



## Original Article

# Result from surgical treatment on the terrible triad of the elbow<sup>☆</sup>



Anderson de Aquino Santos<sup>\*</sup>, Thomaz Antônio Tonelli, Fabio Teruo Matsunaga, Marcelo Hide Matsumoto, Nicola Archetti Netto, Marcel Jun Sugawara Tamaoki

Escola Paulista de Medicina, Universidade Federal de São Paulo (UNIFESP), São Paulo, SP, Brazil

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## ABSTRACT

**Objective:** To evaluate the results from surgical treatment of the terrible triad of the elbow, with a minimum of six months of follow-up, taking elbow function into consideration.

**Methods:** The analyzed aspects of 20 patients, who underwent surgical treatment of the terrible triad of the elbow, were given as follows: Dash score (Disabilities of the Arm, Shoulder and Hand), Meps (Mayo Elbow Performance Score), pain according to VAS (visual analog scale), ROM (range of motion), patient satisfaction, degree of energy of the trauma, complications and radiographs.

**Results:** The mean length of follow-up among the patients was 38 months. There were statistically significant relationships between the following set of parameters: trauma mechanism and patient satisfaction; radiological outcome of “heterotopic ossification” and satisfaction; functional flexion–extension ROM and satisfaction; and between type of radial head fracture and presence of a radiological outcome.

**Conclusion:** The surgical treatment for the terrible triad of the elbow generally provided satisfactory results, when the functioning of this joint upon the return to activities was taken into consideration.

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## Resultado do tratamento cirúrgico da tríade terrível do cotovelo

## RESUMO

**Objetivo:** Avaliar os resultados do tratamento cirúrgico da tríade terrível do cotovelo, com no mínimo seis meses de seguimento, considerando a função do cotovelo.

**Métodos:** Foram analisados os seguintes aspectos de 20 pacientes submetidos a tratamento cirúrgico por tríade terrível do cotovelo: escores Dash (Disabilities of the Arm, Shoulder and Hand), Meps (Mayo Elbow Performance Score), dor pela EVA (Escala Visual Analógica), ADM (arco de movimento), satisfação do paciente, grau de energia do trauma, complicações e radiografias.

## Palavras-chave:

Cotovelo

Fratura

Luxação

Cirurgia ortopédica

<sup>☆</sup> Work developed in the Discipline of Hand and Upper-limb Surgery, Department of Orthopedics and Traumatology, Escola Paulista de Medicina, Universidade Federal de São Paulo (UNIFESP), São Paulo, SP, Brazil.

<sup>\*</sup> Corresponding author.

E-mail: [ander.aquino@gmail.com](mailto:ander.aquino@gmail.com) (A.d.A. Santos).

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**Resultados:** O tempo médio de seguimento dos pacientes foi de 38 meses. Houve relação estatisticamente significativa entre: mecanismo de trauma e satisfação dos pacientes; desfecho radiológico "ossificação heterotópica" e satisfação; ADM funcional de flexo-extensão e satisfação e entre o tipo de fratura da cabeça do rádio e a presença de desfecho radiológico. **Conclusão:** O tratamento cirúrgico da tríade terrível do cotovelo proporcionou, de forma geral, resultados satisfatórios, quando se considera a função dessa articulação no retorno às atividades.

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## Introduction

Traumatic lesions in adult elbows can be very challenging to treat due to their complex anatomy and potential complications.<sup>1</sup>

Hotchkiss<sup>1</sup> described an association pattern of lesions in this joint, the terrible triad of the elbow, which consists of posterior dislocation of the elbow associated with a coronoid fracture and with a radial head fracture, which presents great potential for joint instability. It is thus named due to its unfavorable prognosis.

The terrible triad is rare and generally occurs in young male patients, related to high-energy trauma. The most common mechanism consists of falling onto the outstretched hand, with the elbow under hyperextension, supination and valgus stress.<sup>2</sup>

The treatment for these lesions is eminently surgical because conservative treatment is risky and related to various complications.<sup>3</sup> The latter treatment is considered to be the exception, indicated in well-selected cases in which there is good alignment of the elbow, without articular block, and in which the coronoid and radial head fractures are relatively small and only slightly deviated.<sup>4</sup>

Surgical treatment has the objectives of restoring joint stability and achieving anatomical reduction and early mobility during the postoperative period. This allows restoration of functional capacity and, therefore, reduces the risk of complications.<sup>5</sup>

Due to the seriousness and rarity of the lesion, few studies have evaluated the results from surgical treatment of the terrible triad of the elbow.<sup>6,7</sup> Its prognosis remains uncertain, especially over the long term.<sup>6</sup>

The objective of the present study was to evaluate the results from surgical treatment of the terrible triad of the elbow, with at least six months of follow-up, considering the function of the elbow.

## Material and methods

Patients with terrible triad of the elbow who were treated surgically between 1999 and 2012, at the Shoulder and Elbow Sector of the Discipline of Hand and Upper-limb Surgery of our service, were retrospectively evaluated.

All patients older than 18 years who agreed to participate in the study and signed the free and informed consent statement were included. The statement had previously been

accepted by the Research Ethics Committee under the number CEP 0032/11.

The exclusion criteria comprised associated lesions or diseases that could interfere in the evaluation of the outcomes, lack of information in the medical records due to absence or non-comprehension and failure to return for reevaluation.

The following epidemiological information was obtained: age, age on the date of the trauma, sex, dominance, elbow affected, trauma mechanism, associated lesions, surgery performed, duration of immobilization, complications during treatment, patient's degree of satisfaction and data from the last consultation.

The primary outcome used was the DASH score,<sup>8</sup> as validated for the Portuguese language.

The secondary clinical functional outcome was the Mayo Elbow Performance Score (MEPS).<sup>9</sup> In addition, pain was evaluated using a visual analog scale (VAS)<sup>10</sup> and the patients' range of motion (ROM) was analyzed dichotomously, considering the functional ROM according to Morrey (30–130° of flexion–extension of the elbow and 50–50° of pronation and supination).<sup>9</sup>

Complications were recorded according to their severity and the date of occurrence; for instance: infection, renewed dislocation and reoperation.

Lesions were evaluated radiographically and classified as follows:

- Radial head fracture, with description of the type of fracture according to Mason. Classified<sup>11,12</sup> according to their severity and divided into type I: fractures without deviation, type II: fractures with deviation, and type III: comminuted fractures.
- Coronoid process fracture. Classified according to the system described by Regan and Morrey<sup>13</sup> and divided into type I: apex avulsion, type II: impairment of up to 50% of its height and type III: involving over 50% of its height.

In addition, postoperative radiographs were produced in frontal and lateral views and the following characteristics were evaluated: presence of osteoarthritis, presence of ligament calcification, pseudarthrosis, skewed consolidation (malunion) and heterotopic ossification. The responses were dichotomous.

All the evaluations were made by three independent evaluators who were experts on shoulder and elbow surgery and did not have connections with the study.

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