Outpatient Total Knee Replacement: How Do We Get There?
Maxim S. Eckmann, MD
Associate Professor of Anesthesiology and Pain Medicine
UT Health San Antonio

Disclosures
- Unrestricted educational grants from Boston Scientific, Medtronic, and Abbott.

Objectives
- Briefly Review Pathogenesis explaining an increase in Total Knee Arthroplasty (TKA) nation-wide.
- Identify factors that predict success in outpatient TKA.
- Compare differential outcomes of efficacy and adverse outcomes of continuous peri-neural blockade techniques for total knee arthroplasty.
- Highlight challenges and opportunities in the development of total arthroplasty and Enhanced Recovery Programs.
- Highlight increased need for preoperative preparation and a perioperative surgical home.

Clinical Presentation of Osteoarthritis: Activity Related Joint Degeneration and Pain
- Early disease presentation
  - Pain shortly after supernormal activity, resolving with rest
- Later disease
  - Constant pain, even nightly
  - Brief stiffness before use (<30 min)
  - Joint “buckling”, catching, or locking
  - Muscle inhibition
  - Cartilage / ligament derangement

Clinical Features
- Starts to emerge about age 40, especially prevalent after age 60, can occur earlier
- Risk factors:
  - Age
  - Extreme joint use
  - Previous major joint injury
  - Obesity
  - Chronic joint loading or poor joint alignment
  - Family history: inheritability of hand and hip OA 50%, knee 30%

Epidemiology and Impact
- Common cause of disability in elderly, especially weight bearing joints
- Prevalence
  - Symptomatic Knee OA: 6% age ≥ 30; 12% age ≥ 60.
  - OA affects over 26 million people in the USA
  - Total Knee Arthroplasty Procedures total well over 600,000 annually.
- Second most common orthopedic surgical procedure performed in adults.
- Heritability comes from the Growth Differentiation Factor 5 (GDF5) gene which is involved in cartilage matrix anabolism.
Interest in Outpatient TKA

Preoperative information and medical optimization
Anesthetic technique
Surgical technique
Pain/ opioid-sparing multimodal analgesia
Early mobilization/ orthostatic tolerance
Muscle function/ rehabilitation
Postoperative length of stay (LOS)
Post-discharge pain management
Cognitive function
Perioperative blood management
Thromboembolic prophylaxis
Postoperative morbidity
Organizational issues (drains, tourniquet, etc.)
Cost issues

Continuum Of Length-of-Stay

Traditional Inpatient ➔ 4-12 Days
Fast Track ➔ 2-4 Days
Outpatient ➔ 5-6 Hours
ERAS Concepts
High volume Selection and Intervention

Trends in Total Joint Replacement: Projections

Average length of stay:
Year 2000: 4.6 days
Year 2016: 2.8 days
Over 50% may be outpatient by 2026
Some may be done in ASCs
CMS requesting comments on TKA/THA

Pearls for Success

Time to Discharge: ~ 6 hours
Analgesia
Anesthetic Side Effect Mitigation (e.g. PONV, sedation)
DVT prophylaxis
Post-operative ambulatory challenge
PT post-op consultation

Coordination of Care for Outpatient TKA
Patient Education and Selection

- Managing Expectations
- Pre-operative "Joint Academy"
- Presentations from specialists involved in care
- Anesthesiology
- PT / OT
- Question/Answer in a Relaxed Setting
- Discharge Planning - Family Education


Anesthetic Techniques: Summary

| GA | NA | LPB |
| LIA | ACB | FNB | SNB |

Anesthetic Goals for Outpatient TKA

- Minimized exposure to central hypnosis, opioids
- Short acting agents
- Maximized time to alertness
- Minimized side effects: PONV, Urinary retention
- Maximized analgesia
  - Multi-modal oral therapy: Gabapentinoids and NSIADS, Local / Regional Anesthesia

Key Anesthetic Goals for Outpatient TKA

- Minimized impact on quadriceps motor function, especially: PONV, ACB
- Post-surgical pain care: Catheter Adjustment, Questions, Catheter Removal

Saphenous Nerve and the Adductor Canal

- Nerve Stimulator Technique:
  - Palpate groove b/t sartorius and vastus medialis at mid thigh
  - Stimulate nerve to vastus medialis

Adductor Canal Block (ACB): Relevant Anatomy

- ACB and FNB have similar analgesic efficacy
- ACB has less quadriceps weakness, but clinical outcomes similar

ACB vs FNB: Superior Choice?

Peri-articular Injection / Local Infiltration Analgesia (PAI / LIA)

- 8 Anatomic Targets with increased nociceptors
- Negligible motor impairment
- Better analgesic performance than IT morphine
- Has been combined with saphenous block, spinal block
- Role of liposomal bupivacaine unclear


Surgical Strategy

- Reduced incision size
- Quadriceps sparing technique
- Subvastus approach
- Avoidance of medial saphenous N injury
- Bleeding Reduction / Blood Salvage
- Tranexamic Acid (TXA)?

Physical Therapy: The Anchor

- Early Ambulation is KEY
- Aggressive attention
- Coordination of Availability
- Weekend Coverage
- Part of a larger “Total Joint Program” and “Enhanced Recovery After Surgery” Program (ERAS)
- Practice and System Interplay
- Economic gains

Summary: Elements for Success

- Patient Selection
- Preoperative Education
- Medical Optimization
- Pain Optimization
  - Possible home treatment
  - Reduced Surgical Invasiveness
- Reduced Bleeding
- Thromboprophylaxis
- Immediate Ambulation
- Aggressive PT/OT
- Coordinated care between Anesthesiologist, Surgeon, Therapist, Health System

Thank you!