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ORIGINAL ARTICLE

Single intravenous tranexamic acid dose to reduce blood loss in primary total knee replacement☆

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KEYWORDS
Tranexamic acid;
Total knee replacement;
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Abstract
Objective: To evaluate the effectiveness and safety of a single intravenous dose of tranexamic acid in order to reduce blood loss in total knee replacement.
Materials and methods: Prospective observational study of the administration of tranexamic acid in patients undergoing primary total knee arthroplasty from November 2013 to February 2015, in which an autologous blood recovery system was used. The study included 98 patients, distributed into two groups of 49 patients according to whether or not they received intravenous tranexamic acid. The primary endpoint was the number of patients requiring autologous transfusion from the recovery system autologous blood recovery system.
Results: No drop-outs were recorded during follow-up. There were no significant differences between groups as regard the preoperative and hospital variables. The mean preoperative haemoglobin and haematocrit at 24 and 48 h postoperatively were similar in both groups. The average volume of bleeding in the autologous blood recovery system and estimated average blood loss was lower in patients who had been administered tranexamic acid, with significant differences. No patients in the group that was administered tranexamic acid required blood autotransfusion. The transfusion rate was zero in the two groups. No adverse events related to the administration of tranexamic acid were recorded.
Conclusions: Intravenous administration of tranexamic acid, according to the described protocol, has presented a non-autotransfusion or allo-transfusion rate of 100%, with no increased incidence of thrombotic events. Thus, its use in this group of patients is recommended. The indication should be individualised, its use justified in the patient medical records, and informed consent is mandatory.

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PALABRAS CLAVE
Ácido tranexámico;
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Cirugía sin sangre

Dosis única intravenosa de ácido tranexámico como medida de ahorro transfusional en prótesis total primaria de rodilla

Resumen
Objetivo: Evaluar la eficacia y seguridad de la administración de una dosis única intravenosa de ácido tranexámico como medida de ahorro transfusional en prótesis total primaria de rodilla.
Material y métodos: Estudio observacional prospectivo de la administración de ácido tranexámico en pacientes intervenidos de prótesis total primaria de rodilla desde noviembre de 2013 a febrero de 2015, en los que se utilizó un sistema de recuperación de sangre autóloga. Se incluyeron en el estudio 98 pacientes distribuidos en dos grupos de 49 pacientes según la exposición a la administración de ácido tranexámico. La variable principal del estudio fue el número de pacientes que precisaron autotransfusión del sistema de recuperación de sangre autológa.
Resultados: No se registraron pérdidas durante el seguimiento. No hubo diferencias significativas entre ambos grupos con respecto a las variables preoperatorias y hospitalarias. Los valores medios de hemoglobina y hematocrito preoperatorios, a las 24 y 48 h postoperatorias eran similares en ambos grupos. El volumen medio de sangrado en el sistema de recuperación de sangre autóloga y la pérdida media estimada de sangre fue menor en los pacientes a los que se había administrado ácido tranexámico, siendo las diferencias significativas. Ningún paciente del grupo en el que se administró ácido tranexámico precisó autotransfusión sanguínea. No se precisó alotransfusión sanguínea en los pacientes de la cohorte. No se registraron eventos adversos relacionados con la administración del ácido tranexámico.
Conclusiones: El uso de una dosis única 15 mg/kg de ATX intravenoso en PTR primaria ha presentado una tasa de no autotransfusión ni alotranfusión sanguínea del 100%, sin aumento en la incidencia de eventos trombóticos. Por ello recomendamos su utilización en este grupo de pacientes, con una indicación que debe ser individualizada, justificar su uso en la historia clínica y precisar del consentimiento informado del paciente.
Nivel de evidencia III.

Introduction

Knee replacement surgery (KRS) is a procedure for which between 39% and 67% of patients require an allogenic blood transfusión.[1] The release of the ischaemia at the end of the intervention causes bleeding due to the increase in the fibrinolytic activity which sometimes necessitates an allogenic blood transfusion in patients, that is not without complications and risks. Moreover, these transfusions may also have a negative affect on the outcome of surgery and increase the risk of perioperative infection, hospital stay and health care costs.[2,3] As a consequence, it is recommended that transfusional policies be applied to reduce blood loss in perioperative stages.[4]

The use of perioperative autologous blood recovery (ABR) systems reduces the relative risk of allogenic transfusion by 42% according to Cochrane's study in KRS, with several blood quality conditions an absolute guarantee.[5] For this, blood flow above 400 ml needs to be in the system during the first 4 h, which must be transfused before 6 h have passed. Large volumes of blood for transfusion are not recommended, due to the risks and complications this may entail.[6]

Tranexamic acid (TXA) is a synthetic derivative of lysine with a pure antifibrinolytic activity. Its mechanism of action is based on it binding to the lysine bond of plasminogen. This prevents the fibrin from binding to the complex formed by the plasminogen-plasmin tissue activator complex and degrading fibrin.[7] Another possible effect is the protection of platelets based on its antiplasmin effect and the inhibition of the platelet activation in addition to the reduction of the loss of intracapilliary albumin maintaining intravascular volume.[8] The administration of TXA as a means of cost saving in transfusion in KRS is strongly evident in literature due to its efficacy and safety, in randomised and meta-analysis studies, with very low perioperative allogenic blood transfusion rates.[9–11]

The working hypothesis was that the administration of a single 15 mg/kg dose of intravenous TXA would prevent allotransfusion and autotransfusion in primary KRS.

Material and method

A prospective observational study was designed for the administration of TXA in patients undergoing primary KRS where an ABR system was used. This began in November 2013 and terminated in February 2015. Previous studies referring to an autotransfusion rate of 34%[12] of the ABR system in KRS were reviewed in order to calculate the sample size. In keeping with perioperative blood reduction results recorded in literature,[13,14] 49 patients were required for each group so as to obtain a confidence level of 95%