Citation

Lee LA, Dutton RP, Posner KL, Stephens LS, Domino KB: Massive Hemorrhage: A Report from the Closed Claims Project. Anesthesiology, A3002, 2013.

Abstract

Background: Failure by anesthesiologists and surgeons to recognize and appropriately treat hemorrhage in a timely fashion may result in high severity outcomes. Advances in resuscitation have improved patient survival with massive hemorrhage over the last several decades, as techniques developed in combat casualty care have reached civilian hospitals.[1] We examined closed anesthesia malpractice claims with hemorrhage from the past decade to identify the types of procedures and recurring patterns of harm from hemorrhage that could inform future efforts to improve patient safety.

Methods: After IRB approval we identified 76 claims where hemorrhage occurred in the year 2000 or later from the Closed Claims Project Database of 9799 claims. Hemorrhage claims were compared to 1512 other surgical and obstetric claims from the same time period with chi square analysis, Fisher's exact test, Mann Whitey U test, and t-test with $0<0.05$ for statistical significance. Payment amounts were adjusted to 2012 dollars using the Consumer Price Index.

Results: Patients in hemorrhage claims were younger ($p=0.008$) and more commonly undergoing emergency procedures ($p<0.001$) than other claims (Table). The most common types of procedures were obstetrical and non-cervical spine operations. Thirteen (17%) hemorrhage claims were associated with minimally invasive procedures. Only 1 trauma case was identified (<1%), compared to 4% trauma claims in the registry as a whole. Findings of less than appropriate care were associated with failure to recognize that the patient was bleeding in the OR, recovery room, or intensive care unit, and failure to treat the patient aggressively (e.g. return to OR, administration of clotting factors, calling for help, obtaining adequate iv access) when ongoing hemorrhage was identified.

Conclusions: Claims against anesthesiologists for inadequate resuscitation from hemorrhage are infrequent, but serious in nature when they occur. Hemorrhage claims involved obstetric emergencies and routine spine surgeries, rather than trauma claims, suggesting that legal action may be more likely when injury from hemorrhage is an unexpected outcome. Inability to immediately recognize ongoing hemorrhage - seen with minimally-invasive surgical techniques, retroperitoneal injuries, and post-partum bleeding - is an important risk factor. Publicly available FDA data corroborates these findings with numerous patient injuries and deaths related to major vascular lacerations during robotic surgical cases. Likewise, post-partum hemorrhage is the leading cause of maternal mortality worldwide and has prompted team training that emphasizes the importance of early recognition, communication among team members, and defined - and practiced - treatment protocols. Hemodynamic instability after delivery, during spine surgery, and in minimally invasive operations should heighten the suspicion of the anesthesia team for unrecognized hemorrhage. All anesthesiologists should be familiar with modern principles of resuscitation, and be prepared to implement them when massive hemorrhage occurs.

References:

1. Holcomb JB, et al. for the PROMMTT Study Group. *Arch Surg* 2012 Oct; 15:1-10

2. American College of Obstetricians and Gynecologists. *Obstet Gynecol* 2006 Oct; 108:1039-47

Figure 1

Table: Characteristics of Hemorrhage vs. Other Claims

	Hemorrhage Claims (n=76)	Other Claims (n=1512)	*P* value
Mean (±SD) age in years	42 (±15)	48 (±19)	0.008
Emergency case	33%	17%	< 0.001
Obstetrics	38%	11%	< 0.001
Non-cervical spinal surgery	25%	7%	< 0.001
Mortality or permanent Injury	96%	53%	< 0.001
Less than appropriate care	62%	42%	0.001
Anesthesia payment made	74%	52%	< 0.001
Median payment (2012 $)	$422,250	$260,000	0.017
Interquartile range	$194,250 - $937,500	$64,000 - $705,050	