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Our experience with osteoid osteomas treated by percutaneous radiofrequency ablation

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Abstract
Aim: Evaluating the outcome of computed tomography (CT) guided percutaneous radiofrequency ablation in the treatment of osteoid osteoma in unattainable region.
Material and Methods: 12 patients between 12 - 30 years of age with osteoid osteoma were selected and treated by percutaneous CT guided radio-frequency ablation. All the patients had complained of pain. Evaluation done with x-ray, CT, MRI and bone scintigraphy. The lesion is heated to 90^0 C for a minimum of 6 minutes by Radiofrequency ablation under general anaesthesia.
Results: All patients had complete relief of pain after radiofrequency ablation and was fully weight bearing without any support. Local erythema was noted in 6 patients, paresthesia was observed in 2 patients, 1 patients had a small cortical chip fracture at entry site of needle which healed spontaneously and 3 cases of minor thermal injury of skin were noted which required dressing with 0.2% Silver Nitrate ointment. Patients were followed up for 2 years (24 months), and no recurrence was reported.
Conclusion: CT guided percutaneous radiofrequency ablation is an effective, minimally invasive and economic treatment method for osteoid osteomas.

Keywords: osteoid osteoma, radiofrequency ablation, RFA, CT guided radio-frequency ablation

Introduction
Osteoid osteoma are benign bone forming tumors [1-6], with a nidus measuring less than 1.5cm in the greatest dimensions [1-6]. They are largely seen in the age group of 12 to 30 years [1-6] with male predominance of 3:1 [1, 5, 6]. Osteoid osteoma can arise from any bone with a predilection for the lower extremity [1, 5-7]. 5% of tumors are subperiosteal [8]. The nocturnal pain is the most important clinical symptom [6-8] that is reduced by NSAIDs [6-8]. Nocturnal Pain is due to the increased prostaglandin synthesis at night [9, 10]. Bone deformity, growth disturbances, swelling of joints with stiffness and contracture and painful scoliosis include the other symptoms of Osteoid osteoma [11]. Osteoid osteoma was diagnosed both clinically and radiologically [12-15]. X-rays showed a circular to ovoid radiolucent lesion representing the nidus surrounded by an area of sclerosis [6, 9-15]. The diagnosis and localization of the tumors is more effected by CT [16-18]. Osteoid osteoma were treated by curettage and nidus excision previously. Currently CT guided percutaneous radiofrequency ablation is gaining popularity [17-28].

Materials And Methods
Between August 2017 and July 2019, 12 patients (9 males and 3 females) between 12-30 years with osteoid osteoma were diagnosed and treated with CT guided percutaneous radiofrequency ablation. All the patients had severe pain at night and radiological features of osteoid osteoma. All patients received NSAIDs for pain management. We confirmed the size of nidus to be less than 1.5 cm in diameter in CT scan. The lesions were located in the

- Femur - 7 patients
- Tibia - 2 patients
- Humerus - 1 patients
- Radius - 1 patient
- Calcaneum - 1 patient

Anaesthetic fitness obtained pre operatively. Patients were explained of the alternate treatment methods and written consent obtained. 1 dose of CEFOPERAZONE and SULBACTUM 1.5gm (antibiotic) and ATROPINE was administered 1 hour before the procedure.

