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How intravenous tranexamic acid affects blood loss and recovery in total knee replacement surgery

Submission date
01/06/2024

Recruitment status
No longer recruiting

Registration date
04/06/2024

Overall study status
Completed

Last Edited
31/07/2025

Condition category
Surgery

[_] Prospectively registered
[X] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
Total knee arthroplasty (TKA) is sometimes associated with significant perioperative bleeding. This study aims to determine the effects of tranexamic acid (TXA) in reducing perioperative blood loss in patients undergoing primary TKA. The secondary objectives will assess the effects of TXA in reducing the need for blood transfusion in these patients and determine its effect on verticalization and ambulation after TKA. The null hypothesis is that there is no difference between the two groups regarding perioperative blood loss, need for transfusion, and postoperative verticalisation and ambulation. It is hypothesised that there will be a significant difference between the two groups in perioperative blood loss, need for transfusion, and postoperative verticalisation and ambulation.

Who can participate?
Patients aged 18 years old and over who plan to undergo primary, unilateral TKA due to degenerative knee diseases

What does the study involve?
The research will be a single-centred study at the Clinic for Orthopedic Surgery and Traumatology University Clinical Center of Vojvodina in Novi Sad. The study has been approved by the Ethics Committee of the Clinical Center of Vojvodina in Novi Sad (Serbia). It will be conducted following the principles of the Declaration of Helsinki.

Patients will be randomly assigned to two groups. The intervention group received TXA at two time points, immediately after the induction with doses of 15 mg/kg, and 10 mg/kg 15 minutes before the release of the pneumatic tourniquet. The control group received an equivalent volume of 0.9% saline solution via the same route.

What are the possible benefits and risks of participating?
Possible benefits from this research include reduced perioperative bleeding, reduced use of allogeneic blood and faster functional recovery (verticalization and walking).

Possible harm from intravenous administration of TXA may include adverse effects of the drug itself, from mild ones, such as irritation at the site of administration, or mild nausea with too rapid administration (more than 1ml/min), or the more serious ones (unknown frequency) such as anaphylaxis, convulsions and visual disturbances.

Where is the study run from?
University Clinical Center of Vojvodina in Novi Sad, Serbia

When is the study starting and how long is it expected to run for?
February 2011 to December 2014

Who is funding the study?
University Clinical Center of Vojvodina in Novi Sad, Serbia

Who is the main contact?
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Study information

Scientific Title
The effect of intravenous tranexamic acid on perioperative blood loss, transfusion requirements, verticalization, and ambulation in total knee arthroplasty: a randomized double-blind study

Study objectives
The null hypothesis is that there is no difference among the two groups in perioperative blood loss, need for transfusion, and postoperative verticalisation and ambulation. It is hypothesised that there is a statistically significant difference between the two groups in perioperative blood loss, need for transfusion, and postoperative verticalisation and ambulation.

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 23/02/2011, Ethical Committee of Clinical Center of Vojvodina (Hajduk Veljkova Street No 1, Novi Sad, 21000, Serbia; +381 21 487 22 05; clinicns@eunet.yu), ref: 00-01/97

Primary study design
Interventional

Study design
Prospective single-center controlled randomized double-blind study

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Reducing perioperative blood loss in patients undergoing primary unilateral total knee arthroplasty

Interventions
This trial has been designed to determine the efficacy of tranexamic acid (TXA) in reducing perioperative blood loss in patients undergoing primary unilateral total knee arthroplasty (TKA). The study's secondary objectives are to determine the efficacy of TXA in reducing the need for blood transfusion in patients undergoing primary TKA and to assess its effect on verticalization and ambulation after TKA.

The study group receives TXA (Tranexamic acid Medochemie® 500mg/5 mL) at two time points (T1 and T2), with doses of 15 mg/ kg and 10 mg/kg, respectively. The drug will be administered as a continuous intravenous (IV) infusion over 15 minutes. The first time point (T1) is immediately after the induction of anesthesia, and the second time point (T2) is 15 minutes before the release of the pneumatic tourniquet. The control group receives the same volume of

0.9% saline solution via the same route (IV). The attending anesthesiologist and anesthesia assistant are blinded to IV infusion content. Patients are allocated using a random selection method.

