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Original Article

Nonpalpable intramuscular hemangioma treated with hookwire localization and excision

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Abstract

Background: The local recurrence rate after surgical excision of intramuscular hemangioma reported is between 18% and 61%. The aim of this study was to review the clinical outcome and local recurrence rate after surgical excision of nonpalpable intramuscular hemangioma using preoperative ultrasound-guided hookwire localization.
Methods: We performed ultrasound-guided hookwire localization before excision surgery for nonpalpable intramuscular hemangioma in 37 cases between January 1997 and 2011. There were 20 females and 17 males, with a mean age of 30.2 years (range, 17–49 years). The mean localization procedure time was 10.6 minutes (range, 3–20 minutes).
Results: The average operation time was 48.6 minutes (range, 30–80 minutes). The average length of the excision wound was 5 cm (range, 4–11 cm), and the average hospital stay was 2.5 days (range, 2–4 days). The postoperative therapeutic report confirmed the diagnosis of intramuscular hemangioma. The average tumor size was 2.11 cm and all excision margins were free in all specimens. After the mean follow-up of 92.9 months (range, 14–179 months), one of the 37 patients had local recurrence (recurrence rate 2.7%).
Conclusion: The use of ultrasound-guided hookwire localization before excision surgery is safe and effective in treating nonpalpable intramuscular hemangioma and could provide a better cosmetic result and functional recovery.

Keywords: hemangioma; localization; local recurrence

1. Introduction

Intramuscular hemangioma (IMH) is one of the most common deep-seated soft tissue tumors and is the most common benign tumor in muscles,[1] comprising 0.8% of all hemangiomas.[2] IMH occurs in patients of all ages but is most frequent in young adults, with 80–90% occurring before the age of 30.[3] Pain is the most common symptom.[4] In the limbs, symptoms are consistent with expansion during times of increased blood flow into the vascular spaces of the lesion.[5] With more advanced imaging modalities, lesions can be discovered earlier than before. It is rare for IMH to be palpable at the time of diagnosis.

Surgical treatment is indicated for the relief of symptoms or cosmetic purposes.[6] However, due to the inherent characteristics of the deep-seated intramuscular location of IMH, adequate surgical resection is difficult to achieve. Thus the outcome varies, with a local recurrence rate of 18–61%.[4,7–10] However, the surgical margin is the major determinant for local recurrence.[7,10] Due to the infiltrative

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nature of IMH, normal muscle must be removed well beyond the gross limits of the tumor for local recurrence prevention. This may cause unnecessary surgical trauma and bleeding.

Presurgical ultrasound-guided localization of nonpalpable breast lesions is now the most commonly used presurgical guiding procedure for nonpalpable breast cancers, with reliable success rates.[11–16] We suggest the exact presurgical localization of the lesion is quite important for achieving optimal surgical outcome in the treatment of IMH. In this study, we performed ultrasound-guided hookwire localization to identify and mark nonpalpable IMH prior to excision in an attempt to enable complete surgical removal, thus reducing the recurrence rate with the added benefit of reduced tissue trauma and a better cosmetic result.

2. Methods

2.1. Patients

Fifty-one patients with IMH who were treated with surgical excision following ultrasound-guided hookwire localization between January 1997 and 2011 by a single orthopedic surgeon (W.M. Chen) were reviewed. Our surgical indications for IMH excision included: (1) symptoms persist or progress under conservative treatment; (2) size of tumor progresses during follow up; and (3) the patient requests the procedure. All IMHs were diagnosed by an experienced radiologist (H.J. Chiou), and had the typical imaging features of being well-defined, lobulated, heterogeneous, and showed evidence of vascularity on ultrasound and magnetic resonance imaging (MRI).[17] Fourteen patients with 14 palpable masses were excluded. Thirty-seven patients with nonpalpable IMH who received ultrasound-guided hookwire localization and surgical excision were included. There were 17 males and 20 females. The average age at the time of first evaluation was 30.2 years (range, 17–49 years). Twenty-three lesions arose from the thigh; 12 of those originated in the vastus lateralis muscle, seven originated in the vastus medialis and the remaining four arose from the vastus intermedius muscle. Ten lesions arose from the lower leg, six of those originated in the soleus muscle, and two came from the gastrocnemius muscle. Four IMHs originated in the upper limbs. Three of those originated in the triceps muscle and the one remaining arose from the deltoid muscle. The average duration of symptoms was 18.5 months (range, 5–48 months). The average tumor size (largest diameter on ultrasonography) was 2.11 cm (range, 0.8–4.5 cm).

2.2. Intervention

All ultrasound-guided procedures were performed within 3 hours before the surgical procedure by a single radiologist (H.J. Chiou). Free-hand ultrasound guidance was performed under local anesthesia in the ultrasound examination room (Fig. 1A). The needle that carried the hookwire was percutaneously inserted, passed through the lesion, and placed at the deepest part of the lesion. The wire used for localization had a hooked tip that could be fixed in the soft tissue (Fig. 1B). The ultrasonography pictures taken during the procedure were available for the surgeon to make comparisons and correlations between the wire and the lesion. In order to facilitate viewing of the tumor, tourniquets were placed on the patients' limbs preoperatively and were inflated without elastic bandage exsanguinations. Marginal excision was performed following down the hookwire, which was located at the deepest part of the lesion (Fig. 1C–E). No other preoperative procedures (e.g., needle biopsy) were performed before the excision operation.

2.3. Clinical and radiological evaluation

Clinical symptoms, and preoperative imaging including radiography, ultrasonography and MRI were investigated for all patients. The histopathological results, especially the surgical margin were reviewed. All patients were followed up at 3-month intervals for the 1st year after surgery, then annually. During follow up, we assessed the patients' symptoms and detailed palpation. If recurrence was suspected, additional ultrasonography or MRI was then performed. The mean period of follow up was 92.9 months (range, 14–179 months). This study project is approved by the Institutional Review Board of Taipei Veterans General Hospital.

3. Results

In our study, almost all clinical symptoms were spontaneous pain in the affected area; only one patient complained of progressive swelling during exercise with mild discomfort.

Tumors were evaluated by radiography, ultrasonography, or MRI. For plain radiography, 34 out of 37 patients were normal; only three revealed phleboliths. All of our patients revealed typical imaging findings in both ultrasonography and MRI.

The average time for localization was 10.6 minutes (range, 3–20 minutes). No procedure-related complications such as wire migration, wire transection, or neurovascular injury were noted. Mean excision operation time was 48.6 minutes (range, 30–120 minutes), and the average incision length was 5.0 cm (range, 4–11 cm). The average blood loss during the operation was 34.7 mL (range, 5–100 mL). The average length of hospital stay for our patients was 2.5 days (range, 2–4 days).

Macroscopically, all of the patients had negative surgical margins. Neither intraoperative complications nor skin necrosis developed. One patient had a minor wound infection and was treated successfully with a course of oral antibiotics.

After a mean follow up of 92.9 months, one of the 37 patients (2.7%) complained of recurrence of symptoms and had confirmed local recurrence via MRI 12 months after the surgery. This patient underwent subsequent excision surgery following preoperative ultrasound-guided hookwire localization and had been symptom-free for 19 months before their last follow-up visit.