Does RFA Have a Role in the Treatment Plan of Small Painful Benign Tumors Of Bone?

Thesis

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BY

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Introduction

Osteoid osteomas are benign tumors of the bone typically seen in children and young adults. They cause inflammation, local effects on normal tissue from tumor expansion, and secondary effects and complications (e.g., scoliosis, osteoarthritis). ***(Hayes, 2005)***

The disease is self-limiting and pain may disappear after several years of conservative medical treatment, with an average time of pain resolution of 5–6 years. This treatment usually includes aspirin or other non-steroidal anti-inflammatory agents. However, long-term medical therapy may be unacceptable because of refractory pain and complications of chronic anti-inflammatory agents. In addition, osteoid osteoma may occur in articular or peri-articular areas of bone; In such cases, medical therapy may be inadequate and more aggressive interventions are necessary. ***(Anthony et al., 2003)***

Several methods of treatment plan have been utilized as treatment options other than medical management. These options include open surgical resection with intra-lesional, marginal, or wide surgical margins, CT-guided burr ablation and, most recently, CT-guided radiofrequency (RF) ablation. There is general agreement that in open procedures complete removal of the nidus is needed for cure and resolution of symptoms. Fail to do so is usually associated with incomplete relief of symptoms, and an increased risk of local recurrence. Since intra-operative localization of these small lesions can be very difficult, open surgical removal often necessitates considerable resection of bone, and consequently internal fixation and/or bone grafting may be required. Although various localization techniques have been developed to ensure complete removal, the nidus may even be missed at surgery. ***(Anthony et al., 2003)***

Chondroblastoma is a rare, benign, cartilaginous tumor that accounts for approximately 1–2% of all benign bone tumors. ***(Christie-Large et al., 2008)***

Radiofrequency ablation (RFA) is a minimally invasive procedure where cancerous or diseased cells are destroyed using heat produced by high-frequency radio waves. ***(Hayes, 2005)***

Percutaneous image-guided radiofrequency ablation (RFA) has been used most often in the treatment of primary and secondary hepatic malignancy. However, researchers are evaluating RFA as a treatment modality in different areas of the body. ***(Goetz, et al., 2004)***

Rosenthal et al., 1995 have reported the use of RF ablation for treatment of osteoid osteomas. Dupuy et al., 1998 together with European and American researches have reported that treatment with percutaneous image-guided radiofrequency ablation can result in significant palliation of painful bone tumors. **(Goetz et al., 2004)**.

Percutaneous radio-frequency ablation is a safe and effective first-line treatment for chondroblastoma. The technique is minimally invasive and can apparently be curative. Patients with small initial or recurrent lesions are ideal candidates, although multiple treatments during a single session may be necessary for larger lesions. ***(*Joel *et al., 2001)***

Regardless of the method of treatment chosen, success is highly dependent on pre-procedural localization of the nidus. CT-guided procedures may reduce morbidity and complications when compared with traditional open surgical resection. ***(Lindner et al., 2001)***

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18-FDG	18-fluorodeoxyglucose
99m Tc	technetium-99m
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AP	Antero-posterior
C.P.T.M	Center for Preservation and Transplantation of Musculoskeletal Tissues
CA	California
cm	centimeter
CMF	Chondromyxoid Fibroma
CMFs	Chondromyxoid Fibromas
CT	Computerized tomography
G	Gauge
GCTTS	giant cell tumor of the tendon sheath
GHz	Gigahertz
hr	hour
kHz	Kilohertz
kV	kilovolt
LITT	laser interstitial thermal therapy
min	minute
mL	millilitre
mm	millimeter
MRI	Magnetic resonance imaging
NICE	The National Institute for Health and Clinical Excellence
NSAIDs	non-steroidal anti-inflammatory drugs
PET	Positron emission tomography
PVNS	pigmented villo-nodular synovitis
RF	Radiofrequency
RFA	Radiofrequency ablation
SIR	The Society of Interventional Radiology

USA	United States of America
W	watt
WHO	World Health Organization

Aim of Work

The aim of work is to practice and to demonstrate the techniques, advantages, drawbacks and efficacy of the radiofrequency ablation as well as to set its role in management of small painful bone tumors.

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Abstract

Radiofrequency ablation of osteoid osteoma is a highly effective, efficient, minimally invasive and safe method of treating osteoid osteoma.

The scientific peer-reviewed literature supports the treatment of osteoid osteoma with radiofrequency ablation (RFA). RFA provides outcomes comparable to those of surgical excision, with destruction of the tumor nidus and relief of symptoms in 70-100% of patients. Due to the difficulty locating the nidus, surgical treatment may result in weakening of the remaining bone, necessitating grafting or internal fixation. These complications are avoided with RFA. Results of the peer-reviewed literature support the use of RFA for the treatment of osteoid osteoma.

Key word: Radio-Frequency, benign, bone tumor.

Classification of bone tumors

It may be convenient to classify bone tumors according to their cell of origin or histogenesis. However, histologically the exact cell of origin of a tumor is not always certain and typing may depend only on the cell or cells that predominate in the developed lesion. ***(Dahlin & Krishnan, 1986)***

Table 1- Histological Typing of Primary Bone Tumor and Tumor -Like Lesions *(modified from WHO classification):*

	Benign	**Malignant**
I. Bone-forming tumors	Osteoma Osteoid osteoma Osteoblastoma	Osteosarcoma Parosteal osteosarcoma Periosteal osteosarcoma Telangiectatic osteosarcoma and many other types
II. Cartilage-forming tumors	Chondroma Osteochondroma (cartilage capped exostosis) Chondroblastoma Chondromyxoid fibroma	Chondrosarcoma Mesenchymal chondrosarcoma Clear-cell chondrosarcoma
III. Giant cell tumor	Giant cell tumor	Malignant giant cell tumor
IV. Marrow tumors **a. Round cell tumors**		Ewing's sarcoma Atypical Ewing's sarcoma Primitive neuroectodermal tumors
b. Lymphoma		Hodgkin's disease Non-Hodgkin's lymphoma