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Preoperative Ultrasound-A Worthy Investigation in de Quervain's Disease

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ABSTRACT

de Quervain's disease is a common clinical condition seen by a hand surgeon. The diagnosis is usually clinical which can be confirmed by ultrasound and the treatment varies from conservative management to surgical decompression of the first extensor compartment .The commonest cause of persistent symptoms post operatively is incomplete release of the compartment. ***Objective :*** *This study was done to study the ultrasound features of de Quervain's disease and to study the ability of Ultrasound to detect anatomical variations of first extensor compartment preoperatively which will help to prevent the incomplete release of the compartment and hence recurrence of disease.* ***Materials & Methods:*** *All clinically diagnosed cases of de Quervain's disease were included and underwent ultrasound examination of both the affected and unaffected wrists. In patients who were operated the ultrasound findings were compared with intra operative findings.* ***Results:*** *In acute cases ultrasound revealed presence of fluid in the sheath, which decreased with chronicity.In the latter internal echoes were observed. More percentage of chronic case required surgery. Ultrasound also correctly picked the anatomical variations of the first extensor compartment.* ***Conclusions:*** *Ultrasound can aid in diagnosis as well as guide in choosing the mode of management. It can also pick up anatomical variations of the first extensor compartment pre operatively and prevent the complication of incomplete surgical release.Thus a routine ultrasound scan in all patients of de Quervain's disease is suggested.*

KEYWORDS : de Quervain's disease; Ultrasound; First Extensor Compartment; Anatomical Variations; tenosynovitis

INTRODUCTION

Fritz de Quervain described the tendovaginitis of first extensor compartment tendons, Abductor Pollicis Longus (APL) and Extensor Pollicis Brevis (EPB) (1). Clinically it is characterized by pain and swelling over the Radial styloid process, a positive Finkelstein test, accompanied sometimes by a palpable thickening of the tendon sheaths and painful wrist and thumb movements (2, 3, 4). The diagnosis is usually clinical and the treatment varies from conservative management to surgical decompression of the first extensor compartment. There is no definite treatment protocol suggested in literature and usually surgical decompression is done when conservative treatment fails (4, 5). Persistent symptoms after surgical decompression are most commonly due to inadequate and incomplete release. The most common cause of incomplete surgical decompression is the myriad of anatomical variations present in first extensor compartment (5, 6, 7). 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 ultrasound features of de Quervain's disease and to study the ability of Ultrasound to detect anatomical variations of first extensor compartment preoperatively which will help to prevent the complication of incomplete release.

MATERIAL AND METHODS

This is a prospective study of 42 patients of de Quervain's tenosynovitis involving 45 wrists. All patients diagnosed to have de Quervain's disease were included in the study. Permission was granted by the institutional review board of the university. The diagnosis was 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. Patients with history of trauma or surgery at the site were excluded. All patients underwent sonological examination using a 12 MHz linear array transducer by the same sonologist 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 to prevent false hypoechoic appearance (8). The APL & EPB tendons were identified by doing a dynamic study. The following were noted:

1. Sonological 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 sonological appearance. If symptoms persisted, surgical decompression was done. Intraoperatively the anatomical variations were noted and these were correlated with the pre-operative sonological 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 four 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.

Sonological Findings

1. APL: Of the 45 wrists examined sonologically APL was represented by a single slip in 13. Multiple slips of APL were seen in 23 wrists. In the remaining 9 wrists the APL & EPB tendons appeared sonologically

fused at the radial styloid process. We called it pseudo fusion as a distal scan in these 9 wrists revealed a single slip of APL in 2 wrists and multiple slip of APL in 7 wrists. Thus APL was represented by multiple slips in 30 wrists whereas single slip was seen in 15 wrists.

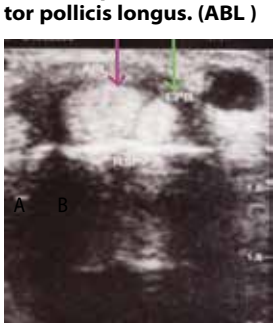
In the 24 operated wrists we found that preoperative ultrasound correctly identified the number of slips of APL in all the cases.

