Outpatient Total Shoulder Arthroplasty

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Faculty Financial/Conflict of Interest Disclosure

- **Tornier Inc.**: Shoulder arthroplasty medical education

Shoulder Arthroplasty

- Incidence growth expected to *equal or surpass* hip and knee arthroplasty [1]
  - 9.4% increase per year
- 1998 - 2011 → almost 4 X increase
  - 18,550 → 68,000[2,3]

1) Day et al, *JSES* 2010 Dec;19(8):1115-20. Epub 2010 Jun 15
2) Kim et al, *JBJS Am 2011*
3) Padegimas, *JSES 2015*.

Traditional Barriers to Outpatient TSA

- Pain control
- Post-operative nausea
- Symptomatic hypo / hypertension

- Singh, Sperling, Cofield [4]
  - 90-day risk of
    - Cardiac event: 2.6%
    - VTE: 1.2%

What are Risk factors for 30-day morbidity and transfusion in total shoulder arthroplasty? A review of 1992 cases[5]

- CHF
- Chronic steroid use
- Pre-op HCT < 38%
- ASA 4
- Operative time > 2 hours

Waterman et al, *JSES 2015*[6]

- Pre-existing cardiac disease
  - Along with increased age = increased mortality risk
- PVD combined with OR time > 174 minutes

5) Anthony et al, CORR 2015

Readmission

- Range: 2.5% - 6.6%[7-10]
- Cancienne et al, JBJS Am 2017[11]
  - 703 outpatient TSA
    - 16% readmission
    - RF's: obesity, DM, PVD, **CHF**, depression, chronic **anemia**, chronic lung disease
  - 4459 inpatient TSA
    - 9% readmission
    - Higher risk of UTI and blood transfusion

Neer Award 2016: Outpatient total shoulder arthroplasty in an ambulatory surgery center is a safe alternative to inpatient total shoulder arthroplasty in a hospital: a matched cohort study

Tyler J. Brolin, MD, Ryan P. Mulligan, MD, Frederick M. Azar, MD, Thomas W. Throckmorton, MD*

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- 30 patients, age / co-morbidity matched
  - ASC (outpatient) mean age 52 yrs vs. hospital age 54 yrs
  - Single surgeon experience
  - Anatomic TSA's
  - Multi-modal pain management for both groups

Results

- **No difference in complication rate**
  - 13% ASC vs.

    10% Hosp

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Table II The 90-day episode-of-care complications

	ASC	Hospital	*P* value
Total complications	4 (13.3%)	3 (10.0%)	1.00
Infection	0	0	1.00
Anterior subluxation	1 (3.3%)	1 (3.3%)	1.00
Subscapularis failure	1 (3.3%)	0	1.00
Arthrofibrosis	2 (6.7%)	0	.49
Superficial venous thrombosis	0	1 (3.3%)	1.00
Blood transfusion	0	1 (3.3%)	1.00
Readmission within 90 days	0	0	1.00
Reoperation within 90 days	0	0	1.00

ASC, ambulatory surgery center.

Key Points of this study:

No cardiopulmonary complications or infections

No readmissions within 90 days

Study established baseline for future

Identifying appropriate candidates for ambulatory outpatient shoulder arthroplasty: validation of a patient selection algorithm

Matthew N. Fournier, MD[a], Tyler J. Brolin, MD[a], Frederick M. Azar, MD[a], Raj Stephens, MD[b], Thomas W. Throckmorton, MD[a,*]

Journal of Shoulder and Elbow Surgery

- Prospectively obtained data
- 49 TSA , 12 RSA (all primary)
- Patients selected based on data and refined progressively

- Decision points
  - From data in literature on shoulder, hip and knee
  - Previously not described as ***used for creation of algorithm***

