

**PERI-OPERATIVE
CONSIDERATIONS AND
MANAGEMENT**
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**ORTHOPAEDIC
ASSOCIATES**
The Strength of Experience

DISCLOSURES

- Speaker for Mimedx
 - No conflicts involving this lecture

OBJECTIVES

- Diabetes/glucose management
- Pre-op Anticoagulants
- DVT Prophylaxis
- Smoking
- Supplementation (Vitamins C/D)

DIABETES/GLUCOSE MANAGEMENT

- Current guidelines of HbA1c of 7% or below
- JFAS 2016
 - 21,854 diabetic patients with HbA1c performed within 1 year prior to surgery.
 - Overall complication rate of 3.2%
- Patients with complication HbA1c: 6.29%, without: 6.11%
- For every 1% increase in HbA1c, odd of complication increase by 5%
- DM **WITH** neuropathy: 1.78x increase risk
- DM **WITH** 2-3 additional comorbidities: 3.08x increase risk
 - Prior MI, CVA, Liver disease, PVD, CHF, CKD
- Results: Increasing complications with increasing HbA1c
 - Complications are multi-factorial. Increasing complications with additional comorbidities.
- JFAS 55 (2016) 939-943: Association Between Hemoglobin A1c and Surgical Morbidity in Elective Foot and Ankle Surgery. Domek et al.

DIABETES/GLUCOSE MANAGEMENT

- 165 Diabetic patients with either arthrodesis, osteotomy or ORIF
 - Complications: Nonunion, Delayed Union, Malunion
- HbA1c above 7% had a 3x greater risk of complications
- Having at least 1 additional comorbidity was consistent with increased bone healing complications
 - Neuropathy #1, History of ulcer.
- **44% of Neuropathic patients had bone healing complications**
- 50% of patients with a bone complication had neuropathy
- JFAS 52 (2013) 207-211: Factors Associated with Nonunion, Delayed Union, and Malunion in Foot and Ankle Surgery in Diabetic Patients

DIABETES/GLUCOSE MANAGEMENT

- Personal Protocol:
- Non- Elective Surgery: Counsel patient and document increased risk
- Elective Bone Surgery: Counsel patient and document increased risk
 - Proceed with surgery if HbA1c is <7% and all other comorbidities are well controlled/optimized.
- Elective Soft Tissue Surgery: Counsel patient and document increased risk
 - Proceed with surgery if HbA1c is below 7.5%

PRE-OP DIABETES/GLUCOSE MANAGEMENT

- Typically long acting insulin should be discontinued 2-3 days prior to surgery (Lantus)
 - Change to intermediate and short acting (NPH and regular insulin)
 - Lantus can be continued up to the day before surgery in a tightly controlled diabetic patient
- Metformin
 - Some controversy over its use and when to hold
 - Potential risk of lactic acidosis
 - Current recommendation is to discontinue 24-48 hrs prior to surgery. Concern of renal function complications
 - Best source of Anesthesia, will tell you if you don't like the above, come talk
- Sulfonylureas (Glipizide, Glimepiride)
 - May induce hypoglycemia
 - Do not take the day of surgery
- Alpha (glucosidase) inhibitors (Acarbose, Miglitol)
 - No effect on a fasting patient. Do not resume until patient has resumed eating
 - Do not take the day of surgery
- Thiazolidinediones (Actos, Avandia)
 - Do not take the day of surgery
- Glucagon like peptide-1 agonists (Byetta, Victoza)
 - Do not take the day of surgery
- Dipeptidyl Peptidase-4 inhibitors (Januvia, Tradjenta)
 - May be continued if necessary. Work by reducing glycemic levels after meals and much less effective on an NPO patient
- Guidelines for Perioperative Management of the Diabetic Patient: Surgery Research and Practice, May 2015

PRE-OP DIABETES/GLUCOSE MANAGEMENT

- Type 1 Diabetics should continue a basal rate of insulin pre-op of 0.2-0.3U/kg/day of long acting insulin.

PRE-OP DIABETES/GLUCOSE MANAGEMENT

Personal Protocol and Recommendation:

- Defer to anesthesia and PCP/Endocrinologist

ASA PRIOR TO SURGERY

- Should we discontinue ASA prior to surgery or continue?
- Limited literature
- 1841 patients undergoing inguinal hernia repair
- 142 patients on ASA
 - 57 laproscopic
 - 85 open repair with mesh
- 27/57 laproscopic stopped ASA
- 55/85 open stopped ASA
- No differences in the groups
 - Intraoperative blood loss, operative timing, immediate post-op bleeding, follow up wound complications
- Recommended that the continuation of ASA is safe and should be preferred in patients with high cardiovascular risk

Is preoperative withdrawal of aspirin necessary in patients undergoing elective inguinal hernia repair? Surg Endosc. 2016 Dec;30(12):3542-3547. O'ring et al.

