Total Knee Arthroplasty

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Total Knee Arthroplasty

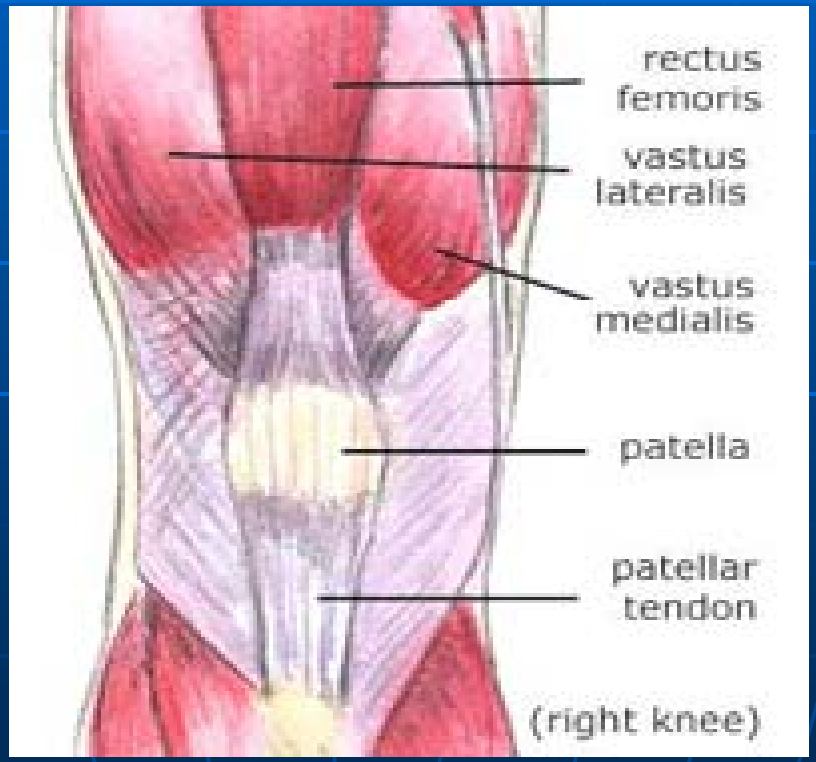
- TKA historically for pain relief
- Trend in younger individuals getting TKA's
- Patient expectations are higher
- Envelope for a simple TKA being pushed

Total Knee Arthroplasty

- Surgical approach
- Rehabilitation pathway
- Treatment principles and research
- Guidelines for return to activities of daily living
- Return to sport

Surgical Approach

- Median Peripatellar Approach



Surgical Approach

- Tibial and femoral components are chosen by surgeon
- Components are selected based on surgical goals
  - ACL always removed during TKA. (Unil TKA spared)
  - PCL may be sacrificed
  - MCL and LCL always spared

Surgical Approach

- PCL deficient approach, will use a “CAM” (Meniscus portion has upward stump)
- Journey prosthetic to replace ACL and PCL
  - used on younger patients, more expensive
  - no control first 60 degrees of flexion
- Hinged component is used if deficient lateral or medial stability

Surgical Approach

- Components

Surgical Approach

- Femur and Tibia are shaved using a saw
- May correct varus or valgus deformities by adjusting the tibio plateau angle
- The surgeon may have to release some of the lateral structures to accommodate
- May require bracing and/or limited weight bearing (if significant) in order to allow tissues to heal

