The Effect of Topical Tranexamic Acid in Reduction of Postoperative Blood Loss after Posterior Instrumented Cervical Spinal Fusion: A Retrospective Comparative Study

Akom Prommahachai, MD

Devision of Orthopaedic Surgery, Udon Thani Hospital, Udon Thani, Thailand

Purpose: *to evaluate the efficacy of topical tranexamic acid on postoperative blood loss reduction, risk of blood transfusion and postoperative complications in patients undergone posterior cervical spine surgery compared with a control group.*

Methods: *Retrospectively non-randomized observational study was conducted. The clinical data of patients who underwent posterior cervical spine instrumented fusion in Udon Thani hospital from October 2016 to March 2021 were included. Perioperative and postoperative outcomes were analyzed to compare between 20 patients received local tranexamic acid before wound closure and another 20 patients with no tranexamic usage as a control group.*

Results: *A total of 40 cases undergone posterior cervical spinal instrumented fusion procedure were enrolled, of which male to female ratio was 33:7 and mean age was 55.0±15 years. The mean of drainage volume was significantly lower in the topical tranexamic acid group than in the control group during the first 24 hour after surgery (163.0±78.8 versus 280.5±115.1 ml, p-value 0.001). The mean total drainage volume was significantly lower in the topical tranexamic acid group than in the control group (293.5±126.71 ml versus 456.3±174.56 ml, p-value 0.002). Postoperative blood transfusion rate was lower in the tranexamic acid group (5%) than the control group (35%) (Odd ratio 0.0977, 95% confidence interval 0.0107 to 0.8918; p-value 0.03). The mean duration of postoperative hospitalization was significant shorter in the topical tranexamic acid group (6.8±4.58 days) than the control group (11.6±7.37 days), p-value 0.019.*

Conclusion: *The local administration of 500 mg of tranexamic acid to the surgical site in posterior instrumented cervical spine fusion reduces postoperative blood loss from drainage output, decreases risk of blood transfusion, and shortens postoperative hospital stay without an increase in the risk of systemic thrombosis or other complications.*

Keywords: *topical tranexamic acid, postoperative blood loss, cervical spine surgery*

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Introduction

Posterior cervical instrumented fusion can be used to treat cervical spine conditions because it provides rigidly immediate stabilization and early rehabilitation including fastened ambulation to patients. Perioperative blood loss is one of the most common complications for the surgery. This condition causes surgical wound hematoma, wound infection, prolonged retained drainage leading to prolonged hospitalization and postoperative anemia followed by risks of blood transfusion[1]. Potential problems associated with blood transfusion include disease transmission, transfusion reactions, and infections[2]. The causes of perioperative blood loss lie in surgical techniques such as multilevel cervical spinal fusion requiring a longer operative time, extensive soft tissue dissection associated multiple level of surgical address, and a difficult level of fusion (upper cervical spine surgery).

Various measures have been used to decrease perioperative blood loss and reduce risks of blood transfusion, such as intraoperative cell saver machine[3], deliberate hypotensive anesthesia[4], and anti-fibrinolytic agents. An anti-fibrinolytic agent, tranexamic acid, has been investigated in many clinical trials including systemic review[5] and proven that systemic tranexamic acid can control perioperative bleeding and reduce postoperative blood transfusion significantly[6]. Nevertheless, many surgeons are concerned whether the effects of systemically administered tranexamic acid can result systemic thrombotic events such as myocardial infarction, stroke, deep vein thrombosis and pulmonary embolism[7]. To eliminate thrombotic events from systemic administration, topical tranexamic acid has been used in many studies[8] and appeared to be effective to reduce perioperative blood loss significantly in many orthopedic procedures including lumbar spine

Correspondence to: Prommahachai A. Devision of Orthopaedic Surgery, Udon Thani Hospital, Udon Thani, Thailand
E-mail: prommahachai@gmail.com

surgery[9-11]. However, the evidence of the locally tranexamic acid usage in cervical spine surgery is scarce[12]. Few studies have been reported using topical tranexamic acid in posterior cervical spine surgery to date.