ASA PRIOR TO SURGERY


- 200 patients undergoing spine surgery with cardiac stents
- 100 stayed on ASA
- 100 stopped ASA 5 days pre-op.
- Looked at bleeding related complications
 - Spinal epidural hematoma, operative time, EBL, hospital length of stay, transfusions, 30 day readmission rates
- Those continuing ASA:
 - Shorter hospital LOS
 - Reduced operative time
- No difference in blood loss, transfusions, overall complication rates
- Conclusion: Peri-operative ASA is relatively safe in patients undergoing spinal surgery.

Does aspirin administration increase perioperative morbidity in patients with cardiac stents undergoing spinal surgery? Spine. 2015 May 1; 40(9):629-35. Cebular et al.

ASA PRIOR TO SURGERY


- Continued ASA prior to spinal fusion
- No increased bleeding.
- No increased operative time.

• *Safety of Continuing Aspirin Therapy During Spinal Surgery, A Systematic Review and Meta-Analysis.* Zhang et al. Medicine, 2017 Nov; 96(46):e8603




ASA PRIOR TO SURGERY

- Personal Protocol
- Continue ASA
 - All surgeries
 - Any anesthesia
- If patient has stopped ASA at the instruction of PCP or Cardiology:
 - If no cardiac stents.
 - Proceed with surgery. Patient to resume ASA immediately after surgery.
 - In patients with history of MI, cardiac stents, CABG
 - Patient to take/chew 81mg ASA prior to leaving pre-op.



ASA FOR VTE PROPHYLAXIS

- ACFAS Clinical Practice Guidelines
 - 2015
 - No high level evidence to support ASA



ASA FOR VTE PROPHYLAXIS

- American College of Chest Physicians (CHEST Guidelines) 2016
- THA or TKA patients
 - Recommended 35 days of treatment
 - LMWH, Arixtra, Eliquis, Pradaxa, Xarelto, LDUH, Dose adjusted Warfarin, and ASA all given grade 1B evidence to support their use.
 - Compression therapy recommended (IPC/D)
 - Dual therapy recommended while in the hospital
 - Start 12 hours post-op
 - Lovenox was then recommended over all other treatments.

ASA FOR VTE PROPHYLAXIS

- American College of Chest Physicians (CHEST Guidelines) 2016
- Knee Arthroscopy patients without history of VTE
 - No thromboprophylaxis recommended
- Lower extremity Trauma below the knee requiring immobilization:
 - No thromboprophylaxis recommended

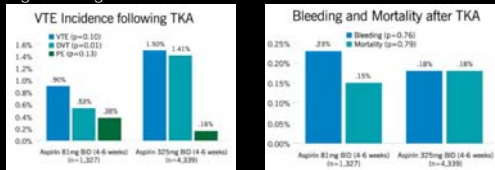
ASA FOR VTE PROPHYLAXIS

"There is convincing evidence that, taking all factors into account, aspirin is an effective, inexpensive, and safe form of VTE prophylaxis following total joint arthroplasty in patients without a major risk factor for VTE, such as previous VTE."

Aspirin and the Prevention of Venous Thromboembolism Following Total Joint Arthroplasty, The Bone & Joint Journal 2017 Nov; 99-B(11): 1420-1430

ASA FOR VTE PROPHYLAXIS

81mg vs 325mg Which is better?????



Cleveland Clinic, October 2017, Consult OD. Review of 10,000 patients.

ASA FOR VTE PROPHYLAXIS

81mg vs 325mg Which is better?????

81mg PO, BID for 4 weeks post TKA and THA in low risk patients is recommended in multiple sources.

- Currently used by Cleveland Clinic Orthopedics system wide.

This is also my personal protocol as well as my orthopedic partners.

SMOKING

- Well known risk factor for complications in surgical patients.
- Systematic review of 177 articles
- Smoking:
 - Decreases tissue oxygenation and aerobic metabolism
 - Reduced inflammatory response
 - Reduced oxidative bactericidal mechanisms
 - Impairs the proliferative response
 - Downregulates collagen synthesis and deposition
- After smoking cessation:
 - Tissue oxygenation and metabolism rapidly restore
 - Inflammatory response reverses in 4 weeks
 - Proliferative response remains impaired
- Nicotine and nicotine replacements, marginal effects
 - Reduced inflammatory response
 - Enhance proliferation


Wound healing and infection in surgery: the pathophysiological impact of smoking, smoking cessation, and nicotine replacement therapy: a systematic review. Ann Surg. 2012 Jun;255(6):1087-94

SMOKING

Are there surgeries that should be avoided in smokers?