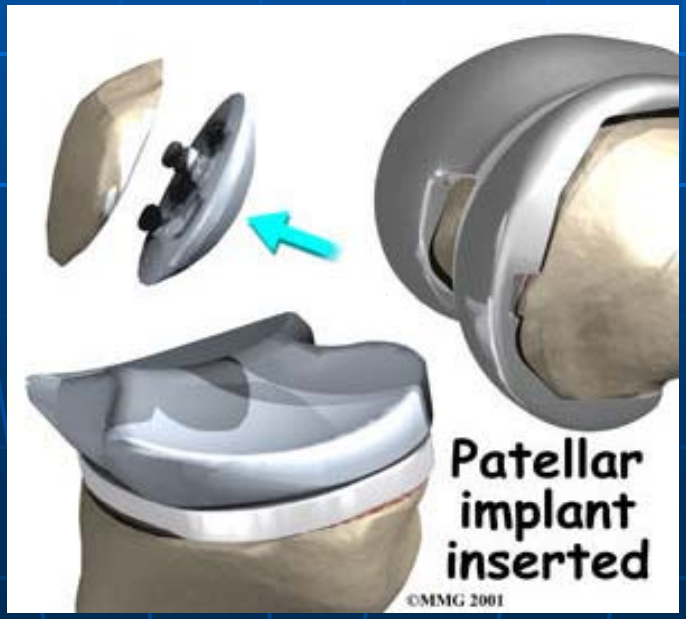
Surgical Approach

Surgical Approach

- Polyethylene meniscus- sits on metal components, guides extension and flexion (squeaking common)
- Cement for tibial and femoral components has antibiotic and is strong (Plexiglas)
- Solidifies immediately

Surgical Approach

- Patella preserved if in good condition
- If patellar OA is present, may use a button on the undersurface of the articular surface



Surgical Approach

- “Cocktail” of analgesic injected
- Decreases pain for first 16-18 hours
- Surgeons ensure adequate knee ROM prior to leaving the operating room

Key Points

- VMO and quadriceps are cut
- The most vulnerable soft tissue of the knee is the perpendicular cut of the VMO tendon
- Patient controlled movements will NOT rupture the sutured tendon

Key Points

- WBAT directly after components are in place
- Cement is very strong composition =Plexiglas
- Patient may experience more localized swelling/pain if soft tissue release is involved
- Weight bearing status may be reduced or bracing administered to protect healing

Key Points

- Pain will be less over the first 16-18 hours post operation due to “cocktail” injection
- There are no restrictions post operation, but we need to consider the soft tissue healing process.

Rehabilitation Pathway

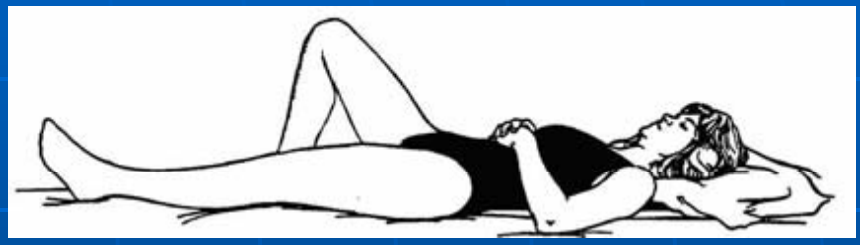
- No TKA protocol» Pathway
- Based on individual needs
- Considerations:
  - Surgical approach
  - Complications during/post sx
  - Patient age, activity level pre-op, general health, PMHx (ie. hip,spine,ankle)
  - Patient goals!!

