

“The complication rate in deformity surgery is 100%”


ISASS 2014



Standardizing Care for High-Risk Patients in Spine Surgery


The Northwestern High-Risk Spine Protocol

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Define High Risk Spine Surgery

- Prolonged Duration
- Large anticipated volume of blood loss
- Patients with significant medical Co-morbidities PRIOR to surgery




Complications of Adult Scoliosis Surgery

- Rate 37-86%
- RISKS:
 - Blood Loss
 - Post-Op Infections
 - Neurologic deficits
 - MI
 - Pneumonia
 - PE
 - Blindness
 - Death




GOAL: Prevention!

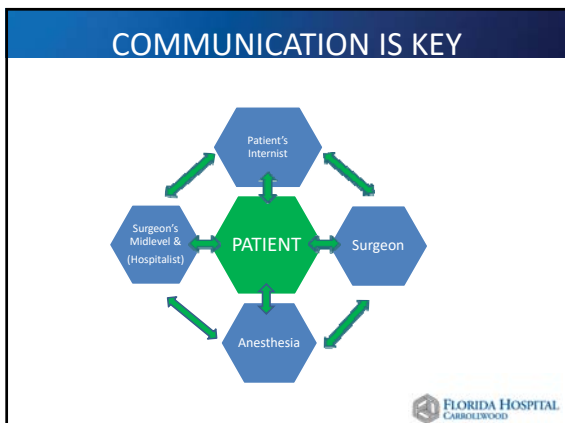
- *Identifying* those at risk
- *Optimizing* medical Co-morbidities
- ALGORITHM
 - Intraoperative management
 - Postoperative management



WHO SHOULD BE INCLUDED AS HIGH RISK

- Surgeon anticipates >6 hours of surgery time
- Plans >6 levels of surgery
- Plans a staged procedure (greater than 3 levels)
- Anterior/Posterior approach
- Surgeon's clinical judgment
- High-Risk medical conditions: CAD, CHF, cirrhosis, dementia, emphysema, renal insufficiency, cerebrovascular disease, hx stroke, pulmonary hypertension, age>80





High Risk Spine PRE-OP PROCESS

Cardiac Evaluation:
ACC/AHA Guidelines

- unstable coronary syndrome
- decompensated heart failure
- Significant arrhythmias
- Severe valvular disease
- Hx prior ischemic HD, prior HF, stroke, DM, renal insufficiency

PRE-OPERATIVE CARDIAC CLEARANCE
STRESS TEST, ECG (ECHO)

High Risk Spine PRE-OP PROCESS

Pulmonary Evaluation:
Risk Factors

- age
- smoking (fusion rates, 1.4-4.3 relative risk) MUST STOP 8 weeks prior- urine nicotine
- asthma
- COPD
- poor exercise capacity
- cough and/or dyspnea
- thoracic approach or thoracoabdominal


PRE-OPERATIVE PULMONARY CLEARANCE
PFTS

**High Risk Spine
PRE-OP PROCESS**

Renal Evaluation:
-Chronic Renal Failure
-End-Stage Renal Disease

Hemodialysis pts. should be transfused and dialyzed PRIOR sx and WITHIN 24 hours AFTER sx – set up prior elective case


Monitor Electrolytes and Volume



**High Risk Spine
PRE-OP PROCESS**


Controlling Other Risk Factors:
DM- pre-op Hemoglobin A1c (if not completed in past 3 months); tight glucose control (multimodal approach) Hgb A1c <7.5 Drawn in office on surgery scheduling day

Anemia- CAUSE?? pre-operative supplementation to include: iron, vitamin B12 and folate. recombinant human erythropoietin and transfusions



High Risk Protocol Preop

- Obesity- BMI > 40
Hold surgery until equal or less than 40
Dietary counseling
Referral to Bariatric Surgeon




High risk spine PRE-OP PROCESS

Nutrition Assessment and Optimization
Risk Factors:
>60 age
DM
Osteomyelitis
Spinal Cord Injury

Nutrition parameters have shown to take 6-12 weeks to return to baseline after spinal reconstruction sx

ORDER: albumin, pre-albumin, lymphocyte count and supplementation prior sx




High Risk Spine PRE-OP PROCESS

Controlling Other Risk Factors:
Osteoporosis: Bone Density
Risk factors: white, age>50, postmenopausal, smoker, hx of fracture over age 40, family hx, small frame
Identify prior vs. secondary causes

Psychosocial Evaluation: (know support system)
Accuracy of pre-surgical screening in predicting overall outcomes can be as high as 82%


