

# The diagnostic value of clinical examination after falanga

*A pilot validation study*

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## Abstract

Medico-legal documentation of alleged exposure to falanga torture warrants a high diagnostic accuracy of the applied clinical tests. The objective of this study was to establish data on the validity of palpatory examination of the footpads and the plantar fascia and to assess the distribution of observations among selected cases and non-cases in a small study sample. Calculated estimates of sensitivity and specificity of the individual diagnostic tests are reported and, in general, did not meet the authority-based criteria of an 80% cut-off point. The observed total number of true tests in this study was 65%. It is concluded that future studies of the reliability of clinical examination and assessment of the variability of observations among unselected cases and non-cases should be conducted in a larger cross-sectional study population.

*Keywords:* torture, falanga, clinical examination, medico-legal documentation, validity

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## Introduction

Documentation of alleged exposure to falanga is based on clinical examination, which entails reporting the degree of consistency between: 1) the torture history, 2) symptoms as described by the victim, and 3) possible pathological findings at objective examination. Standardised medical examination, including palpatory examination of the soft tissues of the feet, has therefore become routine procedure in assessing torture victims for medico-legal purposes.<sup>1</sup>

Systematic knowledge is, however, lacking in several areas. The aetiology and pathogenesis of the persistent pain and disability seen after falanga torture is still not fully understood. Several theories about the long-term consequences and causal soft tissue lesions have been put forward based on clinical observations,<sup>2-8</sup> but larger systematic studies are not available.

Thus, in spite of a long-standing tradition of clinical assessment, no empirical data on the diagnostic value of the applied tests has been established. The time perspective as well as the association between the magnitude (intensity and duration) of the applied falanga and subsequent development of symptoms and disabilities, and pathological changes in the feet and lower legs that can be demonstrated at clinical exami-

nation, is not known. Also, the role of imaging in substantiating the clinical diagnosis is yet not clarified and the present knowledge is mainly based on casuistic reports and studies of smaller samples.<sup>9-17</sup>

An increased knowledge about the lesions caused by falanga and development of evidence-based examination methods would not only contribute to a more reliable diagnosis and improved treatment, but also be an important tool in the medico-legal documentation of torture.

Prompted by the descriptive studies by Grethe Skyvl<sup>8</sup> and the lack of evidence supporting the reliability and validity of clinical examination after falanga, it was decided in 1992 to carry out a pilot validation study in Izmir. Dr. Veli Lök organised the study, which took place in January 1993.

### **Objective of the study**

The objective of the study was to assess the validity of palpatory examination of the footpads and plantar fascia “diagnosing” exposure to falanga torture and to assess the distribution of observations among selected cases and non-cases in a small study sample.

The examination took place in Izmir 1993.

### **Material**

Five persons, all males, who allegedly had a prior history of exposure to falanga and five persons of matching ethnicity, gender and age and without past history of trauma or other pathology involving the feet or lower legs were identified by Dr. Veli Lök and entered the study after informed consent.

### **Method**

Six observers, all medical doctors familiar with clinical assessment of torture victims, but with limited experience in palpatory examination after falanga, participated in the

study: Dr. Veli Lök, Dr. Turkcan, Dr. Sukran Irençin & Dr. Yesim Kuey from Turkey; Dr. Amris & Dr. Rasmussen from Denmark.

In order to standardise test procedures a protocol describing the palpation technique was developed:

1) *Palpation of the heel pads*: the person lies supine on an examination table. The observer stabilises the calcaneus with the left hand, and applies a light pressure at a perpendicular angle with the fingers of the right hand over the tuberosity of the calcaneum. It is registered if the elasticity in the heel pad is normal (negative test) or reduced with immediate bony contact through the tissue (punctured heel pad = positive test).

2) *Palpation of the medial and lateral footpad*: the person lies supine on an examination table. The observer stabilises the calcaneus with the left hand, and applies a light pressure at a perpendicular angle with the fingers of the right hand over the plantar aspects of the heads of the lateral and medial metatarsal bones. It is registered if the elasticity in the footpads is normal (negative test) or reduced with immediate bony contact through the tissue (punctured foot pad = positive test).

3) *Palpation of the plantar fascia*: the person lies supine on an examination table. The observer passively subjects the plantar fascia to tension with the left hand by dorsal flexing the 1st to 3rd toe. With the fingers of the right hand the entire plantar fascia, from its origin on the tuberosity of the calcaneum to its insertion on the proximal phalanges, is palpated. It is registered if the fascia appears thickened with an uneven surface (aponeurosis = positive test) or normal (negative test).

**Table 1.** Five persons with and five persons without reported falanga evaluated by six observers, by lesion: number of observations.

