

Evaluation of the Early Treatment Response with Microwave Ablation Technique Applied to Fibroadenomas of the Breast

Memenin Fibroadenomlarına Uygulanan Mikrodalga Ablasyon Tekniği ile Erken Dönem Tedavi Yanıtlarının Değerlendirilmesi

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ABSTRACT

Objective: Benign breast lesions are one of the most common diseases detected in women and the popularity of minimally invasive methods has increased in recent years for the treatment of these lesions. The purpose of the present study was to evaluate the safety and efficacy of the microwave ablation (MWA) technique as a potential therapeutic option for fibroadenomas.

Method: Pre- and post-procedure magnetic resonance images of a total of 20 patients, who were diagnosed with fibroadenomas, who underwent MWA therapy, were evaluated. Follow-up was performed with MR imaging for 6 months after the ablation treatment.

Results: The mean age of the patients was found to be 27.6 (15–50) years. The mean size of fibroadenomas was measured within the range of 20.2 (9–35) mm. Technical success was achieved in all patients. After the procedure, central enhancement disappeared (100%). Furthermore, approximately 79.6% regression was obtained in tumor volume.

Conclusion: MWA technique is an effective in the treatment of fibroadenomas. Treatment efficacy can be measured in the early period with MR imaging reliably.

Keywords: Benign lesions of the breast, microwave ablation, MR imaging

ÖZ

Amaç: İyi huylu meme lezyonları kadınlarda sık görülen hastalıklardan olup, son yıllarda bu lezyonların tedavisinde minimal invaziv yöntemlerin popülerliği artmıştır. Bu çalışmanın amacı, fibroadenomlar için potansiyel bir terapötik seçenek olarak mikrodalga ablasyon tekniğinin güvenliğini ve etkinliğini değerlendirmektir.

Yöntem: Mikrodalga ablasyon tedavisi uygulanan 20 fibroadenom tanılı hastanın işlem öncesi ve işlem sonrası manyetik rezonans görüntüleri değerlendirildi. Ablasyon tedavisi sonrası manyetik rezonans görüntüleme ile altıncı ayında takibi yapıldı.

Bulgular: Hastaların yaş ortalaması 27,6 (15–50) yıldı. Fibroadenomların ortalama büyüklüğü 20,2 (9–35) mm aralığında ölçüldü. Tüm hastalarda teknik başarı sağlandı. İşlem sonrası tamamında santral kontrastlanma kayboldu (%100). Ayrıca tümör hacminde yaklaşık %79,6 regresyon elde edildi.

Sonuç: Fibroadenomların tedavisinde mikrodalga ablasyon etkili bir yöntemdir. Manyetik rezonans görüntüleme ile tedavi etkinliği erken periyotta güvenilir olarak ölçülebilir.

Anahtar kelimeler: Manyetik rezonans görüntüleme, memenin benign lezyonları; mikrodalga ablasyon

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INTRODUCTION

Benign breast diseases cause a significant risks for breast cancer in their further follow-ups.^[1] Breast cancer was reported to develop at a rate of 7.8% in a 15-year follow-up in the literature.^[1] The lesions are controlled by techniques such as surgical/vacuum excision, percutaneous thermal ablation, microwave ablation (MWA), laser, and cryotherapy because of their growth, malignancy, and cosmetic deformation potentials.^[2] The advantage of ablation is that it has the least systemic side effects and ensures that multiple lesions are intervened with no size limits within a short time.^[1] With MWA, coagulation necrosis is induced by creating intralesional high temperature.^[1,2]

The purpose of the study was to demonstrate the effectiveness of the procedure even in a short time period using the MWA technique to detect the control of the benign lesions of the breast with magnetic resonance imaging (MRI).

METHOD

A total of 20 patients who were found to have benign lesions of the breast as a result of USI, MRI, or 14 G thick needle biopsy in the Radiology Department, and who were treated with MWA between February 2020 and June 2021 were analyzed retrospectively in the study. Permission was obtained from the Clinical Research Ethics Committee of Kanuni Sultan Süleyman Training and Research Hospital to conduct the study on July 2021 with the number 2021.07.202. The treatment rates were calculated according to the MRI results of the patients before the treatment and in the 6th month after the end of MWA.

MWA Procedure

The patients were taken to supine or lateral decubitus position, were sterilized, and locally anesthetized using 2% Lidocaine. After the procedure, IV Dexametopfen was given to all patients for pain control. MWA was started immediately after the local anesthesia with 20 W output and 3 mm active edge for tumors <2 cm in diameter 30 W output, and 5 mm active edge for the rest. The withdrawal technique was used. The risk of complications was minimized with hydrodissection in the lesions that were close to the skin or pectoral muscle. The follow-ups of the patients were performed with ultrasonography and contrast-enhanced MRI in the 1–2 and 6 months.

Statistical Analysis

All analyses were carried out using the SPSS 23.0 package program. Descriptive statistical methods (mean, standard deviation, median, frequency, ratio, minimum, and maximum) were used when evaluating the study data.