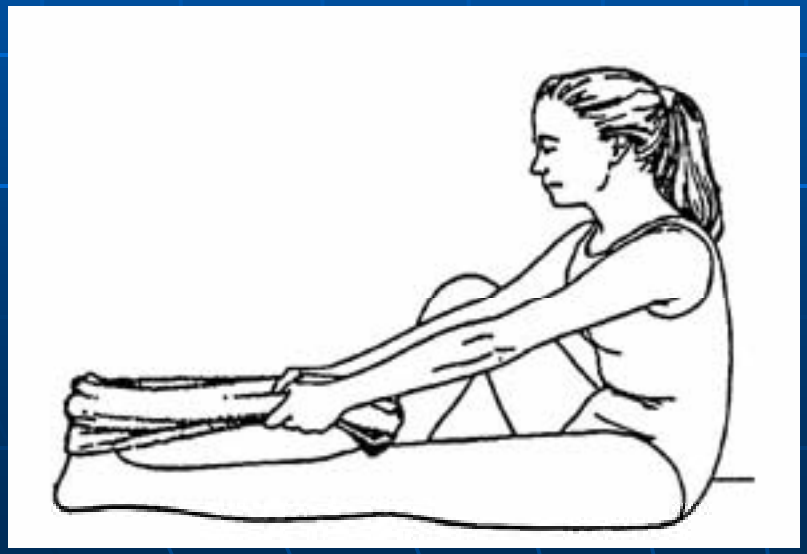
Pathway

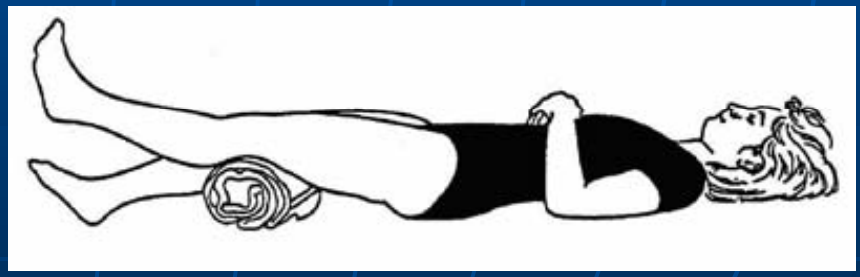
- At LHSC, patients are mobilized WBAT POD#1
- Exercises start POD#1
- Stay at the hospital is typically 3-4 days
- D/C home +/- CCAC and OP referral

University Hospital's TKA Exercises

www.lhsc.on.ca/jointreplacement







Goal Setting

- Important for patient and therapist to set goals at first outpatient appointment
  - Ie. Active vs. Sedentary Individual
- Need to keep patient compliant and motivated

6 week surgeon follow-up

- Minimum of 90 degrees of flexion
- Quadriceps activation
- Gait
- Independence

(LHSC Dr. Jamie Howard)

6 week surgeon follow-up

- If 90 degrees flexion not attained, 8 week appointment booked
- 105 degrees flexion for ADL's
- No aggressive strengthening until 6 weeks post op
- Pain complaints are typical, usually lessens after 3 months

Variations with Exercise Prescription

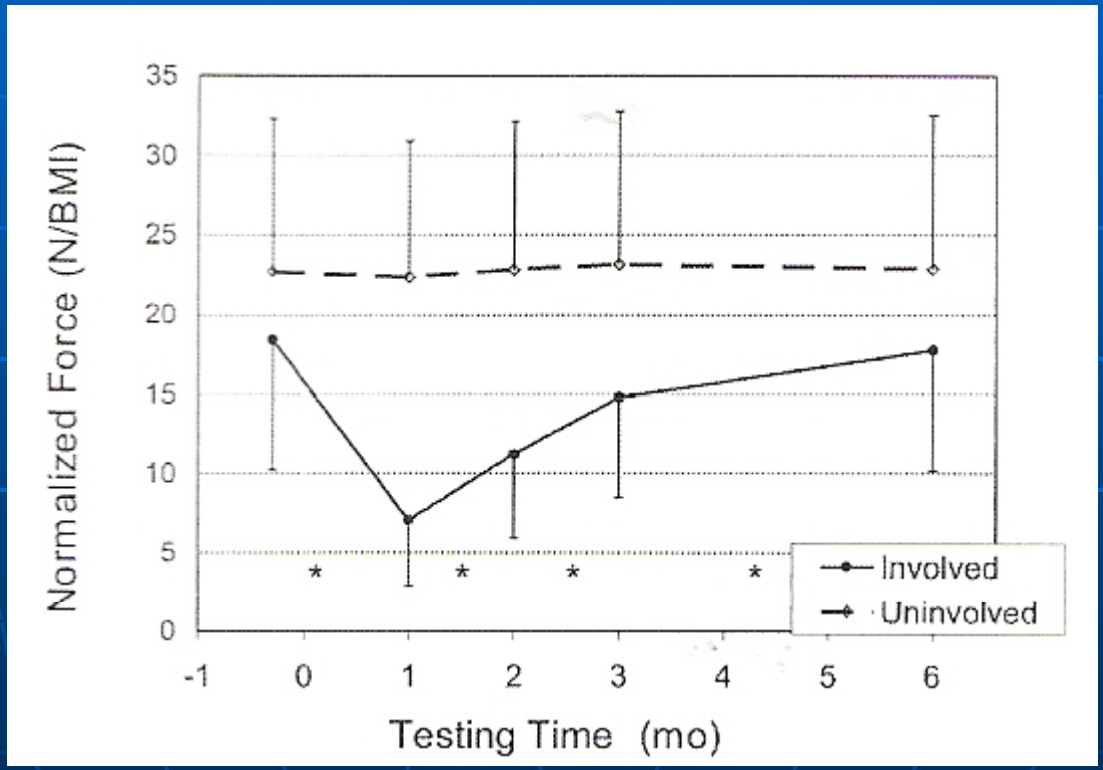
- Repetitions of exercises
- Different methods to achieve flexion and extension
- Pain and function should direct early outpatient progressions
  - WBAT
  - Painful inhibition

