

Original article

The “peg test”: A novel technique for dexterity evaluation in hand immobilized with a splint

Le test des bûchettes : une nouvelle technique pour évaluer la dextérité des mains immobilisées par une attelle

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Abstract

Manual dexterity tests are difficult to apply in the clinical practice. They are either destined for specific lesions, or are rather complicated and time-consuming. The aim of this study was to evaluate a new manual dexterity test for hand immobilized with a splint: the “peg test”.

Our series included 86 persons (without any hand trauma or disease) of mean age 42 years of which 77 were right-handed. Materials included five pegs, splints immobilizing the DIP joint, a desk and a stopwatch. Each subject moved the pegs from a horizontal to a vertical position using the thumb-ring pinch grip. This was repeated three times without a splint, with a palmar splint, with a simple dorsal splint and with a dorsal splint glued to the nail, then once more without a splint. A time score was recorded for each trial. A point was deduced at each fall of a peg for result analysis. Results showed that a learning curve affected performance, but that dominance and age before learning had no effect. After learning performance diminished with these variables in the following order: without splint, then more so with a glued splint, even more with a simple dorsal splint and most with a palmar one. The peg test fulfills metrological requirements of dexterity tests: test-retest (intra-observer) reliability (reproducibility), inter-observer reliability (both measured by correlation coefficient), and validity of instrument of measurement. Simple, rapid and reliable, it is perfectly adapted to manual dexterity evaluation in hand immobilized with a splint.

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Keywords: Dexterity; Test; Peg; Evaluation

Résumé

Les tests de dextérité manuelle sont difficiles à utiliser en pratique clinique pour évaluer la dextérité des blessés de la main, soit parce qu'ils sont adaptés à des pathologies spécifiques, soit parce qu'ils sont complexes et/ou chronophages. Le but de ce travail était de proposer un test de dextérité adapté aux blessés de la main porteurs de pansement et/ou d'orthèse : le test des bûchettes. Notre série comprenait 86 sujets, d'âge moyen 42 ans, dont 77 droitiers. Le matériel comportait cinq bûchettes, des orthèses digitales maintenant l'interphalangienne distale, un pupitre et un chronomètre. Chaque sujet devait déplacer les bûchettes du plan horizontal au plan vertical par une prise pulpo-pulpaire entre le pouce et l'annulaire. Cette manœuvre était chronométrée trois fois sans orthèse, avec orthèse palmaire, avec orthèse dorsale simple, avec orthèse dorsale collée à l'ongle et sans orthèse. Un score pondéré à chaque chute de bûchette a été utilisé pour l'analyse des résultats. Les résultats ont montré que l'apprentissage avait un effet sur la performance, mais que la dominance et l'âge avant apprentissage n'en avaient pas. Après apprentissage, la performance décroissait dans l'ordre suivant : sans orthèse, orthèse collée, orthèse dorsale simple et orthèse palmaire. Le test des bûchettes répond aux caractéristiques métrologiques des tests de dextérité : fidélité test-retest, fidélité inter-juges et validité de l'instrument de mesure. Simple, rapide et fiable, il est aussi parfaitement adapté à l'évaluation de la dextérité des blessés de la main.

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Mots clés : Dextérité ; Test ; Bûchettes ; Évaluation

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1. Introduction

From the physiotherapist point of view, the hand has three main functions, mobility, sensitivity, force and the complex function of dexterity. Quantitative specific tests can be used to evaluate each function separately. Manual dexterity involves handling objects with agility; it requires the three essential functions but also integrates rapidity, coordination and precision. It varies from one individual to another. Evaluation tests of manual dexterity differ in the sequence of tasks to be performed as well as the characteristics of the object used for the test [1]. Thus the test is defined by the phases of approach, seizure, displacement, positioning, manipulation, and release.

From the surgeon's perspective, with less demand for quality for practical reasons, normal dexterity of a hand simply signifies the absence of lesions. Dexterity can be evaluated in comparison with the healthy side for a given patient. To properly assess dexterity the surgeon must have an easy, rapid test independent of laterality. Of the existing tests [1] most do not correspond because they are specific to certain lesions or are

too complex and time-consuming for the clinical setting. Three tests exist for evaluation of manual dexterity in hand immobilized with a splint, 'the take-five test', the test of Purdue, and the test of Roeder. 'The take-five test' [2] demands no positioning or manipulation of the object, while the test of Purdue [3,4] does. The test of Roeder [5] - more elaborate - involves all phases. These tests are all performed only on the horizontal plane. We distinguish between tests by the object to be handled which determines their degree of difficulty. Objects are classified according to their length, their diameter, texture and their cut section. For example, matchsticks are used for the 'take-five test' [2] and are easier to handle than the smooth metal probes of the Purdue test [3] or the Roeder test [5]. All these tests cannot be performed with dressings or splints as the objects used are too small.