RESULTS

The mean age of the cases was found to be 27.6 (15–50) years. The median longest diameter of the tumor was found within the range of 20.2 (9–35) mm. Central contrast-enhancement was not detected in all cases in the 6th month early evaluation results of the MRI after the ablation (100%). Furthermore, an average of 79.6% regression was detected in the tumor volume (Fig 1a, b). No complications regarding the procedure were encountered in the patients.

DISCUSSION

The benign lesions of the breast are treated with minimally invasive techniques to preserve breast functions and not to leave cosmetic deformations. These treatments affect not only the tumor but also the adjacent breast and adipose tissue.^[3]

Yang et al.^[1] applied 755 MWA procedures to a series of 440 patients and reported 100% success rates. The volume response rate was 78.8% in the 6th month follow-up, and 97.9% in the 12th

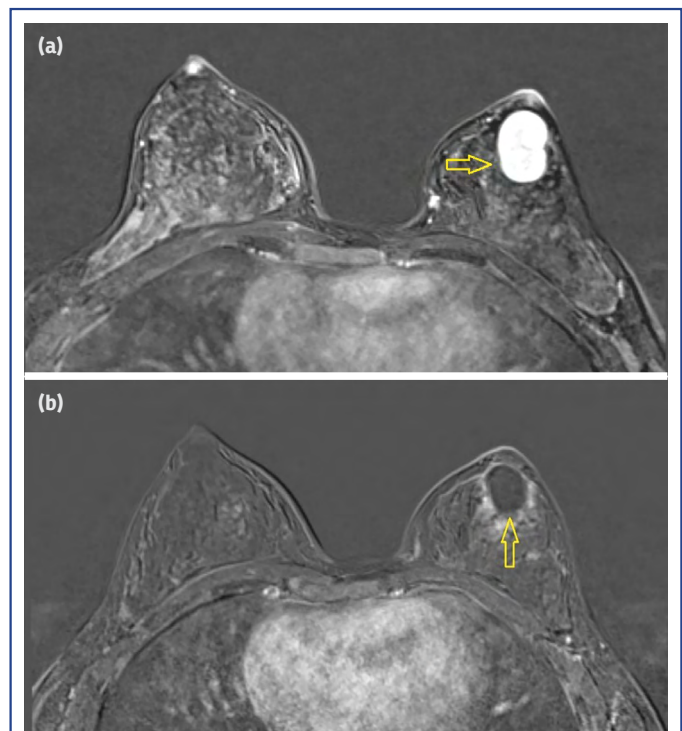


Figure 1. (a) A 27 mm, well-contoured lesion, which exhibited diffuse contrast enhancement in the left breast in contrast-enhanced magnetic resonance imaging (MRI) before microwave ablation (MWA), (b) The size of the lesion in the left breast was measured as 17 mm in contrast-enhanced MRI of the patient after MWA, and contrast-enhancement was not observed in the lesion secondary to the procedure

Table 1. Results of volume responses with MWA in the literature–evaluation of the past 5 years

Study	Diameter (mm)	3 months, %	6 months, %	12 months, %
Zhang et al. ^[4] 2019	10.8	97.8	100	100
Yang et al. ^[1] 2020	17	58.7	78.8	97.9
Cui et al. ^[5] 2021	24.5	49.8	64.1	80.2
Liu ^[6] 2021	13.5	24.2	45.5	40.9
Zhang et al. ^[7] 2021	10.6	–	–	92.1
Lin et al. ^[8] 2021	64.8	–	–	78

MWA: Microwave ablation

month. Response rates and volume restriction were found to be similar to the present series in our cases (79.6%). Although no significant complications were detected in our study, a 99.3% rate of procedural success was reported in the literature.^[1] In Zhang et al.'s^[4] study, ablation success was found to be 97.8%, and the complication rate was 1% in 314 cases (Table 1).

Imaging is important before the ablation in terms of measuring the location, size, and volume of the lesion, the relations between the tissue surrounding the lesion, and the termination time of the ablation procedure. Although USI evaluates the size, morphology, and blood flow characteristics of the lesion accurately, it still has poor spatial resolution, and MRI is preferred because of its high spatial resolution and sensitivity. Contrast-enhanced MRI is used to evaluate tissue necrosis after ablation.^[9]

Contrast-enhanced MRI images were examined for the cases before and in the 6th month after the procedure. Homogeneous enhancement was detected in all lesions before the procedure in the subtraction images, and then, a nearly complete necrosis area was detected in all lesions along with a 79.6% reduction in the volume.

The present study had certain limitations. First, the sampling size was insufficient; and second, it required a long follow-up period to evaluate the long-term outcomes.

CONCLUSION

MWA provides important outcomes in therapeutic efficacy, significant reduction in tumor volume, and cosmetic satisfaction for the treatment of benign tumors of the breast especially if below 2 cm. Contrast-enhanced MRI is widely used to detect the morphological and pathological changes of the lesion after MWA. It is a reliable imaging method in detecting treatment response in short- and long-term follow-ups instead of histopathological evaluations after ablation.

Disclosures

Ethics Committee Approval: The study was approved by the University of Health Sciences Kanuni Sultan Süleyman Training and Research Hospital Clinical Research Ethics Committee (No: 2021.07.202, Date: 08/07/2021).

Informed Consent: Written informed consent was obtained from all patients.

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Conflict of Interest: No conflict of interest was declared by the authors.

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