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Original Research Article

Retrospective comparative study of IV+ local tranexamic acid versus IV tranexamic acid only in primary total knee replacement

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ABSTRACT

Background: The study is to compare the immediate post-operative outcomes with use of intravenous (IV) tranexamic acid (TXA) versus IV and local TXA combination in primary unilateral total knee arthroplasty. Study comprised of 72 cases of tricompartmental knee primary osteoarthritis who have undergone unilateral total knee arthroplasty at Manipal Hospital, Goa from January 2016 to December 2018. The observations for each group was analysed and post op blood loss in drain, fall of haemoglobin levels and need of blood transfusion was recorded. The results were statistically compared. The mean blood loss fall in HB levels and need of blood transfusions revealed statistically significant differences.
Methods: Total 72 patients diagnosed with primary tricompartmental osteoarthritis were divided into two groups retrospectively. Group 1 (IV only): 1 gm IV Tranexamic acid bolus 10 min before deflating the tourniquet. Group 2 (IV + Local): 1 gm IV Tranexamic acid bolus 10 min before deflating the tourniquet and 1 gm Tranexamic Acid in 50 ml saline locally at the time of closure.
Results: It was observed that higher post op blood loss, higher fall in haemoglobin (HB) levels and higher requirement of blood transfusions were associated with group 1 as compared to 2.
Conclusions: The study inferred that the combination of local and systemic tranexamic acid was superior than systemic administration alone with lower post op blood loss, lower rates of blood transfusion and lower fall in haemoglobin levels without any added complications.

Keywords: Total knee replacement, Tranexamic acid, Haemoglobin, Blood transfusion

INTRODUCTION

Total knee replacement is the only surgical option currently available in case of well-established tri-compartmental osteoarthritis. Intra and postoperative bleeding remains one of the main concerns in total knee arthroplasty (TKA), with blood loss ranging between 1000±500 ml.[1] The use of a pneumatic tourniquet ensures a dry surgical field and minimal intraoperative bleeding, but it augments fibrinolysis stimulated by surgical trauma.[2-7] This activation of the fibrinolytic system might lead to high postoperative blood loss . Different methods to reduce perioperative blood loss have been studied, such as perioperative blood donation, perioperative red cell salvage, deliberate hypotension, and use of recombinant human erythropoietin. Furthermore, perioperative transfusions add to the costs of the treatment and the risks (of infection, allergic reaction and disease transmission, for example) to the patient.[8]

In recent times, pharmacological approaches are attracting a lot of attention. As hyperfibrinolysis is considered one of

the major causes of postoperative bleeding after TKA surgery, antifibrinolytic drugs have been proposed, including aprotin, aminocaproic acid, and tranexamic acid (TXA).

Tranexamic acid[9-12]

Tranexamic acid is used in orthopaedic surgery to reduce blood loss, to the extent of reducing or altogether abolishing the need for perioperative blood collection. It is of proven value in clearing the field of surgery and reducing blood loss when given before or after surgery. Drain and number of transfusions are reduced.

Tranexamic acid is a synthetic analogy of the amino acid lysine. It serves as an antifibrinolytic by reversibly binding four to five lysine receptor sites on plasminogen. This reduces conversion of plasminogen to plasmin, preventing fibrin degradation and preserving the framework of fibrin's matrix structure. Tranexamic acid has roughly eight times the antifibrinolytic activity of an older analogue, ε-aminocaproic acid. TXA inhibits fibrin cleavage, thus reduc-ing the risk of haemorrhage. TXA also directly inhibits the activity of plasmin with weak potency (IC50=87 mM) and it can block the active-site of urokinase plasminogen activator (uPA) with high specificity (Ki=2 mM) among all the serine proteases. Plasma protein binding of 3%. Low hepatic metabolism and 95% renal clearance and half-life approximately 2.3 hours.

The aim of the present study was to compare the efficacy of systemic versus systemic plus local administration of TXA in reducing blood loss after TKA.