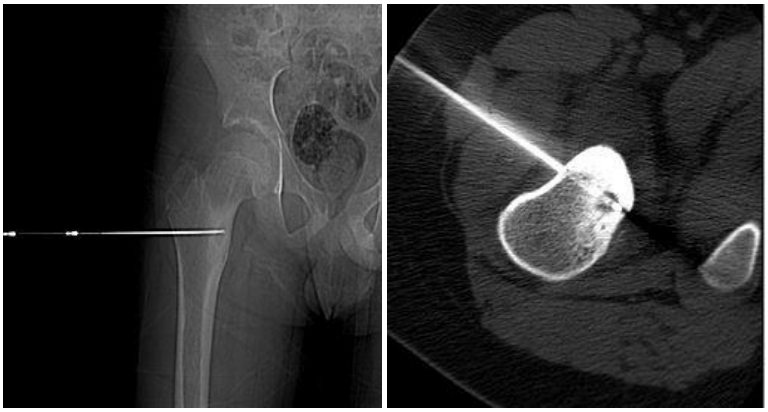

Fig 1, 2: CT guided targeting of the nidus

Technique

Under general anaesthesia, dispersive pad especially grounding pads which helps to reduce risk of complication and attached over dry, shaven area mostly patient's thigh or on the back. Under CT guidance, lesion was localized and the needle trajectory was planned. Through a stab incision, core biopsy needle was inserted. Through the biopsy needle cannula, insulated radiofrequency electrode was passed (Figs. 1 & 2). Thermal coagulation of lesion was done at 90^0c for a minimum of 6 minutes. If nidus was more than 1.5 cm, then electrode repositioned and re-ablated another time. A sterile dressing was applied. Post-operatively analgesics and 2 doses of IV antibiotics were administered. Patients were advised to avoid heavy activities for 1 month without restriction of daily activities. Patients were discharged after the 3rd post-operative day and followed up at 1 month, 6 month and 1 year and 2 years after the procedure.

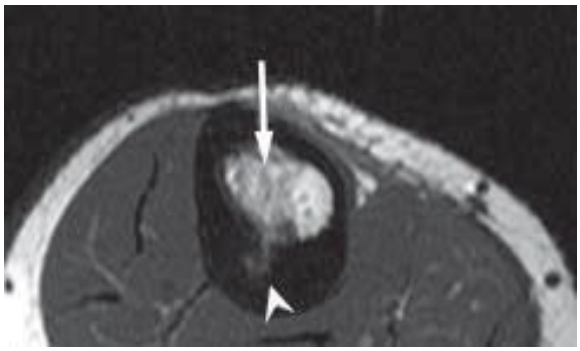

Fig 3: MRI showing nidus surrounded by zone of ablation

Results

All the patients acquired full Technical success with pain relief within 48 hours of the procedure. Pain recurrence was noted in 2 patients at 5th and another at 8th month. Both patients acquired total pain relief after re-ablation.

Complication	No. of patients	Management
Local erythema	6	Dressing with silver nitrate cream
paresthesia	2	
cortical chip fracture at the needle entry site	1	Spontaneously healed
minor skin thermal injury	3	Dressing with silver nitrate cream

After the primary ablation management we acquired 94% success rate and after the secondary re-ablation we acquired 100% success rate were achieved in our study. After 24 months follow up, no recurrence of pain or nidus in CT were found.

Discussion

Osteoid Osteoma is a benign bone forming tumors [1-6] that causes severe pain and disability [6-11]. The clinical and technical success rate was 94% after primary ablation and after re ablation of the other 2 patients we finally achieved 100% clinical and technical success rate. Our study showed a favorable outcome compatible to other international studies [17-28]. Radiofrequency ablation technique is an effective, minimally invasive and economic method of treatment. This technique is particularly helpful in areas that are difficult to access through surgery. The outcome depends on probe temperature, nidus size, the site involved. But the procedure is technically demanding that requires skilled and trained surgeon. The most common complications are skin burns and local erythema. The recurrence rate is very minimal with this procedure. Poor skin quality, local sepsis and uncontrolled diabetes are contra indicated for the procedure.

Conclusion

Computed tomography (CT) guided percutaneous radiofrequency ablation in the treatment of osteoid osteoma is safe, effective with minimally invasive procedure[28] compared to previous the surgical techniques which has the drawback of difficult localisation, incomplete excision and high rate of recurrence. Literature has proven RFA in the treatment of osteoid osteoma in unattained area have achieve a favourable success rate with minimal complications and morbidity. From our study, we conclude that percutaneous radiofrequency ablation should be considered as the best choice of treatment for osteoid osteoma in unattained areas.

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