Microwave ablation therapy (MWAT) of liver malignancies: Principles, devices & clinical results

Essay
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Radio-diagnosis

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٢٠١٢

List of contents

List of figures

List of tables

AFP	***Alpha feto protein***
CBD	***Common bile duct***
CECT	***Contrast enhanced Computed tomography***
CEMRI	***Contrast enhanced Magnetic resonance imaging***
CEUS	***Contrast enhanced Ultrasound***
CRC	***Colo-rectal carcinoma***
CT	***Computed tomography***
D°W	***Dextrose in water***
FNA	***Fine needle aspiration***
GHz	***Gega hrtz***
GIT	***Gastrointestinal tract***
HBV	***Hepatitis B virus***
HCC	***Hepatocellular carcinoma***
HCV	***Hepatitis C virus***
HU	***Hounsfield unit***
HVs	***Hepatic veins***
Hz	***Hertz***
IMV	***Inferior mesenteric vein***
IV	***Intra venous***
IVC	***Inferior vena cava***
LHV	***Left hepatic vein***
LITT	***Laser-induced interstitial thermotherapy***
MHV	***Middle hepatic vein***
MHz	***Mega hertz***

Min	***Minute***
MRI	***Magnetic resonance imaging***
MW	***Microwave***
MWA	***Microwave ablation***
NCB	***Needle core biopsy***
PEI	***Percutaneous Ethanol Injection***
PV	***Portal vein***
RF	***Radiofrequency***
RFA	***Radiofrequency ablation***
RHV	***Right hepatic vein***
SMV	***Superior mesenteric vein***
TACE	***Trans-arterial Chemo-Embolization***
T١W	***T١ weighted***
T٢W	***T٢ weighted***
UCAs	***Ultrasound contrast agents***
US	***Ultrasound***
W	***Watt***
٣D	***٣ dimensional***

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Introduction

Primary and secondary malignant hepatic tumors are some of the most common tumors worldwide. Metastatic and primary cancers of the liver have a dismal influence on patient survival and are responsible for a large fraction of all cancer deaths in the world. The liver is the most common site for blood-borne metastases. The single most important factor for length of survival is the extent of liver involvement. **(Hansjörg et al, ٢٠١١).**

Hepatic resection remains the reference standard in the treatment of malignant liver tumors; however, a large number of patients have disease that is not amenable to surgical therapy. This may be due to unfavorable anatomy, the presence of multiple tumors, or poor hepatic reserve. Therefore, several ablative treatment modalities have been developed for local control of liver tumors in patients with non resectable hepatic tumors**. (Hansjörg et al, ٢٠١١).**

In the past ٢ decades, percutaneous local ablative therapies, including percutaneous ethanol injection, chemoembolization, radiofrequency ablation, and microwave ablation and cryo-ablation have emerged as effective treatments for small hepatocellular carcinoma (HCC) and unresectable metastatic lesions with survival rate of ٥ years. . **(Lu et al, ٢٠٠٧)**

Microwave ablation is the most recent development in the field of tumor ablation **.**The technique allows for flexible approaches to treatment, including percutaneous, laparoscopic, and open surgical access. With imaging guidance, the tumor is localized, and a thin (١٤,٥-gauge) microwave antenna is placed directly into the tumor. A microwave generator emits an electromagnetic wave through the exposed, noninsulated portion of the antenna. Electromagnetic microwaves agitate water molecules in the surrounding tissue, producing friction and heat, thus inducing cellular death via coagulation necrosis**.** ***(*****Brace *et al.,* ٢٠١٠*).***

MWA systems are composed of three basic elements; generator, low-loss flexible coaxial cable and microwave antenna. Manipulating the designs of MW antenna has a greater effect on electromagnetic field distributions which in turn govern the temperature distributions found in unwanted tissue***. (*Wongtrairat *et al.*, ٢٠١١*).***

The main advantages of microwave technology, when compared with existing thermo ablative technologies, include consistently higher intratumoral temperatures, larger tumor ablation volumes, faster ablation times, and an improved convection profile. **(Liang et al., ٢٠٠٨)**.

Microwave ablation has promising potential in the treatment of primary and secondary liver tumours, primary and secondary lung malignancies, renal and adrenal tumors, and bone metastases. The technology is still in its infancy, and future developments and clinical Implementation will help improve the care of patients with cancer. ***(Lubner et al., ٢٠١٠).***

Aim of work

To highlight the role of microwave ablation in hepatic malignancies. Its advantages & disadvantages.