METHODS

Source of data

The retrospective study was conducted in a tertiary institute by collecting data of 72 cases of tricompartmental knee primary osteoarthritis who have undergone unilateral total knee arthroplasty at Manipal Hospital, Goa from January 2016 to December 2018.

The data collected from medical record department of Manipal Hospital. Data was statistically analysed to reach a conclusion. Analysis is descriptive with limitation as patients were analysed from the time of surgery till the post operative day 3. All cases operated by two surgeons with same techniques and same anaesthesia protocol.

Study design

This is a comparative retrospective study in which patients were admitted and operated at Manipal Hospital from January 2016 to December 2018.The comparison in terms of: post-operative blood loss, fall in haemoglobin level post operative, post operative blood transfusion rate.

All patients underwent TKR by cemented, medial para-patellar, and posterior cruciate ligament substituting method. Tourniquet were used in all patient which was inflated before the incision and was deflated at the time of closure. Tablet Rivaroxaban 10 mg OD started for all patients from POD1 for prophylaxis against DVT. All patients received rehabilitation after the surgery including pain management, exercises for Range of Motion (ROM) re-gaining and muscular strength enhancement. The exercises majorly included active ankle pumping for deep venous thrombosis prevention and oedema control, active and active-assisted ROM exercises of knee flexion and extension, strengthening knee joint musculature with special emphasis on knee extensors by isometric method progressing to isotonic exercise and gait education with walker and cane. Exercise performance was supervised by a physiotherapist.

Ethical approval

No ethical approval was required as it's a retrospective study and patients personal details not mentioned in the study.

Software statistical package for social sciences (SPSS) version 20.0 used for statistical analysis.

Use of tranexamic acid

Group 1 (IV only)

1 gm IV Tranexamic acid bolus 10 min before deflating the tourniquet.

Group 2 (IV + Local)

1 gm IV Tranexamic acid bolus 10 min before deflating the tourniquet and 1 gm Tranexamic Acid in 50 ml saline locally at the time of closure.

Inclusion criteria

Surgically fit patients more than 50 years of age who has been diagnosed as having tri compartmental primary osteoarthritis knee.

Exclusion criteria

Known RA of knee, complicated surgeries with need for computer navigation, age less than 50 years, patients with preop Hb levels less than 10, revision TKRs, patients with contraindications to Tranexamic acid administration (a medical history of DVT or pulmonary thromboembolism, acute myocardial infarction, heart failure, heart valve stenosis, ischemic stroke, coagulopathy, allergy to TXA, severe liver or kidney disease), patient with known coagulation disorders.

RESULTS

The average post operative drain on day 1 in group 1 cases was 275.4 which was noted to be significantly higher than in group 2.

Table 1: Post-operative day1 drain collection.

Group statistics (significant)				
	Tranexamic acid	**N**	**Mean**	**Std. Deviation**
Post op D1 drain (in ml)	Group1	35	275.43	92.192
	Group2	37	179.57	114.250

Furthermore, the average post op drain on day 2 in group 1 also appeared to be considerably higher than group 2 by almost 40.6 ml. In Addition to this, more number of drains were retained in group 1 patients as compared to group 2 on post operative day.

Table 2: Post-operative day2 drain collection.

Group statistics (highly significant)				
	Tranexamic acid	**N**	**Mean**	**Std. Deviation**
Post op D2 drain (in ml)	Group1	35	128.66	44.881
	Group2	37	88.24	58.360

Also, preoperative hemoglobin levels were almost identical in both the groups, however there was a significant drop in post op hemoglobin in group 1 as compared to group 2. Lastly, higher incidences of blood transfusion was observed in group 1 but it was not statistically significant.

Table 3: Day 3 post-operative drain retention.