The primary objective was to evaluate the efficacy of topical tranexamic acid on postoperative blood loss and blood transfusion rate in patients receiving posterior instrumented cervical spine fusion compared with a control group. The second purpose was to observe the perioperative complications that may be associated with the local tranexamic acid administration.

Methods

Study population

A retrospectively non-randomized observational study was conducted. The clinical data of patients who received posterior cervical spine fusion from 1 October 2016 to 31 March 2021 were analyzed. Twenty consecutive patients with locally tranexamic acid administration were included first. Then another 20 patients who were not given tranexamic acid were chosen for a control group.

The study was approved by the Udon Thani hospital ethics committee (registration number: I055/2563). The inclusion criteria were male or female patients with age of 18 to 80-years-old having cervical spinal diseases and/or cervical spine trauma receiving posterior instrumented cervical spine fusion (including posterior decompressive laminectomy and instrumented fusion, or posterior cervical instrumented fusion alone). Patients with previous history of thromboembolic events (pulmonary embolism, deep venous thrombosis and embolic stroke), previous history of using NSAIDs within one week preoperatively, coagulation disorders, cervical spine infection, cervical spine malignancy, renal insufficiency, cardiovascular diseases (unstable angina, recent myocardial infarction, and uncontrolled hypertension), intraoperative dural tear, history of tranexamic acid allergy, preoperative hemoglobin<10 g/dL, preoperative platelet count $<100\times109$/L, combined anterior and posterior cervical spine surgery or combined cervical spine fusion with other surgical procedures were excluded from the study to obtain a homogeneous group.

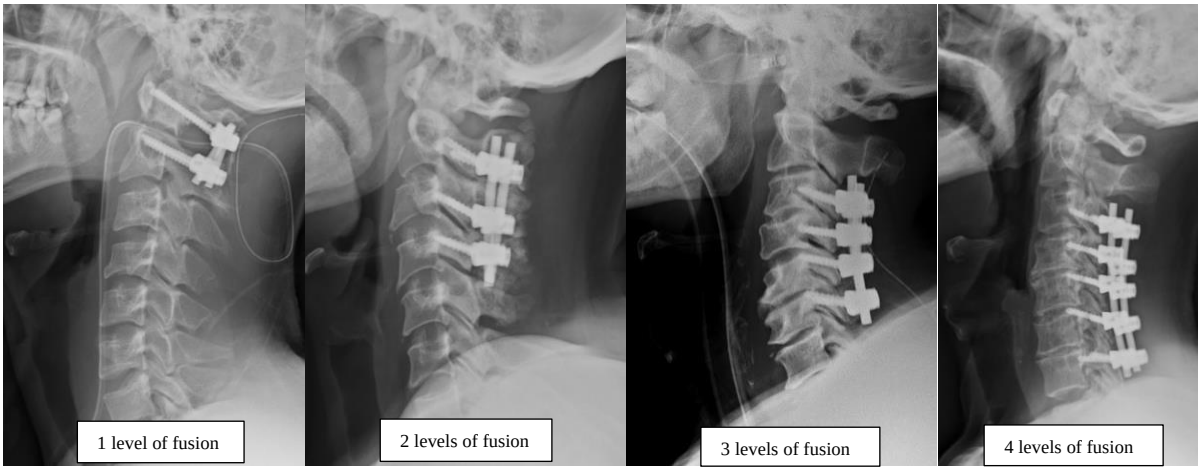

Fig. 1 Postoperative radiological findings after posterior instrumented cervical fusion.

