Preoperative ultrasound in de Quervain's disease: an investigation worth doing

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Abstract

Background The diagnosis of de Quervain's disease is traditionally clinical. There are no defined objective criteria to select a mode of treatment (conservative or surgical). Usually, all cases are initially treated conservatively and are offered surgery if it fails. Persistent symptoms after surgery, a nightmare for treating surgeon, are attributed to improper diagnosis or inadequate release of the compartment.

Methods A total of 45 symptomatic wrists in 42 patients were analyzed. All patients underwent ultrasound examination using a 12 MHz linear array transducer by the same radiologist in both the affected and unaffected wrists.

Results The highest incidence was seen in housewives involved in domestic work.

Conclusion Ultrasound is a worthwhile preoperative investigation in case of de Quervain's disease.

Keywords de Quervain's disease · Ultrasound · Anatomical variations

Introduction

de Quervain's disease is one of the commonest case at a hand clinic. The diagnosis is usually clinical and the treatment varies from conservative management, in the form of splints, nonsteroidal anti-inflammatory drugs (NSAIDs) and steroid injection, to surgical decompression of the first extensor compartment [1]. There is no definite treatment protocol suggested in literature and usually surgical decompression is done when conservative treatment fails [2, 3]. As there is no known clinical test or investigation which can identify the patients likely to benefit from conservative management, it leads to prolonged suffering of those who do not respond to conservative treatment and ultimately require surgical decompression. Persistent symptoms after surgical decompression is most commonly due to inadequate and incomplete release which again is due to myriad of anatomical variations present in first extensor compartment [4, 5]. A failed surgical decompression adds to the agony of the patient and is equally embarrassing to the treating surgeon.

This study was undertaken to study the sonological features of de Quervain's disease, to find out if it can be of help in decision making (conservative or surgical) and to detect its ability to pick up anatomical variations of first extensor compartment preoperatively and thereby preventing the complication of incomplete release.

Materials and methods

This is a prospective study which included 42 consecutive cases of de Quervain's tenosynovitis seen at out patient clinic between May 2005 and December 2007. Three patients had bilateral involvement, making it a total of 45 wrists. The diagnosis was clinical in all the cases based on a history of pain over radial aspect of wrist, aggravated by the use of the thumb, tenderness over the radial styloid process and a positive Finkelstein test.

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Patients with history of trauma or surgery at the wrist and hand were specifically excluded from the study.

All patients underwent ultrasound examination using a 12 MHz linear array transducer by the same radiologist in both the affected and unaffected wrists. Ultrasound examination was first done with the probe placed over the radial styloid process and in a direction perpendicular to the direction of tendons. Artifact of false hypoechogenicity is seen when the scan plane is not strictly perpendicular to the true axis of the tendon [6].

The abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons were identified by doing a dynamic study, such as examination during the contraction and relaxation of the muscle.

Normally on longitudinal scan tendons are echogenic and display a characteristic fibrillar echo texture and are surrounded by two echogenic lines representing tendon sheath without any obvious synovium or fluid in the sheath. The hallmark of tenosynovitis is swelling and inflammation of the tendon sheath, which becomes filled with fluid with or without synovial proliferation. On ultrasound the tendon sheath becomes enlarged and ill defined. The edematous tendon sheath is seen as a hypoechoic halo surrounding the tendons. On scan teno-

synovitis is characterized by the presence of fluid within the synovial sheath surrounding the echogenic tendon. Synovial thickening and fluid is seen in acute cases and this decreases with increase in duration of symptoms. In long-standing cases internal echoes are seen and the fibrillary pattern of the tendon may become less apparent.

The following were noted during the scan:

1. Ultrasound appearance of first extensor compartment in affected and unaffected wrists
2. Presence of anatomical variations like multiple slips of tendon or a sub septum dividing the first extensor compartment.

