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Investigation of Breast Cancer Treatment by Using Radio Frequency Ablation in Iraq Hospitals

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Abstract: *The purpose of this retrospective study was to assess the safety and efficacy of percutaneous radiofrequency ablation (RFA) in the treatment of breast carcinomas. Amended for minimal invasive therapy by the breast cancer society, the study consisted of 386 patients, who passed through RFA in 10 institutions between July 2003 and June 2009. Patients were treated with standard RFA procedures directed by ultrasound and were followed every 6 to 12 months. The analysis focused on the viability, protection and events of the ipsilateral breast tumor recurrence (IBTR). Adverse events related to RFA included local pain, skin irritation and nipple return. The study found that IBTR was more common in patients with initial tumor sizes more than 2 cm. 50-year-old IBTR-free rates were the highest among patients with tumors and the lowest tumor and lowest tumor> 2.0 cm patients. The results suggest that RFA tumor is a safe and effective minimum invasive treatment for CM 2 cm, although further research is required to customize the process and determine its future role in local breast cancer.*

Keywords*: Breast cancer, ipsilateral breast tumor recurrence, local medical, minimum invasive surgical procedures, radiofrequency ablation*

I. Introduction

Minimally invasive therapeutic options have been developed as an alternative to surgery for many cancers due to technological innovations. Radiofrequency ablation (RFA) has become a widely recognized therapeutic approach for managing various solid tumors, including liver cancer, renal cell carcinoma, lung malignancies, and metastatic bone lesions, among others. Its minimally invasive nature and efficacy in targeting localized tumors have established it as a key clinical intervention in oncology (Tetishi et al., 2005, p. 1201). In the last decade, clinical research has introduced minimally invasive treatment of breast cancer and emphasized the feasibility and effects of RFA (Gervice et al., 2005, p. 64). Both RFA in combination with surgery and as a stand-alone RFA for early-stage breast cancer has been studied (Lenkoni et al., 2008, p. 621). Various separation approaches have been reported, including high-intensity ultrasound, cryoablation, laser ablation, and microwave ablation. A recent meta-analysis has been done demonstrating RFA is the most effective (Peak et al., 2016, p 1). Founded in 2005, the Breast Cancer Society for Minimal Therapy carried out a retrospective study to evaluate the viability, safety, and effectiveness of radiofrequency ablation (RFA) as a non-surgical approach for treating early-stage breast cancer (Khatri et al., 2007, P . 1644).

II. Patients and Methods

2.1 Patients

The study was treated with RFA for breast cancer from July 2003 to June 2009 in 10 institutions (Tetishi et al., 2005). Patients require at least 18 years old for eligibility criteria, biopsy-wide breast cancer, and either their physician or fall surgery (Gervice et al., 2005) is recommended to RFA . The diameter of the tumor was limited

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to ≤3.5 cm, which was measured through ultrasound or MRI (Lesoni et al., 2008). Patients with multipliable lesions, widespread introductory, or those who had to undergo systemic chemotherapy were excluded (Hirki et al., 2006). The study protocols were approved by the Institutional Review Board, and all participants provided written informed consent prior to their involvement (Goitz et al., 2004).

Pre-visible diagnosis included core needle biopsy (CNB) and/or vacuum-assisted biopsy (VAB) to confirm the pathological nature (Mayo-Smith and Dupui, 2004) of the tumor. Tumor viability post-RFA was evaluated using hematoxylin-eosin and/or NADH-Diaphorez staining techniques (Jeffrey et al., 1999).

2.2 RFA Procedure

Various RFA electrodes, generators and techniques were employed; However, all processes follow fundamentals such as ultrasound-guided electrode insertion and high tumor temperature (Tetishi et al., 2005). The Sentinel lymph node biopsy was conducted under general anesthesia, in which the excellent lymph node was dissected if metastasis was detected (Gervice et al., 2005). The grounding pads were placed on the thighs of the patients, and the respective breast ultrasound made the process facilitated (Lencioni etc., 2008).

Choosing a safe skin penetration point to avoid vessels in the RFA process, keeping the needle in the tumor under ultrasound guidance, and 20-40 ml of 5% glucose solution to protect the surrounding tissue (Hirik et al, 2006) Injecting involves. The RF energy was gradually extended, and hypreakogenity on ultrasound was monitored until a 0.5 cm security margin was obtained around the tumor (Goetz et al., 2004). Post-processer ultrasound evaluated technical success and potential complications (Mayo-Smith and Dupui, 2004).

2.3 Follow and Assistant Medicine

Patients were monitored at 1 month later and later at an interval of 6- or 12 months. Imaging methods such as ultrasound, MRI and mammography assessed the treated area. Decisions about systemic auxiliary therapy were based on internal sub-factories identified in the watchdog lymph node status, tumor size and pre-healing biopsy.