Research
(Mizner et al 2005)

- Research collected at pre-op,1,2,3 and 6 mos post TKA
- Tested isometric quad strength, knee ROM, TUG, Stair climb test, NRS, general health and knee function
- Knee ROM, quad strength and function worsened 1 month post op
- Quad strength most correlated with functional performance

Quad Strength

(Mizner et al 2005)



Research

- Most patients had osteoarthritis pre operatively
- OA has been reported in the literature to be associated with knee extension weakness
- Isokinetic extension strength values approach baseline at 60+ days post TKA

(Rossi, Brown et al 2005)

Research

(Silva et al 2003)

- At minimum of 2 years post TKA, the quad mechanism is 83% of the strength of the contra lateral knee
- Tested control subjects (no TKA) vs. healthy TKA population >2 yrs post TKA
- Showed that average isokinetic ext and flex strength was more than 30% lower than matched control subjects

OKC vs. CKC Exercise

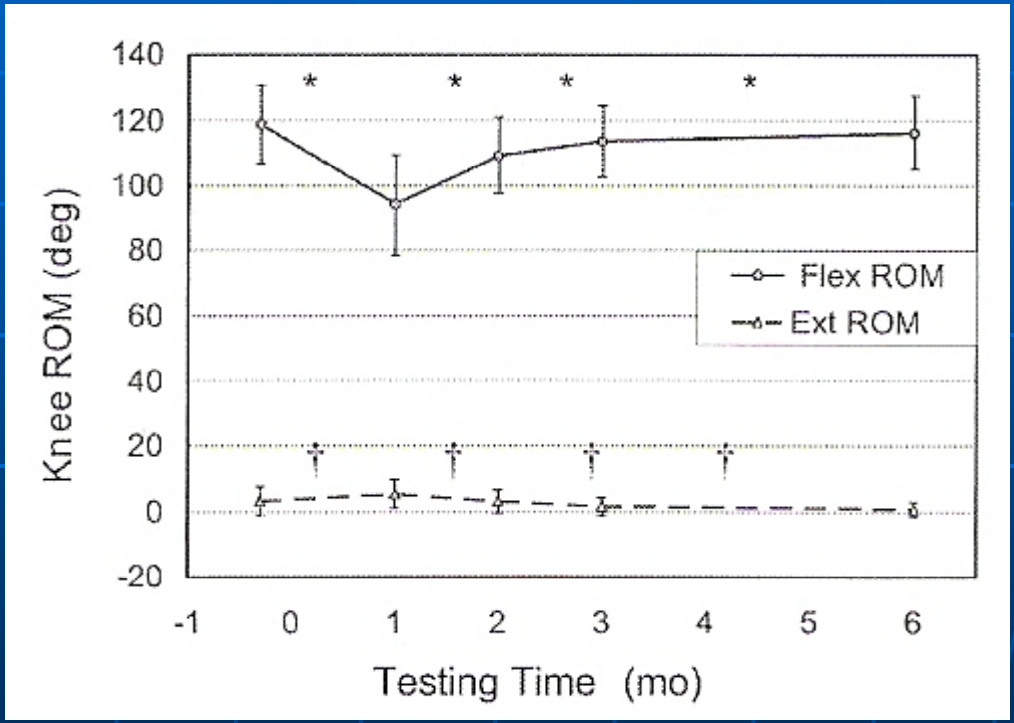
(Rossi et al 2007)

- Force production during CKC assessment strongly associated with perceived function (WOMAC)
- Poor relationship exists between OKC measure of strength and physical function
- Closed Kinetic assessment of the entire lower limb strength may provide greater insight to functional limitations