Risk Factors:
Depression, anxiety, psychosis, bipolar, narcotic abuse



High Risk Spine PRE-OP PROCESS

Hepatic Evaluation:
-Acute viral or alcoholic hepatitis
-Fulminant hepatic failure
-Severe chronic hepatitis
-Child-Pugh class C cirrhosis
-Severe coagulopathy
-Severe extrahepatic complications of liver disease (hypoxia, cardiomyopathy, ARF)

POSTPONE ELECTIVE CASE
MELD (model for end-stage liver disease) scores: <10 relative degree of safety, >20 increase risk
3 variables: INR, total bilirubin, creatinine levels



Complete Worksheet Prior Incision

- **Estimated blood volume**
Patients weight x70ml
- **Acceptable hemoglobin levels for patient**
Patient weight/cardiovascular disease= 10hbg,
all others = 8 hbg
- **Acceptable Mean Arterial Pressure**
- **Maintenance Fluid**
4mL/kg for 10kg
2mL/kg for 11-20kg
1mL/kg for each kg greater than 20
- **NPO deficit**
of hrs. NPO x maintenance
- **Hourly estimated insensible loss**
8-12 mL/kg/h for the first 2 hr. post incision
5-7 mL/kg/h after 2 hr. post incision



Written Communication

Adopt the use of a 3 part record on every high risk spine procedure:

1. Anesthesia Record
2. Intraoperative transfusion record including pre-incision worksheet
3. Intraoperative blood gas and laboratory data flow sheet including neurological testing results



Intraop Communication Guidelines

Verbal Communication

Report HOURLY or when significant changes occur

Anesthesia to Surgeon

- Vitals (BP, HR, Temp)
- CVP- other invasive monitoring
- Cumulative Blood Loss
- Laboratories (latest results/trends)
- Any potential issues for balance of case
- Confirmation table position is horizontal unless otherwise specified

Surgeon to Anesthesia


- How pt. is responding to sx
- Observed blood loss and clotting
- Unusual anatomic findings that may impact the scope of procedure
- After 6 hours- Plan of Action



Intraoperative Protocol


- ❖ Labs drawn EVERY 2 hours in the FIRST 6 hours then EVERY 1hour
- ❖ *CBC with platelets*
- ❖ *PT, PTT*
- ❖ *Fibrinogen*
- ❖ *Ionized Ca++*

- ❖ Maintain Patient's Core Temperature Euthermic throughout surgery- IV fluid warmers, Bair huggers
- ❖ OR room temp to 70 degrees prior arrival




Blood loss protocol

- **TSA**
- Use of Cell Saver unless contraindication (infection/oncologic)
- **Determine Acceptable Hemoglobin levels for patient**
 - Patient weight/Cardiovascular Disease = 10Hbg
 - All Others = 8Hbg



Transfusion Therapy Management Protocol

<p style="text-align: center;">High-risk spine cryoprecipitate guidelines</p> <p><i>ORDER</i> Cyro to be thawed at fibrinogen <200</p> <p><i>ADMINISTER</i> Cyro when fibrinogen <150</p> <p><i>Standard dose is 1U bag (8 donors)</i></p>	<p style="text-align: center;">High-risk spine Platelet Guidelines</p> <p><i>ORDER</i> platelets when <150,000</p> <p><i>ADMINISTER</i> platelets when <100,000</p> <p>Standard dose is 1 bag; if this fails to raise the platelet count, a second bag may be ordered</p>
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Transfusion Therapy Management Protocol

IF patient is **OOZING AND**

- **Fibrinogen is normal**
- **Platelet Count is corrected (>100,000)**

ORDER and ADMINISTER: **DDAVP**

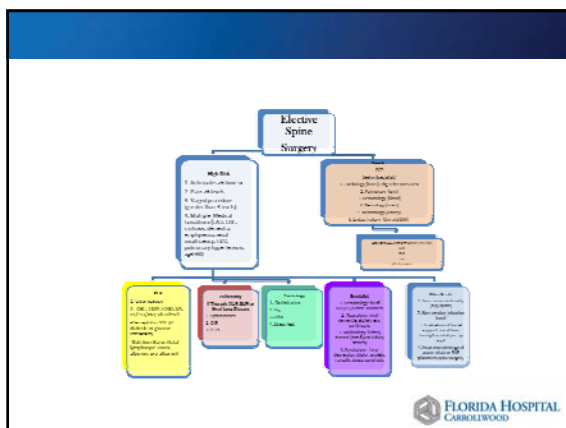
dose= 0.3ug/kg placed in 50mL saline, infused IV over 20min

IF patient is still oozing after DDAVP AND INR>2

ORDER and ADMINISTER: **Recombinant factor VIIa**

Fresh Frozen Plasma is Generally not Indicated





Thank You