Jinekomasti Hastalarında Ultrason Elastografi Bulgularının Değerlendirilmesi

Evaluation of Ultrasound Elastography Findings in Gynecomastia Patients

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ÖZ

GİRİŞ ve AMAÇ: *Jinekomasti tanısı alan erişkin hastalarda jinekomasti tanısında ve tiplerinin belirlenmesinde ultrason elastografinin (UE) etkinliğinin değerlendirmesi ve elastografinin tanıya katkısının araştırılması amaçlanmıştır.*

YÖNTEM ve GEREÇLER: *Çalışmaya Kasım 2016 – Şubat 2017 tarihleri arasında kliniğimize jinekomasti ön tanısıyla gönderilen ve sonografik olarak jinekomasti tanısı konulan 26 hasta dahil edildi. Jinekomasti ile ilişkili olabilecek hastalıklar ve ilaç kullanım öyküsü sorgulandı. Jinekomastisi bulunmayan 30 sağlıklı erişkin kontrol grubuna dahil edildi. Hasta ve kontrol gruplarının vücut kitle indeksi (BMI) hesaplandı. B-mod ultrasonografi ile jinekomasti dokusunun boyutu ve paterni (nodüler, dendritik, diffüz) değerlendirildi. UE incelemede bu dokunun gerinim oranı kaydedildi. Kontrol grubunda ise retroareoler rudimente meme dokusuna ve aynı derinlikteki referans yağ dokusuna ROİ yerleştirildi ve gerinim oranı kaydedildi.*

BULGULAR: *: Jinekomasti dokusunda gerinim oranı, rudimenter meme dokusuna göre anlamlı derecede yüksekti (p <0.05). Jinekomasti paternlerinin boyutları ile gerinim oranları arasında istatistiksel olarak anlamlı farklılık saptandı (p <0.05). Diffüz jinekomastide gerinim oranı ve jinekomasti alanı diğer paternlere göre daha yüksek saptandı.*

TARTIŞMA ve SONUÇ: *Ultrason elastografi, jinekomasti tanısında ve tiplerinin belirlenmesinde B-mod ultrasonu destekleyerek tanıya katkı sağlamaktadır.*

Anahtar Kelimeler: *jinekomasti, ultrasonografi, ultrason elastografi*

ABSTRACT

INTRODUCTION: *We aimed to evaluate the efficacy of ultrasound elastography in the diagnosis of gynecomastia and to identify its types in adult patients.*

METHODS: *A total of 26 adult patients diagnosed as gynecomastia were included in the study. All patients were questioned in terms of diseases that may cause gynecomastia and drug use history. The control group consisted of age-matched 30 healthy individuals without gynecomastia. Body mass index (BMI) values were measured and recorded in both patient and control groups. The dimensions of the gynecomastia tissue were calculated via B-mode ultrasound and the pattern (nodular, dendritic, diffuse) of gynecomastic tissue was analyzed. The strain ratio was recorded using ultrasound elastography. In the control group, the region of interest (ROI) was inserted into the retroareolar rudimentary breast tissue and into the reference adipose tissue at the same depth, and strain ratio was recorded.*

RESULTS: *The strain ratio was significantly higher in the gynecomastia tissue (p<0.05), compared to the rudimentary breast tissue. There was a statistically significant difference between the strain ratio and the dimension of gynecomastia patterns (p <0.05). Strain ratio and gynecomastia area were significantly higher in diffuse gynecomastia compared to other patterns.*

DISCUSSION AND CONCLUSION: *Ultrasound elastography supports B-mode ultrasound in the diagnosis of gynecomastia and identification of its types, thereby, it contributes to the diagnosis.*

Keywords: *gynecomastia, ultrasonography, ultrasound elastography*

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INTRODUCTION

Gynecomastia is a benign proliferation of glandular tissue in the male breast and it is caused by an altered estrogen-testosterone balance, in favor of estrogen (1). Patients usually present with complaints of unilateral or bilateral breast enlargement, pain, palpable mass, and breast discharge. Although physical examination plays a central role in the diagnosis of gynecomastia, radiological evaluations are important tools to confirm the diagnosis and to differentiate it from benign-malignant masses (2).

