TRANEXAMIC ACID AND TRANSFUSION REQUIREMENTS IN PRIMARY AND REVISION TOTAL KNEE ARTHROPLASTY

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BACKGROUND AND GOAL OF STUDY

Tranexamic acid (TXA) appears to reduce perioperative blood loss and transfusion requirements in major orthopaedic surgery. In our hospital, a protocol for TXA administration in elective primary total knee arthroplasty (PTKA) and revision total knee arthroplasty (RTKA) was implemented. It consists of TXA 1g diluted in 50mL saline or 2g in 100mL saline administered through the drain after closure of the articular capsule. If bleeding exceeds 500mL, 1g of intravenous TXA or a 1mg/kg/h perfusion for 6h should be administered 3 to 12 hours after surgery. Anaesthesiologists decided on TXA administration in accordance with their clinical judgement and protocol's exclusion criteria.

Our goal was to investigate if haemoglobin (Hb) variation and transfusion requirements decreased with protocol implementation.

MATERIALS AND METHODS

Retrospective cohort study of all patients submitted to PTKA and RTKA during an one-year period at a single institution.

Exclusion criteria were no postoperative haemogram, incomplete medical records and dosing, timing or route of TXA administration not according to protocol.

Demographic data was obtained from a review of individual medical records. Specific information identified through retrospective chart reviews was included: administration of TXA, pre and postoperative Hb levels and postoperative transfusion records.

We compared transfusion requirements and postoperative Hb drop in the TXA group vs the No TXA group in PTKA and RTKA patients.

Statistical analysis was performed with SPSS version 22. A p-value <.05 significance level was used for all hypothesis tests. Fisher's exact test, chi-square test and U Mann-Whitney test were employed when appropriate.

RESULTS

- 323 total knee arthroplasties, with 277 patients meeting our inclusion criteria:

- PTKA in 254 patients (*Image 1*)
- RTKA in 23 patients (*Image 2*)

Image 1. PTKA cohort

Image 2. RTKA cohort

- 46 patients excluded (*Table 1*):

Exclusion criteria	PTKA	RTKA
Dosing	10	0
Route of administration	9	3
Unknown TXA dose	18	0
No postoperative hemogram	6	0

Table 1. Exclusion criteria

PRIMARY TOTAL KNEE ARTHROPLASTY

Demographic data:

- Sex – 72,8% female
- Mean age – 70 ± 8 years
- ASA physical status – 78,3% ASA 2
- Anaesthetic technique – 73,6% spinal block
- Mean preoperative Hb – 13,3 ± 1,3 g/dL (range 8,5 – 17,7)

Outcomes of TXA administration (*Table 2*):

		TXA	No TXA	Total	p-value
Postoperative Hb	Mean	10,9 ± 1,4	9,4 ± 1,4	10,4 ± 1,5	< .001
	Range	7,3 – 15,1	5,5 – 12,6	5,5 – 15,1	
Hb variation	Mean	2,7 ± 1,2	3,8 ± 1,5	3 ± 1,3	< .001
	Range	0,1 – 6,7	1,3 – 8,6	0,1 – 8,6	
RBC transfusions	Yes	11	18	29	< .001
	No	184	41	225	

Table 2. Outcomes of TXA administration in PTKA

- Mean postoperative Hb drop – significantly lower in TXA group vs. No TXA group (2,7±1,2 g/dL vs. 3,8±1,5 g/dL, p<.001).
- Transfusion rate – significantly lower in TXA group vs. No TXA group (5,6% vs. 30,5%; p<.001).
- Total number of red blood cell units (RBCU) transfused – significantly lower (p<.001) in TXA group vs. No TXA group (16 vs. 33 RBCU transfused, max. 3 vs. 6 units per patient).

REVISION TOTAL KNEE ARTHROPLASTY

Demographic data:

- Sex – 60% female
- Mean age – 70 ± 16 years
- ASA physical status – 54% ASA 3
- Anaesthetic technique – 72% general anaesthesia
- Mean preoperative Hb – 12,4 ± 8 (range 7,5 - 17,6)

Outcomes of TXA administration (*Table 3*):

		TXA	No TXA	Total	p-value
Postoperative Hb	Mean	9,9 ± 1,5	9,2 ± 1,8	9,4 ± 1,7	NS
	Range	7,0 - 11,3	6,6 - 13,0	6, - 13	
Hb variation	Mean	2,6 ± 1,5	2,9 ± 1,4	2,8 ± 1,4	NS
	Range	0,7 - 5,9	0,2 - 5,1	0,2 - 5,9	
RBC transfusions	Yes	2	7	9	NS
	No	6	8	14	

Table 3. Outcomes of TXA administration in RTKA

- Mean postoperative Hb drop and transfusion requirements were lower in TXA group vs. No TXA group, but the difference did not reach statistical significance (2,6 ± 1,5 g/dL vs. 2,9 ± 1,4 g/dL, p=0,591; 33,3% vs. 46,7%, p=0,4).

DISCUSSION & CONCLUSIONS

Administration of TXA in PTKA patients was associated with a significant reduction in postoperative haemoglobin drop, number of patients requiring RBC transfusions and number of RBC units transfused per patient. In RTKA patients, there was a trend towards reduction of blood transfusion requirements with the use of TXA, however sample size was too small to draw conclusions.

In conclusion, TXA IV administration in PTKA appears to reduce both postoperative haemoglobin variation and transfusion requirements, so its use in PTKA is recommend. A larger sample should be considered to investigate the role of TXA in RTKA.