	Falanga	Non-falanga	Total (n=60)
Punctured heel pad			
Right	22	13	35
Left	21	14	25
Punctured medial pad			
Right	23	14	37
Left	25	15	40
Punctured lateral pad			
Right	21	12	33
Left	22	13	35
Aponeurosis			
Right	4	6	10
Left	3	6	9
Normal heel pad			
Right	8	17	25
Left	9	16	25
Normal medial pad			
Right	7	16	23
Left	5	15	20
Normal lateral pad			
Right	9	18	27
Left	8	17	25
Normal plantar fascia			
Right	26	24	50
Left	27	24	51

The test procedure and palpation technique was practiced and calibrated among observers the day before the study.

On the day of the study a full clinical examination of both feet of all participants was performed according to protocol by all the observers. The individual observers performed examinations independently and mutually blinded and were blinded to the clinical status (case, non-case) of the participants. In order to ensure blinding of the observer, the participants were lying supine on an examination table hidden behind a drape only with the feet exposed, with the observer present in the examination room.

Further, participants were instructed not to communicate with the observer during the examination and the observers had no access to the participants' medical records including clinical information about any

symptoms present at the time of the examination.

Findings at clinical examination were recorded independently and mutually blinded by all observers according to protocol at the end of each session.

### Statistics

Estimation of test validity parameters: sensitivity, specificity, and predictive values of positive and negative tests were based on bivariate analysis.<sup>18</sup> Additionally odds ratios by lesion were calculated with a 95% confidence interval as an indicator of the strength of the relationship between binary variables (reported falanga – test-result).<sup>19</sup>

### Results

Table 1 summarises the relationship between findings in five persons with reported fa-

**Table 2.** Five persons with and five persons without reported falanga evaluated by six observers, by lesion: Test parameters, by number of observations.

Test	Sensitivity	Specificity	Positive predicted value	Negative predicted value	Odds Ratio	95% confidence Interval
Punctured heel pad						
Right	73.3	56.7	62.1	68.0	3.60 <sup>2</sup>	1.22 to 10.64
Left	70.0	53.3	60.0	64.0	2.67 <sup>1</sup>	0.92 to 7.70
Punctured medial pad						
Right	76.7	53.3	62.2	69.6	3.76 <sup>2</sup>	1.24 to 11.39
Left	83.3	50.0	62.2	75.0	5.00 <sup>3</sup>	1.51 to 16.56
Punctured lateral pad						
Right	70.0	60.0	63.6	66.7	3.50 <sup>2</sup>	1.20 to 10.20
Left	73.3	56.7	62.8	68.0	3.60 <sup>2</sup>	1.22 to 10.64
Aponeurosis						
Right	13.3	80.0	40.0	48.0	0.6 <sup>2</sup>	0.15 to 2.45
Left	10.0	80.0	33.3	47.1	0.4 <sup>4</sup>	0.10 to 1.97

1) 0.05 < p < 0.10

2) p < 0.05

3) p < 0.01

langa and five persons without, evaluated by lesion by six observers. The accuracy of the clinical tests in diagnosing alleged exposure to falanga torture was calculated based on this relationship.

The total number of true tests (true positive tests + true negative tests/total number of tests) was 117/180 = 65%, the number of true positive test in persons with reported falanga 66/90 = 73.3%, and the number of true negative tests in controls 51/90 = 56.7%.

Calculated test parameters: sensitivity, specificity, predictive values of positive and negative tests and odds ratios are summarized in Table 2.

The sensitivity of clinical testing of footpads ranged from 70.0% to 83.3%, the specificity from 50.0% to 60.0%, the predictive value of positive test from 60.0% to 63.6%, and the predictive value of negative test from 64.0% to 75.0%.

Test parameters for clinical examination of the plantar fascia indicated low accuracy of the test with a very low sensitivity and

predictive values of positive and negative tests below 50.0%.

The observed odds ratios for punctured foot pads ranged from 2.67 to 5.0, the largest odds ratios being associated with clinical testing of the medial foot pads.

Observed odds ratios for aponeurosis were below one, indicating no relationship between findings at clinical testing of the plantar fascia and the reporting of falanga.

## Discussion

Sensitivity, specificity and prediction values are one approach to quantifying the diagnostic ability of a test. The acceptable values for these test parameters depend on the context of the subject that is studied. Sensitivity and specificity are generally positioned between 50% (unacceptable test) and 100% (perfect test), the arbitrary cut-off point being 80% on authority-based evidence.<sup>20</sup> Such accuracy, however, is often unachievable in clinical settings.<sup>20-23</sup>

The use of clinical examination in documenting exposure to falanga torture for

medico-legal purposes warrants a high diagnostic accuracy of the applied tests. In our study the observed estimates of sensitivity and specificity of the individual diagnostic tests did not meet the criteria of an 80% cut-off point.

