

Excisional biopsy of impalpable soft tissue tumors

US-guided preoperative localization in 12 cases

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We present a technique to facilitate excisional biopsy of impalpable soft tissue tumors. A modified Kopans localization needle is positioned preoperatively under ultrasound-guidance (7.5 MHz). The needle contains a hookwire with an over-bent hook

that springs open when protruded beyond the needle tip and anchors the wire in the lesion. The technique was used in 12 patients and facilitated excisional biopsy in all of them.

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Impalpable soft tissue lesions may be difficult to find preoperatively. We report our experience with preoperative localization using ultrasound (US)-guided hookwire needle placement, followed by limited excisional biopsy.

Technique and results

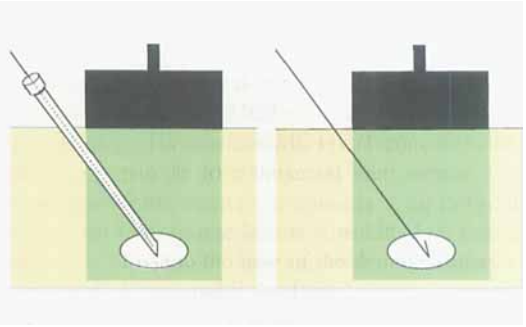
All US examinations and US-guided preoperative localizations were performed by the same radiologist. A Toshiba SSA 250 (Toshiba Medical Systems, Tokyo, Japan) with a 7.5 MHz (annular array) transducer was used. By slowly moving and gently pressing the transducer (i.e., sonographic palpation), triggerpoints were detected and pathologic entities identified. For localization, a 21-gauge disposable, modified Kopans localization needle (Cook[®], William Cook Europe, Denmark) (length 50 mm) was used. The localization needle contains a hookwire (length 150 mm) with an over-bent hook that springs open when protruded beyond the needle tip and anchors the wire preferably inside or otherwise just behind the lesion (Figure 1). In order to improve visualization of the needle tip during sonography, all localization needles had an Echotip[®] design. To improve sonographic visualization of the hookwire (diameter 0.25 mm), a 20-mm long stylet reinforcement (diameter 0.50–0.52 mm) was added to the wire 10 mm proximal to the hook. US-guided localization was performed without the use of analgesics or local anesthetics and within 1–2 hours before surgery.

Between 1991 and 1995, we performed a hookwire-guided excisional biopsy after needle localization with US for impalpable tumors in 12 patients (Table). All patients suffered from local pain, which in most cases interfered with normal work or daily activities. The average duration of pain was 3.5 (1–17) years. 6 patients had undergone surgical intervention, without preoperative US-guided localization and 2 of these had undergone two surgical interventions previously.

In all cases, a circumscribed tumor or abnormal consistency was found with US. All lesions were hypoechoic. The mean length of these oval and fusiform lesions was 17 (8–38) mm. In the 7 sonographically sharply circumscribed lesions, histopathology revealed 4 posttraumatic neuromas, 1 angioleiomyoma, 1 intramuscular myxoma and 1 bursitis with fibrosis and necrosis of subcutaneous fat tissue. In the 5 lesions with indistinct margins, histopathology revealed only subcutaneous fat tissue and signs of chronic granulomatous infiltration with giant cell reaction. Initially, following excisional biopsy, 8 of 12 patients had partial or complete pain relief. In 2 of the 8 patients initially responded, the pain recurred after excision of a posttraumatic neuroma within 1 and 6 months, respectively. All patients with a sharply circumscribed lesion improved initially, whereas 4 of the 5 patients with a sonographically indistinct lesion did not improve at all. 4 of the 6 patients who had undergone one or more unsuccessful operations became free of pain after hookwire-guided excisional biopsy.