2.4 clinic pathological factor

Ipsilateral breast tumor recurrence affects factors propagate (e.g. age, imaging modality, histological subtype), intraoperative (e.g. ablation time, temperature), and postoperative variable (e.g. imaging, lye nodded position, And assistant, lymph node status and assistant Therapy).

2.5 statistical analysis

The associations between clinic pathological factors and IBTRs were analyzed by using the Fisher or Fisher accurate tests, while the rate of survival free from local recurrence was estimated through the couple-analyst Was compared. Statistical importance was determined at P <.05, and analyzed using the SPSS version 17.0.

III. Result

A total of 386 patients passed through RFA as a standalone treatment. The average age was 54 years (range: 22–92), and the average tumor had a diameter of 1.6 cm, with 92% of the tumor measuring ≤2 cm. The pathological diagnosis included invasive ductal carcinoma (334 patients), invasive lobular carcinoma (10 patients), and various other kinds (42 patients). Detailed patient characteristics are briefly consecrated in Table 1 (Tetishi et al., 2005; Gervice et al., 2005; Lenkoni et al., 2008).

Table 1. Patient Characteristics

Characteristic	Number
Age, y	54 (range, 22–92)
Follow-up, mo	50 (range, 3–92)
Tumor size, cm, mean ± SD	1.6 ± 1.1
Histology	
- Invasive ductal carcinoma	334
- Invasive lobular carcinoma	10
- Others	42
Lymph node	
- Positive	43
- Negative	343
ER	
- Positive	342
- Negative	39
- Unknown	5
PR	
- Positive	303
- Negative	74
- Unknown	9
HER2	
- Positive	30
- Negative	325
- IHC2 and FISH not performed	3
- Unknown	12
Adjuvant radiotherapy	
- Positive	350
- Negative	34
- Unknown	2
Type of RFA electrode	
- Cool-tip	356
- LeVeen	13
- RITA	17
Diagnostic modality for tissue biopsy	
- Preoperative	
-- CNB	323
-- VAB	62
-- Other	1
- Postoperative	
-- CNB	39
-- VAB	149
-- Other	183
- Not done	-
Timing of viability assessment after RFA	
- Before radiotherapy	274
- After radiotherapy	76
- Not done	2
- Unknown	11
Adjuvant therapy	
- None	35
- Chemotherapy	25
- Endocrine therapy	292
- Both	31
- Unknown	3

Abbreviations: VAB: Vacuum-Assisted Biopsy, ER: Estrogen Receptor, FISH: Fluorescence In Situ Hybridization, IHC: Immunohistochemistry, PR: Progesterone Receptor, RFA: Radiofrequency Ablation/ SD: Standard Deviation, CNB: Core Needle Biopsy, HER2: Human Epidermal Growth Factor Receptor Type-2.

3.1 RFA System and Process Description

Three main systems were used for RFA therapy in breast cancer:

- Cool-Tip radiofrequency system 26
- Leven needle electrode system 1
- Rita System 27

Of the 386 individuals treated, 356 (92%) achieved a reduction in the process using a cool-TIP system. The mean duration of the separation process was 19 minutes (range: 4-72 minutes), and the average tumor temperature immediately post-eberans was 91 °C (Tetishi et al., 2005, p. 1201–1209).

3.2 Imaging Results Post-RFA

Magnetic resonance (MR) Imaging organized a post-RFA that the enhancing wound had disappeared, while a separate peripheral growth was observed (Mananty et al., 2009, P. 339–346).

MRI before (left) and after (right) RFA.

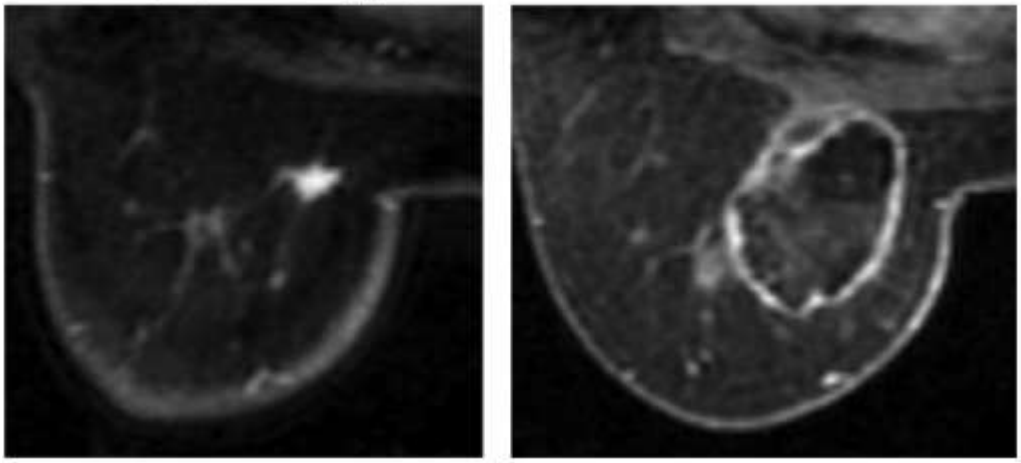

Figure 1. The larger wound vanished and a particular peripheral growth was seen on MR imaging after RFA.

