RESEARCH ARTICLE

Wire-guided Localization Biopsy to Determine Surgical Margin Status in Patients with Non-palpable Suspicious Breast Lesions

Lutfi Dogan*, M Ali Gulcelik, Murat Yuksel, Osman Uyar, Erhan Reis

Abstract

Purpose: Guide-wire localization (GWL) has been a standard technique for many years. Excision of non-palpable malignant breast lesions with clear surgical margins reduces the risk of undergoing re-excision. The objective of the present study was to evaluate the efficacy of GWL biopsy for assessing surgical margins. Methods: This retrospective study concerned 53 patients who underwent GWL biopsy for non-palpable breast lesions and breast carcinoma diagnosed by histological examination. Age of the patients, tumour size, radiographic findings, breast density specifications, specimen volumes, menopausal status and family history of the patients and surgical margin status were recorded. Results: Median age was 53.3 years, median tumour size was 1.5 cm and median specimen volume was 71.5 cm^3. In fifteen patients (28%) DCIS and in 38 patients (72%) invasive ductal carcinoma was diagnosed. There was positive surgical margins in twenty eight (52.8%) patients. The median distance to the nearest surgical margin was 7.2 mm in clear surgical margins. Younger age and denser breast specifications were found as statistically significant factors for surgical margin status. Median age of the patients who had positive margins was 49.4 years where it was 56.9 years in the patients with negative margins (p=0.04). 79% of the patients with positive margins had type 3-4 pattern breast density according to BIRADS classification as compared to 48% in the patients who had negative margins (p=0.03). Some 38 patients who had positive or close surgical margins received re-excision (72%). Conclusion: Positive margin rates may be higher because of inherent biological differences and diffuse growth patterns in younger patients. There are also technical difficulties that are relevant to denser fibroglandular tissue in placing hooked wire. High re-excision rates must be taken into consideration while performing GWL biopsy in non-palpable breast lesions.

Keywords: Breast lesions - wire guided biopsy - surgical margin - factors

Asian Pacific J Cancer Prev, **13 (10)**, 4989-4992

Introduction

Due to the widespread implementation of breast screening programs and improvements in diagnostic imaging, approximately 25-35% of breast cancers are non-palpable at diagnosis (Skinner et al., 2001). However, because of these breast screening programs and improvements there is an increase in the incidence of breast lesions which have to be clarified histopathologically. As well as nonpalpable breast lesions, microcalcifications that has linear configuration, asymmetric densities and structural distorsions are considered as BIRADS 4-5 lesions. Positive prediction of mammography in malign lesions (diagnosed malignancy/number of biopsy) is 30% and 90% for BIRADS 4 and BIRADS 5 lesions respectively. So, these lesions have to be clarified histopathologically. In palpable lesions fine needle or core biopsies are good standart diagnostic procedures and in nonpalpable lesions the aim is to establish histopatological diagnosis as well as complete excision of the lesion for local definitive treatment at the same time. In necessity, sentinel lymph node biopsy can be carried out later for axillary status evaluation. Radio Guided Localisation (RGL) and Wire-guided localization (WGL) thechniques are used for excision of these nonpalpable lesions. Wire-guided localization (WGL) has been the standard technique used for many years: using either ultrasound or stereotactic guidance, a thin, hooked wire is inserted into the lesion, and the surgeon uses the wire and standard imaging to identify and remove the lesion (Lovrics et al., 2011). Not using radioactive material is the advantage of WGL. However, dislocation or migration of wire contributing to pneumothorax and discomfort of the patient are some of the restrictions of the procedure. The removal of the lesion is verified by the specimen radiography although verification of complete removal of the lesion is impossible (Dua et al., 2011). Excision of the non-palpable malignant breast lesions with clear surgical margins relieves the patient undergoing a re-excision. Re-excision as a cost increase factor has a higher morbidity and makes cosmetic results worser as well. The objective of the present study is to evaluate the achievement of WGL biopsy thechnique about surgical margins and the effective factors on positive margins.

*[1]Department of General Surgery, Ankara Oncology Training and Education Hospital, Ankara, Turkey *For correspondence: lutfidogan1@gmail.com*

Materials and Methods

Fifty three patients who had the diagnosis of in-situ and invasive carcinoma are reviewed among the BIRADS 4-5 breast lesions which are excised by WGL thechnique in the year 2011. All the lesions were non-palpable breast lesions which were diagnosed in routine controls. 53 patients received WGL biopsy for 53 non-palpable breast lesions.