2. EPB: Of the 45 wrists examined sonologically, EPB was represented by a single slip in 35 and one wrist had 2 slips. In the remaining 9 wrists which showed pseudo fusion, a distal scan revealed 2 slips of EPB in 2 wrists and one slip of EPB in 7 wrists. Thus EPB was represented by a single slip in 42 wrists and by two slips in 3 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 sonologically examined a separate compartment for EPB was noted in 13 wrists. In the 24 operated wrists we found the presence of septum dividing the first extensor compartment in 8 wrists. Preoperative ultrasound correctly identified the presence of sub septum in all the cases. Presence of fluid in the tendon sheath was the most consistent finding in de Quervain's disease. The amount of fluid decreased and internal echoes appeared as the disease became chronic. A better response (18 out of 31 wrists) to conservative measures was seen in patients with acute features of the disease. Most of the patients with chronic features needed surgical decompression (11 out of 14 wrists).

Figures and Figure Legends

Fig.1 : Ultrasound of the first extensor compartment in unaffected wrist. RSP is radial styloid process ; asterix is extensor pollicis brevis (EPB) and white arrow is abductor pollicis longus. (ABL)



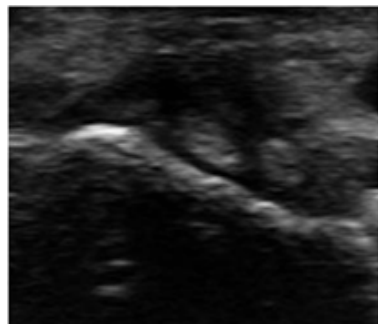


Fig. 2 A, B ,C : Ultrasound of the first extensor compartment in a patient with acute symptoms.The hypo echoic area around the tendons depicts the presence of fluid. (asterix is extensor pollicis brevis (EPB) and white arrow is Abductor Pollicis Longus (APL) .

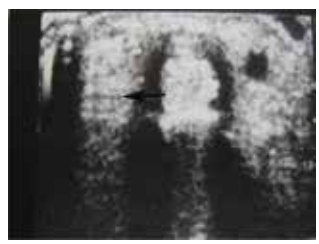


Fig 3 : The phenomenon of "Pseudofusion" seen in case of a patient presenting with acute symptoms. There is profound hypoechogenicity seen as a pronounced hypoechoic halo around the two tendons . Both the APL and EPB appear to be fused at the radial styloid level.

Fig.4: A distal scan in same patient revealed two slips of APL and one slip of EPB.

Fig. 5 : Operative picture of the same patient confirms the ultrasound finding of two slips of APL and one slip of EPB .

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. Third, 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 the three problems.

All normal tendons are echogenic and display a characteristic fibrillar echo texture on longitudinal scan. The higher the frequency, the higher is the number of visible fibrils.The tendon is surrounded by two echogenic lines which are supposed to represent the peritenon. Transverse scan of a tendon provides the most accurate measurement of tendon thickness. A normal tendon may appear falsely hypoechoic when the scan plane is not strictly perpendicular to the true axis of the tendon (8,9).

Tenosynovitis is characterized by the presence of fluid in the synovial sheath surrounding the echogenic tendon. On transverse scan, sonography can demonstrate a hypoechoic halo surrounding these tendons which is thought to represent the edematous sheath. Internal echoes may be demonstrated in chronic or infected effusions (8, 9,10,11,12).

In the present study synovial thickening and fluid was seen in acute cases and this decreased with increase in duration of symptoms. In contrast, none of the unaffected wrist had any noticeable synovial thickening and fluid present. Thus presence of synovial sheath thickening and fluid in the presence of relevant history and clinical finding can be considered diagnostic of this condition. The other characteristic feature seen in de Quervain's tenosynovitis is that the echogenic tendons can be easily made out against an anechoic background (usually the case with synovial thickening and fluid which appears black). We found that an edematous sheath which appears anechoic sonologically 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 could be made out.

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 worth to directly go ahead with surgical decompression rather than wasting vital time in less likely to succeed conservative treatment. 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 incomplete release of the compartments and hence recurrence of symptoms. In spite of this fact incomplete release remains one the most frequent cause 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.

In 9 wrists the tendon of APL & EPB could not be sonologically 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 sonological and not anatomical as was revealed intra-operatively in three wrists. 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.

Ultra sound 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 Bryan Keon-Cohen(12) and J. Bahm (13).

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 (eight percent) it had two tendons. Out of the total 45 wrists which underwent sonological examination EPB had one tendon in 42 wrists (95 %) and two tendons in three wrists (five percent). These values are in agreement with the available studies (12,13). 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 was in accordance with the available literature.

CONCLUSION

Ultrasound is a very useful diagnostic tool in 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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