Surgical procedures

All patients were positioned prone on the operating table with the abdomen free and horse-shoe head rest. The anesthetic technique in all patients was similar. Operative procedures were performed by the same spine surgeon (AP). All patients underwent standard open posterior cervical spine approach and definite surgical procedure was performed according to definite diagnosis (posterior decompressive laminectomy and instrumented fusion for spinal trauma and OPLL with loss of lordosis or preoperative cervical kyphosis, or cervical spondylotic myelopathy with normal lordosis, posterior cervical instrumented fusion alone for cervical instability without spinal cord compression). A midline skin incision was used for all patients, then longitudinally dividing the nuchal fascia inline of the incision was proceeded. The spinous process, lamina, lateral mass and facet joints were exposed. Posterior instrumented fusion was performed according to Margerl's lateral mass screw insertion technique[13] for subaxial cervical spine fusion, Goel's technique for pedicle screw insertion of C2[14,15] (C2 par screw for alternative fixation in case of C2 combined subaxial construction) and Goel-Harms' lateral mass screw insertion technique for C1 fixation[16] (figure 1). All cases used polyaxial 3.5 mm in diameter screws with rod construct. After instrumentation, total laminectomy, if it is necessary as indications, was performed using a diamond headed high speed burr. The excised lamina and spinous processes were used for autograft material. Pieces of autograft material were carefully placed posterolaterally over decorticated lateral mass and

into the facet space. Then, the incision was rinsed, and meticulous hemostasis by electrocauterization was accomplished. After that, in the tranexamic acid group, wound surface and paraspinal muscle, ligament, lateral gutter for graft side of both sides was sprayed with Transamin® (OLIC Thailand, Ayutthaya, Thailand) 500 mg in 10 ml for 5minutes before wound closure. The principle of our study protocol regarding tranexamic acid local administration dosage and timing was followed previous studies by Krohn[17] in 2003 and Ren in 2017[18]. The thecal sac and spinal cord was covered with sterile gauze while spraying tranexamic acid to prevent the substance directly contact to the spinal cord. Standard surgical wound closure was performed with a same technique in both groups. A negative-pressure drainage (Radivac® drain) was placed, and a layer-to-layer suture was carried out to close the wound. Cell saver equipment was not used in this study.

Evaluation

The primary outcome was drainage volume. The drainage volume was recorded every 8 hours until removal. 24 hours drainage less than 50 mL was defined as our study protocol for removal of drainage tube. Secondary outcomes include postoperative hemoglobin in 24 and 48 hours respectively, time to drain removal, and duration of postoperative hospitalization. The blood transfusion criteria followed the clinical practice guideline recommending transfusion if postoperative Hb was ≤8.5 g/dL or postoperative Hb was <10 g/dL with anemic symptoms. Complications occurring intraoperatively and postoperatively through hospitalization until discharge were also recorded. Patient's discharge criteria were included 1) a patient had stable clinical status and vital signs, 2) a patient reached goals of postoperative rehabilitation protocol (which all the patients received rehabilitation service from Physical Medicine and Rehabilitation (PM&R) division of Udon Thani hospital during the postoperative period) and 3) a patient had no complication at the time of discharge. At least one month follow-up data was collected after the surgery to evaluate intermediate and long-term complications, fusion rate and construct failure from follow-up radiographs.

Table 1 Demographic data.

Characteristic	Control group (n=20)	Topical tranexamic acid (n=20)	*P*-value
Gender (male/female)	15/5	18/2	0.407[a)]
Age, year ± S.D.	58.4±15.2	51.7±14.38	0.161[b)]
BMI, kg/m^2	25.5±10.7	24.3±3.3	0.648[b)]
Preoperative hemoglobin, g/dL	12.5±1.5	13.0±1.2	0.169[b)]
ASA classification, n (%):			0.487[a)]
1 and 2			
3	20 (100)	18 (90)	
4		2 (10)	
Diagnosis, n (%):			0.258[a)]
Cervical spondylotic myelopathy	11 (55)	7 (35)	
Ossified posterior longitudinal ligament	1 (5)	4 (20)	
Cervical spine trauma	8 (40)	9 (45)	
C-segment level of fusion*, n (%)			0.493[a)]
1 level	3 (15)	2 (10)	
2 level	1 (5)	3 (15)	
3 level	11 (55)	13 (65)	
4 level	5 (25)	2 (10)	
Number of decompressive levels, n (%)**			0.774[a)]
No laminectomy	5 (25)	4 (20)	
3 laminae	1 (5)	1 (5)	
4 laminae	14 (70)	14 (70)	
5 laminae	0 (0)	1 (5)	
Duration of operation, minute	169±28.3	168±46.8	0.935[b)]
Intraoperative fluid replacement, ml	1,485±622.6	1,757±877.4	0.264[b)]
Intraoperative blood loss, ml	155±105.0	197.5±170.6	0.349[b)]

Values are expressed as mean ±SD unless stated otherwise.

