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Original Article

Use of superficial peroneal nerve graft for treating peripheral nerve injuries☆

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ARTICLE INFO

Article history:
Received 1 March 2015
Accepted 6 April 2015
Available online 13 January 2016

Keywords:
Peripheral nerve
Nerve/transplantation
Peroneal neuropathies

ABSTRACT

Objective: To evaluate the clinical results from treating chronic peripheral nerve injuries using the superficial peroneal nerve as a graft donor source.
Methods: This was a study on eleven patients with peripheral nerve injuries in the upper limbs that were treated with grafts from the sensitive branch of the superficial peroneal nerve. The mean time interval between the dates of the injury and surgery was 93 days. The ulnar nerve was injured in eight cases and the median nerve in six. There were three cases of injury to both nerves. In the surgery, a longitudinal incision was made on the anterolateral face of the ankle, thus viewing the superficial peroneal nerve, which was located anteriorly to the extensor digitorum longus muscle. Proximally, the deep fascia between the extensor digitorum longus and the peroneal longus muscles was dissected. Next, the motor branch of the short peroneal muscle (one of the branches of the superficial peroneal nerve) was identified. The proximal limit of the sensitive branch was found at this point.
Results: The average space between the nerve stumps was 3.8 cm. The average length of the grafts was 16.44 cm. The number of segments used was two to four cables. In evaluating the recovery of sensitivity, 27.2% evolved to S2+, 54.5% to S3 and 18.1% to S3+. Regarding motor recovery, 72.7% presented grade 4 and 27.2% grade 3. There was no motor deficit in the donor area. A sensitive deficit in the lateral dorsal region of the ankle and the dorsal region of the foot was observed. None of the patients presented complaints in relation to walking.
Conclusions: Use of the superficial peroneal nerve as a graft source for treating peripheral nerve injuries is safe and provides good clinical results similar to those from other nerve graft sources.

☆ Work developed in the Hand Surgery and Microsurgery Group, Pontifícia Universidade Católica de Campinas, Campinas, SP, Brazil, and Hospital Nossa Senhora do Pari, São Paulo, SP, Brazil.

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http://dx.doi.org/10.1016/j.rboe.2015.04.010

Emprego do enxerto do nervo fibular superficial para tratamento de lesões de nervos periféricos

Palavras-chave:
Nervos periféricos
Nervo/transplante
Neuropatias fibulares

RESUMO

Objetivo: Avaliar resultados clínicos do tratamento das lesões crônicas de nervos periféricos com o nervo fibular superficial como fonte doadora de enxerto.
Métodos: Estudo de 11 pacientes com lesões de nervos periféricos nos membros superiores tratados com enxerto do ramo sensitivo do nervo fibular superficial, com intervalo médio de 93 dias entre a data de registro da lesão e a cirurgia. Foram observadas lesões do nervo ulnar em oito pacientes e do nervo mediano em seis. Em três ambos os nervos foram lesados. Na cirurgia faz-se incisão longitudinal na face anterolateral no tornozelo, visualiza-se o nervo fibular superficial, situado anteriormente ao músculo extensor longo dos artelhos. Proximalmente disseca-se a fáscia profunda entre os músculos extensor longo dos artelhos e o fibular longo. A seguir, identifica-se o ramo motor do músculo fibular curto, um dos ramos do nervo fibular superficial. O limite proximal do ramo sensitivo encontra-se nesse ponto.
Resultados: A média do espaço entre os cotos nervosos foi de 3,8 cm, comprimento médio dos enxertos de 16,44 cm, número de segmentos usados de dois a quatro cabos. Na avaliação da recuperação da sensibilidade, 27,2% evoluíram para S2+, 54,5% para S3 e 18,1% para S3+. Quanto à recuperação motora, 72,7% apresentavam grau 4 e 27,2%, grau 3. Não houve déficit motor da área doadora, observou-se déficit sensitivo na região dorso lateral do tornozelo e dorsal do pé. Nenhum paciente apresentou queixas à deambulação.
Conclusões: O uso do nervo fibular superficial no tratamento das lesões de nervos periféricos como fonte de enxerto é seguro e proporciona resultados clínicos semelhantes a outras fontes de enxerto de nervos.

Introduction

In treating peripheral nerve injuries, the objective is to achieve primary repair without tension on the suture. Situations in which there is no possibility of suturing, or in cases of loss of nerve segments, such as late injuries, or in complex cases, the treatment consists of reconstruction of the nerve.[1]

Over recent decades, a variety of experimental studies have been developed to determine the best methods for filling the gap between the stumps of injured nerves.[2]

Although research using autogenous tubes (from muscles or vessels)[3,4] and synthetic (non-autogenous) tubes[5] has been developed, grafts from autogenous nerves are still the material most indicated and used.[1,2]

In choosing the nerve graft, the matters that need to be taken into consideration include whether it is sufficiently long to ensure tension-free anastomosis; whether the number of fasciculi is coincident with those of the receptor nerve; and whether the sequelae in the donor area are minimal.[6]

Given these characteristics, the donor nerves are generally limited to the cutaneous nerves of the extremities.

In the upper limbs, the nerves that are used most are the medial cutaneous nerve of the forearm and the lateral cutaneous nerve of the forearm.[1,2,6] The advantage of these nerves is their location (in the same limb that is to be operated), while their disadvantage is their small diameter and limited length, which is often insufficient to adequately fill the gap.[6]

The sural nerve, in the lower limbs, is considered to be the standard for nerve grafts.[7,8] It is the one most used because of its more suitable diameter and length (up to 30 cm in length). However, despite the above characteristics, even this may not always be sufficient when larger gaps need to be filled or in cases of multiple injuries. It also has the inconvenience of sensory loss on the lateral face of the foot or other complications inherent to the surgical procedure.

In seeking alternatives, the superficial fibular nerve has emerged as an interesting option. This is a lateral branch of the common fibular nerve that innervates the long and short fibular muscles. It supplies sensitivity to the lateral and inferior faces of the skin of the lower leg and dorsum of the foot.[9] In the lower third of the lower leg, it perforates the deep fascia and penetrates into the subcutaneous cellular tissue at the junction of the middle and lower thirds. At this level (i.e. the malleolus of the ankle), it divides into two branches (medial and intermediate dorsal cutaneous branches), which are both responsible for the sensitivity of the dorsal surface of the foot.[10] This is the commonest branching pattern that has been described. In a less common type, these branches pass independently through the deep fascia, which indicates the starting point for branching that is more proximal,[2] but it presents the same area of sensitivity on the foot.

Buntic et al.[6] and Agthong et al.[11] published studies reviewing the limitations of the number of nerve graft sources. They provided deeper knowledge regarding use of the superficial fibular nerve as a possible efficient alternative graft source, although the literature on this remains sparse.