Anesthesia and surgery
All patients received spinal anesthesia with isobaric bupivacaine 0.5% (Marcain spinal 0.5%, Astra Zeneca) at a dose of 15mg (3ml). Standard intraoperative monitoring will be conducted, including continuous monitoring of heart function by electrocardiogram (D II lead), non-invasive blood pressure measurement, and pulse oximetry (Infinity Delta XL, Drager). The night before the surgery, all participants received subcutaneous low molecular weight heparin nadroparin calcium (Fraxiparine 2850 IU/0.3mL, GlaxoSmithKline), dosed according to body weight. All TKA's will be performed by the same surgical team, using a pneumatic tourniquet inflated at 200-250 mmHg. The hemoglobin level at which allogeneic blood transfusion was initiated in this study was 9 g/dl.

Intervention Type
Drug

Phase
Not Applicable

Drug/device/biological/vaccine name(s)
Tranexamic acid (Tranexamic acid Medochemie® 500mg/5 mL)

Primary outcome(s)
Efficacy of tranexamic acid on perioperative blood loss measured using intraoperative and postoperative blood loss. The intraoperative loss was estimated by visually examining graduated suction canisters, expressed in ml, and gauze/sponges loss was determined using the gravimetric method. The postoperative blood loss was measured after 6, 12, and 24 hours, including drain loss measured in ml and total postoperative loss from 0-24 hours. Perioperative blood loss is calculated as intraoperative plus postoperative blood loss in ml.

Key secondary outcome(s)
1. Need for transfusion is calculated as the total number of allogenic blood units given intraoperatively up to 48 hrs postoperatively
2. Verticalisation and ambulation of patients were measured as the first time to verticalisation (standing up with no help) and the first time to ambulation (walking with the help of crutches)

Completion date
20/12/2014

Eligibility

Key inclusion criteria
1. Adult female and male patients who plan to undergo primary, unilateral TKA due to degenerative knee diseases
2. ASA status 1-3
3. Provide written informed consent to participate in the study

Participant type(s)

Patient

Healthy volunteers allowed
No

Age group
Mixed

Lower age limit
18 Years

Upper age limit
100 Years

Sex
All

Total final enrolment
96

Key exclusion criteria
1. Patients with a known allergy to TXA
2. Coagulation disorders
3. Previous history of any type of thromboembolic event
4. Those who received fresh frozen plasma, other blood products, or drugs affecting the coagulation system 24 hours before surgery
5. Severe heart disease (New York Heart Association Classification-NYHA III and IV), creatinine values above115 µmol/l for men and 100 µmol/l for women, elevated liver enzymes, or congenital thrombophilia

Date of first enrolment
20/10/2012

Date of final enrolment
10/12/2014

Locations

Countries of recruitment
Serbia

Study participating centre
Clinical center of Vojvodina
Hajduk Veljkova Street No 1
Novi Sad
Serbia
21000

Sponsor information

Organisation
Klinički centar Vojvodine

ROR
https://ror.org/00fpn0e94

Funder(s)

Funder type
Hospital/treatment centre

Funder Name
Klinički Centar Vojvodine

Alternative Name(s)
Clinical Centre of Vojvodina, Centrul Clinic al Voivodinei, Vajdasági Klinikai Központ, Klinikako maškar Vojvodinako, Klinické stredisko Vojvodiny

Funding Body Type
Private sector organisation

Funding Body Subtype
Other non-profit organizations

Location
Serbia

Results and Publications

Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study will be available for any purpose upon reasonable request from the Principal Investigator, Gordana Jovanovic M.D., PhD., gordana.jovanovic@mf.uns.ac.rs. Researchers who provide a methodologically sound proposal can be provided with these data immediately following publication, up to 5 years after publication. The individual participant data that underlie the results reported in this research (text, tables, and figures) will be shared. The study protocol and statistical analysis plan will also be made available. All participants from the study signed informed consent. Data anonymisation: the forename and surname of the participants are replaced with a generated number (code) in the data entry process.

IPD sharing plan summary

Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		21/07/2024	31/07/2025	Yes	No
Participant information sheet			04/06/2024	No	Yes
Protocol file			04/06/2024	No	No