Visible No deaths related to any procedure were stated. Regarding adverse incidents related to RFA, local pain in 9 patients (2.3%), skin irritation in 15 patients (3.9%), and 7 patients (1.8%) (1.8%) (1.8%) (1.8%) (1.8%) (Table 2) saw a return. No significant differences in adverse events were noted depending on the size of the tumor.

Table 2. RFA Details and Adverse Events

Characteristic	Value
Total ablation time, min	19.2 ± 12.6
Temperature of the tumor just after RFA, °C	91.0 ± 8.2
Adverse Events (cases)	
- Local pain	9
- Skin burn	15
- Nipple retraction	7

President data shows the results of a study on breast cancer, with a total of 386 patients, out of which 43 had positive excellent lymph nodes. A significant part of patients (348, 90%out of 386) received auxiliary therapy, with 292 patients undergo endocrine therapy, undergo 25 chemotherapy, and 31 treatment. Additionally, 352 patients (91%) received breast radiation.

The study reported an average follow -up period of 50 months (from 3 to 92 months). The occurrence of IBTR was found more in patients with tumors larger than 2 cm (3 out of 30, or 10%), which was found more in patients

with tumor 4 cm (6 out of 356, or 2 with tumors. %Or more than 2%or 2%. 87%for tumors, 1.0 cm, 1.1–2.0 cm, and> 2.0 cm. ; Lesoni et al., Lesoni et al., Lesoni et al., 2005; 2005;

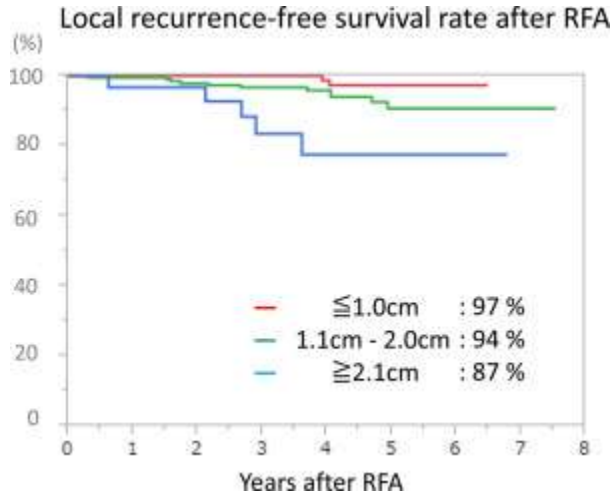

Figure 3. In 5 years after RFA, IBTR-free survival rate 97%, 94%, and tumor-sized patients 87%, 1.0 cm, 1.1 to 2.0 cm, and> 2.0 cm, respectively.

ER-negative patients (3 out of 43, 7%of 43) were viewed more often compared to ER-negative patients (8, 2.3%; of 343; P = .059). No significant difference in IBTR rates was seen between Her2 positive and Her2-Negative patients (3.3% vs. 2.8%; p = .858) (Table 3).

Table 3. Factors Related to Local Recurrence

Factor	Local Recurrence (IBTR)	All Cases	P
Tumor size, cm			.032
- ≤ 1.0	4 (1.6%)	244	
- > 1.0–2.0	4 (3.6%)	111	
- > 2.0	3 (10.0%)	30	
Age			1.000
- ≤ 49	5 (3.1%)	160	
- 50–59	3 (2.8%)	106	
- ≥ 60	3 (2.5%)	120	
Type of RFA needle			.781
- Cool-tip	11 (3.1%)	356	
- LeVeen	0 (0%)	13	
- RITA	0 (0%)	17	
Nodal status			.084
- Positive	3 (7.0%)	43	
- Negative	8 (2.3%)	343	
ER			.059
- Positive	8 (2.3%)	342	
- Negative	3 (7.7%)	39	
PR			.517
- Positive	8 (2.6%)	303	
- Negative	3 (4.1%)	74	
HER2			.858
- Positive	1 (3.3%)	30	
- Negative	9 (2.8%)	325	
Radiotherapy after RFA			<.001
- Yes	5 (1.7%)	350	
- No	6 (14.7%)	34	

Abbreviations: ER: Estrogen Receptor / IBTR: Ipsilateral Breast Tumor Recurrence/PR: Progesterone Receptor/ RFA: Radiofrequency Ablation

IV. Discussion

This study evaluates the clinical effectiveness of percutaneous radiofrequency ablation as a minimally invasive treatment for pre-invasive breast cancer. The RFA is recognized as a low aggressive alternative to surgery for various diseases and solid tumors, such as hepatocellular carcinoma and atrial fibrillation (tetishi et al., 2005). While RFA is widely adopted to other conditions, its application remains under the scope of examination as a standalone treatment for breast cancer. The feasibility study on the RFA after surgical sorting has been conducted first; However, RFA's capacity is still emerging without later affection.