* Level of fusion was determined by a number of disc level that was fused by lateral mass fusion.

** Decompressive level was determined by a number of laminae that was removed by laminectomy.

a) Results of Fisher's exact test. b) Results of two sample *t* test.

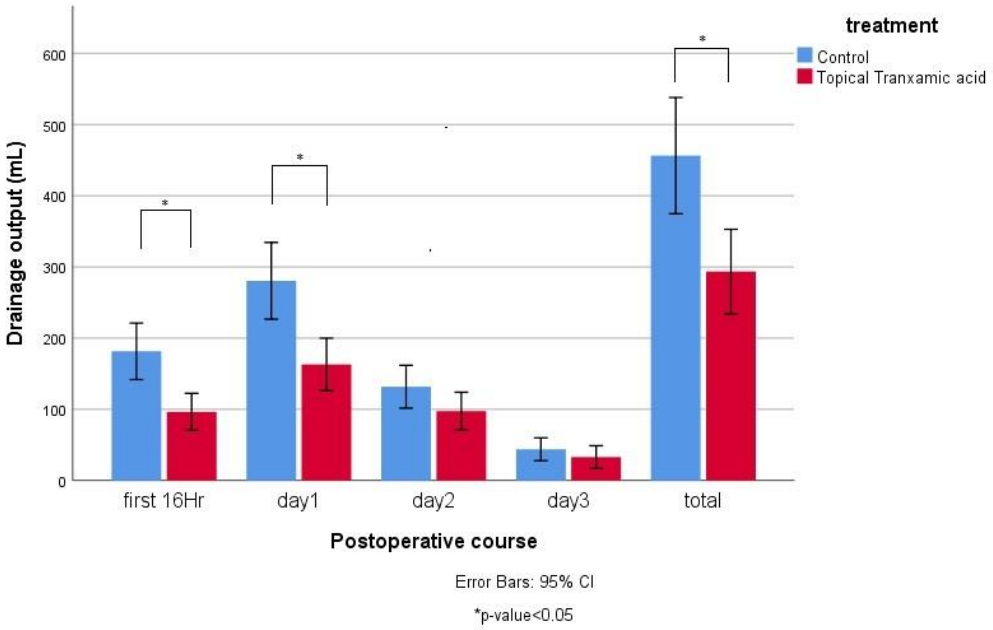

Fig. 2 Postoperative blood loss was demonstrated by mean drainage output and 95% confidence interval during the first 16 hours and the subsequent day 1, day 2, day 3 and total drainage after operation.

Data analysis

Data was recorded in Excel version 2013 (Microsoft cooperation) and all statistical analyses were performed with SPSS Statistics for Windows, version 25 (IBM Corp., United States of America). Data were represented in mean ± standard deviation (SD) and frequency (percentage). Statistical differences between the two groups were compared using Fisher's exact test for categorical variables and Student t test (equal variance groups with parametric data) for continuous variables appropriately. The nonparametric Mann-Whitney *U*-test was used for non-normally distributed data. Two-sided value of $p < 0.05$ was considered statistically significant.

Results

Forty patients, 7 females and 33 males, aged 18 to 76 years, were included in the study. The mean age was 55.0±15 years. There are 20 patients in the topical tranexamic acid group and 20 patients in the control group. There was no statistical difference in demographic values (patients' age, gender, body mass index, American Society of Anesthesiologists (ASA) classification, types of diagnosis, preoperative hemoglobin, and number of fused levels) between the two groups (table 1). In terms of surgical characteristics, overall mean operative time was 168.5±38.18 minutes and mean intraoperative blood loss was 176.3±141.47 ml with no statistical different between the two groups.

