# The Role of Antifibrinolytics in Minimally Invasive Craniosynostosis Repair: Impact on Blood Loss, Transfusion Rates, and Hospital Stay

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### Introduction

Craniosynostosis occurs when the bones of the skull fuse prematurely, leading to abnormal head shape and potential neurocognitive impairment. Administration of antifibrinolytics during open repair of craniosynostosis is well-established.

However, the use of antifibrinolytics in minimally invasive craniosynostosis repair, which is becoming increasingly common, remains controversial.

This study was performed to evaluate whether the use of antifibrinolytics in patients undergoing minimally invasive craniosynostosis repair impacts intraoperative blood loss, frequency and volume of blood transfusion, complication rates, and length of hospital stay.

#### Methods

A retrospective chart review of patients who underwent minimally invasive craniosynostosis repair at Lurie from 2007 to 2023.

Patients were then stratified into two cohorts denoted by perioperative and intraoperative antifibrinolytic administration status.

Recorded: demographic information, preop and postop Hct, intraoperative and postoperative blood transfusion volume, complications, and length of hospital stay.

Calculated blood loss (CBL) was calculated using estimated blood volume (EBV) and incorporating hematocrit values to calculate estimated red cell mass (ERCM) pre-and-post operatively.

A) ERCM = EBV  $\times \frac{\text{Hct}}{100}$ 

B)  $ERCM_{deficit} = ERCM_{preoperative} + ERCM_{transfused} - ERCM_{postoperative}$ 

C) %CBL =  $\frac{\text{ERCM}_{\text{deficit}}}{\text{ERCM}_{\text{preoperative}}} \times 100$ 

Finally, intraoperative transfusion management was assessed. Transfusion volumes were considered appropriate for changes in ERCM within 15% of the preoperative value. Over-transfusion was defined as ERCM excess >15% and under-transfusion as ERCM deficit >15%.

 $\Delta ERCM\% = \frac{ERCM_{postoperative} - ERCM_{preoperative}}{ERCM_{preoperative}} \times 100$ 

#### Length of Hospital Stay





Complications of interest included: hematoma, hemorrhage, infection, wound dehiscence, CSF leak, increased ICP, dural tear, and return to OR

#### Results

# **Transfusion Management by Hct**





Reference range Hct for a 3–6-month-old: 29 - 41

We demonstrate the safety and benefit of antifibrinolytic administration in single-suture minimally invasive craniosynostosis repair.

Aminocaproic acid reduced blood loss and hospital length of stay without increasing complications.

Although the group that received antifibrinolytics lost less blood, patients in this group still received transfusions at lower rates when exceeding the acceptable blood loss.

These findings suggest that antifibrinolytic agents should be used in all cases of minimally invasive craniosynostosis repair, and one should strive for transfusion to match blood volume loss irrespective of whether antifibrinolytic agents are utilized.

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Antifibrinolytic (AF) N=40	Non-Antifibrinolytic (Non - AF) N=45	P - value
$\textbf{1.5}\pm\textbf{0.7}$	$\textbf{2.2}\pm\textbf{0.7}$	< 0.0001
38.9	62.9	0.0011
48.6%	78.6%	0.0011
42.5%	95.6%	< 0.0001
32.31	34.85	0.63
30%	57.8%	0.0101
62.5%	26.7%	0.009
7.5%	15.6%	0.25
27.8±5.8	32.3 ± 6.3	0.0009
72.5%	100%	0.0002
0	1	0.34
$\textbf{181.8} \pm \textbf{30.5}$	$189.2 \pm 26.6$	0.24

#### CBL – Calculated blood loss, Hct – Hematocrit, MABL – Maximal allowable blood loss





#### Final Hct at Discharge

## Conclusions