Mammography is recommended as the first imaging modality in the diagnosis of gynecomastia; however, some studies suggest ultrasound (US) as the first imagining modality because it is easy and safe to apply, especially in young adults (3,4).

Three types of gynecomastia have been described by Appelbaum (5): nodular, dendritic, and diffuse glandular. Each of these types represents a different degree of ductal and stromal proliferation. The nodular and dendritic forms correspond to the florid and fibrous stages of proliferation, whereas the diffuse glandular type corresponds to epithelial proliferation and is often linked to the use of exogenous hormones (6). These patterns provide insight into both etiology of gynecomastia and prediction whether it is reversible or not.

Ultrasound elastography (UE) is a US-based imaging method that measures the elasticity value of the tissues to repeated pressure effect according to their stiffness properties. It is widely used in the differentiation of benign and malignant breast lesions (7,8). However, there isn't any study that has been conducted to investigate the contribution of elastography to patients diagnosed with gynecomastia.

In this study, we aimed to evaluate the efficacy of ultrasound elastography in the diagnosis of gynecomastia and to identify its types in adult patients.

MATERIAL AND METHOD

Between November 2016 and February 2017, patients over the age of 18 who were referred to our clinic with the complaint of breast pain or enlargement were evaluated with ultrasound, and patients diagnosed with gynecomastia on ultrasound examination were included in the study.

Age-matched healthy adults without gynecomastia or breast lesion were included in the control group. The body weight and height of the control group were measured and recorded and the BMI was calculated. The body weight and height of the patients were measured and recorded. The body mass index (BMI) was calculated by dividing the body weight (kg) by the square of height (m^2). Gynecomastia-related diseases and a history of drug use were questioned. Exclusion criteria were the detection of pseudo gynecomastia or the presence of a breast mass (benign or malignant) on US.

This prospective study protocol was approved by the local Ethics Committee. Written informed consent was obtained from each participant. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Ultrasound examination

All examinations of the patients and the control group were performed by a single radiologist with Toshiba Aplio 500 (Toshiba Medical System Corporation, Tokyo, Japan) in routine B-mode US and static UE by using a linear probe of 13 MHz. Anteroposterior (a) and transverse (b) size of gynecomastia tissue were calculated in mm by using B-mode US. Area calculation was performed using the (axb)/2 formula. The pattern of gynecomastia tissue was evaluated on B-mode US imaging.

Different gynecomastia patterns have been defined on mammography (nodular, dendritic, and diffuse) (5). Sonographically, nodular gynecomastia appears as retro areolar hypoechoic mass-like ovoid lesion with well-defined margins (Fig. 1). Dendritic gynecomastia is seen as retro areolar hypoechoic lesion with radial extensions into the corresponding fat tissue (Fig. 2). Diffuse gynecomastia is seen as central hypoechoic and peripheral hyperechoic areas which is similar appearance with adult female breast (Fig. 3) (6).

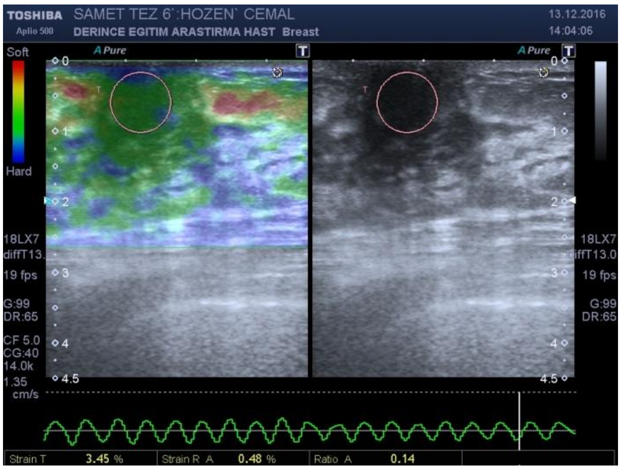

Fig. 1 Nodular gynecomastia appears as a solid, retro areolar area with a homogeneously hypoechoic echotexture and well-defined margins.