Local tranexamic acid * Post operative D3 drain crosstabulation (Very Highly Significant)					
			Post op D3 drain		**Total**
			Retained	**Removed**	
Local Tranexamic acid	Group1	Count	12	23	35
		% within Local Tranexamic acid	34.3%	65.7%	100.0%
	Group2	Count	0	37	37
		% within Local Tranexamic acid	0.0%	100.0%	100.0%
Total		Count	12	60	72
		% within Local Tranexamic acid	16.7%	83.3%	100.0%

Table 4: Preoperative hemoglobin levels.

Group Statistics (Not Significant)				
	Local tranexamic acid	**N**	**Mean**	**Std. Deviation**
Pre-operative Hb (in gm/dl)	Group1	35	12.78429	1.103042
	Group2	37	12.62173	1.060483

Table 5: Post-operative hemoglobin levels.

Group Statistics (Not Significant)				
	Local tranexamic acid	**N**	**Mean**	**Std. Deviation**
Post-operative Hb (in gm/dl)	Group1	35	11.11200000000 0000	1.121652667220273
	Group2	37	11.48445945945 9460	1.258539598869230

Table 6: Fall in hemoglobin levels.

Group Statistics (Very Highly Significant)					
	Local Tranexamic acid	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Fall in Hb	Group1	35	1.6780	0.63172	0.10678
	Group2	37	1.1373	0.61306	0.10079

Table 7: Blood transfusions.

Local Tranexamic acid * Packed red blood cell Crosstabulation (Not Significant)					
			Packed red blood cell		Total
			1	Not given	
Local Tranexamic acid	Group1	Count	4	31	35
		% within Local Tranexamic acid	11.4%	88.6%	100.0%
	Group2	Count	1	36	37
		% within Local Tranexamic acid	2.7%	97.3%	100.0%
Total		Count	5	67	72
		% within Local Tranexamic acid	6.9%	93.1%	100.0%

DISCUSSION

Perioperative blood loss is an inevitable complication of revision TKA, which could lead to anaemia. Effective blood management can minimize blood loss and transfusions such that patients achieve better results. This study demonstrated that TXA is effective in reducing total blood loss, transfusion rate and blood in the drain, without increasing the rate of complications. Furthermore far better results in terms of lesser post-operative blood loss, lesser rates of blood transfusions and lower fall of post operative Hb was evident when Systemic Tranexamic acid was coupled with local infusion.

Table 8: Summary of meta-analyses on the efficacy of tranexamic acid in total knee arthroplasty.

Author	Year	Protocol	Studies	Outcomes evaluated	Results
Alshryda et al[17]	2011	IV or topical or oral	19 RCTs (18 involving IV administration, 1 IA administration, and 1 oral administration)	Blood loss, transfusion rate	Reduction in blood loss (MD 591 ml; 95% CI 536 to 647, p<0.001; heterogeneity I^2 = 78%), reduction in transfusion rate (RR 2.56, 95% CI 2.1 to 3.1, p<0.001; heterogeneity I^2 = 75%)
Zhang et al[18]	2012	IV	15 RCTs	Blood loss, transfusion rate	Reduction in blood loss (MD 487ml, 95% CI −629 to −344), reduction in transfusion rate (risk difference −0.4, p<0.00001)
Panteli et al[19]	2013	Topical	7 (4 RCTs, 1 PCS, 2 quasi-RCTs)	Blood loss, haemoglobin drop, transfusion rate	Reduction in total blood loss (MD = −220.08 ml, p<0.00001, 95% CI = −279.54 ml to −160.63 ml), maximum haemoglobin drop (MD = −0.94 gr/dl, 95% CI = −1.24 gr/dl to −0.65 gr/dl, p< 0.00001); lower risk of transfusions (RR = 0.47, p=0.01, 95% CI = 0.26 to 0.84)
Wang et al20	2014	IV or topical	6 (5 RCTs, 1 PCS)	Total blood loss, Hemoglobin drop, drain output, transfusion rate	No differences as regards total blood loss (MD −14.36, 95% CI −92.02 to 63.30), haemoglobin loss (MD 0.43, 95% CI −0.25 to 1,11), total drain output (MD 21.91, 95% CI −85.01 to 128.82), transfusion rate (RR 1.02, 95% CI 0.70 to 1.9)
Alshryda et al[21]	2014	Topical	14 RCTs (11 knee replacement, 1 hip replacement, 1 both)	Transfusion rate	Reduction in transfusion rate (RR 4.51; 95% CI: 3.02 to 6.72; p<0.001; heterogeneity I^2= 0%)

Continued.