- Negative outcomes were found:
 - ORIF
 - Arthrodesis
 - Plastic surgery
- No change in outcomes:
 - Non-osseous procedures
 - TAR, amputations
- The lack of negative effect on amputations was felt to be related to the significant comorbidities effectively making smoking a much lower relative risk in these patients.


Is It Worth Discriminating Against Patients Who Smoke? A Systematic Literature Review on the Effects of Tobacco Use in Foot and Ankle Surgery Jason H. Kim DPM, Sandeep Patel DPM. JFAS May-June 2017, Vol 56, Issue 3, 394-399



SMOKING

Personal Protocol:

- Every smoker is given a handout on smoking cessation.
- If any surgery (elective or not) is to be done on smokers, they are informed that smoking increases the risk of complications.
- If no other significant risk factors, continue with soft tissue or "low risk" surgeries.
- No elective osseous surgeries on smokers.
 - Check nicotine pre-op
- No "high risk" surgeries. (Achilles, TAR, Plastics, Tendon Transfers)
 - Check nicotine pre-op




VITAMIN C POST-OP

- 7 studies on post-operative pain
- 6 studies on CRPS
- High level evidence supporting the use of 1g per day of Vitamin C for 50 days for prevention of CRPS
- Moderate level evidence supporting 2g of Vitamin C pre-op for reducing post-op morphine consumption.

Effect of Perioperative Vitamin C Supplementation on Postoperative Pain and the Incidence of Chronic Regional Pain Syndrome: A Systemic Review and Meta-Analysis

- Chen et al. Clin J Pain. 2016 Feb;32(2):179-85



VITAMIN C POST-OP

Personal Protocol:

1000mg Vitamin C PO daily starting the day of surgery x 6 weeks

VITAMIN D POST-OP

- We know that vitamin D plays an important role in bone health.
- Vitamin D deficiency is very common, even in Florida.
- Toxicity threshold is estimated to be 10,000-40,000 IU/Day.
- Avoid serum levels above 125-150nmol/L
- Tolerable upper limits of intake for adults is 4,000 IU/day (100mcg)
- RDA for adults
 - Age 18-70: 600 IU/day
 - Age >70: 800 IU/day
- NIH Office of Dietary Supplements, nih.gov

VITAMIN D POST-OP

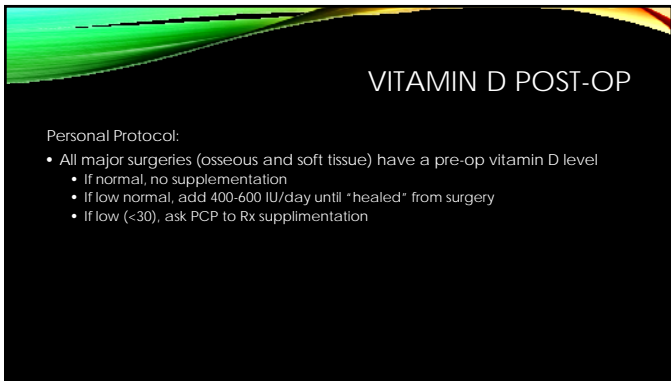
- 218 consecutive patients undergoing shoulder arthroplasty
 - 43% were Vitamin D insufficient (<30ng/mL)
 - 11% were Vitamin D deficient (<20ng/mL)
- Risk factors for Hypovitaminosis D:
 - Lack of prior supplementation
 - BMI greater than 30
- "Routine pre-op evaluation is merited"

Hypovitaminosis D in Patients Undergoing Shoulder Arthroplasty: A Single-Center Analysis. Orthopedics. Inkrott et al. 2016 Jul 1;39(4):e651-6

VITAMIN D POST-OP

- Arthrodesis non-union risk
- 29 patients with non-union compared to 29 patients with union.
- No differences in regards to outcome based on:
 - Age
 - Sex
 - Tobacco use
 - BMI
 - Procedure selection
- Vitamin D deficient patients were **8.1x** more likely to have a non-union.

Risk Factors Associated With Nonunion After Elective Foot and Ankle Reconstruction: A Case-Control Study. JFAS 2017, May-Jun;36(3):457-462 Moore et al.



VITAMIN D POST-OP

Personal Protocol:

- All major surgeries (osseous and soft tissue) have a pre-op vitamin D level
 - If normal, no supplementation
 - If low normal, add 400-600 IU/day until "healed" from surgery
 - If low (<30), ask PCP to Rx supplementation



THANK YOU

Questions?????

Comments, issues, complaints,
suggestions, please email me
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