



Original Article

Distal femoral cut in total knee arthroplasty in a Brazilian population[☆]



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ABSTRACT

Objective: To determine the ideal angle for making the distal femoral cut in total knee arthroplasty in a Brazilian population.

Methods: Panoramic radiographs of the lower limbs bearing weight from 79 patients (57 women and 22 men) were studied, totaling 107 knees with an indication for total knee arthroplasty. The femoral anatomical axis, femoral mechanical axis and cervical-diaphyseal angle were traced out. The angle of the femoral cut was determined from the meeting point between the femoral anatomical and mechanical axes. The ideal degree of femoral valgus was compared between men and women and between knees presenting varus and valgus alignment of the lower limb. The ideal distal femoral cut was also correlated with the cervical-diaphyseal angle.

Results: The ideal femoral valgus angle ranged from 4.2 to 8.6 degrees, with a mean of 6.3 degrees. There was no statistically significant difference in the distal femoral cut between patients with coronal varus and valgus alignment ($p=0.180$). Comparing men and women, there was no statistically significant difference regarding the ideal femoral valgus between the groups ($p=0.057$). The cervical-diaphyseal angle presented an inverse relationship with the distal femoral cut.

Conclusions: The mean angle between the femoral mechanical and anatomical axes was 6.3 degree. Neither preoperative coronal alignment nor sex had any influence on the distal femoral cut. The cervical-diaphyseal angle presented an inverse relationship with the distal femoral cut.

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Corte femoral distal na artroplastia total de joelho na população brasileira

R E S U M O

Palavras-chave:

Artroplastia do joelho

Alinhamento em artroplastia

Corte femoral

Objetivo: Determinar o ângulo ideal para feitura do corte femoral distal na artroplastia total do joelho em população brasileira.

Métodos: Foram estudadas radiografias panorâmicas com carga dos membros inferiores em 79 pacientes (57 mulheres e 22 homens), num total de 107 joelhos com indicação de artroplastia total. Foram traçados o eixo anatômico femoral (EAF), o eixo mecânico femoral (EMF) e o ângulo cervicodiafisário (âCD). O ângulo do corte femoral distal foi determinado pelo encontro entre o EMF e o EAF. O valor do valgo femoral ideal foi comparado entre homens e mulheres e entre joelhos com alinhamento em varo e valgo do membro inferior. O corte femoral distal ideal foi correlacionado ainda com o ângulo cervicodiafisário.

Resultados: O ângulo do valgo femoral ideal variou de 4,2 até 8,6 graus, com média de 6,3. O corte femoral distal não mostrou diferença quando comparados pacientes com alinhamento coronal em varo e valgo, sem significância estatística ($p = 0,180$). Quando comparados homens e mulheres, o valgo femoral ideal não mostrou diferença entre os grupos estatisticamente significante ($p = 0,057$). O ângulo cervicodiafisário mostrou relação inversa com o corte femoral distal.

Conclusões: A média do ângulo entre os eixos mecânico femoral e anatômico femoral foi de 6,3 graus. Alinhamento coronal pré-operatório, assim como o sexo, não exerceu influência no corte femoral distal. O ângulo cervicodiafisário mostrou relação inversa com o corte femoral distal.

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Introduction

Numerous studies have shown a correlation between the durability of total knee arthroplasty (TKA) and restoration of the normal limb alignment.¹⁻³ It is believed that restoration of the mechanical axis with a maximum variation of 3° toward varus or valgus is associated with the best results from TKA.¹⁻⁶ However, some authors have demonstrated that postoperative alignments of the limb outside of the interval of $\pm 3^\circ$ in the coronal plane are observed in up to 30% of the cases.⁷⁻⁹

In normal knees, the tibial joint surface is at a varus angle of approximately 3° in relation to the mechanical axis, while the femoral surface is at a valgus angle of 9° . Historically, attempts have been made to reproduce this anatomical alignment of the knee in total arthroplasty by cutting the tibia at a varus angle. However, several studies have demonstrated that tibial components placed at varus angles greater than 5° tend to fail due to medial collapse.^{3,10}

Incorrect alignment of TKA has been identified as a cause of long-term complications, including accelerated wear,^{11,12} premature mechanical loosening of the implant^{1,13,14} and patellofemoral problems¹⁵⁻¹⁷ such as patellofemoral instability and patellar fracture.

Thus, it is recommended that the tibial component should be implanted perpendicularly to the mechanical axis of the tibia in the coronal plane. The femoral component is usually implanted at a valgus angle of 5° to 6° , which is the size of angle supposedly necessary for reestablishing a neutral mechanical axis in the limb.

The aim of the present study was to measure the ideal angle for making the distal femoral cut in Brazilian patients who

Table 1 – Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
- Patients awaiting total knee arthroplasty operations - Primary osteoarthritis - Failure of conservative treatment	- Secondary osteoarthritis - Osteoarthritis of the hip - Ipsilateral hip prosthesis - Previous femoral osteotomy - Previous tibial osteotomy - Extra-articular deformity

underwent TKA at the Knee Surgery Center of the National Institute of Traumatology and Orthopedics (INTO).

Material and methods

Between August 2011 and February 2012, panoramic radiographs on 79 patients (22 men and 57 women) were analyzed, thus totaling 107 limbs, in accordance with the inclusion and exclusion criteria listed in Table 1.

This study was submitted for evaluation and approval by our institution's research ethics committee.

Radiographic evaluation

The radiographic evaluation was done on anteroposterior (AP) panoramic radiographs of the lower limbs with weight-bearing on both feet. All the radiographs were produced at the imaging examination center of our service. The examinations were

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