

Multidisciplinary Conference for Complex Surgery Leads to Improved Quality and Safety

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INTRODUCTION:

Complex surgery for adult spinal deformity has high rates of complications, reoperations, and readmissions. Multidisciplinary conferences have been shown to improve patient outcomes in many medical specialties, but are not widespread in spine surgery. Preoperative discussions of high-risk operative spine patients at a multidisciplinary conference may decrease rates of these adverse outcomes through appropriate patient selection and surgical plan optimization. With this goal, we implemented a high-risk case conference involving orthopaedic and neurosurgery spine, anesthesia, intraoperative monitoring neurology, and neurological intensive care.

METHODS: This was a retrospective review at a single institution. We analyzed all spinal deformity patients who had surgery between 1/1/2017 and 10/31/2020, and met one of the following criteria for presentation to the multidisciplinary conference: 8+ levels fused, osteoporosis with 4+ levels fused, 3 column osteotomy, anterior revision of the same lumbar level, or severe myelopathy, scoliosis (>75°), or kyphosis (>75°) with planned significant correction. Patients were categorized as Before Conference (BC): surgery before 2/19/2019 or After Conference (AC): surgery after 2/19/2019. The outcome measures assessed included intra and perioperative complications and 30 and 90 day readmissions and reoperations.

RESULTS:

A total of 263 patients were included (96 AC, 167 BC). AC patients were older than BC (60.0 vs. 54.6, p=0.025) and had lower BMI (27.1 vs. 28.9, p=0.047), but had similar CCI (3.2 vs. 2.9 p=0.312), and ASA Classification (2.5 vs. 2.5, p=0.790). Surgical characteristics, including levels fused (10.6 vs. 10.7, p=0.839), levels decompressed (1.29 vs. 1.25, p=0.863), 3 column osteotomies (10.4% vs. 18.6%, p=0.080), anterior column release (9.4% vs. 12.6%, p=0.432), and revision cases (53.1% vs. 52.4%, p=0.911) were similar between AC and BC. AC patients had lower EBL (1.1 vs. 1.9L, p<0.001) and fewer total intraoperative complications (16.7% vs. 34.1%, p=0.002), including fewer dural tears (4.2% vs. 12.6%, p=0.025), delayed extubations (8.3% vs. 22.8%, p=0.003), and massive blood loss (4.2% vs. 13.2%, p=0.018). Length of stay (LOS) was similar between groups (7.2 vs. 8.2 days, p=0.251). AC had a lower incidence of deep surgical site infections (SSI, 1.0% vs. 6.6%, p=0.038), but a higher rate of hypotension requiring vasopressor therapy (18.8% vs. 4.8%, p<0.001). Other postoperative complications were similar between groups. AC had lower rates of reoperation at 30 (2.1% vs. 8.4%, p=0.040) and 90 days (3.1% vs. 12.0%, p=0.014) and lower readmission rates at 30 (3.1% vs. 10.2%, p=0.038) and 90 days (6.3% vs. 15.0%, p=0.035).

DISCUSSION AND CONCLUSION:

Following implementation of a multidisciplinary high-risk case conference, 30- and 90-day reoperation and readmission rates, intraoperative complications, and postoperative deep SSIs decreased. Hypotensive events requiring vasopressors increased, but did not result in longer LOS or greater readmissions. These overall promising results demonstrate this conference's important role in improving quality and safety for high-risk spine patients. Multidisciplinary conferences are a useful tool for minimizing complications and optimizing outcomes in complex spine surgery.

Table 1: Comparison of demographics between patients with spine surgery before and after implementation of the multidisciplinary high risk case conference

	Before Conference (N=167)	After Conference (N=96)	p-value
Age (years)	54.62±18.04	59.91±18.07	0.025
Gender (M/F)	70/96	37/59	0.375
BMI	28.89±7.74	27.05±6.13	0.047
CCI	2.94±2.15	3.21±2.13	0.312
Current Smoker	10.8%	7.5%	0.626
ASA	2.54±0.63	2.52±0.62	0.790
Pre-operative Hemoglobin	12.83±1.77	12.83±1.59	0.857

BMI= Body Mass Index, CCI= Charlson Comorbidity Index, ASA = American Society of Anesthesiologists classification.

Table 2: Comparison of surgical characteristics between patients with spine surgery before and after implementation of the multidisciplinary high risk case conference

	Before Conference (N=167)	After Conference (N=96)	p-value
Levels Fused	10.72±3.52	10.64±3.25	0.839
Levels Decompressed	1.25±2.23	1.29±1.83	0.863
3 Column Osteotomy	64.3%	69.8%	0.345
3 Column Osteotomy	18.6%	10.4%	0.080
Anterior Column Release	12.6%	9.4%	0.432
PinW/ FlareW	65.9%	62.5%	0.582
Revision	52.4%	53.1%	0.911
Posterior Approach	86.8%	83.3%	0.438
Combination Anterior and Posterior Approach	13.2%	16.7%	0.438

Table 3: Comparison of procedural outcomes between patients with spine surgery before and after implementation of the multidisciplinary high risk case conference

	Before Conference (N=167)	After Conference (N=96)	p-value
Operative Time (min)	449.66±112.52	451.03±138.67	0.934
Length of Stay (days)	8.15±7.83	7.17±3.90	0.251
Estimated Blood Loss (mL)	1843.79±1553.43	1084.39±681.33	<0.001
Intraoperative Transverse Aorta (mL)	4505.59±1732.24	3354.54±1247.98	0.181
Intraoperative RBC (mL)	384.77±261.11	211.21±113.90	0.006
Intraoperative Salvage Blood(mL)	543.74±245.82	223.01±128.94	<0.001
Postoperative RBC (mL)	232.04±89.93	199.54±127.21	0.895
Anesthesia Dose (mcg)	16.29±40.89	23.40±55.59	0.255

Table 4: Comparison of intraoperative and postoperative complications, readmissions, and reoperations between patients with spine surgery before and after implementation of the multidisciplinary high risk case conference

	Before Conference (N=167)	After Conference (N=96)	p-value
Intraoperative Complications			
Total Intraoperative Complications	34.1%	16.7%	0.002
Loss of Neurovascularity	6.0%	4.2%	0.526
Incidental Durotomy	12.6%	4.2%	0.025
Massive Blood Loss	13.2%	4.2%	0.018
Delayed Extubation	22.8%	8.3%	0.003
Postoperative Complications			
Total Postoperative Complications	62.3%	56.3%	0.337
New Onset motor deficit	0.0%	1.0%	0.054
New Onset sensory deficit	2.4%	1.0%	0.438
Deep Surgical Site Infection	6.6%	1.0%	0.038
Superficial Surgical Site Infection	6.0%	5.2%	0.793
Mechanical Complication	1.8%	2.1%	0.897
Hypotension requiring vasopressor therapy	4.8%	18.8%	<0.001
Pulmonary Complications	7.2%	11.5%	0.238
DVT or PE	6.0%	3.1%	0.302
Reoperations and Readmissions			
Reoperation within 30 days	8.4%	2.1%	0.040
Reoperation within 90 days	12.0%	3.1%	0.014
Readmission within 30 days	10.2%	3.1%	0.038
Readmission within 90 days	15.0%	6.3%	0.035

DVT= Deep Vein Thrombosis, PE= Pulmonary Embolism