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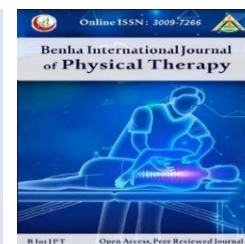
Original research

Validity of Palpation in Detecting the Site of Lesion in Diabetic Trigger Finger Patients.

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Abstract

Background: Trigger finger (TF) is a painful disorder that hinders the use of the entire hand. Although the A1 pulley is a typical location for triggering, other areas may also be involved in some patients, according to many published studies. **Objective:** The objective of this study is to assess the validity of palpation in detecting the lesion site in diabetic TF patients, which is essential for proper topical physical therapy or surgical treatment. **Methods:** A case-control observational trial was conducted at the physical therapy outpatient clinic of Al-Ahrar Teaching Hospital in Zagazig, Egypt. Fifteen TF patients (cases) and 45 non-TF diabetic patients (controls) were examined by a physical therapist to identify the affected area (A1 pulley, other finger pulleys, mid-palm, or wrist). Confirmation was obtained through ultrasound examination by a radiologist. A 2x2 contingency table and receiver operating characteristic (ROC) curve were used to compute sensitivity, specificity, an accuracy. A 2x2 contingency table was used to compute positive predictive value and negative predictive value of palpation in detecting the lesion site in diabetic TF patients. **Results:** Palpation demonstrated a sensitivity of 91.67%, a specificity of 94.95%, and an accuracy rate of 94.76% in localizing TF pathology. The positive predictive value was 52.38%, and the negative predictive value was 99.47%. **Conclusion:** The results of this study demonstrate that palpation is a highly effective clinical tool for locating lesions in patients with diabetic TF. However, since the positive predictive value was only 52.38% and many cases were mildly affected, a larger study using MRI as a gold standard is needed, as it could detect early involvement.

Keywords: Diagnostic accuracy, ultrasonography, physical therapy, A1 pulley, tenosynovitis.

INTRODUCTION

Trigger finger (TF) represents a condition that causes the finger to lock or snap during movement.

The bending and straightening of the affected finger produce painful popping or clicking sounds.[1] It is a multifactorial condition. The finger's

annular pulleys (A1-5) (retinacular sheath) and the flexor tendons have a different diameter, this is the common mechanism of triggering. While the A1 pulley is typically associated with triggering, other components of the pulley system may be the exact site of affection in some patients. [2,3] Moreover, the palmar aponeurosis in the mid hand palm or the flexor retinaculum at the wrist can be the exact site of triggering in the absence of any pulley pathology in other patients according to some published studies. [4] Ultrasonography (US) allows for accurate assessment of hand and finger tendon abnormalities. [5] US enables static and dynamic evaluations of TF, along with comparisons to neighboring unaffected fingers. [6] US imaging can identify several alterations, such as generalized or nodular pulley thickening, increased vascularity within the pulley, and the development of cystic structures. Flexor tendon alterations may involve disruption of the normal fibrillar echogenic pattern, irregular or indistinct tendon margins, and fluid accumulation (cyst) within the tendon sheath, indicative of tendinosis or tendinopathy. [7] Certain lesions associated with TF can be identified through ultrasonography, appearing as hypoechoic or hyperechoic masses. [5] Some histological studies have found some changes like granulation tissues, myxomatous degeneration, disorganized collagen arrangement, and thickened pulleys and tendons which are consistent with US finding. [8,9]

Since detecting the site of lesion is essential for various physical therapy (PT) modalities, steroid injection, or surgical treatment, this study aimed to assess diagnostic accuracy of palpation in detecting the site of lesion that cause triggering, using ultrasonography (US) as gold standard.

METHODS
Study design:
A case-control observational trial was conducted at a PT outpatient clinic and the radiology department at Al-Ahrar Teaching Hospital in Zagazig, Egypt. The Registration number on clinical trials is NCT05466058, ID: HAH00012. This study was approved by General organization of Teaching Hospitals and institutes ethical approval committee (ID:HAH00012) Fifteen TF patients (cases) and 45 non-TF diabetic patients (controls) were enrolled.

Inclusion and exclusion criteria:
Diabetic patients were included in this study if they had TF (cases) as determined through clinical evaluation and referral by orthopedist and/or rheumatologist, and those without any hand ailment (controls). Subjects with a fully locked finger were not included since these neglected cases may hinder assessing main site of triggering, and participants younger than 18 years were excluded as TF in this age group have a different mechanism. Patients with any other hand pathology were excluded.

Procedures:
TF patients were referred by orthopedist and /or rheumatologist based on clinical evaluation. Diabetic patients without TF were refereed from diabetes unit (control). The physical therapist assessed patients by palpation to detect tender and painful site (A1 pulley, A2, A3, A4, A5, mid-palm or wrist). The patients (cases and control) were then refereed to radiologist who identified the pathology site using ultrasonography (US) (TOSHIBA APLIO 500). The physical therapist and radiologist examined all seven previously mentioned areas for every patient.

Statistical analysis:
Data were screened, for normality assumption test and homogeneity of variance. Normality test of data using the Shapiro-Wilk test was used, that the data was normally distributed (P>0.05) after removal of outliers that were detected by box and whiskers plots. Additionally, Levene's test for testing the homogeneity of variance revealed no significant difference (P>0.05). So, the data are normally distributed and parametric analysis is done. The statistical analysis was conducted by using the statistical SPSS Package program version 25 for Windows (SPSS, Inc., Chicago, IL). Quantitative data variables are expressed as mean and standard deviation for subject age and compared statistically between both groups by independent t-test. Qualitative data variables are reported as frequency (percentage) for gender and compared statistically between both groups by Chi-square test. A 2x2 contingency table and receiver operating characteristic (ROC) curve were used to compute sensitivity, specificity and accuracy. A 2x2 contingency table was used to calculate positive predictive value and negative predictive

value of palpation in detecting the lesion site in diabetic TF patients. All statistical analyses were significant at probability (P ≤ 0.05).