All patients were initially managed by conservative treatment irrespective of severity of symptoms and ultrasound appearance. The figures 1–6 depicts our observation. The conservative management included splints, activity modification, NSAIDs for a period of 6–10 weeks. If conservative treatment failed steroid injection in the synovial sheath was given. A maximum of two steroid injections were given at an interval of three weeks. Injections were given without any ultrasound guidance. If still patient had no relief, surgical decompression was done. Intraoperatively the number of tendon slips and presence

Fig. 1 Ultrasound of the first extensor compartment in a normal wrist. It is difficult to clearly demarcate the outline of the individual tendons

Fig. 2 Ultrasound of the first extensor compartment in a patient with acute symptoms. The hypo-echoic area around the tendons depicts presence of fluid

Fig. 3 Ultrasound of the first extensor compartment in a patient with chronic symptoms showing absence of fluid

Fig. 4 The phenomenon of 'Pseudo fusion' seen in case of a patient presenting with acute symptoms. Both the APL and EPB appear to be fused at the radial styloid level

or absence of septum dividing the first compartment was noted. These were correlated with the preoperative ultrasound findings.

Results

A total of 45 symptomatic wrists in 42 patients were analyzed. The mean age of the patients was 49 years. Of the 42 patients, eight were males and 34 females. The highest incidence was seen in housewives involved in domestic work. Dominant hand was involved in 25 patients and 3 had bilateral involvement. Of the 45 wrists, 23 had symptoms for less than 4 weeks duration, 14 had symptom ranging from 4 to 12 weeks and eight presented with symptoms for more than 12 weeks duration. Twenty-four wrists needed surgical decompression. Transverse incision was used in 13 wrists and longitudinal incision in 11 depending on the preference of the surgeon.

Ultrasound findings

None of the uninvolved sides had any noticeable synovial thickening or fluid present in the tendon sheath. The characteristic feature of tenosynovitis such as fluid and synovial thickening in the tendon sheath was seen in 31 out of 45 wrists. The remaining 14 wrists had internal echoes and no fluid indicating chronicity. These internal echoes were never noted in any of the uninvolved side tendons.

Out of 31 wrists which had fluid on sonogram 18 responded to conservative measures and 13 required surgical decompression. But only three of the 14 cases in whom there was no fluid in the sheath responded to conservative treatment while rest 11 required surgical decompression.

Fig. 5 A distal scan in the same patient revealed two slips of APL and one slip of EPB

Anatomical variations in the tendons

Abductor pollicis longus (APL)

At the radial styloid level out of 45 wrists APL was represented by a single slip in 13 and multiple slips in 23 wrists. In the remaining nine wrists the APL and EPB tendons on ultrasound scan appeared fused at the radial styloid level but a distal scan in these nine wrists revealed a single slip in two wrists and multiple slip in seven wrists. We referred this as pseudo fusion because on surgical exploration the tendons were separate and this was only the radiological appearance. Thus APL was represented by multiple slips in 30 wrists whereas single slip was seen in 15 wrists.

In the 24 operated wrists we found that preoperative ultrasound correctly identified the number of slips of APL in all the cases.

Extensor pollicis brevis (EPB)

At the radial styloid level out of 45 wrists EPB was represented by a single slip in 35 and only one wrist had two slips. In the remaining nine wrists the APL and EPB tendons appeared fused on ultrasound scan at the radial styloid level but a distal scan in these nine wrists revealed a single slip in two wrists and multiple slip in seven wrists. We referred this as pseudo fusion because on surgical exploration the tendons were separate and this was only the radiological appearance. Thus, EPB was represented by a single slip in 42 wrists and by two slips in three wrists.

In the 24 operated wrists we found that preoperative ultrasound correctly identified the number of slips of EPB in all the cases.

Separate compartment: Of the 45 wrists which were examined by ultrasound scan, a separate compartment for EPB was noted in 13 wrists.

Fig. 6 Ultrasound showing multiple slips of APL

In the 24 operated wrists we found that preoperative ultrasound correctly identified the presence of subseptum in all the cases.

Discussion

In management of de Quervain's tenosynovitis there are still some grey areas of concern. Firstly, the diagnosis is mainly clinical, which is obviously very subjective, and there are no confirmative tests. Secondly, there are no objective criteria to decide whether to choose a conservative or surgical management for a given case and hence all the patients are first subjected to conservative mode and if it fails surgical decompression is advised. Thirdly, recurrence of symptoms after inadequate decompression is disastrous. It obviously will be an investigation worth doing if it can address these three problems.

