

# Blood transfusion requirements in pediatric spinal deformity corrective surgery: Comparison of idiopathic and neuromuscular aetiologies.

Author(s) JA. Grant, PhD, MD\* J Luntley, MBBS, FRCA^ J Howard, MD, FRCSC\* J Harder, MD, FRCSC\* S Aleissa, MD\* D Parsons, MD, FRCSC\*

**Affiliation:**\*Division of Orthopaedics, Dept. of Surgery, Faculty of Medicine; ^Division of Paediatric Anaesthesia, Dept. of Anaesthesia: University of Calgary & Alberta Children's Hospital

**Introduction:** Previous studies have noted that patients with neuromuscular scoliosis tend to bleed more during spinal instrumentation and fusion as compared to idiopathic scoliosis patients.(1) Tranexamic acid (TXA) has been limitedly studied in this population but consensus with respect to the dosing regimen has not been achieved. (2,3) The purpose of this study was to first determine if neuromuscular scoliosis results in greater peri-operative transfusion requirements compared to idiopathic scoliosis, and secondly to compare the effects on reducing transfusion requirements of two TXA dosing regimens

**Methods:** After ethical board approval a retrospective chart review was performed on all scoliosis patients undergoing spinal instrumentation and fusion from 1999 to 2006 to determine total peri-operative transfusion requirements. Idiopathic and neuromuscular scoliosis patients were compared both with and without the use of TXA. Patients receiving either a low (10mg/kg loading, 1mg/kg/h infusion) or high (20mg/kg loading, 10mg/kg/h infusion) dose of TXA were also compared. Given that 82% of cases involved a single-stage posterior instrumentation and fusion, our analysis was limited to that group.

**Results:** One hundred and sixty eight patients were eligible and reviewed.

Table 1. Demographic and outcome variables (mean  $\pm$  SD)

Variable	Without tranexamic acid		With tranexamic acid	
	Idiopathic	Neuromuscular	Idiopathic	Neuromuscular
N	79	19	26	10
Age (years)	15 $\pm$ 1.7	13.3 $\pm$ 2.4	15.0 $\pm$ 2.1	14.1 $\pm$ 1.4
Sex (% female)	81%	52.6%	92.3%	14.1%
Weight (kg)	55.9 $\pm$ 11.2	41.3 $\pm$ 16.2	53.8 $\pm$ 10.2	44.4 $\pm$ 10.0
Major Cobb Angle (°)	57.7 $\pm$ 9.8	65.8 $\pm$ 16.2	59.9 $\pm$ 8.2	60.7 $\pm$ 14.9
Levels Fused (No)	9 $\pm$ 2	12 $\pm$ 4	9 $\pm$ 2	14 $\pm$ 3
Surgical Time	4.84 $\pm$ 1.3	5.41 $\pm$ 2.2	6.78 $\pm$ 1.5	7.60 $\pm$ 1.2
Intra operative blood loss	659 $\pm$ 509	1038 $\pm$ 847	837 $\pm$ 801	1724 $\pm$ 1330
Post operative blood loss	370 $\pm$ 434	363 $\pm$ 466	246 $\pm$ 409	320 $\pm$ 413
Total perioperative blood loss	1028 $\pm$ 559	1401 $\pm$ 911	1083 $\pm$ 1006	2044 $\pm$ 1398

Idiopathic patients required significantly less blood transfusion regardless of TXA use (no TXA: idiopathic 1028ml vs. neuromuscular 1401  $\pm$  911.3ml,  $p = 0.02$ ; with TXA: idiopathic 1083ml vs. neuromuscular 2044ml,  $p = 0.03$ ).

The high dose of TXA resulted in a significant reduction in transfusion requirements compared to the low dose for idiopathic scoliosis patients (688  $\pm$  778ml vs. 1355  $\pm$  966ml,  $p = 0.04$ ).

**Discussion:** This study demonstrates that peri-operative transfusion requirements for the idiopathic scoliosis group are 27 – 47% lower than the neuromuscular group. Most of the difference occurs intra-operatively. The increased extent of surgery and surgical time in the neuromuscular group may reflect more extensive surgery with greater surgical trauma affecting blood loss. Regardless of etiology blood loss was reduced when TXA was used. The use of TXA warrants further study in this patient population.

**Refs:**

1. Kannan S, Meert KL, Mooney JF, et al. Bleeding and coagulation changes during spinal fusion surgery: A comparison of neuromuscular and idiopathic scoliosis patients. *Pediatr Crit Care Med* 2002;3:364-9.
2. Neilipovitz DT, Murto K, Hall L, et al. A randomized trial of tranexamic acid to reduce blood transfusion for scoliosis surgery. *Anesth Analg* 2001;93:82-7.
3. Sethna NF, Zurakowski D, Brustowicz RM, et al. Tranexamic acid reduces intraoperative blood loss in pediatric patients undergoing scoliosis surgery. *Anesthesiology* 2005;102:727-32.