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ORIGINAL ARTICLE

Versatility of the microvascular fibular flap in limb reconstruction☆

Miguel de la Parra-Márquez[a,*], Oscar Zorola-Tellez[a], Silvia Cárdenas-Rodríguez[b], Jesús María Rangel-Flores[a], Gerardo Sánchez-Terrones[a]

[a] *Unidad Médica de Alta Especialidad No. 21, Departamento de Cirugía Plástica y Reconstructiva, Instituto Mexicano del Seguro Social, Monterrey, Nuevo León, Mexico*
[b] *Facultad de Medicina, Universidad de Monterrey, Investigación, Monterrey, Nuevo León, Mexico*

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KEYWORDS
Fibula;
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Abstract
Background: The structural characteristics of the fibula, strength, shape, length and limited donor site morbidity make it more suitable for reconstructing long bone defects larger than 6 cm in the limbs.
Material and methods: A descriptive study was conducted using a non-probabilistic sample of consecutive cases undergoing on limb reconstruction with free fibular flap in the period from January 2010 to January 2015 in the Mexican Institute of Social Security No. 21, Monterrey, Nuevo Leon.
Results: The mean age of the ten cases included was 25 years, with the most common diagnosis being trauma in 4 patients, osteosarcoma in 2, followed by one congenital pseudoarthrosis of the tibia, one non-union fracture, and one gunshot wounds, respectively. The most common location was tibia, followed by humerus, radius, ulna and femur.
Conclusions: This study has shown that the fibular free flap can be an excellent option for management of long bone defects, regardless of cause of the injury. One or more skin islands can be added for coverage in exposure of deep tissue and osteosynthesis material, thus preserving the septocutaneous perforators.

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* Corresponding author at: Hidalgo 2480 Pte, Col Obispado. Cons.: 212, C.P. 64060, Monterrey, Nuevo León, Mexico. Tel.: +52 81 8151 8452.
E-mail address: drdelaparra@yahoo.com.mx (M. de la Parra-Márquez).

PALABRAS CLAVE
Peroné;
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Versatilidad del colgajo microvascular de peroné en reconstrucción de extremidades

Resumen
Antecedentes: Las características estructurales del peroné: fuerza, forma, longitud y, morbilidad limitada del sitio donador, lo convierten en un colgajo excelente para la reconstrucción de grandes defectos óseos mayores de 6 cm en extremidades.
Material y métodos: Mediante un muestreo no probabilístico de casos consecutivos se realizó un estudio descriptivo de los pacientes operados de reconstrucción de extremidades con colgajo libre de peroné, en el periodo comprendido entre enero de 2010 a enero de 2015 en la Unidad Médica de Alta especialidad No. 21 del Instituto Mexicano del Seguro Social, Monterrey, Nuevo León.
Resultados: Se obtuvo un total de 10 pacientes, la edad promedio fue de 25 años con un diagnóstico de traumatismo como el más frecuente con 4 pacientes, seguido de osteosarcoma con 2 pacientes, seudoartrosis congénita de tibia, falta de consolidación de fractura y herida por proyectil de arma de fuego con uno respectivamente. La localización más común fue tibia, seguido de húmero, radio, cubito y fémur.
Conclusiones: El colgajo libre de peroné es una excelente opción en reconstrucción de defectos óseos de 6 cm o mayores en extremidades superiores e inferiores, independientemente de la causa de lesión. Conservando las perforantes septocutáneas puede agregarse una o más islas de piel para cobertura en exposición de tejidos profundos y material de osteosíntesis.

Background

One of the most significant advances in reconstructive surgery during the last few decades has been the introduction of microsurgical techniques for tissue transfer, subsequently leading to broadening therapeutic options on undertaking more refined and safer procedures both from a functional and aesthetic viewpoint, and thus resolving many complex reconstructive problems.[1,2]

Limb salvage based on extensive oncological resection and reconstruction combined with free microvascular flaps has become the primary aim for bone tumour treatment. It facilitates vascularisation and the necessary nutrients whilst simultaneously providing a resistant structure and the necessary robustness to preserve function.[3–5]

The structural characteristics of the fibula, such as strength, shape, length and limited donor site morbidity, make it an excellent tool for reconstructing long bone limb defects. Taylor et al.[6] published the first successful free fibular flap report in 1975. In 1983 Yoshimura et al.[7] added a skin island for flap vascularity monitoring. In 1979[8] Gilbert, and in 1980 Tamai et al.[9] refined the method for fibula removal with a significant reduction in surgery time. The technique therefore evolved and was made much easier to apply. Since then the free fibula flap has been extensively used in the management of long bone defects larger than 6 cm.

Several authors have reported that if the bone defect is under 6 cm, a conventional bone graft with clamping plates or fasteners is sufficient. A microvascular fibula flab is also necessary in larger defects or in those with a poor vascular bed or with chronic osteomyelitis.[10,11] Revascularisation which occurs on completion of anastomosis preserves the function of the osteoblasts and osteoclasts, with for consolidation and remodelling of fractures being incorporated faster and more efficiently than the bone graft.[11,12] Despite the disadvantage this procedure has due to the complexity of the surgical technique, using a short pedicle which may hinder anastomosis in the receptor bed, the risk of obstruction of the peroneal vessels during flap dissection and the need for osteotomies during its obtainment, this procedure is currently considered a flap which enhances safe vascularity, which is also related to the surgeon's experience in microsurgical procedures.[13–15]

The free fibula flap has been reported in reconstruction of the bony parts of the head and neck, using 1 or 2 skin island and as a simple flap or double barrelled flap. Its versatility has led to it becoming the most frequently used microvascular bone or bone and skin flap today.[13–23]

Material and methods

Through a non probabilistic sample of consecutive cases a descriptive and retrospective study was carried out taking as inclusion criteria all cases of inferior and superior limb reconstruction using free fibula microvascularised flaps during the period between January 1, 2010 and January 1, 2015 in the Unidad Médica de Alta Especialidad of the Instituto Mexicano del Seguro Social in Monterrey, Nuevo León, Mexico. Exclusion criteria were those patients which did not have a complete clinical history, and those cases where a free fibula flap was used for reconstruction which did not affect the limbs. All cases were managed by the main author.

Patients with lesions of a limb which was treated with a different type of flap and those for whom a free fibula microvascular flap had been used for lower or upper jaw reconstruction were excluded.