Nonpalpable breast lesions: preoperative radiological guidance in radioguided occult lesion localisation (ROLL)

Lesioni mammarie non palpabili: la guida radiologica preoperatoria nella ROLL (radioguided occult lesion localisation)

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Received: 7 May 2010 / Accepted: 30 July 2010 / Published online: 22 March 2011
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Abstract

Purpose. This study evaluated the methods, technical aspects and impact of preoperative radiological guidance in radioguided occult lesion localisation (ROLL) for single nonpalpable breast lesions.

Materials and methods. A total of 288 patients underwent ROLL before surgery. Human serum albumin macroaggregates labelled with 3.7–7.4 MBq of technetium99 were injected into the lesion. In the case of ultrasonographic guidance (221/288 patients), inoculum positioning resulted in a change of echogenicity at the lesion site. In the case of mammographic guidance (67/288 patients), iodinated contrast medium was injected following the radiotracer for subsequent mammographic evaluation. Patients underwent surgery within 24 h from ROLL. A gamma-detecting probe was used to locate the lesion during surgery and guide its removal. After excision, the specimen was examined by either ultrasonography or mammography to verify complete lesion removal before histological evaluation.

Results. The lesion was correctly localised in 281/288 patients (97.5%). One ROLL procedure failed because surgery could not be performed within 24 h and the radioactivity decayed. Of the six incorrect localisations, 2 were due to the radiological guidance and 4 to technetium99 dispersion.

Conclusions. Radiological guidance in ROLL ensured the outcome of the procedure of localisation and removal of single, nonpalpable breast lesions in the majority of cases.

Riassunto

Obiettivo. Scopo del presente lavoro è stato quello di valutare metodi, aspetti tecnici ed impatto della guida radiologica preoperatoria nella radioguided occult lesion localisation (ROLL) per lesioni mammarie singole non palpabili.

Materiali e metodi. Duecentottantotto pazienti sono state sottoposte a ROLL prima dell’intervento. All’interno della lesione sono stati iniettati macro-aggregati di albumina umana marcata con tecnezio99; nel caso di guida ecografica (221/288 soggetti), l’inoculo ha prodotto iperecogenicità in corrispondenza della lesione; nel caso di guida mammografica (67/288 soggetti), dopo il radiotracciante è stato inoculato mezzo di contrasto iodato per il successivo controllo mammografico. Le pazienti sono state sottoposte ad intervento chirurgico entro 24 ore dalla ROLL. Per localizzare la lesione e guidarne la rimozione chirurgica, è stata utilizzata una sonda per la rilevazione dei raggi gamma. Dopo l’escissione, il pezzo operatorio è stato esaminato con ecografia o mammografia per verificare la completa rimozione della lesione.

Risultati. La lesione è stata localizzata correttamente in 281/288 pazienti (97,5%). Una ROLL non ha avuto successo poiché non è stato possibile effettuare l’intervento chirurgico entro 24 ore. Delle 6 localizzazioni non riuscite, 2 sono da mettere in relazione alla guida radiologica e 4 alla dispersione del tecnezio99.

Conclusioni. La guida radiologica nella ROLL ha garantito l’esito della localizzazione e rimozione di lesioni mammarie singole non palpabili nella maggioranza dei casi.
**Introduction**

A variety of preoperative localisation techniques for nonpalpable breast lesions has been described in the literature: hypodermic needles, wires (the most widely accepted technique), carbon solution, methylene blue dye [1–10]. Ultrasound-guided intraoperative lesion localisation and placement of a radioactive seed have also been proposed [11–14]. Radioguided occult lesion localisation (ROLL), introduced in 1998, involves the inoculation of macro-aggregates of human serum albumin labelled with radioactive technetium$^{99}$ (99mTc) directly into the site of a nonpalpable breast lesion, with mammography (Mx) or ultrasound (US) guidance. After radiotracer injection, a gamma-detecting probe (GDP) was used to locate the lesion during surgery, allowing the surgeon to evaluate its skin projection and decide the best approach with an acceptable cosmetic outcome [15, 16]. The same group that described ROLL for the first time compared this technique with wire localisation and concluded that ROLL was rapid, easy and accurate, with reduced excision volume and better lesion centring [17], and also safe in terms of radiation exposure [18].

Following this experience, other groups tested ROLL alone or in combination with the sentinel node (SN) procedure in different clinical settings [19–22]. Prospective randomised trials compared ROLL with wire-guided lumpectomy and concluded that ROLL was as effective as wire for localising and excising breast lesions, was simple, reduced localisation time and pathologically positive margins and gave better cosmetic results [23–26]. Most international papers focused on evaluating ROLL from the surgical point of view, with particular attention to surgery duration, choice of access and cosmetic outcome. Relatively little attention has been directed to the role of radiological guidance with Mx and US in the ROLL procedure.

The aim of this prospective study was to evaluate the methods, technical aspects and impact of patient-tailored preoperative radiological guidance in ROLL in a large series of women with single, nonpalpable breast lesions.

**Materials and methods**

**Study population**

We evaluated 288 women (mean age 57.5 years; range 32–88 years) with single, nonpalpable breast lesions who were...