A hooked wire was inserted into the non-palpable breast lesion under ultrasound guidance by radiologists just prior to surgery. Informed consent was obtained from all patients. Then all the lesions were excised under local anesthesia by a general surgeon. The wright incision was preferred on cosmetic basis according to the position of the lesion and the enterance of the wire through the skin. All of the non-palpable breast lesions were totally excised with the guidance of the hook. The posterior, lateral and superior surgical margins of the specimens were marked with sutures. So the surgical specimens were sent to the radiographic verification. All of the lesions were displayed in specimen radiography and there was no excised additional pieces of specimen. Finally, all the specimens were sent for histopathological examination. Margins 1mm or closer were accepted as positive margins and 1-5 mm were accepted as closed margins which required re-excision as well. Specimen volumes were calculated by multiplying the three dimensions of the specimen mentioned in the pathology report and tumour size was the diameter mentioned in the pathology report. BIRADS classification were used to identify breast density specifications which was drawn from mammography reports.

Age of the patients, tumour size, histological grade, hormonal receptor status, radiographic findings, breast density specifications, specimen volumes, menauposal status of the patients, family history of the patients and surgical margin status were recorded.

Microsoft Excel and SPSS version 10.0 were used to store and analyze the data. Factors that may have any effect on surgical margin status were evaluated by chi-square test. Logistic regression test was carried out for effective factors. The $p<0.05$ was considered as statistically significant.

Results

There were 53 non-palpable breast lesions in 53 patients. Mean age of the patients was 53.3 years ranged between 37-72 years. Mean tumour size was 1.5 cm and mean specimen volume was 71.5 cm^3. In fifteen patients (28%) DCIS and in 38 patients (72%) invasive ductal carcinoma was diagnosed. There was positive surgical margins in twenty eight (52.8%) patients. The mean distance to the nearest surgical margin was 7.2 mm in clear surgical margins. Tumour size, histological grade, hormonal receptor status, specimen volumes, menauposal status of the patients had no significant statistical effect on surgical margins. Younger age and denser breast specifications were found as statistically significant effective factors on surgical margin status (Table 1).

Table 1. General Characteristics of Patients.

	Surgical Margin		Mean	p value
	+ n: 28	- n: 25		
Age	49.4	56.9	53.3	0.04
Tumour size (cm)	1.6	1.38	1.5	0.09
Specimen volume (cm^3)	72.4	70.4	71.5	0.07
DCIS	8 (53.3%)	7 (46.7%)		
IDC	20 (52.6%)	18 (47.4%)		
BIRADS 3-4	22 (78.0%)	12 (48%)		0.03

*DCIS: Ductal carcinoma in-situ, IDC: Invasive ductal carcinoma

Mean age of the patients who had positive margins was 49.4 years where it was 56.9 years in negative margins ($p=0.04$). 79% of the patients having positive margins had type 3-4 pattern breast density according to BIRADS classification so it was 48% in the patients who had negative margins ($p=0.03$). There was no significant difference in surgical margin status between DCIS and invasive ductal carcinoma diagnosed patients. Thirty eight patients who had positive or close surgical margins received re-excision (72%). Residual cancer was found in 14 (38.8%) of the 38 cases (invasive eight, DCIS six).

Discussion

Suspicious clinically occult breast lesions are found frequently as a result of widespread mammographic screening programs of asymptomatic women. Some 15–20% of these lesions are malignant, and they should be removed (Postma et al., 2011). The aim of surgical treatment in a nonpalpable breast cancer is to remove the marked lesion with negative surgical margin as well as achieving a good cosmetic result. The width of resection is the main factor affecting negative surgical margin and cosmetic result. If the tumour size/breast volume proportion is suitable for radiotherapy, then removal of the malignant lesion with negative surgical margin is adequate for local treatment.

Wire-guided localization is presently the most commonly used localization method for non-palpable breast lesions (Besic, 2002; Postma et al., 2011). While there is widespread use of this technique, WGL is discussed for some limitations that can lead to re-excision which increases cost and morbidity. The oriantation of the surgeon on macroscopic margins is difficult if there is trouble in determining the depth and localization of the lesion. In centers where this approach has been employed as a definitive therapeutic procedure, 41-60% of patients require no further local surgery, which results in lower costs and morbidity (Saarela et al., 2001; Ocal et al., 2011; Sajid et al., 2012). However, as there is heterogeneity of study designs and endpoints as well as small study sample sizes in literature, the range of the rates vary so widely. In most published series, positive margin rates after wire localization are high, varying from 14-47% (Gajdos et al., 2002; Medina-Franco et al., 2008; Lovrics et al., 2011). Zgajnar et al. found the positive margin rate as 55% in 96 patients where the rate is 40% in Thind's study with 70 patients (Zgajnar et al., 2004; Thind et al.,

