The efficacy of adjunctive local tranexamic acid for blood salvage in patient undergoing palliative decompressive spinal metastasis surgery

A Randomized double-blinded controlled trial

Ronnakrit Maethungkul, M.D. , Apiruk Sangsin, M.D., Ph.D.

Department of Orthopaedics, Faculty of Medicine, Chiangmai University, Chiangmai, Thailand

Introduction

Palliative decompressive spinal metastatic surgery is associated with massive perioperative and postoperative blood loss and transfusion rate. The mean blood loss of more than 1000 ml with more than 3 U blood transfusion was reported. Many methods are used to minimize peri- and post-operative bleeding. Intravenous tranexamic acid (iTXA) has shown to reduced blood loss and proportion of patients receiving a blood transfusion in spine surgery. Concerning in thromboembolic events and cardiovascular complications, topical tranexamic acid (tTXA) was used in traumatic or degenerative spinal surgeries and showed similar efficacies compared with intravenous route but there was no study examined the efficacy of tTXA in palliative decompressive spinal metastatic surgery.

The present study examined the efficacies of adjunctive tTXA in term of post-operative blood loss and packed red cells (PRC) transfusion in patient underwent palliative decompressive spinal metastatic surgery due to malignant epidural spinal cord compression.

Method

This single-center, randomized, double-blind, placebo-controlled study was conducted at the Department of Orthopaedics, Faculty of Medicine, Chiang Mai, University, Thailand. The trial included 65 patients undergoing palliative decompressive spinal metastatic surgery according to malignant epidural spinal cord compression. The trial was approved by Institutional ethical board committee, Faculty of Medicine, Chiang Mai University (ORT-2561-05719), and registered with Thai Clinical Trial Registry.co.th (TCTR20190831001)

Patients with malignant epidural spinal cord compression who underwent palliative decompressive spinal surgery and were ≥ 18 years of age and able to give informed consent were screened for inclusion. Patient were, in general, not excluded on the basis of comorbidity; however, exclusion criteria were known allergic reaction to TXA, coagulopathy, history of thromboembolic events, renal insufficiency with creatinine level ≥ 2 mg/dL, pregnancy, lactation, or high-risk surgery (American Society of Anesthesiologist level 4)

Randomization was performed using computerized stratified block randomization in hypervascular (hepatocellular carcinoma, renal cell carcinoma, thyroid cancer and hematologic malignancy) and non-hypervascular tumor

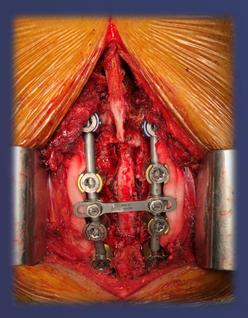
Intention to treat analysis was used in our study

- **Standard General Anesthetics**
- **1 g tranexamic acid, 30 mins before skin incision**
- **Same technique and same orthopedic surgeon**

Before wound closure

Treatment group

1 g tranexamic acid (20ml)
+
Absorbable gelatin sponge
(1x5x7 cm^3)



Placebo group

Normal saline 20 ml
+
Absorbable gelatin sponge
(1x5x7 cm^3)

Postoperative blood loss = Total blood loss – Intraoperative blood loss
(Gross formula) *(Suction container, gauze, swab)*

Result

Group	Local TXA (N=33)	Placebo (N=32)
Age	57.21±10.8	58.66±12.56
Sex (% male, % female)	69.7, 30.3	59.38, 40.63
Weight	59.27±11.46	57.84±10.29
Height	162.67±8	160.47±7.74
Body mass index (kg/m^2)	22.29±3.26	22.39±3.17
Pre-operative Hb/ Hct	12.37±1.89 / 37.72±5.09	11.72±1.52 / 35.8±4.38
Pre-operative platelet count	301,969.7±96538.04	290,218.8±98347.55
Pre-operative PT	11.72±1.11	11.64±0.98
Pre-operative PTT	29.35±3.31	30.66±4.81
Pre-operative INR	1.07±0.1	1.06±0.09
No. of hypervacular tumor patient (%)	33.33	34.38
Operative times (mins)	250.15±51.26	242.34±49.59
Decompression level (no. of patients, %) 0 levels 1-2 levels 3-4 levels >4 levels	 4 (12.12%) 20 (60.6%) 8 (24.24%) 1 (3.03%)	 2 (6.25%) 19 (59.38%) 9 (28.13%) 2 (6.26%)
Instrumentation level (no. of patients, %) < 6 6-9 >9	 26 (78.78%) 6 (18.18%) 1 (3.13%)	 22 (68.77%) 9 (28.13%) 1 (3.13%)

Table 1: Baseline Characteristic

Group	Local TXA (N=33)	Placebo (N=32)	P-value
Intraoperative blood loss (ml)	589.39±381.1	648.43±464.98	0.84
Postoperative blood loss (ml)	790.3±492.97	670.11±526.53	0.24
Total blood loss (ml)	1379.7±673.10	1318±659.25	0.77
PRC transfusion within D3 (no. of patients, %) 0 unit 1 unit >1 unit	 18 (54.55%) 12 (36.36%) 3 (9.09%)	 16 (50%) 10 (31.25%) 6 (18.75%)	0.59