The observed sensitivity of clinical testing of foot pads was in general acceptable, in particular testing of medial footpads, but the corresponding values for specificity low. This resulted from a high frequency of false-positives in the study as illustrated by a false-positive fraction ( $1 - \text{specificity}$ ) ranging from 0.5 to 0.4 (50% to 40%).

Observed predictive values for testing of the footpads were also found to be low. Test parameters for the predictive value of negative tests were in general higher than those of the positive tests, but the result does not support the predictability of clinical findings to differentiate reported falanga cases from non-cases.

The test parameters for clinical testing of the plantar fascia were in general unacceptable. This lack of validity was supported by odds ratios indicating that there was no relationship between test outcome and the reporting of falanga.

There are, however, several points for discussion related to the outcome of this study.

To assess the value of a diagnostic test it is necessary to compare the test results with a reference standard (a so called "gold standard") or a confirmed diagnosis. In our study the clinical tests were compared to the self-reporting of prior exposure to falanga torture. This clearly represents a methodological problem since it is the alleged exposure to falanga torture that is to be validated by the clinical test.

Further the performance of a diagnostic test may differ between subgroups of patients depending on the clinical spectrum. In

this context spectrum denotes the range of variation of clinical and pathological characteristics in patients with a given medical condition. These characteristics may vary and the performance of the test will therefore depend on the composition of the study sample it is tested in (spectrum bias).

The time perspective (the chronicity) as well as the association between the magnitude (the intensity and duration) of the applied falanga and subsequent development of symptoms, disabilities, and pathological changes in the feet, which can be demonstrated at clinical examination (the dose-response), is not known.

Prevalence rates can have an impact on sensitivity and specificity values when small populations are being evaluated, but more important for clinical decision-making, prevalence rates have a substantial impact on predictive values for clinical tests. If the condition in question is very rare a high negative predictive value can be obtained even if the sensitivity of the test is only moderate. If, vice versa, the condition is very frequent a negative outcome of the test is unreliable even if the sensitivity is high.

The prevalence of pathological changes in the feet after falanga is not known. Only a few clinical studies exists describing findings at palpatory examination of soft tissues and these studies have included highly selected populations.<sup>5,8,24</sup> Further the prevalence of painful foot syndromes in the general population is reported to be as high as 10%,<sup>25</sup> and in the elderly it ranges from 53% to 95%.<sup>26</sup>

As a gold standard is not obtainable, future studies of test accuracy will need to address the following questions:

- 1) Which pathological changes are likely to be found in the feet after falanga and how prevalent are they?

- 2) Are these changes subsequently to be used as a valid measure of prior exposure to falanga (validity)?
- 3) How much does the evaluation of these pathological changes in the feet vary from observer to observer (reliability)?

A strong relationship between variables – exposure to falanga and findings at clinical testing – and a high reproducibility of the clinical findings will be a precondition for accepting the diagnostic test to be accurate and useful in clinical practice.

An assessment of the reproducibility of the applied tests and estimates of inter-observer variations was not done in this study. Our study design based on a small study sample and six observers without prior experience in palpatory examination after falanga torture may have influenced the observed accuracy of the applied clinical test.

In contrast to the findings in previous clinical studies<sup>5,8</sup> and reported findings from MR imaging and ultrasound studies,<sup>15,17,27</sup> clinical testing of the plantar fascia only revealed pathology in a minority of the falanga cases and positive findings were more common in non-cases. This outcome may result from the research design including a small study sample and six inexperienced observers performing the clinical examination.

Research indicates that accuracy of diagnostic tests can be improved by clinical information and that this improvement results from increased sensitivity without loss of specificity.<sup>28</sup> The reporting of tenderness and pain elicited by palpatory examination of soft tissue structures is an important sign of pathology. In our study, participants were not allowed to communicate with the observer during the examination, which may have compromised this specific test. Future studies validating testing of the plantar fascia

should address this issue and include ultrasound in the study design.

A final point of discussion is the achievable diagnostic accuracy combining several clinical tests. In our study test parameters were only observed by lesion and we did not estimate the overall test accuracy. A combination of several clinical tests also including e.g. sensory testing of foot soles, analysis of foot function and gait analysis and testing informed by clinical information may prove to increase the achievable overall diagnostic accuracy.

### **Conclusion and perspectives**

The accuracy of clinical examination after falanga torture is still uncertain. Future research addressing the validity and the reliability of the applied clinical tests are therefore warranted in order to advance an evidence-based approach.

In order to permit generalisation, studies of the reliability of clinical examination and assessment of the variability of observations among unselected cases and non-cases should be conducted in a larger cross-sectional study population.

Based on experience, the achievable accuracy of clinical testing is, however, often limited. It is therefore recommended that research focusing on the development of diagnostic imaging as a complementary tool in the documentation of falanga torture be prioritised.

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