For RFA to succeed, the precise preparesal tumor assessment, including intractable proliferation, is important, and the accurate evaluation of post -treatment response is important. Ultrasound (B-Mode) plays an important role in guiding the process and assessing the results (Gervice et al., 2005). MRI also has significant capacity for both pre-and RFA evaluation and is often considered as a gold standard to assess RFA results (Lenkoni et al., 2008).

There are many technical challenges in RFA for breast cancer. Major issues include determining the optimal ablation zone and duration due to intractable spread, accurately define the tumor margin and select the appropriate sampling sites within the ablated tissue (Hirki et al., 2006). Activity assessments are important using a VAB or CNB, but methods such as nadh-diphorase staining require complex procedures. Incorporating advanced imaging such as MRI -can help remove these challenges by providing wide assessment beyond sample tissues.

In this study, the breast tumor performed promising results with RFA in ≤2 cm diameter. The most analysis showed that most patients with luminal-type breast cancer did not experience IBTR during follow-up (Goetz et al., 2004). However, hormone receptor-negative, HER 2-positive, and triple-negative breast cancer demonstrated more aggressive behavior by warranting primary chemotherapy instead of RFA. Additionally, aggressive lobular carcinoma may not be suitable for RFA (Mayo-Smith and Dupui, 2004) due to its tendency for wide duct proliferation.

Estrogen receptors (ER) -Patients with negative tumors performed a high trend for IBTR than those with ER -positive tumors (Jeffrey et al., 1999). After RFA, breast radiation reduced the IBTR phenomenon, emphasizing that RFA should be combined with radiation therapy for optimal results (singalatry, 2003).

The most frequent adverse phenomenon seen in this study was skin irritation, followed by nipple retraction. To reduce these complications, the ice pack was applied to the affected areas, and the 5% glucose solution was injected into a retomamery space to protect the underlying tissues from heat damage. Induration, a common post-RFA phenomenon, is usually caused by fibrosis around the ablation zone and is not considered a major adverse event (Burk Junior et al., 2003). Variables such as mammary gland size and neoplasm localization might influence its incidence.

The study has several limitations, including its retrospective design, lack of randomization, and the absence of data about the effects of helpful chemotherapy or endocrine therapy on the results. Despite these limitations, this study represents one of the largest analyzes of patients treated with RFA alone for breast cancer (Khatri et al., 2007).

Ultimately, RFA, in conjunction with Sentinel lymph node biopsy, may set a new benchmark for breast-conserving treatment in early-stage breast cancer. Further investigations are needed for tiny breast cancers to verify the effectiveness of this method (Emoto et al., 2009).

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الملخص :

كان الغرض من هذه الدراسة هو تقييم سلامة و فعالية الاستئصال بالترددات الراديوية عن طريق الجلد (RFA) في علاج سرطان الثدي. تم تعديل الدراسة للعلاج طفيف التوغل من قبل جمعية سرطان الثدي ، وتألفت الدراسة من 386 مريضا مروا عبر RFA في 10 مؤسسات بين يوليو 2003 ويونيو 2009. تم علاج المرضى بإجراءات RFA القياسية الموجهة بالموجات فوق الصوتية وتمت متابعتهم كل 6 إلى 12 شهرا. ركز التحليل على جدوى وحماية وأحداث تكرار ورم الثدي المماثل (IBTR). تضمنت الأحداث السلبية المتعلقة بالترددات الراديوية الألم الموضعي وتهيج الجلد وعودة الحلمة. وجدت الدراسة أن IBTR كان أكثر شيوعا في المرضى الذين تزيد أحجام الأورام الأولية لديهم عن 2 سم ، وكانت المعدلات الخالية من استئصال ورم الثدي IBTR من العمر 50 سنة هي الأعلى بين المرضى الذين يعانون من الأورام (أقل ورم > 2.0 سم). تشير النتائج إلى أن ورم RFA هو علاج آمن وفعال للحد الأدنى من التدخل الجراحي ل 2 سم ، على الرغم من ان هناك الحاجة الى مزيد من البحث لتخصيص العملية و تحديد دورها المستقبلي في سرطان الثدي الموضعي .