Key Points

- 1 month post TKA quads are very weak
- Quadricep strength is correlated with function
- Deficits in extension strength throughout first 60+ days
- Physio exercises need to be done by the patient beyond that time
- Home exercise program is important as many PT services are finished by this time

Range of Motion
(Mizner et al 2005)



ROM GOALS

- Flexion ROM did not change significantly from pre-op value and plateaued at 3-6 months
- Extension improved 2 degrees
- Clinically significant for goal setting

Functional Testing

(Mizner et al 2005)

- Average time to complete the performance based functional tests returned to pre-op levels in 2 months
- Significant changes in functional ability >6 months post op

Biomechanics

(Benedetti et al 2003)

- Proved that residual muscle function loss post TKA leads to abnormal gait
- Analysis showed a ‘stiff knee gait pattern’
- Abnormalities during the loading acceptance after TKA are associated with co-contractions in muscular activity patterns

Food for thought

- ACL reconstruction is 26-52 weeks of structured rehabilitation
- TKA being done on younger, active populations with desires of ↑ function
- Data shows that knee strength is important element in increased function
- Does rehabilitation need to evolve to meet this demand?

Program Design

- Based on the individual
- Consider the phase of recovery
  - Week 0-6
  - Week 6-12
  - Week 12+
- Please refer to handout “Rehabilitation Guidelines Following a TKA”

Program Design

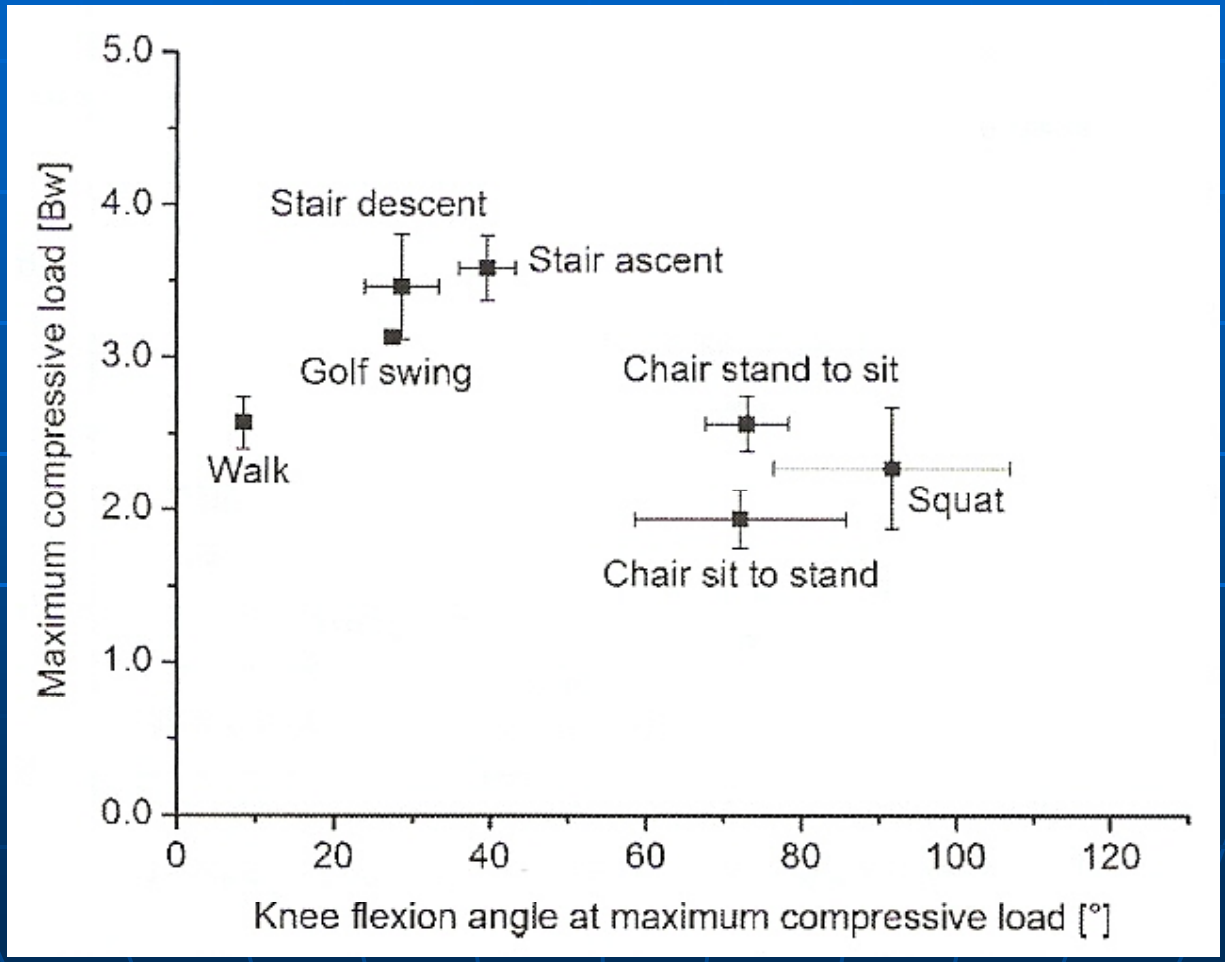
- Important to keep patient challenged
  - Progress reps, sets and exercise
  - Independent gym, pool and activities promoted
  - Plan for return to sport

