Correction of Massive Varus Deformity in TKR

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Massive Varus-Overview

- Classification and definition
- Surgical options and challenges
- Literature
- Technique
- Illustrative cases
  - intra articular correction
  - femoral osteotomy

Massive Varus-Classification

Classification

- Intra articular

Massive Varus-Classification

Classification

- Extra articular

- Femoral or tibial

Massive Varus-Classification

Classification

- Combined

Massive Varus-Definition

Definition of massive varus

- 15 degrees Tibio-Femoral
- 20 degrees Tibio-Femoral
  - Mullajimmet-2005

Others refer to mechanical axis
Reproducible but requires long films
Increasing navigation - mechanical
Massive Varus-Definition

Definition of massive varies
15 degrees Tibio-Femoral
Laskin 1996, Ritter 2003
20 degrees Tibio-Femoral
Mullajimet-2005
Others refer to mechanical axis
Reproducible but requires long films
Increasing navigation -mechanical

Not Massive Varus

Massive Varus-Factors

Factors to consider
- Size of deformity
- Site - intra articular or extra articular
  proximity to joint
- Bone stock loss
- Passively correctable
- Time for deformity to develop

BUILD A SURGICAL PLAN

Massive Varus-Causes

Short term
- Malunion recent intra articular fracture - plateau or condyle
- AVN/stress fracture often associated with high dose steroid use

LESS DIFFICULTY BALANCING

Long term
- Longstanding OA & bone loss
- Old fracture malunion
- Osteotomy
- Metabolic bone disease
- Pagets disease
- Congenital deformity

MORE DIFFICULTY

Massive Varus-Surgical Options

- Too hard non operative management
- TKR with correction of deformity
  within joint and balance of knee
- Correct deformity with osteotomy
  either before or at time of TKR
- TKR and leave in mild malalignment
- Arthrodesis
Massive Varus-Surgical Options

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Massive Varus-Challenges

- Alignment
- Balancing
- Bone stock

Massive Varus-Challenges

- Alignment
- Is it possible to correct an extra articular deformity within confines of the ligamentous attachments and balance the joint
- Will bony cuts remove collateral attachments
### Massive Varus-Challenges

**Alignment**
- Should an extra articular deformity be corrected
- Prior to or at the same time
- Femoral deformity more difficult-extension gap only

**Balancing**
- What do we need to release and in what order to balance the joint
- Will the joint be stable

### Literature-Massive Varus

**Should we perform TKR?** Ritter 2004
- Outcome just as good in matched series of 84 pts with varus or valgus greater than 20 degrees.
- TKR is appropriate

**Should we retain the PCL?** Laskin 1996
- Inferior results if retain PCL
- Greater radioluencies
- "wedge sign"
- More pain
- Lower arc of motion
- More revisions with PCL retain V resection in TKR's with greater than 15 degrees tibiofemoral varus
- Generally easier to balance
**Literature-Massive Varus**

Should we leave in some varus?
Ritter 2011 and 2013

- Post op malalignment associated with higher revision rates
- If leave the tibia in varus not more than a degree or two

**Surgical technique**

Some Tips & Answers

- Medial bone loss
- Ligament balancing
- Extra articular deformity

**Bone stock loss**

- Become more frequent problem
- Better

**Bone stock loss**

Options

- Cut lower on tibia
- Leave in 1-2 degrees varus
- Augment/Wedge tibia

**Bone stock loss**

Options

- Leave in 1-2 degrees varus – Happy to do with navigation
Bone stock loss

- Augment
- Wedge tibia
- Flat augment

Ligament Balancing

Part way thru surgery
- Massive varus and mild flexion contracture
- Intra articular
- Cuts done & osteophytes removed
- Straight mechanical axis
- Trials in place
- Not out straight
- Very tight medially thru range
- Tiny bit lax laterally

Ligament Balancing

- Need to loosen medial side
- Deep and superficial
- Anterior fibers
- Posterior fibers (Posterior oblique ligament)
- Epicondylar attachment broad
- Medial capsule
- Active constraints
- Medial hamstrings through pes anserinus and semimembranosus

Ligament Balancing

Varus Release Algorithm

Flexion - Flexion - Extension - Extension

MCL- anterior
MCL- posterior

Ligament Balancing

Anterior band subperiosteal release
Ligament Balancing

- Still tight-pie crust proximal MCL
- Choose anterior or posterior portion as appropriate

Ligament Balancing

- Saw or rongeurs to remove medial margin
- Necessitates prior good medial release
- MCL runs shorter course

Ligament Balancing

Other tricks
Medial Epicondylar osteotomy
- Engh 1999 reported “good results”
- But 46% non union
- Dixon et al
- Described downsizing tibia and shifting it laterally.
- Then remove medial uncovered bone
- Allows shorter course for MCL

Ligament Balancing

- Extra Articular Deformity Correction
  - Tibia
  - Mullajmet al 2005
  - Transverse osteotomy to correct extraarticular deformity
Extra Articular Deformity Correction

Mullajimet et al 2005

- 173 PCL retaining TKR for mechanical varus greater than 20 degrees
- Transverse osteotomy
- Serial releases on medial side
- "Reduction osteotomy" of posteromedial tibial flare

Extra Articular Deformity Correction

Distal Femur

Old supra and intercondylar femoral fracture

- 75 year old male
- Prior distal femoral and proximal tibial fractures in 1960
- Femur plated intercondylar component not reduced
- Healed in varus with translocation
- Marked lateral wear
- Successful contralateral TKR

Extra Articular Deformity Correction

Surgical Options

- Primary TKR
- Femoral osteotomy
- TKR with osteotomy
- Lateral plateau bone loss

Extra Articular Deformity Correction

Surgical Options

- Femoral deformity close to joint
- Osteotomy and stem fixation
- Single operation and rehabilitation

Extra Articular Deformity Correction

Simultaneous TKR and femoral osteotomy

- Navigation not feasible
- Closing wedge femoral osteotomy
- Chevron to control rotation
- TKR with stem fixation

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Extra Articular Deformity Correction

Delighted patient - femoral non union - unstable in rotation

Unicortical plate-healed

Femoral Shaft Deformity

- 72 year old male
- Paget's disease proximal femur
- OA hip symptom free
- Medial knee pain and moderate osteoarthritis
- Opinion from hip surgeon
- Knee pain WAS NOT referred from hip

Options

- TKR
- Femoral shaft osteotomy
- Both together

Surgery 2002

- Femoral shaft osteotomy
- Healed but incompletely
- Medial knee pain disappeared till recently
- Awaiting TKR

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Extra Articular Deformity Correction

- Hip surgeon not too happy

Summary

- Difficult cases
- Identify the problems
- Plan the surgery
- Leave plenty of time
- Not the case for the end of the list
- Stable balanced articulation
- Grateful patient

Thank you