The topical tranexamic acid group had significantly less postoperative blood loss (mean 96.5±55.4 ml) during the first 16 hours compared to the control group (mean 181.5±84.7 ml) with p-value 0.001. Within the first 24 hours, the mean total drainage volume in the topical tranexamic acid group was still less than the mean total drainage volume in the control group. (163.0±78.8 versus 280.5±115.1 ml, p-value 0.001). No statistical difference was found in the mean drainage output during 24-to 48 hour and 48-to 72-hour period between the topical tranexamic acid group and the control group (97.5±56.5 versus 131.7±64 ml, p-value 0.082; 33.0±34.0 versus 44.0±34.2, p-value 0.315, respectively). However, total drainage volume in the topical tranexamic acid group was significantly less than total drainage volume in the control group (293.5±126.71 ml versus 456.3±174.56 ml, p-value 0.002). Postoperative drainage output is shown in figure 2.

Hemoglobin level was significantly higher in the topical tranexamic acid group (11.7±1.27 versus 10.5±1.64 g/dL, p-value 0.015) on postoperative day 1. No statistically significant difference of hemoglobin level on postoperative day 2 between the two groups (11.2±1.12 g/dL of topical tranexamic acid group and 11.3±0.89 g/dL of control group, p-value 0.757) were detected. The mean number of days to drain removal in the topical tranexamic acid group was 2.8±0.49 days, compare with 4.0±0.92 days in the control group, a statistically significant difference (p-value 0.000). The mean duration of postoperative hospitalization was significant shorter in the topical tranexamic acid group (6.8±4.58 days) than the control group (11.6±7.37 days), p-value 0.019.

Regarding postoperative blood transfusion, there was one patient in the topical tranexamic acid group (5%) receiving blood transfusion compared to

7 patients (35%) of the control group receiving blood transfusion (Odd ratio 0.0977, 95% confidence interval 0.0107 to 0.8918; p-value 0.03).

The average follow-up period after the surgery was 9.0 months (range from 1 month to 33 months). There was no implant failure of all the patients on the last follow-up radiographic evaluation. One patient showed a radiologically adjacent level degeneration of lower part of fusion segment at 12 months after surgery; however, the patient was still asymptomatic.

Complications

Four patients (20%) of the control group had postoperative pneumonia and two of them had urinary tract infection. All of them were treated successfully with intravenous antibiotics. One patient (5%) of the topical tranexamic acid group had temporary left C5 palsy after the surgery but the condition fully recovered within three months during follow-up period. To compare acute postoperative complications, odd ratio was is 0.2105, 95% confidence interval 0.0213 to 2.0790 with p-value 0.1823.

There were no thrombotic related complications, such as deep vein thrombosis, pulmonary embolism, cerebrovascular accident or myocardial infarction, found in our study. None of the patients of topical tranexamic acid group developed tranexamic acid adverse reaction, for instance, seizure, renal failure nausea, diarrhea or rash.

Discussion

Tranexamic acid is antifibrinolytic drug (synthetic lysine analogue) acting by competitive blocking the lysine binding site of plasminogen, plasmin, and tissue plasminogen activator and at much higher concentration, a non-competitor of plasmin[19]. It mainly functions by impairing the binding capacity of plasminogen and tissue plasminogen activator resulting in decreased conversion of plasminogen to plasmin, which causes dissolution of fibrin clots[20]. According to Astedt et al[21], tranexamic acid acts directly at active bleeding and clot formation sites and not within the circulation, which becomes a rationale of topical administration.