Author	Year	Protocol	Studies	Outcomes evaluated	Results
Kim et al[22]	2014	IV or topical	28 RCTs (22 involving IV administration; 6 IA administration)	Blood loss, drain output, transfusion rate	Reduction in blood loss (range = 191 ml to 942 ml, 14 % to 64 % reduction), drain output (range = 65 ml, 8% reduction to 785 ml, 66% reduction), haemoglobin drop (range = 0.4 g/dl, to 2.8 g/dl, 12% to 70% reduction). Variability in transfusion rate and conflicting results in comparison between IV and topical
Wu et al[23]	2015	IV or topical	34 RCTs	Blood loss (intra operative and postoperative), haemoglobin drop, safety	Reduction in total blood loss [IA (SMD −0.86, 95%CI −1.14 to −0.59, p=0.000) IV (SMD = −1.01, 95%CI −1.43 to −0.60; p=0.00)], in postoperative blood loss [IA (SMD = −1.32, 95 % CI −2.08 to −0.55; p=0.001) IV (SMD = −1.11, 95%CI −1.61 to −0.61; p=0.000)]. No reduction in intraoperative blood loss. Reduction in haemoglobin drop [IA (SMD = −0.65, 95%CI −0.96 to −0.35; p=0.000) IV (SMD = −0.85, 95 CI −1.26 to −0.44; p=0.000)]. No complications
Shemshaki et al[24]	2015	IV or topical	31 RCTs	Blood loss, transfusion rate, comparison between IA and IV	Reduction in blood loss [IV (MD = 392.72 ml, 95% CI 528.12 to −257.33; p<0.001) IA (MD = 282.44 ml, 95%CI 574.73 to 9.85; p<0.001)], reduction in transfusion rate [IV (RR 0.44; 95% CI 0.33 to 0.59; p<0.001) IA (RR 0.27; 95% CI 0.16–0.45; p<0.001)]. No differences between IV or IA administration (blood loss p=0.50; transfusion rate p=0.30)
Yue et al[25]	2015	Topical	12 RCTs	Blood loss, transfusion rate, comparison of dosages	Reduction in blood loss (MD −280.65 ml, 95% CI, −376.43 to −184.88; p<0.00001); reduction in transfusion rate (risk ratio=0.26; 95% CI,. 0.19 to 0.37; p<0.00001; heterogeneity I^2=34%); reduction in drainage output (MD −194.59 ml, 95% CI, −315.86 to −73.32; p<0.002; heterogeneity I^2=63%). High concentration is better than low concentration (total blood loss: mean reduction of 335.79 ml in high concentration group versus 213.47 ml in low concentration group; transfusion rate: risk ratio=0.23 in high concentration group versus 0,37 in low concentration group)

Abbreviations: TXA = tranexamic acid; IV = intravenous; IA = intra-articular; CI = confidence interval; MD = mean difference; SMD = standardized mean difference; RR = risk ratio; RCT = randomized controlled trial; Quasi-RCT = quasi-randomized controlled trial; PCS = prospective cohort study.

The regimen proposed in the study was based on review of literature and our experience.