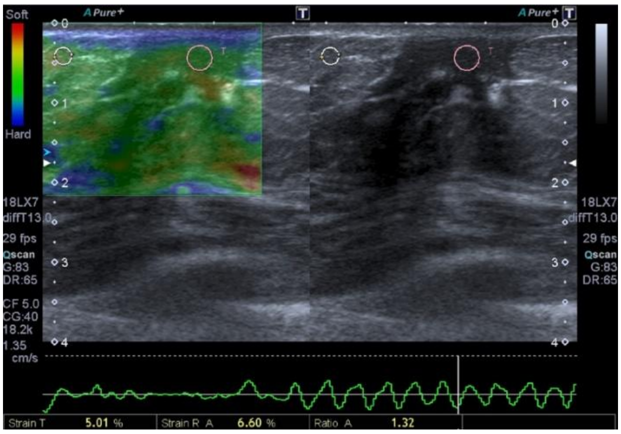

Fig. 2 Dendritic gynecomastia appears as a retro areolar, hypoechoic area with radial extensions into the adipose tissue.

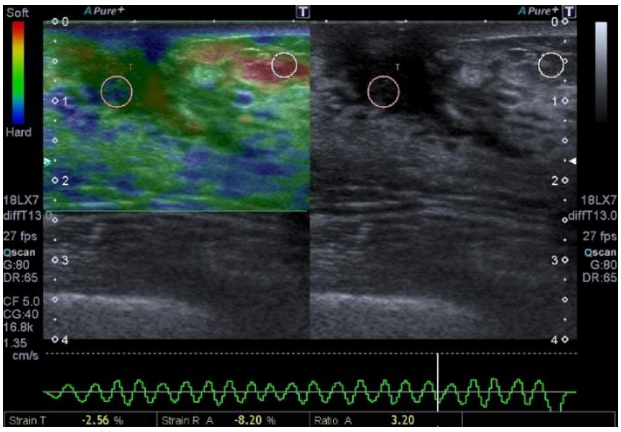

Fig. 3 Diffuse gynecomastia appears as retro areolar hypo-hyperechoic area which is similar to female breast.

The UE window was arranged to include gynecomastia tissue and surrounding adipose tissue as a reference. The elastic properties of the gynecomastia tissue were evaluated by pressing and releasing the transducer several times and the images were captured for further analysis. The colors of the images represented different strain rates, ranging from red to blue, depending on the degree of hardness. A circular ROI was placed in gynecomastia and reference fat tissue at the same depth and at the bottom of the images the strain values of the tissues were determined as percentage and ratio.

The strain ratio was calculated by dividing the strain in the reference to the strain in the lesion. In the control group, a ROI was positioned into the retro areolar rudimentary breast tissue and reference fat tissue at the same depth (Fig. 4). Strain ratio measurement was repeated 3 times and the average of the obtained values was recorded.

