Knee Dislocations in Patients with BMI >40

William H. Harvin, MD
Assistant Professor
University of Texas Health Science Center at Houston

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Disclosures

• None.
Obesity epidemic

• 35% American population is obese.*
• Obesity rate is climbing.
• $147 billion estimated-cost of obesity treatment in US (2008)[1]

Low vs Ultra-low velocity KD

- Several case reports and case series about “low velocity” KDs
  - Mostly sports injuries
- First case reports on USVKD in 1990*
  - Numerous case reports or small series
- Retrospective, 6 years.
  - 17 patients with KD while performing normal daily activities.
  - Mean age: 28.6 years.
  - Mean BMI: 48 (30-68).
  - 13/17 were ANTERIOR dislocations → most likely related to HYPEREXTENSION
  - 7/17 (41%) neurologic injuries
    - 5 peroneal
    - 2 peroneal and tibia
  - 7/17 (41%) popliteal artery injuries
  - Mean follow-up: 28.5 months (8-60)
  - 11 patients with complete follow-up
  - 4 patients lost to follow-up (1 died)
  - 8 patients treated with reconstruction and remained treated with brace/splint, cross pins, or exfix.
  - 6/17 patients with complete follow-up underwent reconstruction.


Ultra-Low-Velocity Knee Dislocations.
Azar et al., AJSM, 2011.

- Outcomes:
  - Higher BMI more likely to have vascular injury (Trend; p=0.0543)
  - Higher BMI more likely to have combined vascular & neurologic injury (p=0.0225)
  - All had “severely abnormal” outcomes IKDC
  - Improved HSS score in reconstructed knees versus non-reconstructed knees (p=0.013)
    - 4/7 vascular repairs successful (2 AKA, 1 died)
    - All had “severely abnormal” outcomes IKDC
  - Lysholm or Tegner
  - Based upon 11 patients (6 recon vs 5 closed)
  - 8/17 patients had complications
    - 2 AKAs
    - 1 superficial infection
    - 1 severe dehiscence
    - 2 LOA/MUA
    - 1 death
**Ultra-Low Velocity Knee Dislocations:**
**Patient Characteristics, Complications, and Outcomes.** Werner et al., *AJSM*, 2014.

- Retrospective, 12 years
- Inclusions:
  - Low energy fall mechanism
  - All patients underwent surgery
- 23 patients
- Mean BMI: 49

Follow-up available for 17/23 patients
Mean follow-up 5.8 years.

Outcomes:
- 6/23 (26.1%) vascular injuries (Significant increase compared to non ULVKD)
- 9/23 (39.1%) neurologic injuries (Significant increase compared to non ULVKD)
- 12/24 (50%) KDIV
  - PLC injured in 22/23
  - 17/22 complications (overall significant increase)
    - 12 persistent pain
    - 4 vascular
    - 2 neurologic
    - 2 instability
    - 2 vascular claudication
    - 2 DVT/PE
  - 2/17 convert to TKA due to pain/arthritis
  - 12/17 (71%) “dissatisfied” or “extremely dissatisfied” with outcome

**Low Velocity KD in Obese and Morbid Obese Patients.**

- Retrospective, 2000-2011
- 19 patients (5M; 14F)
- Mean age: 30.3 yrs
- Mean BMI: 41.8 kg/m²
  - 9 Obese (BMI 30-39.9 kg/m²)
  - 10 Morbid Obese (40-64.4 kg/m²)

- Treatment protocol
  - Pre 2006, ex-fix or cast/splint x 6 weeks as definitive treatment
  - After 2006
    - Open PLC repair; repair or reconstruction ACL; ex-fix
    - Ex-fix removal at 6 weeks; gentle MUA
    - PT with hinged knee brace (only 5/18 had properly fitted brace)
Low Velocity KD in Obese and Morbid Obese Patients.

- 5/19 (26%) popliteal artery injury.
- 7/19 (33%) peroneal nerve injury with 50% recovering.

Results
- Mean OR time significant increased compared to non-obese (p = 0.0000035):
  - Obese: 8.6 hrs
  - Non-obese: 5.8 hrs
- ROM (if compliant with PT): NS
  - Operation: 90 degree of motion
  - Nonoperative: 60 degree of motion
- Tegner (change from pre to post injury): NS
  - Operation: 0.86
- Knee society score, ML laxity significantly improve with surgery but not AP laxity (p=0.0006)
- 2/8 failed reconstructions (recurrent falls)
- 1 late ACL reconstruction for symptomatic instability
- 3/9 non-op KDs → TKA due to residual instability and pain

Counsel Patients
- Not only do they have standard risks of KD but...
  - Increased vascular injuries
  - Increased neurologic injuries
  - Worse functional outcomes
    - Pain
    - Stiffness
    - Recurrent instability
  - Wound complications/infection
  - DVT/PE
  - Vascular claudication

Treatment: Step One
- Prompt reduction, immobilization, check vascularity.
- Obese patients may have increased delays in diagnosis of KD and/or vascular injuries.*
  - Many spontaneously reduce.
  - Body habitus complications, presentation or exam.

Challenges present at every step of the treatment algorithm.

Workup Challenges

- Imaging
  - MRI diameter
    - Closed bore MRI size: 60cm
    - Wide bore MRI size: 70cm
    - "Open" MRI
  - MRI weight limit
    - 250-660lbs (most 300-350 lbs)
- CT scan
- Stress radiographs
Surgical Challenges

• OR bed weight limit
  • May need specialized bed
  • May need two beds

• Arthroscopic equipment size
  • Standard knee arthroscope working length: 160-175mm
  • Hip arthroscope working length: 200-225mm

Postop Challenges

• Immobilization
  • Brace or splints may not be effective

• External fixation
  • Remember principles of stability
  • Increase pin size
  • Increase pin number
  • Spread pins in a single segment
  • Add different planes
  • Proximity to extremity

The New ULVKD?
The New ULVKD?

Ultra-low velocity KDs

- Counsel patients upfront on expectations
- EUA and/or stress radiographs
- Bring help
- Open repair vs reconstruction
- Immobilize possibly with external fixator
- Plan for a long day

Thank you!