It has been demonstrated via various study that TXA is effective as well as safe when given by systemic or local route.[13]

Levine et al., in a randomized controlled trial, demonstrated that a standard dose of 1 g IV can be used with the same efficacy as weighted doses (20 mg/kg).[14] Iwai et al. demonstrated that a double IV dose of TXA produced a further reduction of postoperative blood loss in TKA compared to a single administration, especially if the doses were given preoperatively and intraoperatively.[15] Similarly, Maniar et al., also in a Prospective study (RCT), demonstrated that a three-dose regimen (adding a postoperative dose) may be even more effective than single dose regimens.[16]

Most of the studies summarised below confirmed the effectiveness of varied doses of IV TXA in minimising post op blood loss and need for blood transfusions.

Table 9: Summary of randomized controlled trials on the efficacy of tranexamic acid in total knee arthroplasty.

Author	Year	Number of patients	Protocol	Outcomes evaluated	Results
Jain et al[26]	2016	119	IV versuscombined	Blood loss, transfusion rate	Combined use of IV and topical TXA provided better results than IV use alone: less total blood loss (p=0.001), lower transfusion rate (p=0.001), smaller haemoglobin drop (p=0.001).
Aguilera et al[27]	2015	150	IV (2 g) or topical (1g) versus placebo	Blood loss, transfusion rate, hidden blood loss, safety	Both effective in reducing loss (p=0.001), reduction in transfusion rate; no differences between the two TXA groups (p=0.073)
Shen et al[28]	2015	92	IV 15 mg/kg in 100 ml saline, 10 minutes before tourniquet release	Intraoperative blood loss; postoperative drainage at 12 h; total drain amount; hidden blood loss; total blood loss; transfusion volumes; number of transfusions; postoperative haemoglobin at 1, 3, and 5 days; D-dimer; number of lower limb ecchymose	Significant reduction in postoperative drainage amount at 12 h (p=0.000), total drain amount (p=0.000), hidden blood loss (p=0.001), total blood loss (p=0.004), and postoperative D-dimer value at 24 h (p=0.000).
Hourlier et al[29]	2015	106	IV single dose 30 mg/kg intraoperative versu s 10 mg/kg + 2 mg/kg as continuous infusion 2 h later for 20 h	Blood loss, safety	A single bolus of TXA 30 mg/kg is as effective as a continuous infusion (p=0.68)
Karaaslan et al[30]	2015	81 undergoin g bilateral TKA	IV 15 mg/kg 10 min before inflation of the tourniquet (and continued at 10 mg/kg for 3 h) + 3 g IA 10 min before deflation of the tourniquet	Volume of drained blood 48 h postoperatively, decrease in haemoglobin levels 12 h postoperatively, amount of blood transfused	Drained blood (p=0.05), haemoglobin drop (p=0.05) and transfused units were lower in the TXA group compared with controls
Carvalho et al[31]	2015	125	IA 1.5 and 3.0 g in povidone-iodine solution	Mean postoperative haemoglobin levels, blood loss, safety	Higher mean haemoglobin level (p=0.001, p=0.003) and lower blood loss (p=0.07, p=0.09) in the TXA group compared with controls
Lin et al[32]	2015	120	Combined versus I A versusplacebo drop; total drain amount	Mean total blood, transfusion rate; postoperative haemoglobin	Combining preoperative IV injection and topical administration of TXA can effectively reduce blood loss (p=0.001), total drain amount (p=0.001) and transfusion rate (p=0.009).

Continued.