Table 2: Postoperative outcome

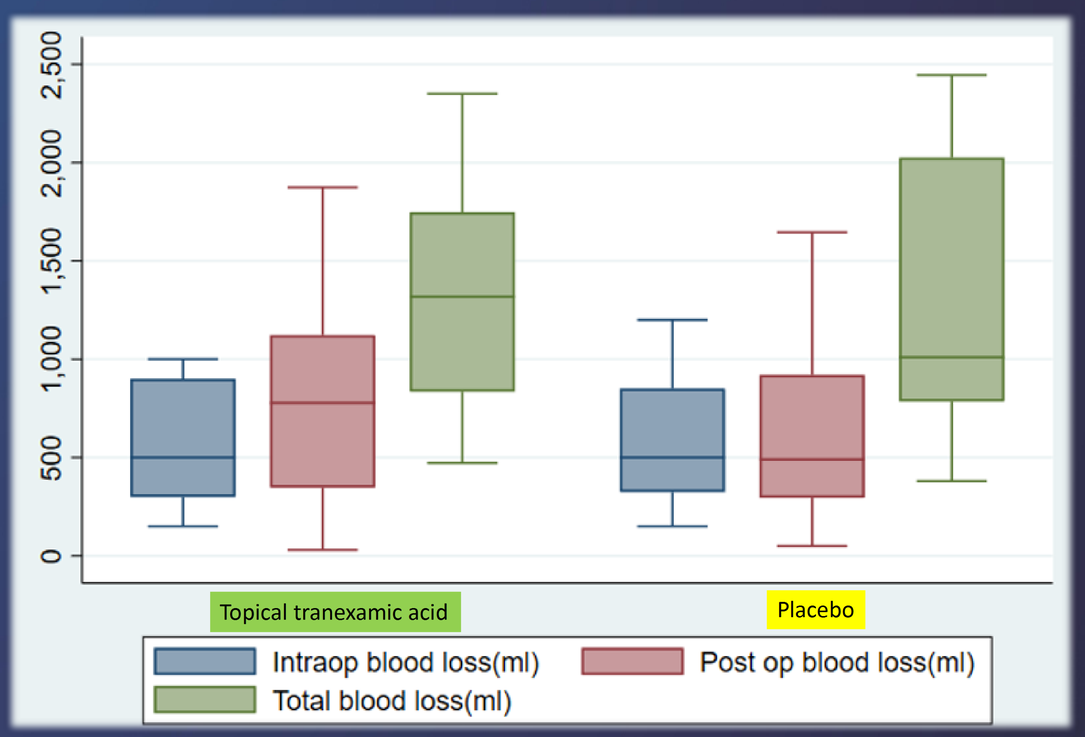


Figure1: Boxplot compare blood loss between treatment and placebo group

Discussion and Conclusion

Our study demonstrated that no significant difference between treatment group and placebo in terms of total blood loss, intraoperative blood loss, post operative blood loss and also post-operative PRC transfusion. No complication from tranexamic acid was found in this study.

No additional benefit of adjuctive topical tranexamic acid to standard prophylactic intravenous tranexamic acid for blood salvage and transfusion rate in patient undergoing decompressive spinal metastasis surgery

Reference

1. Gross MDJeffrey B. Estimating Allowable Blood LossCorrected for Dilution. Anesthesiology. 1983;58(3):277-80
2. Bednar DA, Bednar VA, Chaudhary A, Farrokhyar F. Tranexamic acid for hemostasis in the surgical treatment of metastatic tumors of the spine. Spine (Phila Pa 1976). 2006;31(8):954-7.
3. Chen Y, Tai BC, Nayak D, Kumar N, Chua KH, Lim JW, et al. Blood loss in spinal tumour surgery and surgery for metastatic spinal disease: a meta-analysis. Bone Joint J. 2013;95-B(5):683-8.
4. Cheriyan T, Maier SP, 2nd, Bianco K, Slobodyanyuk K, Rattenni RN, Lafage V, et al. Efficacy of tranexamic acid on surgical bleeding in spine surgery: a meta-analysis. Spine J. 2015;15(4):752-61.
5. Kumar N, Zaw AS, Khine HE, Maharajan K, Wai KL, Tan B, et al. Blood Loss and Transfusion Requirements in Metastatic Spinal Tumor Surgery: Evaluation of Influencing Factors. Ann Surg Oncol. 2016;23(6):2079-86.
6. Winter SF, Santaguida C, Wong J, Fehlings MG. Systemic and Topical Use of Tranexamic Acid in Spinal Surgery: A Systematic Review. Global spine journal. 2016;6(3):284-95.
7. Liang J, Liu H, Huang X, Xiong W, Zhao H, Chua S, et al. Using tranexamic acid soaked absorbable gelatin sponge following complex posterior lumbar spine surgery: A randomized control trial. Clin Neurol Neurosurg. 2016;147:110-4.