RESULTS

Fifteen (11 female and 4 male) TF diabetic patients were cases group, their mean age was (46.44 ±7.83). Forty-five (37 female and 8 male) non-TF diabetic patients were control group, their mean age was (47.55 ±6.75). There were no statistically significant differences between groups regarding age or sex. **(Table 1).**

Table 1. Clinical general demographic data for diabetic trigger finger patients.

Items	TF cases group (n=15)	Non-TF cases group (n=45)	P-value
Age (year)	46.44 ±7.83	47.55 ±6.75	0.558
Gender (males: Females)	11(68.8%): 5 (31.3%)	37(84.1%): 7 (15.9%)	0.189

Quantitative Data (age) are expressed as mean ±standard deviation and compared statistically by independent t-test

Qualitative data (gender) are expressed as frequency (percentage) and compared statistically by Chi-square test

Among 24 trigger sites detected by US, palpation detected 22 trigger sites. Among 396 sound (no pathology) sites examined by sonography, palpation found 376 sites as sound sites. **(Table 2)** Sensitivity, specificity and accuracy for palpation in detection site of finger pathology are 91.67%, 94.95% and 94.76% respectively. **(Table 3)** The Positive Predictive Value was 52.38%, and the Negative Predictive Value was 99.47%.

Table 2. Distribution of examined sites (n=420) (7 sites in 60 patients).

Items		Predicted condition	
		Positive	Negative
True condition	Positive	True positive (n=22)	False negative (N=2)
	Negative	False positive (n=20)	True negative (n=376)

Table 3. Overall Sensitivity, specificity, and accuracy for palpation method and Sonography method.

Items	Sonography	Palpation method
Sensitivity	100%	91.67%
Specificity	100%	94.95%
Accuracy	100%	94.76%

DISCUSSION

The present study aimed to detect the validity of palpation in detecting the site of lesions in diabetic TF patients. The results demonstrated that the sensitivity of palpation for detecting the site of finger pathology was 91.67%, specificity was 94.95% and accuracy was 94.76%. The Positive predictive value was 52.38%, while the negative predictive value was 99.47%.

TF represents a condition that causes the finger to lock or snap during movement. [1] The finger's annular pulleys (A1-5) (retinacular sheath) and the flexor tendons have a different diameter; this is the common mechanism of triggering. Although the A1 pulley is a common site of triggering, other pulleys are found to be the exact site of affection in many patients.[2,3] Moreover, the palmar aponeurosis at the mid-hand palm or the flexor retinaculum at the wrist has been found to be the true site of triggering in many patients .[4] Detecting the site of the lesion is essential for various physical therapy modalities, steroid injections, or surgical treatments to avoid applying procedures at the wrong site.

Ultrasonography (US) allows for accurate assessment of hand and finger tendon abnormalities. [5] US enables static and dynamic evaluations of TF, along with comparisons to neighboring unaffected fingers.[6] US imaging can identify several alterations, such as generalized or nodular pulley thickening, increased vascularity within the pulley, and the development of cystic structures. Flexor tendon alterations may involve disruption of the normal fibrillar echogenic pattern, irregular or indistinct tendon margins, and fluid accumulation (cyst) within the tendon sheath, indicative of tendinosis or tendinopathy. [7]

This current study found a high negative predictive value of 99.47%, suggesting that a negative palpation result is a strong indicator of the

absence of a lesion at the examined site. However, the positive predictive value of 52.38% indicates that while palpation is effective in ruling out lesions at one site, it is less effective in detecting lesions at other sites. Since clinicians can rule out lesions at some examined sites, the lesion should be at the remaining positively detected site. El-Deek and Hassan Dawood (2019) found that ultrasonography had a sensitivity, specificity, and accuracy of 93.8%, 97.8%, and 95.8%, respectively, in evaluating tendon abnormalities in the hand and fingers. In their trial, ultrasonography detected 8 of 10 cases (80%) of TF, with MRI used as the gold standard. [5] This could explain the low positive predictive value in this current trial, as ultrasonography was used as the gold standard, and many cases may have had mild pathological changes that ultrasonography could not detect. Based on the results of this study, it is recommended to palpate all possible tender points from the wrist to the last digit. To our knowledge this is the first trial to investigate validity of palpation in detecting the lesion site in diabetic TF patients, so other trials with large sample sizes using MRI as the gold standard are needed, since US examination is operator dependent, MRI can detect mildly affected soft tissue structures better than the US.

Limitations

While radiologist is blinded to group allocation (cases or control), the physiotherapist (the researcher) who examined patients (cases) and subjects (control) was not blinded to the group allocation.

CONCLUSION

This case-control study demonstrated that hand palpation used to detect the sites of lesions in diabetic TF is a highly effective clinical tool. However, since the positive predictive value was 52.38% and many cases were only mildly affected, a larger sample size study using MRI as the gold standard is needed, as it could detect early involvement.

List of abbreviations:

Trigger finger (TF) Ultrasonography (US) and Physiotherapy (PT)

Declarations:

- **Funding:** No funding was received.
- **Competing interests:** The author declare that they have no competing interests.

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