



Original Article

Evaluation of elbow flexion following free muscle transfer from the medial gastrocnemius or transfer from the latissimus dorsi, in cases of traumatic injury of the brachial plexus[☆]



Frederico Barra de Moraes*, Mário Yoshihide Kwae, Ricardo Pereira da Silva, Celmo Celeno Porto, Daniel de Paiva Magalhães, Matheus Veloso Paulino

Department of Orthopedics and Traumatology, Faculdade de Medicina, Universidade Federal de Goiás (UFG), Goiânia, GO, Brazil

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ABSTRACT

Objective: To compare the gain in elbow flexion in patients with traumatic injury of the brachial plexus following muscle transfer from latissimus dorsi with the gain following free muscle transfer from the medial belly of the gastrocnemius.

Methods: This was a retrospective study in which the medical files of a convenience sample of 13 patients operated between 2000 and 2010 were reviewed. Group 1 comprised seven patients who underwent transfers from the gastrocnemius and group 2 (controls) comprised six patients who underwent transfers from the latissimus dorsi. The following functions were evaluated: (1) range of motion (ROM) of elbow flexion, in degrees, using manual goniometry and (2) grade of elbow flexion strength, using a muscle strength scale. Satisfactory results were defined as: (1) elbow flexion ROM $\geq 80^\circ$ and (2) elbow flexion strength $\geq$ M3. The Fisher exact and Kruskal-Wallis tests were used ($p < 0.05$).

Results: The patients' mean age was 32 years (range: 17–56) and 72% had been involved in motorcycle accidents. Elbow flexion strength $\geq$ M3 was observed in seven patients (100%) in group 1 and in five patients (83.3%) in group 2 ($p = 0.462$). None of the patients presented M5, and one patient (16.7%) in group 2 had a poor result (M2). Elbow flexion ROM with a gain $\geq 80^\circ$ (daily functions) was found in six patients (86%) in group 1 and in three patients (50%) in group 2 ($p = 0.1$).

Conclusion: The patients in group 1 had greater gains in strength and ROM than did those in group 2, but without statistical significance. Thus, transfers from the gastrocnemius become a new surgical option, if other techniques cannot be used.

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[☆] Study carried out at Hand and Microsurgery Service, Hospital das Clínicas, Universidade Federal de Goiás (UFG), Goiânia, GO, Brazil.

* Corresponding author.

E-mail: frederico.barra@yahoo.com.br (F.B. de Moraes).

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Avaliação da flexão do cotovelo após transferência muscular livre do gastrocnêmio medial ou transferência do latíssimo do dorso na lesão traumática do plexo braquial

R E S U M O

Palavras-chave:

Plexo braquial/cirurgia
Músculo/transplante
Procedimentos cirúrgicos
reconstrutivos

Objetivo: Comparar o ganho de flexão do cotovelo em pacientes com lesão traumática do plexo braquial após transferência muscular do latíssimo dorsal (TMLD) com a transferência muscular livre do ventre medial do gastrocnêmio (TMLGM).

Metódos: Estudo retrospectivo, revisão de prontuários, amostra de conveniência, com 13 pacientes operados, entre 2000 e 2010. Grupo 1 (TMLGM) com sete pacientes e grupo 2 ou controle (TMLD) com seis. Função avaliada: 1) amplitude de movimento (ADM) em graus da flexão do cotovelo, goniometria manual; 2) grau de força de flexão do cotovelo, por escala de força muscular. Satisfatórios: 1) ADM: flexão do cotovelo $\geq 80^\circ$; 2) Força: flexão do cotovelo $\geq M3$. Testes exato de Fisher e Kruskal-Wallis ($p < 0,05$).

Resultados: Média de idade foi de 32 anos (17 a 56). Acidente de moto em 72%. Força de flexão do cotovelo $\geq M3$ no grupo 1 em sete pacientes (100%) e o grupo 2 em cinco (83,3%) ($p = 0,462$). Não tivemos M5 e o grupo 2 apresentou um paciente (16,7%) com resultado ruim M2. ADM na flexão do cotovelo com ganho $\geq 80^\circ$ (funções diárias) foram encontrados no grupo 1 em seis pacientes (86%) e no grupo 2 em três (50%) ($p = 0,1$).

Conclusão: Pacientes do grupo 1 tiveram um ganho maior de força e ADM, quando comparados com os do grupo 2, sem significado estatístico. Assim, TMLGM se torna uma nova opção cirúrgica, caso não possam ser aplicadas outras técnicas.

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Introduction

Traumatic brachial plexus injuries (BPIs) can hinder the elbow flexion function and thus dramatically alter the quality of life of individuals. Very often, the initial microneurosurgery cannot appropriately restore movement in this joint. In older injuries, nerve repair surgeries are not recommended, as there is definite atrophy and classic muscle transfers (MT) are possible only in partial lesions. Thus, some patients require complementary interventions for functional gain of elbow flexion. These procedures are related to MT or free muscle transfer (FMT).¹

The MTs were the first techniques described. Steindler flexorplasty and use of the latissimus dorsi, pectoralis major and triceps were the main types.² The FMTs are newer and exhibit higher technical difficulty, due to the need to perform the neurovascular microanastomosis between the transplanted muscle pedicle and the vessels and nerves of the injury site. In the upper limb, and more specifically to gain elbow flexion, the techniques used are the FMT of the contralateral latissimus dorsi (LD), rectus femoris and gracilis muscles.^{1,3}

The literature has only three studies concerning the medial gastrocnemius (MG) used in the upper limb for FMT, in order to recover the function of an injured muscle group. Liu et al.⁴ used it for Volkmann's ischemic contracture in the forearm, with good functional results. Serafin⁵ proposed that the MG would have significant potential to restore elbow flexion or extension. Kwaie et al.⁶ described the FMT of the MG to gain elbow flexion in patients with traumatic BPI.

The aim of this study was to compare the gain in elbow flexion in patients with traumatic BPI after standard surgical procedure of MT of the LD (control group) with FMT of the MG (study group).

Method

Retrospective study carried out by the review of medical records from a convenience sample consisting of 13 patients with traumatic BPI that were consecutively submitted to surgical procedure from December 2000 to December 2010 at the Hand and Microsurgery Service. These patients were divided into two groups. Group 1 or study consisted of seven patients submitted to FMT of the MG and group 2 or control consisted of six patients submitted to MT of the LD.

Patients that were included in the two groups had muscle strength equal to M0 (without strength) and degree of elbow flexion between 0 and 10° (no movement), who had already been submitted to surgery with other techniques, but without success, or those that had the plexus injury for about a year and had not been treated surgically, without the possibility of a previous neural surgery. Also, as inclusion criteria, patients with preoperative LD muscle activity $\geq M4$ were chosen for the LD control group, while for the MG study group, patients with LD strength $\leq M3$ were selected, as LD transfer would be contraindicated in this situation.

We excluded patients that had incomplete data in their medical records, or preoperative strength $\geq M1$ and elbow flexion $> 10^\circ$.

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