The effect of postoperative blood loss reduction of the first 16 to 24 hour after posterior cervical spinal instrumented fusion in the present study is similar to some clinical trials using topical tranexamic acid in spinal procedure. Saberi et al[22] reported using, 250mg tranexamic acid, with volume of 5ml poured on the site of surgery and epidural space at the end of lumbar laminectomy reduced the blood volume drained during first and second day of the postoperative period, including overall hemorrhage, and decreased the duration of postoperative hospitalization. Ren et al[18] reported that topical use of 1 gram of tranexamic acid in 100 mL saline solution for 5 minutes before wound closure in posterior lumbar decompressive laminectomy with posterolateral instrumented fusion significantly reduced postoperative blood loss and hidden blood loss. Liang et al[23] used 2 grams tranexamic acid soaked Gelfoam (size, 100 cm^2) to cover surgical wound in posterior lumbar surgery to compared with two control groups (Gelfoam alone group and control group) and reported that tranexamic acid soaked Gelfoam reduced blood loss from drainage in the first, second and third 8 hours postoperative period compared to the control group with statistical significance. In addition, the study reported that the duration of the post-operative drain left in the tranexamic acid soaked Gelfoam group was significantly shorter than the control group and also had a significantly shorter hospital stay than the control group. The efficacy of postoperative blood loss reduction was demonstrated by pooled results in a meta-analysis study by Luo and colleague[11] in 2018 and reported that a topical application of tranexamic acid in lumbar spinal surgery, particularly posterior lumbar interbody fusion, decreases the total blood loss and drainage volume and preserves higher postoperative hemoglobin level. These meta-analysis results are consistent with our study results even though the types of spinal procedures are completely different. It would be cautious to compare the results between a study conducting in lumbar spine surgery and a study of cervical spine surgery. Majority of lumbar spine surgery studies are decompressive procedure and reported total calculated blood loss ranged from 650 to 2,839 ml and transfusion requirements were 50 to 81% without any strategy to reduce hemorrhage[3]. On the other hand, cervical laminectomy and instrumented fusion is reported blood loss ranged from 230 to 930 ml[24]. It means lumbar spine surgery tends to cause more intraoperative blood loss than cervical spine surgery. However, to compare the present study results to other studies in cervical spine surgery, topical tranexamic acid has not been reported a usage in any kind of posterior cervical spine surgery to date. There has been only one study by Yu and colleague in 2017[12] with small sample size of twenty patients showing that topical tranexamic acid could provide better visualization in percutaneous endoscopic cervical discectomy. However, the study did not provide any results of postoperative blood loss or blood transfusion requirement. Perez-Roman et al[25] reported using a bolus of intravenous tranexamic acid 10 mg/kg followed by a continuous infusion of 1 mg/kg/hour started 1 hour prior to skin incision and stopped at closure in patients underwent posterior cervical decompression and fusion. The study showed that the I.V. tranexamic group had significant less postoperative blood loss (453 ml vs 701 ml, p-value=0.03), whereas intraoperative blood

loss including postoperative blood transfusion between tranexamic group and non-tranexamic acid group were not statistically different. Additionally, there were no cardiac or thromboembolic complication on the first 30 days after surgical intervention on the tranexamic acid group.

The primary outcome of this comparative study revealed that the topical tranexamic acid group had a significantly reduced postoperative blood loss volume, shortened time until drain tube removal including length of hospital stay, and decreased risk of postoperative blood transfusion. In terms of the postoperative transfusion requirement, the present study showed a statistically significant reduction of blood transfusion rate in topical tranexamic acid group, which is contrary to the results from the meta-analysis by Luo and colleague[11]. The mete-analysis[11] showed no significant differences of transfusion requirement between local tranexamic acid groups and control groups although the pool data still showed that blood transfusion rate in topical tranexamic acid group is lower. The most recent randomized controlled clinical trial by Sudprasert and colleague[10] published in 2019 reported the rate of postoperative blood transfusion in thoracolumbar spine fracture stabilization was significantly lower in the topical tranexamic acid group (13.8%) than in the control group (39.3%) with relative risk of 0.35 (95% confidence interval 0.13 to 0.97, p-value 0.03). The postoperative blood transfusion reduction effect from Sudprasert and colleague's result is similar to the result of the present study even though the procedures using between the two studies are different. The present study showed rate of blood transfusion in Tranexamic acid group (5%) lower than control group (35%) with Odd ratio 0.0977 (95% confidence interval 0.0107 to 0.8918, p-value 0.03). Duration of postoperative hospitalization in the present study showed that topical tranexamic acid group had approximately 5 days shorter postoperative hospitalization than control group. The factors of this finding consisted of 1) time to drain removal in tranexamic acid group was about 2 days shorter than control group and 2) the patients of tranexamic acid group reached the goals of postoperative rehabilitation protocol faster than the patient of control group.

