Clinical Diagnostic Evaluation for Scaphoid Fractures: A Systematic Review and Meta-Analysis

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Purpose To provide an overview of available clinical evaluation tests for scaphoid fractures and to compare their diagnostic accuracies.

Methods PWe performed a systematic review of all studies assessing diagnostic characteristics of clinical evaluation in scaphoid fractures by searching MEDLINE, EMBASE, Cochrane, and CINAHL databases. Only studies on clinical testing prior to radiographic evaluation and with acceptable reference standard for occult fractures were included. Thirteen relevant articles were analyzed that described a total of 25 tests. Diagnostic characteristics of the tests were used to construct contingency tables. If possible, data were pooled and summary receiver operating characteristic curves were fitted.

Results Anatomic snuff-box tenderness (ASB, 8 studies, 1,164 patients) and longitudinal thumb compression (LTC, 8 studies, 961 patients) had sufficient data for statistical analyses. Sensitivity for ASB ranged from 0.87 to 1.00; for LTC, 0.48 to 1.00. Specificity of ASB ranged from 0.03 to 0.98; for LTC, 0.22 to 0.97. Owing to considerable heterogeneity, pooled estimate points were not calculated. Other high-sensitivity tests were scaphoid tubercle tenderness, with sensitivity and specificity ranging from 0.82 to 1.00 and 0.17 to 0.57, respectively, and painful ulnar deviation, ranging from 0.67 to 1.00 and 0.17 to 0.60, respectively. Three studies showed that combining tests increased the specificity and post-test fracture probability while maintaining high sensitivity. Quality assessment showed high or unclear risk of bias and applicability concerns in reference standard and patient selection. Twelve study designs were prospective, and 1 was retrospective.

Conclusions Anatomical snuff box tenderness was the most sensitive clinical test. The low specificity of the clinical tests may result in a considerable number of overtreated patients. Combining tests improved the post-test fracture probability. This can be used to limit unnecessary immobilization, number of hospital visits, and use of imaging. The data presented herein may help to develop clinical prediction rules that could increase specificity without reducing sensitivity. *(J Hand Surg Am. 2014;39(9):1683–1691. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Diagnostic II.

Key words Clinical evaluation, diagnostic management, physical examination, scaphoid fracture.

Additional material is available online.

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Received for publication November 13, 2013; accepted in revised form June 1, 2014.

We would like to thank Faridi van Etten - Jamaludin, clinical librarian, Academic Medical Center Amsterdam, for constructing an adequate and extensive search strategy for all databases.

W.H. Mallee is funded by an AMC PhD scholarship.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

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0363-5023/14/3909-0003$36.00/0
http://dx.doi.org/10.1016/j.jhsa.2014.06.004

Diagnosis of suspected scaphoid fractures faces several challenges. Clinical suspicion is raised with tenderness in the anatomic snuffbox after a fall on the outstretched hand.[1,2] Initial radiographs in multiple views are sometimes ineffective in establishing a definitive diagnosis.[3] From 16% to 27% of patients with normal initial radiographs still have a fracture.[4,5] With the risk of nonunion and/or subsequent degenerative changes in mind,[6–8] all suspected fractures are immobilized with a cast until definitive diagnosis is obtained. Approximately 4 of 5 patients[4,5] will therefore receive unnecessary immobilization, whereas a possible wrist sprain could be treated with a soft bandage. In addition, patients must pay additional visit(s) to the hospital to remove the plaster cast and to be further evaluated with radiographs, computed tomography, magnetic resonance imaging, or bone scintigraphy.[3] This increases healthcare costs and time expended.[9]

The pool of patients who consequently receives unnecessary diagnostic management could be reduced by lowering the number of false positives and raising the post-test fracture probability. This systematic review analyzed all adequately studied clinical tests for suspected scaphoid fractures. The main purpose was to depict the clinical tests with the highest diagnostic accuracy for detecting a scaphoid fracture in patients with wrist trauma.

METHODS

This systematic review is reported according to the 2009 Preferred Reporting Items for Systematic Reviews and Meta-Analyses checklist.[10]

Literature search and study selection

A systematic literature search of EMBASE (Appendix A, available on the *Journal's* Web site at http://www.jhandsurg.org), MEDLINE, CENTRAL, and CINAHL was performed on April 27, 2012. The general search terms were 'scaphoid OR navicular fracture' AND 'clinical evaluation OR physical examination'. Additionally, the reference lists of relevant articles were hand searched, and the related article function in PubMed was used. No language or quality restrictions were applied. Non-English studies were included if translation of the full article was possible.