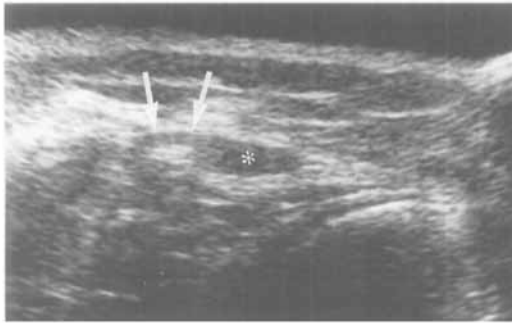


Figure 1. Preoperative US-guided localization. For optimal visualization during localization the needle is introduced parallel to the long-axis of the transducer.

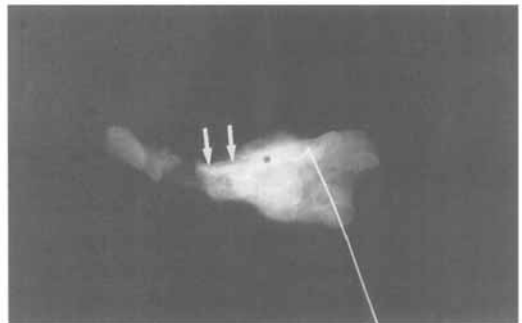


Schematic drawings of the US-guided localization of an impalpable soft tissue tumor. The localization needle contains a hook wire with an over-bent hook that springs open when protruded beyond the needle tip (left). After the needle is withdrawn, the wire is anchored in the lesion (right).

Case 2.



Sonogram of a hypoechoic soft tissue tumor with distinct margins. Histopathologically it appeared to be a posttraumatic neuroma (*). Note also the connected nerve (arrows) and the surrounding hyperechoic scar tissue.



Specimen radiography of the biopsy material showing the localization wire anchored in the posttraumatic neuroma (*) and the nerve (arrows).

12 consecutive patients with localized pain and a sonographically-detected impalpable lesion. Mean follow-up 16 (3–50) months

Case	Age yrs	Sex	History	Years of complaints	Localiza-tion	Max. size (mm)	US margins	Histopathology	Results
1	31	m	osteosyn.dist. femur fracture	5	knee	18	distinct	neuroma	no pain for 6 months
2	24	f	arthroscopy	4	knee	12	distinct	neuroma	no pain
3	20	f	contusion knee	1.5	knee	10	distinct	neuroma	no pain
4	53	f	resection hemangioma	1.5	knee	8	distinct	neuroma	no pain for 1 month
5	51	m	no trauma	17	groin	10	indistinct	lymph node with fibrosis	no pain
6	47	f	fall	1	buttock	38	distinct	bursa with fibrosis and fat tissue necrosis	no pain
7	47	m	no trauma	6	knee	10	distinct	subfascial angioleiomyoma	no pain
8	19	f	Salter-Pemberton operation	2	groin	14	indistinct	scar tissue/chronic granulomatous infiltration	no improvement
9	53	f	MCL lesion/repair	4	knee	13	indistinct	fibrosis/chronic granulomatous infiltration	no improvement
10	51	f	no trauma	2	buttock	34	distinct	intramuscular myxoma	no pain
11	15	f	contusion with open wound	6	knee	11	indistinct	fibrotic connective tissue/fat tissue	no improvement
12	62	f	implantation prosthesis	4	knee	22	indistinct	granulomatous infiltration	no improvement

Discussion

Hookwire needle localization was first used to facilitate biopsy of impalpable breast lesions. Initially, needle placement was performed with radiographic control (Kopans and DeLuca 1980). However, with the development of high-resolution (high-frequency) transducers, US is more frequently used for guided percutaneous punctures and biopsies in even the smallest soft tissue tumors (Otto and Deyhle 1980, Reading et al. 1988, Schwartz et al. 1988, Matalon and Silver 1990). Preoperative localization of impalpable soft tissue tumors is attractive, because it shortens the duration of the surgical intervention and limits the extent of the excisional biopsy. This appears to be a reliable procedure. In all our cases, we found an impalpable tumor or pathologic entity. In most cases, the patients experienced only minor pain during introduction of the needle. Pain was triggered when the needle was introduced into a neuroma (case 2). However, once the needle was withdrawn and only the localization wire was left in situ, little or no pain was felt.

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