We think this leaves a need for the manual dexterity test that can explore the three dimensions in space with objects that are easy to grasp even with a hand immobilized with a splint. The aim of this study was to evaluate a new manual dexterity test that meets these two requisites: the peg test.

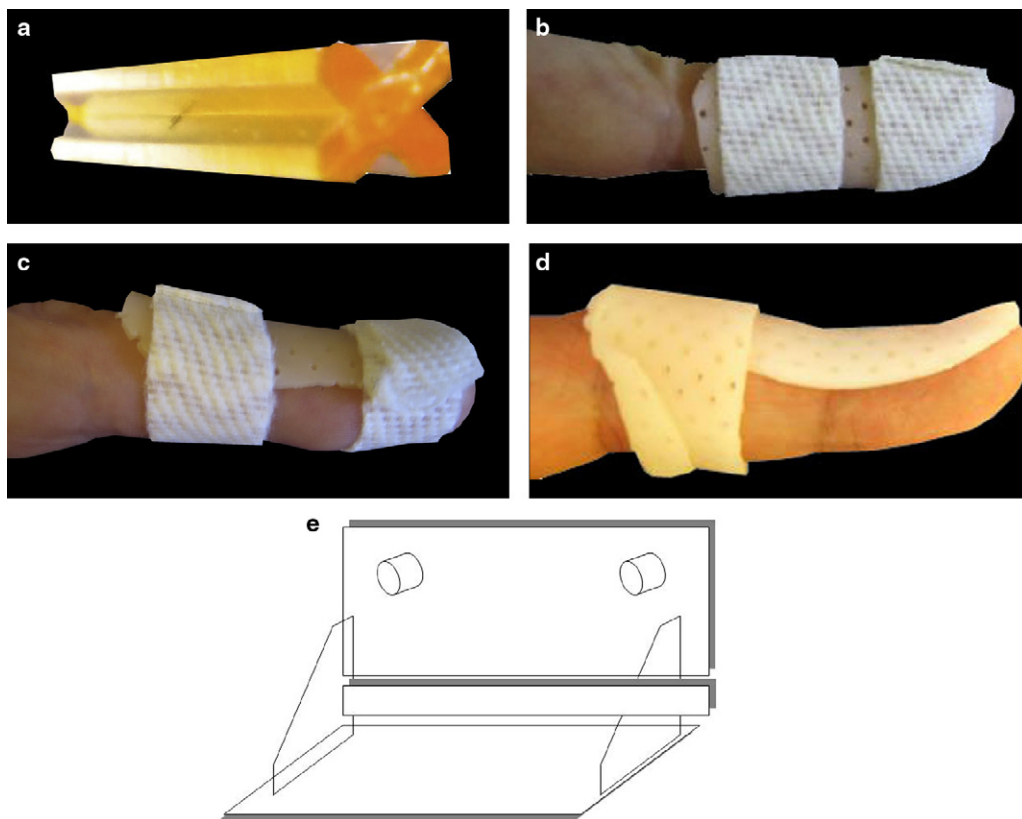


Fig. 1. Material needed for the peg test. a: plastic peg 50 mm long, of cruciate section, 6 mm in diameter, weighing 2 g. It is available in the learning kit in primary school; b: palmar splint in place, on the two distal phalanges of the ring finger, made of perforated thermodeformable material as a 1.6 mm thick rectangle with rounded edges on one side. It was kept in place by adhesive bands on each phalanx; c: dorsal splint in place on the two distal phalanges of the ring finger made of perforated thermodeformable material as a 1.6 mm thick rectangle with rounded edges covering the nail. It was kept in place by adhesive bands on each phalanx; d: dorsal splint in place on the two distal phalanges of the ring finger, made of perforated thermodeformable material as a 1.6 mm thick L shape with rounded edges on both sides. It consisted of a long and a short segment, kept in place on the 2nd phalanx by the short segment rolled over and thermo-glued onto itself. The long segment was glued to the nail plate (3rd phalanx) by cyanoacrylate after having prescrubbed the nail plate; e: a desk of two perpendicular planes. The horizontal plane (35 × 70 cm) bears five marks 10 cm apart to receive the pegs. Two cylindrical recipients 4 cm in diameter and 6 cm on the horizontal axis were fixed onto the vertical plane to receive the pegs. They were 58 cm apart and 35 cm high. The vertical plane was divided into two parts with a hinge to enable dismantling and transportation. The two vertical planes were kept open at a 90° angle by two lateral trapezoidal pieces.

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