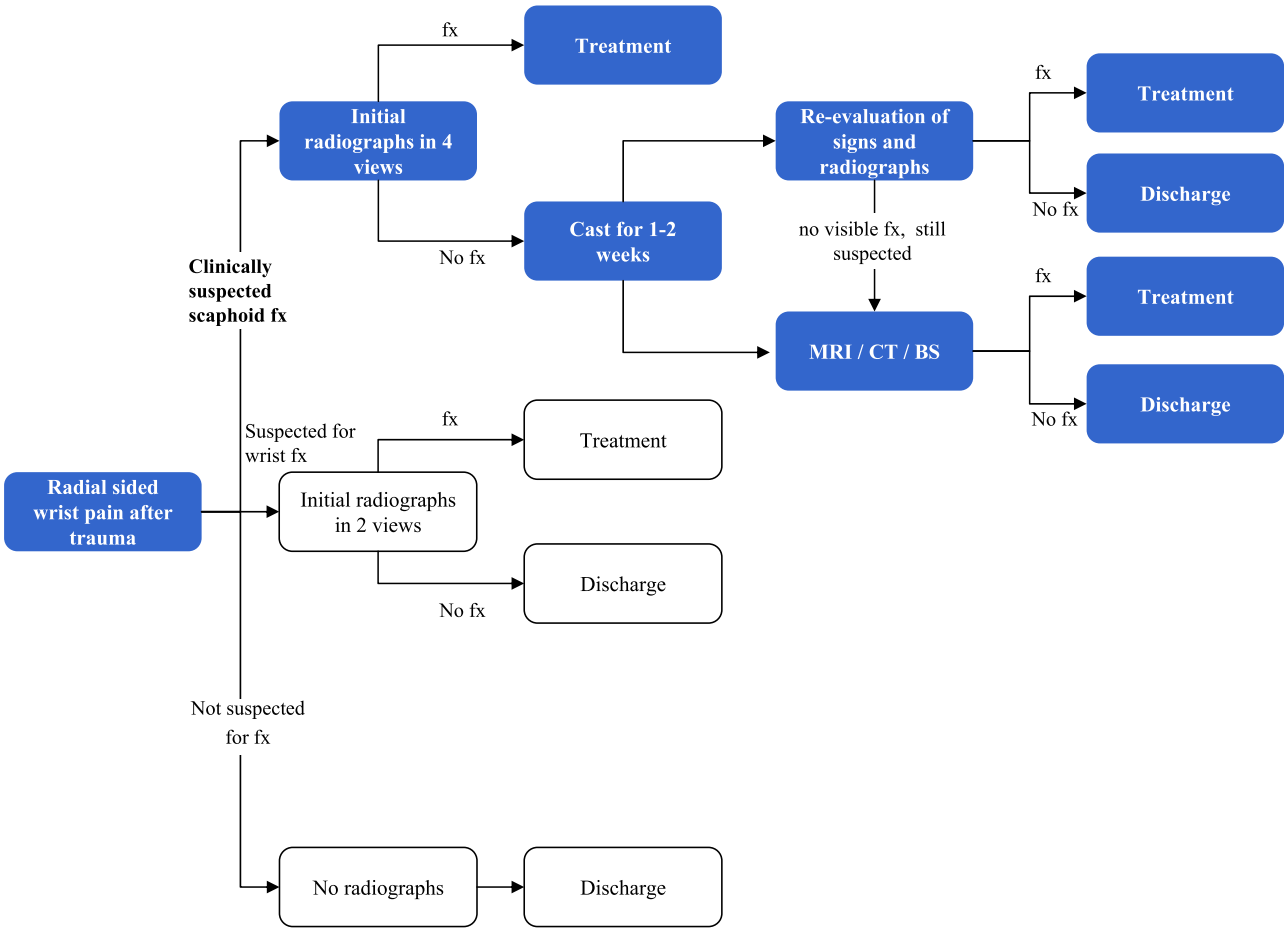

FIGURE 1: Patient flow emergency department. fx = fracture.