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ORIGINAL ARTICLE

Influence of the ischaemic tourniquet in antibiotic prophylaxis in total knee replacement☆

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KEYWORDS
Antibiotic prophylaxis;
Tourniquet;
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Abstract
Objective: There is level IV evidence that the preoperative administration of antibiotics helps in the prevention of prosthetic infection.

There is controversy on whether the ischaemia applied during surgery may affect the minimum inhibitory concentration of the antibiotic in the peri-prosthetic tissues.

The aim of this study is to review this phenomenon through the determination of antibiotic concentration in the synovial tissue.

Material and method: A prospective observational clinical study was conducted on 32 patients undergoing total knee replacement. Cefonicid 2 g was administered as prophylaxis, with a tourniquet used for all patients. The antibiotic concentration was quantified by high performance liquid chromatography in samples of synovial tissue collected at the beginning and at the end of the intervention.

Results: The mean concentration of antibiotic was 23.16 μg/g (95% CI 19.19–27.13) in the samples at the beginning of the intervention and 15.45 μg/g (95% CI 13.20–17.69) in the final samples, being higher than the minimum inhibitory concentration of cefonicid, set at 8 μg/g. These results were statistically significant for both concentrations ($P < .00001$).

Discussion: The antibiotic concentration throughout the standard total knee prosthesis surgery performed with tourniquet gradually decreases throughout the intervention.

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The concentration determined at the end of the intervention was higher than the minimum inhibitory concentration required for the antibiotic studied.

In conclusion, the use of a tourniquet does not increase the risk of infection.

PALABRAS CLAVE
Profilaxis antibiótica;
Manguito de isquemia;
Prótesis total de rodilla

Influencia del manguito de isquemia en la profilaxis antibiótica en prótesis total de rodilla

Resumen

Objetivo: Existe evidencia científica grado IV de la importancia que el antibiótico administrado preoperatoriamente tiene en la prevención de la infección protésica.

Hay controversia en si la isquemia aplicada en la cirugía de estos pacientes puede afectar a la concentración mínima inhibitoria del antibiótico en los tejidos periprotésicos.

Para estudiar este fenómeno hemos diseñado un estudio basado en la determinación de la concentración de antibiótico en el tejido sinovial.

Material y método: Estudio clínico prospectivo observacional de 32 pacientes intervenidos de prótesis total de rodilla. Se administró 2 g de cefonicid como profilaxis y se utilizó el manguito de isquemia en todos los pacientes, cuantificándose la concentración antibiótica mediante la cromatografía líquida de alta resolución en muestras de tejido sinovial del inicio y del final de la intervención.

Resultados: La concentración media de antibiótico fue de 23.16 μg/g (IC del 95%, 19.19-27.13) en las muestras del inicio de la intervención y de 15.45 μg/g (IC del 95%, 13.20-17.69) en las muestras del final, mostrándose superiores a la concentración mínima inhibitoria del cefonicid, establecida en 8 μg/g, siendo estos resultados estadísticamente significativos para ambas concentraciones ($p < 0.00001$).

Discusión: La concentración de antibiótico a lo largo de una intervención estándar de prótesis total de rodilla realizada con isquemia preventiva varía a lo largo de la intervención sufriendo un descenso paulatino.

Aun así, la concentración determinada al final de la intervención no fue inferior a la concentración mínima inhibitoria del antibiótico estudiado.

Como conclusión, la utilización del manguito de isquemia no aumenta el riesgo de infección.

Introduction

The surgical technique for total knee replacement (TKR) has experienced significant advances and improvements, but is not without complications. Infection, together with aseptic loosening, is the main complication, as its consequences entail significant repercussions for the patient, as well as in terms of hospitalization, and social and economic aspects.[1–3] The most frequent origin of contamination is during the surgical procedure. The existence of infection depends on the conditions of the patient and the environment, as well as the presence of an implant allowing infection by minor bacterial inoculums and microorganisms with low virulence. Antibiotic prophylaxis aims to maintain high concentrations of antibiotic throughout the entire intervention in order to prevent the multiplication of germs contaminating the surgical field.[4,5] Specifically, in traumatology and orthopaedic surgery, it has been established that the administration of a dose of antibiotic against the majority of the contaminating flora 30 min prior to the intervention significantly decreases the risk of infection of the surgical wound.[6–9]

In clinical practice, many of the interventions affecting the limbs use a pneumatic ischaemia cuff or tourniquet to prevent bleeding during the operation. This system drains the blood from the surgical field, thus preventing blood loss and facilitating the work of the surgeon, although it has also raised doubts regarding its negative effect in terms of the delivery of prophylactic antibiotic agents.

The objective of this study is to evaluate whether the concentration of prophylactic antibiotic is maintained over the minimum inhibitory concentration (MIC) throughout the entire TKR intervention when an ischaemia cuff is used.

Material and method

Study design

This was an observational clinical study of 32 patients intervened at Hospital Arnau de Vilanova in Lleida (Spain) for primary TKR with arthrosic causes. All the patients signed an informed consent form and the study was approved by the Ethics Committee of the Hospital. The cases were col-