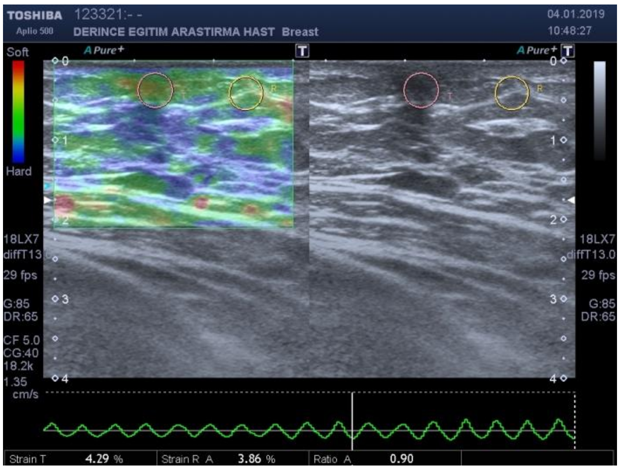

Fig. 4 Retroareolar rudimentary breast tissue and reference adipose tissue. There is a small amount of hypoechoic glandular tissue without any mass formation.

Statistical Analysis

Statistical analysis was performed using the SPSS version 20.0 software (IBM Corp., Armonk, NY, USA). The Kolmogorov-Smirnov test was used to assess the normality of the distribution. Numerical variables were expressed in mean ±standard deviation (SD), median (25th percentile-75th percentile), and frequency (percentage). The significant differences between the groups were evaluated with the Mann-Whitney U test, Kruskal-Wallis one-way analysis of variance (ANOVA), and Dunn’s post-hoc test for numerical variables and with the Fisher’s exact chi-square test for categorical variables. The correlation between the numerical variables was analyzed using the Spearman’s correlation test. A p-value of <0.05 was considered statistically significant.

RESULTS

Twenty-six patients diagnosed with gynecomastia on US and thirty healthy individuals without gynecomastia were included in this study.

Patient Group

Gynecomastia was bilateral in 19 patients (73%) and unilateral in seven patients (27%). A total of 45 breasts with gynecomastia were evaluated.

The median age was 38 (range: 18 to 76) in the patient group. The median height was 175 (range: 170.5 to 180) cm, the median weight was 80 (range: 72 to 86) kg, and the median BMI was 25.6 (range: 22.8 to 27.65) kg/m^2.

The complaints of 7 patients (%27) were breast enlargement, 11 patients (%42) complained of breast enlargement and pain while 8 patients (%31) only complained of pain.

The median value of the gynecomastia area was 92 (range: 54.5 to 315.5) mm^2. The median strain ratio was 1.68 (range: 1.06 to 3.29).

The gynecomastia patterns of the patients were divided into three groups as nodular, dendritic, and diffuse according to their B-mode US appearance. There were nodular gynecomastia in 22 (48.9%) breasts, dendritic gynecomastia in 6 (13.3%) breasts, and diffuse gynecomastia in 17(37.8%) breasts.

There was a statistically significant difference between the strain ratios and the dimensions of gynecomastia patterns (p <0.05).

The relationship between gynecomastia patterns and strain ratio and gynecomastia area is shown in Table 1.

Table 1. Relationship between gynecomastia patterns, strain ratio and gynecomastia area

PATTERN	Strain Ratio	B-mode US area(mm^2)
Nodular Median (25-75%)	1.43 (0.76-1.76)	58.5 (31.5-106.5)
Dendritic Median (25-75%)	0.85 (0.46-1.77)	91 (66-168.5)
Diffuse Median (25-75%)	3.35 (2.72-4.25)	312 (121-460)

The median BMI was 25.45 (range: 21.2 to 26.48) kg/m2 in the patients with nodular gynecomastia, 23.6 (range: 21.4 to 26.75) kg/m2 with dendritic gynecomastia, and 26.4 (range: 23.5 to 28.2) kg/m2 with diffuse gynecomastia. There was no statistically significant difference between the gynecomastia pattern and BMI (p>0.05) (Table 2).

Table 2. Relationship between gynecomastia patterns and BMI

PATTERN	BMI
Nodular Median (25-75%)	25.45 (21.2-26.5)
Dendritic Median (25-75%)	23.6 (21.4-26.8)
Diffuse Median (25-75%)	26.4 (23.5-28.2)

There was no correlation between the BMI and gynecomastia area and between the BMI and strain ratio (p>0.05).