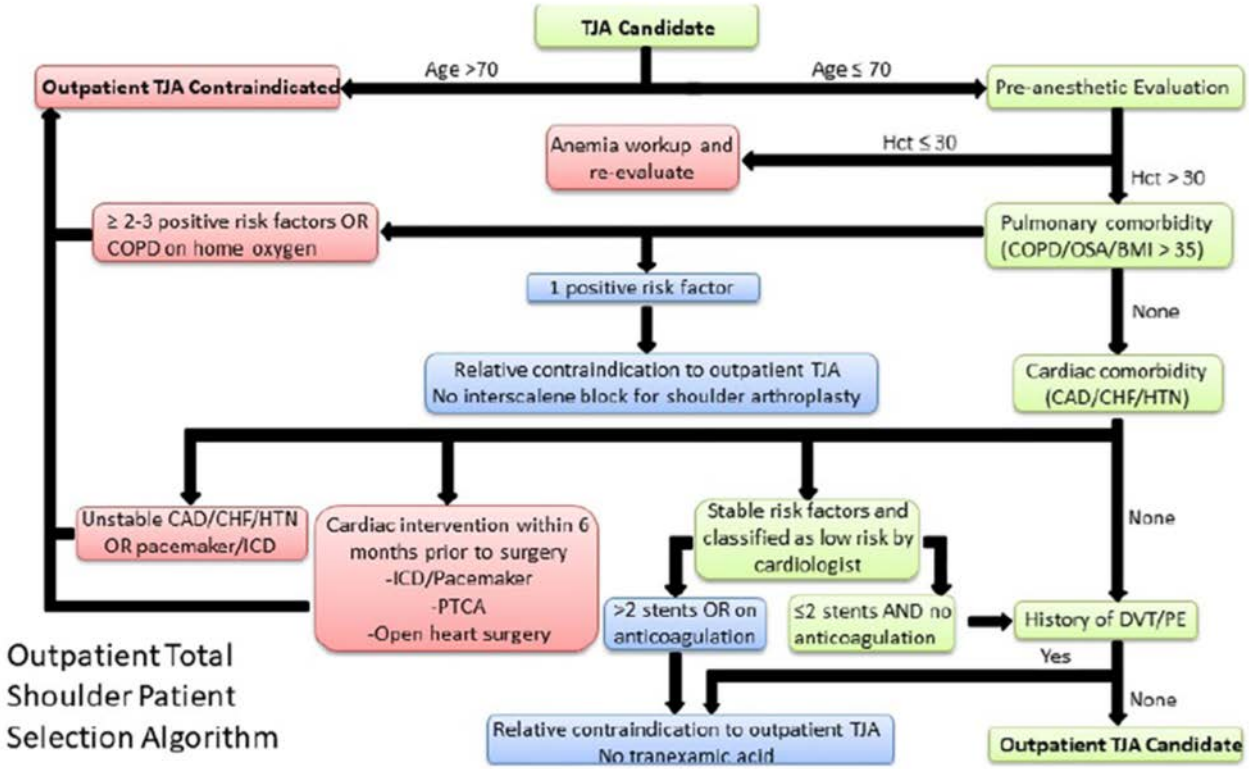
STEPWISE ALGORITHM

- #1 - Age
  - < 70 years ✓
- #2 - Anemia
  - HCT > 30 ✓
  - HCT < 30 ✗ workup / re-evaluate
- #3 - Pulmonary comorbidity
  - COPD / OSA / BMI > 35
  - 1 out of 3 ? ✓ BUT no interscalene block
  - ≥ 2 out of 3? ✗

Patient-specific factors

- #4 - Cardiac comorbidity
  - no CAD / CHF / HTN ✓
  - **Stable** risk factors (per cardiologist)
    - <2 stents AND no anticoagulation ✓
  - **Unstable** CAD / CHF / HTN X
  - Pacemaker / ICD X
  - Cardiac intervention w/in 6 months prior X
  - PTCA X
  - Open heart surgery X

- #5 - VTE History
  - No ✓
  - Yes ✗
    - Relative contraindication, no TXA



Peri-operative protocols

- Multimodal pain regimen
  - Med combination given post-op AND pre-op
    - Oxy IR/ER, celecoxib, gabapentin
  - Intra-op peri-articular block
    - Liposomal bupivicaine, epinephrine, ketorolac
    - Deltoid, pec major, surrounding soft tissues
- No interscalene (or other) block
- No post-op XR
- No drains
- Discharge criteria: walk, eat, void, PO meds sufficient

Results

- 61 patients
  - 39 (64%) men
  - Mean age 58 (r: 37 - 69) years

- 7 Complications
  - 2 medical
  - 5 surgical

Peri-op (medical)

-bradycardia

-hypotension

Post-discharge

- Hematoma
- Stifness
- Anterior subluxation
- Subscap rupture

Table II Complications

Event	No. (%) (n = 61)	Outcome
Reoperation within 90 days	1 (1.6)	Hematoma evacuation
Readmission within 90 days	0	
Total complications	7 (11.5)	
Infection	0	
Cardiopulmonary events	0	
Hematoma	1 (1.6)	Evacuation
Perioperative anesthesia complications	2 (3.3)	
Transient postoperative bradycardia		Uneventful recovery
Acute hypotension		Surgery aborted
Arthrofibrosis	2 (3.3)	Additional physiotherapy
Anterior subluxation	1 (1.6)	No treatment
Subscapularis rupture	1 (1.6)	No treatment

Our Experience

- Limited thus far, promising
- ***RSA > TSA***
- Indications:
  - Patient-expressed desire / home support
  - No prior chronic opioid use
  - Primary TSA or RSA, no fractures

- Relative contraindications
  - Age >75 years** *(have done in 84 y.o.)*
  - Significant cardiac / pulmonary co-morbidities
  - Pre-op anemia
  - BMI > 35

Perioperative

- Pre-op **liposomal bupivicaine interscalene block**
  - **Effective up to 72 hours**
    - **Operator / experience - dependent**
  - Repeated in PACU if not effective
- Tolerating PO / able to **ambulate safely**
- Relatively normotensive (i.e. no pressure lability)

Postoperative

- I call on POD0, POD2, seen in clinic POD3
- No medical or short term (< 30 days) complications thus far
- No re-admissions or re-operations

Summary

- Outpatient TSA and RSA can be safe
- Patient selection / medical clearance is critical
- Multi-disciplinary approach for success:
  - Surgeon
  - Anesthesia
  - Perioperative nursing staff
  - Phone support
- Additional high-quality data reporting needed to refine the selection algorithm / criteria / protocol

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