The most effective technique of the local drug administration in cervical spine surgery has not been clearly determined. Sudprasert and colleague[10] used topical 1 gram of tranexamic acid in thoracolumbar fracture spine surgery by applying to the site of surgery via a drain tube after the spinal fascia was closed, and then the drain was clamped for 2 hours. The rationale of the study based on the pharmacodynamic and pharmacokinetic properties of tranexamic acid, which the maximum plasma concentration is obtained at 30 minutes after administration, and the terminal elimination half-life is about 120 minutes. The aim of using topical tranexamic acid is to avoid systemic thrombosis; therefore, principle of obtaining optimum plasma concentration to provide hemostatic effect to the surgical site will not be applicable in our study. A retrospective study of topical use of tranexamic acid in lumbar spine surgery by Ren and colleague[18] in 2017 soaked wound surface with 1 gram of tranexamic acid for 5 minutes before wound closure. The present study followed the protocol of Ren's study[18], which reported a reduction of postoperative blood in lumbar spine surgery, but reduced the dosage to topical tranexamic acid to 500 mg due to two reasons. First, the patients in our study had an average body weight of 50 kilogram approximately which required 500 mg of tranexamic acid per patient (recommended intravenous tranexamic acid dosage of 10 mg per kilogram body weight.). Second, the average magnitude of invasiveness in cervical spine surgery is smaller than lumbar spine surgery as mentioned previously[3,24]. To determine sample size of the study, we applied the results of previous retrospective observational study by Yu[26] in 2017, the standard deviation of postoperative blood loss in the first 16 hours from 119 patients receiving cervical laminectomy with lateral mass screw fixation and bone grafting was 49.39. We determined at least 50 ml in difference between topical tranexamic acid group and control group with standard deviation of 49.39 ml and a two-sided statistically significance level (p-value) of 5% and power of 80%. A sample size of at least 15 patients per group was required. After the study, post-hoc analysis was conducted and demonstrated post-hoc power of 96.4%.

With regard to systemic thrombotic complications, the present study showed no clinical symptoms and signs of deep vein thrombosis, pulmonary embolism or any thromboembolic events. There were also no adverse reactions after local tranexamic acid administration. This drug safety issue finding was in agreement with the results from a meta-analysis study by Luo and colleague in 2018[11], which reported that there were no statistically significant differences between topical tranexamic acid and control groups for those complications and adverse drug reactions in the patients receiving posterior lumbar spinal fusion.

The strength of the present study is that there have been only few studies of the use of topical tranexamic acid in posterior cervical spine surgery until recently. The study protocol was carefully established in order to compare postoperative blood loss between two considerably homogeneous groups with a population at risk for significant blood loss from posterior cervical spine surgery. All cases received posterior cervical instrumented fusion by the same surgeon at the same hospital with the same fusion and instrumentation technique. The limitation of this study is the study design. As a retrospective

design, even though the present study provided a positive result of tranexamic acid over the control group, it could be influenced by confounding factors and bias which makes the level of evidence become weak. Rigorous prospective randomized controlled trials may be undertaken in the future to increase the strength of evidence. Further clinical application is to apply a local administration of tranexamic acid during or after a procedure of cervical pedicle screw insertion, which requires more extensive soft tissue exploration and leads to more bleeding results. There has been no clinical study of this issue. However, the present study can provide a good clinical result of blood loss reduction even though a wide-ranging posterior cervical fusion technique were conducted including upper cervical spine surgery (requiring epidural venous plexus around C2 cervical root bleeding control) and extensive levels of cervical fusion (4 levels of fusion and 5 levels of laminectomy). Therefore, topical tranexamic acid is likely to provide a similar benefit to cervical pedicle screw insertion procedure but needs to be investigated in the future.

Conclusion

The locally administration of 500 mg of tranexamic acid to the surgical site in posterior instrumented cervical spine fusion reduces postoperative drainage volume significantly and decreases postoperative blood transfusion, shorten time until drain removal and length of hospital stay after surgery without a significant increase in the risk of systemic thrombosis or other complications.

