly arise in the distal femur, proximal tibia and fibula. The peak incidence is between 4–8 years [2] and they are often discovered incidentally on plain radiographs [3]. Physical examination is usually unremarkable. While the vast majority of NOFs are asymptomatic, lesions causing chronic pain and pathologic fractures have been described [4].

NOFs rarely require operative treatment, due to a high rate of spontaneous regression and the lack of symptoms [1,2]. Symptomatic lesions may be treated non-operatively [3]. If symptoms persist, curettage and bone grafting have been proposed, although some have reported an increased recurrence rate [4].

We report the case of a 17-year-old female with a symptomatic NOF treated by percutaneous cryoablation after failure of conservative treatment.

Case report

A 17-year-old healthy female presented with distal right thigh pain after a simple fall. Plain radiographs of the right distal femur revealed an eccentric bone abnormality with typical features of a NOF (Fig. 1a). Pain persisted and limited her in daily activities. Magnetic resonance (MR) imaging features were consistent with a NOF, with a hyperintense...
signal on T2 and isointense signal on T1 weighted images and absent contrast enhancement. There was no evidence of pathological fracture (Fig. 1b–c). After 1 year of persisting pain, the patient was referred to our tertiary medical center for ongoing treatment. Serial imaging revealed no change in the lesion.

The case was discussed at our multidisciplinary tumor board and percutaneous cryoablation was proposed as the first choice because of the benign nature of the lesion and the minimal invasiveness of this procedure. The ablation was performed under general anesthesia on an outpatient basis. A contemporary biopsy was obtained to confirm the diagnosis (Fig. 2). Three Bonopty® bone biopsy sets (AprioMed AB, Uppsala Sweden) were used first to drill the cortical bone under CT guidance and three Icespheres™ cryoprobes (Gallil Medical Ltd, Yokneam, Israel) were inserted into the lesion through the Bonopty® canula (Fig. 3). An 18 gauge Chiba needle (Cook Medical, Bloomington, USA) was placed close to the bone surface to inject CO₂ in order to create an insulation layer around the bone to protect nearby neurovascular structures and the skin during the cryoablation process. Two cycles of 12 minutes freezing, 3 minutes passive thawing and 2 minutes active thawing were delivered to the lesion. The gases used were Argon for freezing and Helium for thawing.

After the procedure the patient noted immediate pain relief. She was discharged home the same day on simple non-opiate analgesia (paracetamol, mefenamic acid) without any mobility restrictions. After 1 month, she was pain free and had resumed all her daily activities. She was permitted a gradual return to sporting activity. After 16 months, plain radiographs demonstrated progressive ossification of the lesion (Fig. 4).

Discussion

NOFs are generally asymptomatic and regress spontaneously [1,2]. Observation with serial annual or biennial plain radiographs is recommended [3]; when they cause chronic pain or impending pathologic fractures, surgical curettage and autogenous bone graft has been proposed as the treatment of choice [4].

To our knowledge, this is the first report of cryoablation as a treatment modality for symptomatic NOF. Cryoablation is a minimally invasive technique, well known for the treatment of neoplastic lesions in kidneys, prostate, liver and lungs [5–7]. It has also been described in the palliative treatment of bone and soft tissue metastases [8]. Compared to other ablation methods, percutaneous cryoablation offers several advantages: it is less invasive than open surgery, with a better cosmetic result, and can easily be performed on an outpatient basis [8,9]. In comparison

Figure 2. Biopsy: spindle non-atypical fibroblasts arranged in storiform pattern with admixed foamy macrophages (a) and focal reactive woven bone (b).

Figure 3. 3D image (a) showing the positioning of three Icespheres™ cryoprobes into the lesion. A needle is visible close to the bone surface. This needle is used to inject CO₂ to create an insulation layer around the bone to protect nearby neurovascular structures and the skin. Axial CT image (b) showing the CO₂ injected around the bone to protect the neurovascular bundle (arrow).
to percutaneous radiofrequency ablation, cryoablation may offer a better control of margins on CT or ultrasound. Finally, patients do typically experience less pain in the immediate post-treatment period as compared to other more invasive ablation techniques. As we did in the present case a biopsy should always be obtained during the procedure to confirm the diagnosis.

Conclusion

In selected cases, particularly when there is no risk of pathologic fracture, percutaneous cryoablation may be an acceptable alternative to treat painful NOFs. It is minimally invasive and does not preclude additional treatment. Further studies are needed to confirm the validity of cryoablation in the treatment of selected benign bone lesions.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References


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