Ultrasonography of the Skin Carcinomas Before and After Superficial X-Ray Therapy

DERİ KARSİNOMLARININ YÜZEYEL RADYOTERAPİ ÖNCESİ VE SONRASI ULTRASONOGRAFİSİ

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Summary

Cutaneous ultrasonography with high-frequency probes was performed on fifteen patients with 13 basocellular carcinomas and two squamous cell carcinomas on the skin. Incisional biopsy and histological examination were performed for all lesions. Then, the lesions were irradiated by superficial x-ray. At the beginning of the treatment and two months later, sonographic examinations were performed concerning echogenicity, size, location and margin of the lesions. The aim of this study was to evaluate the changes of sonographic images after superficial x-ray therapy. We conclude that the cutaneous ultrasonography is a practical and useful modality in the clinic follow-up of the skin carcinomas after treatment.

Key Words: Skin ultrasonography, skin carcinoma, X-ray therapy

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Özet

13'ü bazal hücreli karsinom, 2'si squamöz hücreli karsinom olmak üzere toplam 15 hastaya vüksek frekanslı prob kullanılarak kutanöz ultrasonografi uygulandı.Her lezyon insizyonel biyopsi ve histopatolojik inceleme sonrası yüzeye! x ışınları ile ışınlandı.Tedavinin başında ve tedaviden 2 ay sonra lezyonlar ekojenite, büyüklük, yerleşim ve kenar özellikleri açısından sonografik olarak karşılaştırıldı.Sonuç olarak kutanöz ultrasonografinin deri karsinomlarının tedavi sonrası takibinde pratik ve kullanışlı bir yöntem olduğuna karar verildi.

Anahtar Kelimeler: Deri ultrasonografısi, Deri karsinomu, X-ışım tedavisi

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In the past few years, significant progress has been achieved regarding the imaging techniques of the skin and soft tissue ultrasonography. Introduction of high frequency probes (7.5 to 40 MHz) into clinical use enabled the sonographic study of dermal and subcutaneous layers (1-2-3). Because the echos from the deep tissues hide the imaging of superficial layers, high resolution real-time scanners have been developed to focus the superficial structures recently (4). Normal skin has a characteristic sonographic image that varies in a moderate degree, according to the anatomical site. A superficial hyperechoic band, corresponding to the epidermis, is followed by a thin echoic layer with regular width, which is the expression of the dermis. A large hyperechoic structure underlies the dermal layer corresponds to the subcutaneous fat. The superficial fascia looks like an hyperechoic band (5,6).

Three main utilizations of cutaneous ultrasound are so far available in dermatology.These are called doppler, A-scan and B-scan techniques. Doppler ultrasound is used to evaluate the movement of blood through the skin. The A-scan is a noninvasive technique used for measuring the dimensions of the skin. The last one, B-scan technique is a method combining A-scan data obtained along a linear direction (1,7).

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Materials and Methods

A total of fifteen patients from Ege university, department of dermatology were included in the study. All patients were informed of the conditions of this clinical trial and gave their written informed consent prior to entry into the study. They were diagnosed as skin carcinomas. The age of the patients varied between 52 and 70. Each patient had only one lesion. Incisional biopsy and histological examination of the specimens were performed for all the lesions.

Cutaneous ultrasonography was carried out using a probe at 7.5 mHz. The transducer was always used jointly with a pad which was placed over the patient's skin. This attachment, made of a thick block of transonic gel, enables proper focusing of the ultrasound beam at the level of the superficial tissues.

The sonographic pattern of each lesion was evaluated tising the parameters such as the size, the features of the margins and echogenicity (Table 1).

After sonographic examinations, the lesions were irradiated with a superficial X-ray device (voltage: 100 kV, intensity: 10 mA). Conventional superficial x-ray therapy was completed with a total dose of 4500 to 5440 cGy (five treatments a week and a mean time of three weeks). A margin of at least 5 mm of clinically normal tissue surrounding the lesion were included to the treatment site during the irradiation. A lead shield of 1 mm was used to restrict stricktly the area to be irradiated.

The cases completed the irradiation were studied two months later again by means of sonographic scanning. Statistical analysis was conducted using the Wilcoxon signed rank test for the comparison of significant differences between pretreatment and posttreatment lesion dimensions.

Results

The sonographic images were technically adequate in configuration for all patients. Histologically, the lesions were diagnosed as basocellular carcinoma (13 lesions) and spinocellular carcinoma (two lesions). They were localized on the face (10 lesions), the neck (one lesion), the lower lip (one lesion), the ear (one lesion), the nose (one lesion) and finally the chest (one lesion). Eleven of the lesions had well-defined margins and four of them had ill-defined margins before treatment. Eight lesions were visualised as hypoechoic and seven lesions had a mixt pattern. The sonographic images of six lesions were reduced after irradiation, but continued. The rest of them had no significant images

Table 1. Ultrasonography of skin carcinomas by sonographic features

Patient number	Histological type	Location	Sonographic Dimension (mm) before	after	Margins before	after	Echogenicity before	after	Total dose (cGy)
1	BCC	Neck	12*8	-	W	-	mix	-	4500
2	see	lip	17*4	15*3	I	I	mix	mix	5250
3	BCC	face	15*5	14*4	w	1	hypo	mix	4740
4	BCC	face	8*2	-	w	-	hypo	-	4740
5	BCC	face	10*3	-	w	-	hypo	-	5025
6	BCC	face	14*3	-	w	-	hypo	-	4740
7	BCC	nose	15*3	12*3	w	I	mix	hypo	5175
8	BCC	face	11*9	-	I	-	mix	-	4740
9	BCC	face	10*7	-	I	-	hypo	-	5440
10	BCC	chest	13*9	6*3	w	I	hypo	mix	4740
11	BCC	face	10*7	4*3	w	I	mix	hypo	4500
12	see	ear	6*4	-	w	-	mix	-	4950
13	BCC	face	12*8	-	w	-	hypo	-	4800
14	BCC	face	8*5	5*3	I	1	mix	hypo	4875
15	BCC	face	9*6	-	w	-	hypo	-	4500