Author	Year	Number of patients	Protocol	Outcomes evaluated	Results
Gomez-Barrena et al[33]	2014	78	IA 3 g in 100 ml saline and two 15 mg/kg IV doses (before tourniquet release and after three hours)	Drain blood loss at 24 and 48 hours, transfusion rate	Topical administration is as effective and safe as IV administration, with no differences in blood loss at 24 h (p=0.948), blood loss at 48h (p=0.837) or transfusion rate (0% in both groups)
Yang et al[34]	2015	80	IA 500 mg in 20 ml saline	Blood loss, transfusion rate, safety	Less total blood loss and lower transfusion rate in the TXA group compared with controls (p=0.05)
Huang et al[35]	2014	184	IV 3 g versuscombined IV 1.5 g + topical 1.5 g	Transfusion rate, total blood loss, safety	Combined administration obtains smaller maximum decline of haemoglobin p=0.031), smaller drain volume (p=0.011), less postoperative knee pain, less knee swelling, shorter length of hospital stays. No differences in transfusion rate
Soni et al[36]	2014	40	3 IV doses versus topical	Blood loss, blood in drain	No differences in haemoglobin drop (p=0.38) and blood in drain (p=0.48)
Patel et al[37]	2014	89	IV 10 mg/kg versus topical 2 g	Hemoglobin level, total drain output, transfusion rate	Systemic and topical TXA administration found to be equally effective as in terms of haemoglobin drop (p=0.108), transfusion rate (p=0.342), total drain output (p=0.339) and safety
Sarzaeem et al[38]		200	IV 1500 mg versus IA 3 g in 100 cc saline versus1.5 g injected through the drain versus placebo	Hemoglobin drop, blood in drain, transfusion rate	All administrations showed smaller haemoglobin drop versus controls (p=0.05); IV administration is more effective in reducing haemoglobin drop p=0.05) and transfused units (p=0.031) compared with other groups. Joint irrigation is better than drug administration through the drain for obtaining haemoglobin drop (p=0.001)
Sa-Ngasoongsong et al[39]	2013	135	IA 250 mg versus IA 500 mg (both injected through the drain with a 2 h drain clamping)	Hemoglobin drop, transfusion rate, safety	The two protocols were equally effective in reducing total blood loss (p=0.001) and transfusion rate (p=0.05)
Alshryda et al[40]	2013	157	Topical	Blood transfusion rate, drain blood loss, haemoglobin drop, generic quality of life (EuroQol), length of stay, cost, safety	Topical TXA administration is effective in reducing transfusion rate (p=0.001), blood loss (p=0.0003) and length of stay (p=0.041)

Continued.

Author	Year	Number of patients	Protocol	Outcomes evaluated	Results
Georgiadis et al[41]	2013	101	IA 2 g in 75 saline versus placebo	Blood loss, transfusion rate, safety	Smaller haemoglobin loss and calculated blood loss in TXA group (p=0.001); differences were not significant for transfusion rate
Lee et al[42]	2013	72	IV in patients undergoing prophylaxis with factor Xa inhibitor	Blood loss, transfusion rate, blood in drain, safety	The treatment group showed reduced transfusion rate (p=0.007) and blood in drain (p=0.001). No differences were detectable regarding haemoglobin drop. There was no interaction with factor Xa inhibitor
Seo et al[43]	2013	150	IV 1.5 g in 100cc saline versus IA 1.5 g in 100cc saline	Blood loss, transfusion rate	Both TXA groups showed significantly reduced amount of blood loss (p=0.001) and transfusion rate (p=0.001) compared with the placebo group. IA administration seems to be more effective than systemic administration
Chareancholvanich et al[44]	2012	240	IV 10 mg/kg 20 min before inflating the tourniquet, repeated 3 hours after surgery + 1500 mg /day of oral TXA for 5 days + drainage clamping	Blood in drain at 48 hours postoperatively,hemoglobin drop, transfusion rate	TXA is effective in reducing volumes of drained blood and amount of blood transfusion compared with placebo (p=0.005) Drain clamping combined with TXA administration is more effective than using TXA or drain clamping alone as regards haemoglobin levels (p=0.001) and transfusion rate (p=0.05)
Lin et al[45]	2012	151	IV 1 dose of 10 mg/kg versus IV 2 doses of 10mg/kg versusplacebo	Hemoglobin drop, transfusion rate	A single dose is effective in reducing blood loss (p=0.0001) and transfusion rate (p=0.006). No differences between single and double dose administration (blood loss p=0.148; transfusion rate p=0.672)
Roy et al[46]	2012	50	IA 500 mg/5 ml saline (through the drain after wound closure)	Blood loss, blood in drain, transfusion rate	IA TXA administration is effective in reducing both haemoglobin drop (p=0.05) and total drain collection at 48 hours (p=0.001)
Lin et al[47]	2011	100	IV 10 mg/kg	Blood loss, transfusion rate	Effective in reducing both total blood loss (p=0.001) and hidden blood loss (p=0.01)
Ishida et al[48]	2011	100	IA 2 g/20 ml saline (through the drain after wound closure)	Blood loss, blood in drain, transfusion rate, leg diameter	Decreased blood loss (p=0.01) and less knee joint swelling (circumference at the superior patellar border) in TXA group versus controls p=0.05