Rehabilitation Considerations

- Important to progress to exercises that are functional as soon as possible
- Use pain as a guide
- Consider the ground reaction force and activity based stresses on the knee

In vivo knee loading

(Munderman, Dryby et al. 2008)



Return to ADL's

- Driving – 6 weeks post TKA suggested
  (Pierson and Earles 2003)
- Kneeling- Permitted, no risk to prosthesis
  (Dr. Howard- LHSC)
- Weiss, Noble et al. 2002 Evaluated 176 questionnaires 1 yr post TKA regarding functional activities that are important to the patient

ADL's

- 70% of patients participated in walking, stair-climbing, bathing, sitting, foot care and car travel
- 30% did advanced activities including turning, cutting, moving laterally, kneeling, squatting and carrying heavy objects
- The most difficult activities reported were squatting, gardening and kneeling

Return to Sport

(Chatterji et al 2005)

- Improved function with sports but moderate restrictions
  - Study found ↑participation in walking and aquafit
  - Study found ↓participation in golf (10/19 golfers)

Return to Sport

(Bradbury et al. 1998)

- 160 patients post TKA interviewed
- 65% returned to a sport >1x per week
- 91% low impact
- 20% high impact

Return to Sport

Time to participate in sporting activity post TKA
(Chatterji et al 2005)

Aquafit	6.9 weeks
Exercise walking	8.7 weeks
Golf	13 weeks
Swimming	13.1 weeks
Tennis	30 weeks
Gardening	21 weeks
Bowling	18.3 weeks
Exercise Class	12 weeks
Cycling	12.5 weeks
Hiking	8 weeks
Badminton	6 weeks

Return to Sport
(Healey et al. 2000)

- Surveyed 58 members of the American Knee Society regarding return to sports
- Wear rate, prosthetic loosening and periprosthetic fracture were considerations for surgeons

Recommended Sports

- Aerobics (↓ impact)
- Bicycling (stationary)
- Bowling
- Croquet
- Ballroom Dancing
- Jazz Dancing
- Walking
- Square dancing
- Golf
- Horseshoe
- Shooting
- Shuffle board
- swimming

Recommended with Previous Experience

- Road Cycling
- Canoeing
- Hiking
- Rowing
- Speed walking
- Skiing(x-country)
- Skiing (stationary)
- Doubles Tennis
- Weight machines

Not Recommended

- Aerobics (↑ impact)
- Baseball
- Softball
- Basketball
- Football
- Gymnastics
- Handball
- Hockey
- Volleyball
- Jogging
- Lacrosse
- Racketball
- Squash
- Rock climbing

Sport Summary

- Little research done
- High impact generally not recommended
- Considerations: pre-op athletic ability, rehabilitation, surgical reconstruction, implant fixation, implant failure

- Physiotherapist role is to ensure effective functional and sport specific rehabilitation

Thank You

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