2005). Our positive margin rate is 52.8% in this study. Positive margin rates may be higher because of inherent biological differences and diffuse growth patterns in younger patients. There are also technical difficulties that are relevant to denser fibroglandular tissue in placing hooked wire. The wide range of incidence of positive microscopic margins (26-84%) in the literature is probably associated with the great variation in the relative extent of the biopsy procedure in different series (Senofsky et al., 1990; Ngai et al., 1991; Graham et al., 1994; Lee et al., 1995; Mokbel et al., 1995; Choo et al., 2008). Furher more, some of this wide variation can be attributed to inconsistent definitions of a positive margin and whether surgery was diagnostic or therapeutic in intent (Lovrics et al., 2009). The radiological guided wire placement is a technically difficult procedure, particularly in dense breast tissue. Moreover, when a hook wire is used, the surgeon must follow the path of the wire, which might not be a practical route for reaching the lesion. And sometimes the wire can be displaced.

There is no need to re-excise of all the tumours with close surgical margins. The prognostic factors like grade, tumour size and receptor status generally are taken into consideration while deciding to re-excise the tumour with close surgical margins. In fact, re-excision rates are lower than the close surgical margin rates in literature. Saarela et al, found re-excision rate in their study consisting 66 cases as 74% by the same policy with us (histologic margins <5 mm) (Saarela et al., 2001). Our re-excision rate is 72%. Residual disease in re-excision materials in our series is 38.8%. This is quite lower than the previously reported incidence of 44-58% (Aitken et al., 1994; Cox et al., 1995; Lee et al., 1995; Mokbel et al., 1995; Caughran et al., 2009). There is a discordant situation in here compared to literature. It seems like we decide re-excision more frequently. Because the authors had defined the positive histologic margin differently (<2 mm) this difference can be attributed to re-excision of close margins as well in our series. In fact, residual disease rate makes 50% in re-excision materials when only positive margins considered. An other possible explanation for it is re-excision is carried out in some cases by oncoplastic thecniques to overcome the bad cosmetic appearance due to the first biopsy.

Specimen volume in wire-guided breast biopsy is determined by two opposite limitations. The surgeon aims to obtain histologically tumour-free margins without jeopardizing cosmesis with an unnecessarily wide excision of surrounding normal breast tissue. Because of non-palpability, the localization wire and the mammogram constitute the sole guidelines for tissue excision (Saarela et al., 2001). Further more, in younger premenauposal women surgeon should take the possible pregnancy and lactation period in the future into consideration and behave more conservative while excising the lesion as the malignancy diagnose has not established yet. In our study, the mean specimen volume is 71.5 cc and it is compatible with the literature ranging from 9.5-73.5 cc. (Lovrics et al., 2011).

In the present study, we found age and breast density specifications as statistically significant factors affecting marginal status (p=0.04 and p=0.03 respectively). In most studies, univariate analyses have shown that positive margins are significantly associated with large tumor size, age, extensive intraductal component and higher grade in palpable tumours (Wazer et al., 1999; Singletary et al., 2002; Smitt et al., 2007; Sanchez et al., 2010; Coopey et al., 2011). Unlike the palpable tumours, tumour size and grade were not associated with positive margins in our study.

As re-excision is a cost increase factor having higher morbidity and worser cosmetic results high re-excision rates must be taken into consideration while performing WGL biopsy in non-palpable breast lesions.

References

Aitken RJ, MacDonald HL, Kirkpatrick AE, et al (1994). Outcome of surgery for non-palpable mammographic abnormalities. *Br J Surg*, **77**, 673-6.

Besic N, Zgajnar J, Hocevar M, et al (2002). Breast biopsy with wire localization: factors influencing complete excision of nonpalpable carcinoma. *Eur Radiol*, **12**, 2684–9.

Caughran JL, Vicini FA, Kestin LL et al (2009). Optimal use of re-excision in patients diagnosed with early-stage breast cancer by excisional biopsy treated with breast-conserving therapy. *Ann Surg Oncol*, **16**, 3020-7.

Choo KS, Kwak HS, Tae Bae Y et al (2008). The value of a combination of wire localization and ultrasound-guided vacuum-assisted breast biopsy for clustered microcalcifications. *Breast*, **17**, 611-6.