BCCBasocellular carcinoma
SCCSpinocellular carcinoma
Totaldose.Concerning radiotherapy
W: Well-defined
T.Ill-deftned
Mix:Mixed
Hypo.Hypoechoic

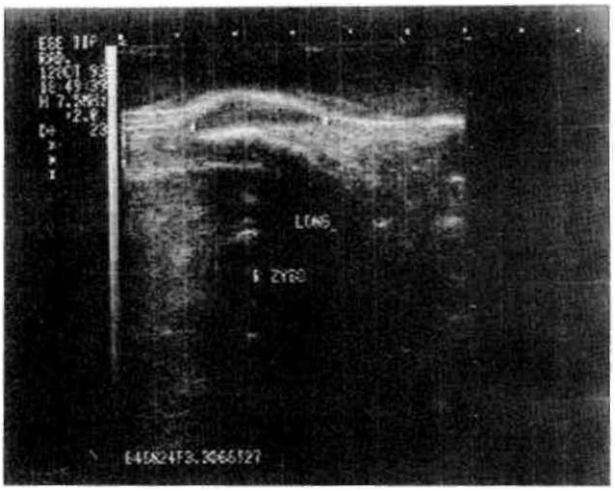

Figure **1.** The image of the lesion before radiotherapy (The tumour is seen as well-defined).

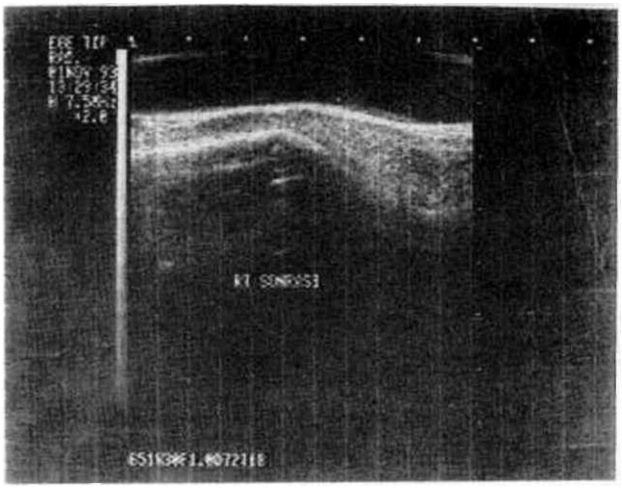

Figure 2. The image of the lesion after radiotherapy (no significant image of the tumour).

(Figure l-2).Posttreatment lesion dimensions were significantly lower than before therapy ($p<0.001$). Clinic follow-up continued for five years with a scheme of twice a year for the first year and once a year for the last 4 years. During the follow-up, there was no recurrence and all the lesions were cured.

Discussion

The aim of this study is to assess the value of ultrasonography as a complement to the clinical follow-up after the superficial radiotherapy. Diagnostically, histologic examination is undoubtedly superior to sonography on establishing the nature of the lesion.Because, the sonographic images of the structures such as sweat ducts, collagen bundles, inflammatory cell infiltrates, epithelial cell nests, cell types in inflammatory or neoplastic infiltrates are still far from satisfactory when compared with histological sections of the skin (3). Ultrasonography, a noninvasive imaging method of the skin carcinomas, allows establishment of the size and depth of a superficial lesion and assessment of the character of the outline of a lesion (5). However, the sonographic criteria for distinguishing benign from malignant solid masses are lacking. But, if the incisional biopsies are taken superficially, the total evaluation of the skin lesion may be questionable. Also, the connection between the lesion and the surrounding tissue may be crucial. This technique allows the assessment of the status of the underlying fascia too (8,9).

However, repeated sonographic examinations after both medical treatment and x-ray therapy are a simple and objective mean to evaluate the course of a dermatological disease and the effectiveness of the therapy.

In our study; the sonographic images of some lesions continued two months after x-ray therapy. We thought that the lesions were in the process of radiobiologic regression, because there was no recurrence at the end of the clinical follow-up of five years and all the lesions were cured.

In 1986, Uysal et al. reported that the probes of 2.5 or 7.5 MHz frequencies have been used in diagnostic ultrasonography although the image quality has improved with increasing frequency. Therefore, 7.5 and 10 MHz frequency probes were the most appropriate for the layers of dermis and subcutis (10). Today in dermatology, the probes of 15 MHz or higher frequencies are more satisfactory when compared with the microscopic sections (3). Although the probe of 7.5 MHz was used in this study, the images were sufficient for the evaluation of the lesions. Because the resolution of a 7.5 MHz transducer gave a clear and required image of size, depth and outline.As similar to our study, Nessi et al. studied a group of 62 patients using the probes at 5 and 7.5 MHz.There were nodular lesions such as basocellular epithelioma, Kaposi's sarcoma, lipoma, hemangioma in this study. Sonographic images were found to be sufficient

and helpful in defining the size and depth of those skin nodules (5).

There is a good statistical correlation between the values obtained by A-scan and by histometry, but there are striking differences in these measurements in some cases (11,12). Such discrepancies are not negligible, because the dose scheme of x-ray therapy is generally carried out due to the thickness of the skin tumour.

In conclusion, cutaneous ultrasonography will be a complement to the clinical and histological examination.

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