Control Group

The median age was 33.5 (range: 20 to 50). The median height was 170.5 (range: 167 to 180) cm, the median weight was 73.5 (range: 65 to 87) kg, and the median BMI was 24.75 (range: 23 to 26.8) kg/m^2. The median strain ratio in the control group was 0.89 (range: 0.65 to 1.01).

Relationship between groups

There was no significant difference between the patient and control groups in terms of age, height, weight, and BMI (p>0.05). However, there was a statistically significant difference between the patient and control groups in terms of strain ratio. (p<0.05).

The median age, height, weight, BMI, and p values of the patients and the control group are shown in Table 3.

Table 3. Median age, height, weight, BMI, and p values of patient and the control groups

Group	Age	Height	Weight	BMI	Strain ratio	Area (mm^2)
Patient Median (25-75%)	38 (22.5-56)	175 (170.5-180)	80 (72-86)	25.6 (22.8-27.7)	1.68 (1.1-3.3)	92 (54.5-315.5)
Control Median (25-75%)	33.5 (26-40)	170.5 (167-180)	73.5 (65-87)	24.8 (23-26.8)	0.9 (0.7-1)	-
P Values	0.109	0.06	0.152	0.433	0.000	

DISCUSSION

Some studies showed that routine radiological examination is not necessary for the diagnosis of gynecomastia (9-10). Imaging is indicated if the clinical presentation is suspicious (11-12).

Although mammography has been described as the first-line diagnostic tool in breast imaging in men (6,13), US imaging can be used as a first-line imaging modality (3). It is not easy to evaluate male breast on mammography because of its small volume. Besides, ultrasound has many advantages such as ease of application, free of ionizing

Three types of gynecomastia patterns have been defined: nodular, dendritic, and diffuse. These three types of gynecomastia, defined sonographically, help us predict the etiology of gynecomastia and determine whether it is reversible (14).

There are many studies investigating the UE values of breast masses in women and men, and it was found to be effective in the differential diagnosis of benign-malignant breast lesions (15-17). It increases the specificity of conventional B-mode ultrasound by more precise characterization of breast lesions. Although ultasound is a very good method in the diagnosis of gynecomastia, it is a user-dependent examination. Diagnosis and typing of gynecomastia can be supported with numerical data by elastographic examination and provide additional information to conventional ultrasound. In our study, gynecomastia tissue was significantly stiffer than retroareolar rudimentary breast tissue (Table 3). The strain ratio and gynecomastia area were also significantly higher in diffuse gynecomastia compared to other patterns (Table 1).

In biomechanical tests, the postoperative samples obtained from the female breast, glandular tissue was found to be significantly stiffer than breast fat tissue (18). In a study by Ginat et al. (19) glandular tissue in a normal female breast was found to be stiffer than breast fat tissue on UE. In our study, gynecomastia tissue was stiffer than retro areolar adipose tissue similar to female breast tissue.

Although one study showed that the prevalence of gynecomastia increased with rising body mass index (20), we did not find such a relationship in our study. This relationship was not observed between gynecomastia patterns either.

There are some limitations of the strain elastography method. Firstly, strain elastography is a qualitative method that can give different results according to lesion size and type. It is also a practitioner-dependent method that requires experience. The pressure applied during elastography can not be standardized. This limitation can be compensated by shear wave elastography, which is a quantitative method and provides a more accurate assessment of the elastic properties of the tissue. However, shear wave elastography also has limitations such that very hard lesions are difficult to measure shear wave velocities. Other limitations of our study are; when we classify according to the patterns, the sample size is small. The diagnosis and types of gynecomastia have been evaluated according to their sonographic appearance. The histopathological diagnosis of gynecomastia patterns is unknown because no biopsy was taken from the patients.

CONCLUSION

UE supports ultrasonography in the diagnosis of gynecomastia and determination of gynecomastia patterns and contributes to the diagnosis.

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