Coopey S, Smith BL, Hanson S et al (2011). The safety of multiple re-excisions after lumpectomy for breast cancer. *Ann Surg Oncol*, **18**, 3797-801.

Cox CE, Reintgen DS, Nicosia SV, et al (1995). Analysis of residual cancer after diagnostic breast biopsy: an argument for fine-needle aspiration cytology. *Ann Surg Oncol*, 2, 201-6.

Dua SM, Gray RJ, Keshtgar M (2011). Strategies for localisation of impalpable breast lesions. *Breast*, **20**, 246-53.

Gajdos C, Tartter PI, Bleiweiss IJ, et al (2002). Mammographic appearance ofnonpalpable breast cancer reflects pathologic characteristics. *Ann Surg*, **235**, 246-51.

Graham RA, Homer MJ, Sigler CJ, et al (1994). The efficacy of specimen radiography in evaluating the surgical margins of impalpable breast carcinoma. *AJR*, **162**, 33-6.

Lee CH, Carter D (1995). Detecting residual tumor after excisional biopsy of impalpable breast carcinoma: efficacy of comparing preoperative mammograms with radiographs of the biopsy specimen. *AJR*, **164**, 81-86.

Lovrics PJ, Cornacchi SD, Farrokhyar F, et al (2009). The relationship between surgical factors and margin status after breast-conservation surgery for early stage breast cancer. *Am J Surg*, **197**, 740-6.

Lovrics PJ, Cornacchi SD, Vora R, et al (2011). Systematic review of radioguided surgery for non-palpable breast cancer. *EJSO*, **37**, 388-97.

Mokbel K, Ahmed M, Nash A, Sacks N (1995). Reexcision operations in nonpalpable breast cancer. *J Surg Oncol*, **58**, 225-8.

Ngai JH, Zelles GW, Rumore GJ, Sawicki JE, Godfrey RS (1991). Breast biopsy techniques and adequacy of margins. *Arch Surg*, **126**, 1343-7.

Ocal K, Dag A, Turkmenoglu O, et al (2011). Radioguided occult lesion localization versus wire-guided localization for non-palpable breast lesions: randomized controlled trial. *Clinics*, **66**, 1003-7.

Postma EL, Witkamp AJ, van den Bosch MA, Verkooijen HM, van Hillegersberg R (2011). Localization of nonpalpable breast lesions. *Expert Rev Anticancer Ther*. **1**, 1295-302.

Saarela AO, Rissanen TJ, Lahteenmaki KM, et al (2001). Wire-guided excisionof non-palpable breast cancer: Determinants and correlations between radiologic and histologic margins and residual disease in re-excisions. *Breast*, **10**, 28–34.

Sajid MS, Parampalli U, Haider Z, Bonomi R (2012). Comparison of radioguided occult lesion localization (ROLL) and wire localization for non-palpable breast cancers: a meta-analysis. *J Surg Oncol*, **15**, 852-8.

Sanchez C, Brem RF, McSwain AP, et al (2010). Factors associated with re-excision in patients with early-stage breast cancer treated with breast conservation therapy. *Am Surg*, **76**, 331-4.

Senofsky GM, Davies RJ, Olson L, Skully P, Olshen R (1990). The predictive value of needle localization mammographically assisted biopsy of the breast. *Surg Gynaecol Obstet*, **171**, 361-5.

Singletary SE (2002). Surgical margins in patients with early-stage breast cancer treated with breast conservation therapy. *Am J Surg*, **184**, 383-93.

Skinner KA, Silberman H, Sposto R, Silverstein MJ (2001). Palpable breastcancers are inherently different from nonpalpable breast cancers. *Ann Surg Oncol*, **8**, 705-10.

Smitt MC, Horst K (2007). Association of clinical and pathologic variables with lumpectomy surgical margin status after preoperative diagnosis or excisional biopsy of invasive breast cancer. *Ann Surg Oncol*, **14**, 1040-4.

Thind CR, Desmond S, Harris O (2005). Radio-guided localization of clinically occult breast lesions (ROLL): a DGH experience. *Clin Radiol*, **60**, 681-6.

Wazer DE, Schmidt-Ullrich RK, Ruthazer R, et al (1999). The influence of age and extensive intraductal component histology upon breast lumpectomy margin assessment as a predictor of residual tumor. *Int J Radiat Oncol Biol Phys*, **45**, 885-91.

Zgajnar J, Hocevar M, Frkovic-Grazio S (2004). Radioguided occult lesion localization (ROLL) of the nonpalpable breast lesions. *Neoplasma*, **51**, 385-9.