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การใช้สาร tranexamic acid เฉพาะที่ในผู้ป่วยที่ได้รับการผ่าตัดเชื่อมกระดูกสันหลังส่วนต้นคอ เพื่อดูประสิทธิภาพการลดการเสียเลือดในระยะหลังผ่าตัด: การศึกษาเปรียบเทียบแบบย้อนหลัง

อาคม พรมมหาไชย, พบ

วัตถุประสงค์: *เพื่อประเมินประสิทธิภาพการใช้สาร tranexamic acid แบบเฉพาะที่ในการลดการเสียเลือดภายหลังผ่าตัด การลดการให้เลือดหลังผ่าตัด รวมถึงการเกิดภาวะแทรกซ้อน ในผู้ป่วยที่ได้รับการผ่าเชื่อมกระดูกต้นคอโดยเปรียบเทียบกับกลุ่มควบคุม*

วิธีการศึกษา: *รูปแบบการศึกษาเป็นการศึกษาผลมาหาเหตุแบบย้อนหลัง โดยการเก็บข้อมูลผู้ป่วยที่ได้รับการผ่าเชื่อมกระดูกต้นคอทางด้านหลังในโรงพยาบาลอุดรธานีระหว่าง ตุลาคม 2559 ถึง มีนาคม 2564 โดยเปรียบเทียบผลของการผ่าตัดระหว่างกลุ่มผู้ป่วยที่ได้รับสาร tranexamic acid แบบเฉพาะที่โรยบริเวณผ่าตัดก่อนเย็บปิดแผลเทียบกับกลุ่มควบคุมที่ไม่ได้รับสารดังกล่าว*

ผลการศึกษา: *ผู้ป่วยจำนวน 40 คนที่ได้รับการผ่าเชื่อมกระดูกต้นคอเป็นสัดส่วนเพศชายต่อเพศหญิง 33:7 อายุเฉลี่ย 55±15 ปี ได้รับการคัดเลือกเข้ามาในการทำการศึกษา ผลการศึกษาพบว่าปริมาณเลือดที่ออกมาในสายระบายเลือดจากแผลผ่าตัดช่วง 24 ชั่วโมงแรกในกลุ่มที่ใช้สาร tranexamic acid แบบเฉพาะที่พบว่าน้อยกว่ากลุ่มควบคุมที่ไม่ได้ใช้สารดังกล่าวอย่างมีนัยสำคัญทางสถิติ (163.0±78.8 ml เทียบกับ 280.5±115.1 ml, p-value 0.001) และปริมาณเลือดโดยรวมทั้งหมดจากสายระบายเลือดในกลุ่มที่ใช้สาร tranexamic acid แบบเฉพาะที่ก็พบว่าน้อยกว่ากลุ่มควบคุม (293.5±126.71 ml เทียบกับ 456.3±174.56 ml, p-value 0.002) การใช้สารดังกล่าวพบว่าลดอัตราการให้เลือดหลังผ่าตัดจาก 35% ในกลุ่มควบคุมเหลือ 5% โดยให้ค่า Odd ratio 0.0977 (95% confidence interval 0.0107 to 0.8918; p-value 0.03) อีกทั้งช่วยลดระยะเวลาการอยู่รักษาตัวในโรงพยาบาลหลังผ่าตัดจาก 6.8±4.58 วันเมื่อเทียบกับกลุ่มควบคุม 11.6±7.37 วัน, p-value 0.019*

สรุป: *การใช้สาร tranexamic acid โรยเฉพาะที่บริเวณแผลผ่าตัดก่อนเย็บปิดแผลในการผ่าตัดเชื่อมกระดูกต้นคอด้านหลังช่วยลดการเสียเลือดจากสายระบายเลือดหลังผ่าตัดและลดโอกาสการให้เลือดหลังผ่าตัดรวมถึงลดระยะเวลาการนอนโรงพยาบาลภายหลังผ่าตัดอย่างมีนัยสำคัญโดยไม่เพิ่มความเสี่ยงการเกิดลิ่มเลือดอุดตันหรือภาวะแทรกซ้อนภายหลังผ่าตัด*