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Original Article

Femur lengthening with monoplanar external fixator associated with locked intramedullary nail☆

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ABSTRACT

Objective: This study aimed to demonstrate that the lengthening technique of an external fixator associated with locked intramedullary nail is an efficient method that decreases the duration of the external fixation and improves the rehabilitation period.
Methods: From January of 2005 to May of 2014, 31 patients with mean lower limb discrepancy of 5.31 cm were treated. The etiologies of the deformity were femur fracture sequelae, infection, hip development dysplasia, polio, and congenital short femur.
Results: The mean duration of external fixation was 2.47 months (external fixation index of 16.15 days per cm). The mean time for bone healing was 6.66 months (consolidation index 43 days per cm). Initial mean knee range of motion was −1° to 100°, progressing to 0°–115° at the end of treatment. The complications observed were incomplete osteotomies, hip subluxation, broken fixator, decreased knee range of motion, and need for locking screw removal.
Conclusion: Femur lengthening with a monoplanar external fixator associated with locked intramedullary nail allowed for a shorter period of external fixation use, better protection for the regenerated bone tissue, and early rehabilitation with possible complications.

☆ Study conducted at the Faculdade de Medicina do ABC, Hospital Estadual Mario Covas, Santo André, SP, Brazil.

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Alongamento ósseo femoral com fixador externo monoplanar associado a haste intramedular bloqueada

Palavras-chave:
Alongamento ósseo
Fixadores externos
Fixação intramedular de fraturas

RESUMO

Objetivo: Demonstrar que a técnica de alongamento do fixador externo associado a haste intramedular bloqueada é eficaz e traz benefícios quanto ao tempo de uso do fixador e a melhoria na reabilitação.

Método: Entre janeiro de 2005 e maio de 2014 foram tratados 31 pacientes com discrepância de membros inferiores com média de encurtamento de 5,31 cm. As etiologias da deformidade foram sequelas de fratura de fêmur, infecção, displasia de desenvolvimento do quadril, paralisia infantil e fêmur curto congênito.

Resultados: O tempo médio de fixação externa foi de 2,47 meses (índice de fixação externa de 16,15 dias por centímetro). O tempo médio necessário para consolidação óssea foi 6,66 meses (índice de consolidação 43 dias por centímetro). A amplitude de movimento do joelho média inicial era de -1 a 100 graus e no término do tratamento de 0 a 115 graus. As complicações observadas foram osteotomias incompletas, subluxação de quadril, quebra do fixador, limitação da amplitude do joelho e necessidade de retirada de material.

Conclusão: A técnica de alongamento femoral com fixador externo monolateral sobre haste intramedular propicia um tempo menor de uso do fixador externo, melhor proteção do regenerado ósseo e reabilitação precoce, não isenta de complicações.

Introduction

Lower limb shortening due to fracture sequelae or congenital defects leads, in the short term, to pelvic tilt and secondary scoliosis; in the long term, it leads to early osteoarthritis of the knee, hip, and spine.[1] Another problem is patient discomfort due to the time spent with a external fixator.

Traditionally, the most used surgical technique for bone shortening is that recommended by IIizarov. It uses a system of rings anchored by transfixing Kirschner wires in tensions ranging from 50 to 130 N, followed by osteotomy and subsequent gradual bone distraction. The lengthening speed is 1 mm per day, but the fixator should remain in place until complete fracture consolidation. Bone regenerate fracture has been described in cases of premature fixator removal.[2–6]

Moreover, patients tolerate the lengthening period well, which is shorter, but the long wait until consolidation may present complications, such as pin site infection and limited joint mobility. The need to use the external fixator until consolidation is not well tolerated by most patients.[7,8]

Femoral lengthening with a monolateral external fixator associated with locked intramedullary nail is an alternative technique that brings benefits such as shorter duration of treatment and improved knee range of motion without compromising the bone regenerate.[9–12]

This study aimed to demonstrate whether the lengthening technique with an external fixator associated with locked intramedullary nail is effective and beneficial regarding duration of external fixator use and improved rehabilitation.

Material and methods

Between January 2005 and May 2014, 31 patients with femoral shortening who underwent lengthening technique with external fixator were retrospectively studied. Regarding the cause of shortening, 23 patients had fracture sequelae, three had congenital short femur, two had polio, two had previously resolved infection, and one had developmental dysplasia of the hip. Age ranged from 15 to 62 years; 26 patients were male and five female. Initial shortening ranged from 2.5 cm to 8 cm, assessed at a scanogram of the lower limbs, with a mean of 5.31 cm. The mean initial knee range of motion was 1°–100°. All patients were treated with a monolateral external fixator and locked intramedullary nails, with 23 anterograde and eight retrograde nails. The nail diameter was 9 mm for solid nails and 10 mm for milled nails.

Surgical technique

Patient is positioned in lateral decubitus for the anterograde nails and in dorsal decubitus for the retrograde nails, on a radiolucent operating table. Femoral osteotomy is made by a small longitudinal lateral incision in the middle third of the thigh. Subsequently, a semi-circumferential bone drilling is made with a 3.5-mm drill in the lateral, medial, and anterior cortices, and a complete linear osteotomy is finalized with the osteotome in the posterior cortex. After the nail is introduced, the locking screws are positioned closest to the entrance of the guide. A Schanz screw is then placed in the fragment proximal to the osteotomy, perpendicularly to the lateral cortex, from lateral to medial, in order to avoid an impact on the previously inserted intramedullary nail. Then, the screw head is

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