



## Original Article

# Rheumatic hand's clinical, functional, and imagiological correlations in the rheumatic hand following metacarpophalangeal joint silicone arthroplasty<sup>☆</sup>

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### ABSTRACT

**Objective:** Evaluation of rheumatoid hand-associated metacarpophalangeal joint silicone arthroplasty most often relies on functional scores alone. This study aimed to understand the correlation between perceived and observed function, strength, and alignment.

**Methods:** Cross-sectional study including all 11 women (15 hands) submitted to second to fifth metacarpophalangeal joint arthroplasty due to rheumatoid arthritis involvement for a time period of seven years. Measurements relied on the Michigan Hand Outcomes Questionnaire, Lafayette Purdue Pegboard, pinch and grip strength, and analysis of a lateral "OK-sign" X-ray view. Correlation analysis used Spearman's coefficient, assuming statistical significance for  $p$ -values  $< 0.05$ .

**Results:** Objective function was strongly correlated with all other variables ( $p < 0.05$ ), while perceived function failed to correlate with articular alignment in both measurements ( $p = 0.240$  and  $p = 0.354$ ). Strength and alignment were also strongly correlated ( $p < 0.05$ ).

**Conclusions:** Most measurements strongly correlate with each other, with emphasis on objective dexterity measurement.

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## Correlações clínicas, funcionais e imagiológicas após artroplastia da articulação metacarpofalângiana com implante de silicone na mão reumática

### R E S U M O

#### Palavras-chave:

Artrite reumatoide  
Artroplastia  
Articulação metacarpofalângiana  
Força da mão  
Silicones

**Objetivo:** Na maioria das vezes, a avaliação da artroplastia da articulação metacarpofalângiana com implante de silicone é feita apenas por meio de escores funcionais. Este estudo teve como objetivo compreender a correlação entre função, força e alinhamento percebidos e observados.

**Métodos:** Este estudo transversal incluiu todas as 11 mulheres (15 mãos) que foram submetidas a artroplastia metacarpofalângiana no segundo ao quinto dedo devido a artrite reumatoide em um período de sete anos. As medições basearam-se no Michigan Hand Outcomes Questionnaire, no Lafayette Purdue Pegboard e nas forças de pinça e preensão, além da análise de radiografia da mão em leque. O coeficiente de Spearman foi usado para avaliar a correlação; valores de  $p < 0,05$  foram considerados estatisticamente significantes.

**Resultados:** A função objetiva foi fortemente correlacionada a todas as outras variáveis ( $p < 0,05$ ). Por outro lado, a função percebida não foi correlacionada ao alinhamento articular em ambas as medições ( $p = 0,240$  e  $p = 0,354$ ). A força e o alinhamento também estiveram fortemente correlacionados ( $p < 0,05$ ).

**Conclusões:** A maioria das medições se correlacionou fortemente entre si, com ênfase na medição objetiva da destreza.

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### Introduction

Rheumatoid arthritis (RA), a chronic, systemic, T cell-driven autoimmune disease, is widely known for its repercussions in the hand, particularly in the middle-aged woman.<sup>1</sup> Early and severe involvement of the metacarpophalangeal (MCP) and interphalangeal joints leads to the nearly pathognomonic hand deformity composed by subluxation of the former and ulnar deviation of the fingers.<sup>2</sup> After initial efforts in controlling the disease through a conservative approach, late stages of the disease frequently require surgical intervention in order to restore hand alignment. Silicone MCP arthroplasty (SMPA), popularized by Swanson nearly 50 years ago, relies on the reactive encapsulation of the prosthesis.<sup>3</sup> By raising the MCP joint arc of motion, it aims to improve function and aesthetics, while attaining pain relief.<sup>4,5</sup> Arc of motion measurements have already proven themselves as a reliable method to approach patient satisfaction. However, despite this and other objective techniques, postoperative evaluation most often relies on perceived function scoring, notably using Michigan Hand Outcomes' Questionnaire (MHQ), as well as pinch and grip strengths.<sup>5</sup> Radiological finger alignment, as an example, has been scarcely used.<sup>5</sup> To our knowledge, however, objective hand dexterity has not so far been evaluated for the post-operative rheumatoid hand. The goal of our study was to determine the relevance of hand dexterity measurement as an objective approach to evaluate postoperative results of SMPA.

### Materials and methods

We performed a cross-sectional study including all 11 patients submitted to 2nd to 5th MCP joint silicone arthroplasty using the Neuflex MCP prosthesis (Depuy Synthes, Warsaw, IN, USA) due to local involvement of rheumatoid arthritis, between July 1st, 2008 and June 30th, 2015. This gave us a convenience sample of 15 hands, four of which were non-dominant. All patients were women, with a median age of 67.0 years-old (interquartile range: 12.63) and a follow-up time of 30.0 months (interquartile range: 32.43). Perceived hand function was evaluated by MHQ, without medical surveillance, with strict help only in situations of doubt, aiming for lowering answering bias. MHQ comprises 37 outcome questions for each hand, on its function, its influence on daily routine and work, related pain, aesthetics and patient satisfaction, scoring from 0 to 100. Objective function measurement relied on Purdue Pegboard's test (Lafayette Instrument Co, Lafayette, IN, USA), in an adaptation of two of its four designed exercises. After an adaptation tryout, patients performed the first exercise, modified from the original, in which the measured hand was the one already submitted to surgery, consisting of sequential pin placement in a predefined board for a time period of 30 s (in the original form, both dominant and nondominant hands are measured for the first and second exercises). Each pin correctly placed counted as a point. The second exercise consisted on a 60-s run in which the patient had to assemble a pin-washer-collar-washer structure

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