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Original Article

Is it safe the empirical distal femoral resection angle of 5° to 6° of valgus in the Brazilian geriatric population?☆

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ABSTRACT

Objective: The purpose of this study is to determine if there is a safe distal femoral resection angle to restore the normal axial alignment of the limb in total knee arthroplasty (TKA) in the Brazilian geriatric population with knee arthrosis.
Method: This study analyzed 99 pre-operative hip-knee-ankle radiographs of osteoarthritic knees of 66 patients (54 women, 12 men) with knee osteoarthritis. The distal femoral cut angle was determined based on the femoral mechanical-anatomical angle (FMA). Mean, median and standard deviation measurements of the distal femoral cut angle were calculated, differentiated by gender and side. The mean result of the distal femoral resection angle was compared to 5.7°, the mean average angle of previous and similar study based on European population of patients with knee arthrosis.
Results: The mean average of the distal femoral resection angle of the study was 6.05 (range 3–9°). The distribution of this angle between genders showed a slight superior average of the male population (6.17°) compared to the female (6.02°), but with no statistically significant difference ($p = 0.726$). There was no statistically significant difference ($p = 0.052$) between the mean average of this study (6.05°) compared to the mean average of the literature (5.7°). However, considering 3° as the limit of acceptable error in the coronal plane, this empirical femoral resection angle would not be appropriated for 19.7% of the population.

☆ Study conducted at the Department of Orthopedics and Traumatology, Universidade Federal de São Paulo, São Paulo, SP, Brazil.

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Conclusion: The distal femoral resection angle of 5–6° is not completely safe for the Brazilian geriatric population.

É seguro o corte femoral distal em artroplastia total do joelho com 5° a 6° de valgo empiricamente na população geriátrica brasileira?

Palavras-chave:
Articulação do joelho
Artroplastia do joelho
Osteoartrite
Radiografia panorâmica

RESUMO

Objetivo: Determinar se existe um ângulo seguro para o corte femoral distal, para que o membro resulte alinhado após uma artroplastia total de joelho (ATJ), na população geriátrica brasileira com gonartrose.

Método: Foram feitas radiografias panorâmicas de 99 membros inferiores em 66 pacientes consecutivos (54 mulheres e 12 homens) portadores de gonartrose do joelho. O ângulo do corte femoral distal foi determinado pelo encontro entre o eixo mecânico femoral (EMF) e o eixo anatômico femoral (EAF). Foram calculados os valores da média, o desvio padrão e a mediana do ângulo do corte femoral distal desses pacientes diferenciados por sexo e lado. O valor médio do ângulo de corte do fêmur distal ideal aqui obtido foi comparado com o valor médio de 5,7 obtido em estudo prévio semelhante a esse feito com populações europeias de pacientes osteoartríticos submetidos a ATJ.

Resultados: A média do ângulo formado pelos EAF × EMF, considerado o ângulo do corte femoral distal em uma ATJ, do grupo estudado foi de 6,05 (variação de 3º a 9º). A distribuição desse ângulo entre os sexos evidenciou uma média discretamente superior entre os homens (6,17º) em comparação com as mulheres (6,02º), porém sem significância estatística (p = 0,726). Não houve diferença estatística (p = 0,052) entre o valor médio obtido na amostra atual (6,05 - DP 1,27) com o valor médio obtido na literatura (5,7°). Entretanto, se considerarmos aceitável um erro de 3° no plano coronal, 19,7% da população operada se encontrariam fora dessa faixa aceitável se optarmos pelo corte femoral empírico de acordo com o instrumental.

Conclusão: O corte femoral distal na ATJ em 5° ou 6° de valgo não é completamente seguro para a população geriátrica brasileira.

Introduction

The geopolitical increase observed among developing counties, and especially in Brazil over the last decade, has led to a typical and unavoidable inversion of the age pyramid. This has established not only a large but also a growing number of elderly people, which in Brazil has already reached 15 million people.[1] Unfortunately, there is no Brazilian data on the number of arthroplasty procedures per year, but the increasing number of indications that are associated with increasing longevity leads to the supposition that there is a growing need for these procedures.

There is a consensus in the literature that the durability of a knee prosthesis is dependent on the resultant axis of the operated limb,[2] given that for the procedure to be carried out, the elemental principle used is that the load should be equally distributed between the medial and lateral femoral–tibial compartments.[3–5] Thus, a lower limb is considered to be aligned when its mechanical axis (the line from the center of the femoral head to the center of the ankle,[4,6–9] known as the Maquet line[10]) crosses the center of the knee. The error limit is accepted to be a varus or valgus angular variation of 3°.[11,12] Achievement of this result depends on making the bone cuts perpendicularly to the mechanical axis desired, in association with medial–lateral ligament equalization.

In this context, both navigation-assisted surgery and the classic methods using intra or extramedullary guides have been shown to be effective for achieving an aligned limb. The former has been shown to be effective for good results,[13] but is limited by the high cost and long learning curve. The classical method, which uses an intramedullary guide for the femur and an extramedullary guide for the tibia, which has gained mass usage within our setting, presents results that are notably satisfactory and easily implemented for planning the bone cuts preoperatively.[12] Thus, panoramic radiographs of the lower limbs should be obtained before the operation[14,15] and the angle of the distal femoral cut should be determined from the meeting points between the mechanical axes and the femoral anatomy.[3,4] However, these measurements are sometimes neglected,[16] with regard to either preoperative analysis or postoperative assessment, because of the coast or the difficulty in finding radiological centers that do this type of imaging.

Since surgeons may choose to replace surgical planning with values that have been empirically preestablished, they need to have in-depth knowledge of the epidemiological characteristics that are prevalent in their setting, given that the