We have found that preoperative ultrasound can provide solution to all these three problems. It can act as an objective documented evidence of the diagnosis which can even be used in a medico legal matter.

Synovial thickening and fluid was seen in acute cases and this decreased with increase in duration of symptoms [7, 8]. In contrast, none of the unaffected wrist had any noticeable synovial thickening and fluid present. Thus presence of synovial sheath thickening and fluid within the sheath in the presence of relevant history and clinical finding can be considered diagnostic of this condition. A similar finding was reported by Francesco Giovagnorio [9]. The other characteristic feature seen in de Quervain's tenosynovitis is that the echogenic tendons can be easily made out against an anechoic background (synovial thickening and fluid which appears black). In unaffected wrists in most of the cases it is impossible to clearly mark the tendon outline and it is very difficult to separately identify APL and EPB slips at radial styloid process (Fig. 1).

We found that an edematous sheath, which appears anechoic on ultrasound was a consistent finding in patients with acute onset of symptoms. We also observed that with increase in duration of symptoms the amount of fluid decreased and internal echoes were noted.

We postulate that presence of fluid in the sheath on sonogram can be used as a guide to decision making. Conservative treatment was successful in 58% of the patients who had fluid in the sheath but only 21% of the patients who had no fluid responded to conservative treatment. We propose, if on sonogram there is no fluid in the sheath it may be prudent to apprise the patient of the high probability of surgical release being required. Also, if there is good amount of fluid in the sheath, patient can have good result with conservative treatment and an unnecessary operation may be avoided.

Variations in anatomy of first dorsal compartment are the rule, rather than exception. Hence, it is imperative for any surgeon to look for these during surgery to avoid in-

complete release of the compartments and hence recurrence of symptoms. In spite of this fact, incomplete release remains one of the most frequent causes of recurrence of symptoms. Preoperative ultrasound can exactly determine the number of tendon slips and presence of separate compartment and thus provide vital information to the surgeon, which will be of great help during surgery.

On ultrasound scan in nine wrists, the tendon of APL and EPB could not be identified as separate tendons at radial styloid process and they appeared fused. A distal scan near the insertion of APL correctly identified the different tendons. However, this appearance of fusion was only an ultrasound feature and not anatomical as at the time of surgery; they were found to be completely separate with no adhesions between them. Hence, we refer this as pseudo fusion of tendons. A more distal scan revealed the correct number of tendons. Thus, we recommend a routine distal scan in all the cases.

Ultrasound showed the presence of single tendon of APL in 15 wrists (32%) and multiple tendons in 30 wrists (68%). This is in agreement with other anatomical studies and our per-operative findings. In our series, ultrasound correctly predicted the number of tendons in all the 24 operated wrists. Out of 24 operated wrists in 17 wrists APL was represented by more than one tendon (71%). A similar incidence was reported by Keon-Cohen (79%) [10] and Bahm (76%) [11].

In our study per-operatively we found EPB to be represented by a single slip in 22 out of 24 wrists (92%). In two wrists (8%) it had two tendons. On ultrasound scan out of the total 45 wrists EPB had one tendon in 42 wrists (95%) and two tendons in three wrists (5%). These values are in agreement with the reports of Kean-Cohen 95% [10] and Bahm 96% [11]. Ultrasound correctly predicted the number of EPB tendons in all the 24 operated wrists.

In eight out of 24 wrists which were operated EPB was found to be in a separate compartment in 33% of wrist. This incidence is in accordance with the studies of Kean-Cohen (33%) [10] and Jackson (40%) [5]. Bahm [11] reported a higher incidence of separate compartment (60%). Ultrasound correctly identified the separate compartments in all the operated cases.

Conclusion

Ultrasound is a worthwhile preoperative investigation in case of de Quervain's disease. It can provide objective and documented proof of the diagnosis and can act as a guide to choose the mode of management (conservative or surgical). It also picks up anatomical variations of the first extensor compartment and can thereby prevent the complication of incomplete release. We thus recommend routine preoperative ultrasound scan in all patients of de Quervain's disease.

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