Abbreviations: TXA = tranexamic acid; TKA= total knee arthroplasty; IV= intravenous; IA= intra-articular; Hb= haemoglobin.

Although, some researchers reported a potential increased risk of thrombotic events and some cases of allergic reaction, this study however did not come across any of these complications.[49] Different Authors have studied the efficacy of IA administration, proposing different doses

and multiple methods of local administration (washing or through the drain). In particular, Georgiadis et al. randomized patients to two groups receiving either 2 g of TXA in 75 ml of saline or a placebo solution intraoperatively.[41] The Authors demonstrated a significant reduction of total blood loss in the TXA group, without the potential complications related to IV administration. Patel et al., in a study of 89 patients who underwent a primary TKA, demonstrated that IV administration of 10 mg/kg of TXA and IA admin-istration of 2 g TXA were equally effective in reducing blood loss.[37] Similarly, various recent studies have demon-strated the efficacy of IA TXA administration in reducing blood loss after TKA.

In addition to this, few recent meta-analyses showed no difference between topical and IV TXA administration, even though some authors reported conflicting results.

Very few studies have compared systemic TXA against local TXA. Jain et al. showed better results in terms of mean total blood loss, transfusion rate and haemoglobin drop, using a combined protocol compared to only IV administration.[26] Similarly, Lin et al., in a study of 120 patients, demonstrated greater reductions in blood loss, haemoglobin drop, total drain amount and transfusion rate using a combined protocol compared to IA administration alone.[32] Karaaslan et al. evaluated the efficacy of an association of three different methods of TXA administration in bilateral TKA: a bolus dose of 15 mg/kg 10 min before the inflation of the tourniquet, followed by IA administration of 3 g 10 min before the deflation of the tourniquet, associated with an IV infusion of 10 mg/kg/h for 3h following the surgery. The authors concluded that this method of TXA administration was effective in reducing total blood loss in bilateral TKA.[30] Huang et al. compared the results of IV TXA administration (3 g) with those of a combined approach (1.5 g IA and 1.5 g IV). The Authors concluded that the two approaches were similarly effective in reducing transfusion rate and total blood loss, but the combined protocol gave better results in terms of maximum decline of haemoglobin, drainage volume, postoperative knee pain, knee swelling, length of hospital stays and short-term satisfaction.[45]

In view of the established efficacy of TXA in TKA irrespective of the method of administration, we conducted a preliminary retrospective study in 72 patients, divided into IV group and IA + IV group. The aim of this study was to evaluate whether one method of administration was more effective than the other. The results of the study showed marked differences in haemoglobin loss, amount of blood in the drain, and rate of transfusions between the combined protocol and systemic administration alone.

The main limitation in the study is the absence of a control group. That said, the efficacy of TXA, whether administered topically or systemically, has previously been extensively described and is widely accepted. Finally, the power of the study was certainly reduced by the small size of the sample. However, these are preliminary data, and the study will be continued, introducing a randomization procedure, to confirm the significance of the results obtained.

CONCLUSION

The study inferred that the combination of local and systemic tranexamic acid was superior than systemic administration alone with lower post op blood loss, lower rates of blood transfusion and lower fall in haemoglobin levels with-out any added complications.

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Ethical approval: The study was approved by the institutional ethics committee

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