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Development of Consensus Based Best Practice Guidelines for Perioperative Management of Blood Loss in Patients Undergoing Posterior Spinal Fusion for Adolescent Idiopathic Scoliosis

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Abstract

Study Design: Delphi process with multiple iterative rounds using a nominal group technique.
Objective: The aim of this study was to use expert opinion to achieve consensus on various methods for minimizing blood loss in patients undergoing posterior spinal fusion (PSF) for adolescent idiopathic scoliosis (AIS).
Background Data: Perioperative blood loss management represents a critical component of safely performing PSF in children with AIS. Little consensus exists on ways to mitigate excessive blood loss after PSF.
Methods: An expert panel composed of 21 pediatric spine surgeons was selected. Using the Delphi process and iterative rounds using a nominal group technique, participants in this panel were presented with a detailed literature review and asked to voice opinion collectively during three rounds of voting. Agreement >80% was considered consensus. Interventions without consensus were discussed and revised, if feasible.
Results: Consensus was reached to support 21 best practice guideline measures for perioperative management of blood loss in patients undergoing PSF for AIS. Areas included preoperative assessment and preparation, intraoperative strategies to decrease blood loss, and postoperative transfusion indications.
Conclusion: We present a consensus-based best practice guideline consisting of 21 recommendations for strategies to minimize and manage blood loss during PSF. This can serve to reduce variability in practice in this area, help develop hospital specific protocols, and guide future research.

Keywords: Blood loss; Scoliosis; Posterior spinal fusion; Adolescent idiopathic scoliosis

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Introduction

Perioperative evaluation and management of patients with adolescent idiopathic scoliosis (AIS) requires careful consideration of practices aimed at mitigating intraoperative and postoperative blood loss. Many of these mediations are weakly supported in the literature, with only a few garnering strong evidence-based support, all of which leads to variability in practice among spinal surgeons. The purpose of this study was to create a series of clinical practice guidelines surrounding perioperative blood loss management using expert opinion and the Delphi method.

Methods

An initial review of the literature was performed by one author (NDF) and used to generate the initial round of 35 questions. A face-to-face meeting was convened with 21 spinal deformity surgeons present. All participants are pediatric orthopedic or spinal deformity fellowship-trained surgeons with extensive experience in caring for patients with AIS. A Delphi method was used to begin construction of a consensus-based best practice guideline for the perioperative management of blood loss in patients undergoing posterior spinal fusion (PSF) for AIS including preoperative evaluation, intraoperative techniques to minimize blood loss, and postoperative management of patients. The Delphi method is a previously validated system of developing consensus through repeated administration of consensus statements that are modified after multiple rounds of discussion [1]. Unique to this method is the fact that respondents may change their responses to consensus recommendations based on the group discussions and/or rewording of the recommendations. This method has previously been used in studies pertaining to spinal deformity [2,3].

A vote was carried out with the questions prior to the initial discussion. All questions could be answered using one of four answers on a Likert scale (strongly disagree, disagree, agree, and strongly agree). Following this initial round, three members of the group summarized the available evidence on 1) preoperative evaluation including laboratory tests, autologous blood donation, and the use of iron or erythropoietin to increase blood counts; 2) intraoperative techniques to minimize blood loss such as higher Bovie settings, the use of a bipolar sealer, and hypotensive anesthesia; and 3) postoperative care including triggers for transfusion. The results of the initial

Table 1
Final best practice guidelines for perioperative management of blood loss in patients undergoing PSF for AIS.

		SA	Agree	Disagree	SD
1	Erythropoietin should be used to increase preoperative hematocrit	0	0	17	83
2	An evaluation of patient blood volume should be performed preoperatively (ie, CBC, H/H)	67	33	0	0
3	Either a type/screen or type/cross should be performed preoperatively with the determination based on institutional practices	67	33	0	0
4	A type and screen should be ordered on all patients	33	58	8	0
5	An evaluation of coagulopathy should be performed preoperatively (ie, PT/PTT/INR or platelet function)	0	46	46	8
6	Iron levels should be evaluated preoperatively	0	0	58	42
7	Patients should be directed to perform preoperative autologous blood donation	0	0	50	50
8	Patients and family should be screened for a bleeding disorder preoperatively	58	33	8	0
9	Patients and family should be screened for religious or cultural barriers to receiving blood products	67	25	8	0
10	We recommend that families routinely provide direct donor blood preoperatively	0	0	50	50
11	Hemodilution should be used as a technique to minimize blood loss	0	8	75	17
12	An ultrasonic bone cutter may be used to minimize blood loss	42	58	0	0
13	A bipolar or bipolar sealer may be used to minimize blood loss	58	33	8	0
14	I routinely use antifibrinolytics (TXA, Amicar, etc) for AIS cases to minimize blood loss	75	25	0	0
15	I have a specific target mean arterial pressure to use during one or more portion of the case for AIS (exposure, instrumentation, correction, closure)	75	25	0	0
16	I use a higher Bovie setting (>40) to minimize blood loss	58	42	0	0
17	I routinely allow residents to place pedicle screws during surgery for routine AIS cases	25	75	0	0
18	I routinely allow fellows to place pedicle screws during surgery for routine AIS cases	58	42	0	0
19	A hemostatic sponge may be used to minimize blood loss	8	75	17	0
20	Not tapping a pedicle prior to screw placement may be performed in an attempt to lower blood loss.	8	92	0	0
21	An Hb of <7 should necessitate transfusion regardless of clinical symptoms	23	62	0	15

AIS, adolescent idiopathic scoliosis; CBC, complete blood count; Hb, hemoglobin; H/H, hemoglobin and hematocrit; INR, International Normalized Ratio; PSF, posterior spinal fusion; PT, prothrombin time; PTT, partial thromboplastin time; SA, strongly agree; SD, strongly disagree; TXA, tranexamic acid.

All numbers are percentages.