Total Knee Replacement vs. Osteotomy as a Treatment for the Cruciate-deficient Stifle

Matthew J. Allen, MA, Vet MB, PhD, MRCVS
Professor of Small Animal Surgery
Director, Surgical Discovery Centre
University of Cambridge
Overview

• Goals of osteotomy vs. total knee replacement
• Clinical course following CCLD
• Assessment of joint disease post-CCLD
• Making the right decision for your patient
• Can we improve decision making - and, if so, how
• Recommendations
Goals of Osteotomy

- Restore full range of motion
- Return normal limb musculature
- Eliminate inflammation
- Stop progression of degenerative joint disease
- Full return to function

Goals of Total Knee Replacement

- Relieve pain
- Restore functional range of motion (>90 degrees)
- Return to normal limb musculature
Normal stifle range of motion is reported to be 41 degrees in full flexion to 162 degrees in full extension
  
  • Jaegger et al., 2002

Kinematics data suggest that normal walk/trot involves a more limited ROM
  
  • Korvick et al., 1994

Sit to stand, climbing stairs etc. are going to be much more demanding on joint ROM (and loading)
Return to Normal Limb Musculature

- 98.5% of control by 6 months, no change from 6 to 24 months
  - Au et al., 2010; Moeller et al., 2010
- Potentially significantly impacted by post-op rehabilitation
  - Monk et al., 2006
Eliminate Inflammation

- Subjective observations support this
- Very little objective data - no easy way to measure this in vivo without invading the joint
Stop Progression of DJD

- Degenerative joint disease continues to progress after TPLO
  - Lazar et al., 2005; Lineberger et al., 2005; Hurley et al., 2007; Boyd et al., 2007; Au et al., 2010; DeLuke et al., 2012
- No clear link between time interval post-surgery and degree of change
Clinical Function vs. Stability

• Available data confirms the efficacy of osteotomy procedures in returning dogs to clinical function
• Direct comparisons suggest that osteotomy is superior to lateral suture
  • Gordon-Evans et al., 2013
  • Nelson et al., 2013
• However, kinematics data indicate ongoing instability in a significant proportion of dogs with good clinical function
  • Rey et al., 2014
Clinical Presentation of CCLD

- Acute CCLD without secondary changes
- Chronic CCLD which have not been managed (well)
- CCLD with failed suture repairs
- CCLD with failed osteotomy
Radiography post-CCLD

- Experimental evidence from Pond-Nuki model
- Osteophytosis (not subchondral sclerosis) is the most significant change over time
  - Innes et al., 2004
- Often disconnect between severity of clinical signs and imaging information
Do Radiographs Predict Function?

- No correlation between progress after TPLO
  - Lazar et al., 2005; Lineberger et al., 2005; Hurley et al., 2007; Boyd et al., 2007; Au et al., 2010; DeLuke et al., 2012
- No significant correlation between the presence of OA and clinical function (force plate)
  - Gordon et al., 2003
Assessing Cartilage Integrity

- Radiography
- Magnetic resonance imaging
  - Standard MRI protocols
  - T2 signal
  - dGEMRIC
- Arthroscopy or mini arthrotomy
## Arthroscopy

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<tr>
<th>Outerbridge score</th>
<th>Description</th>
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Outerbridge, 1961
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Excellent for the surface, less so for deeper cartilage and s/chondral bone
Magnetic Resonance Imaging

Standard T2 sequences

Martig et al., 2006
MRI of Cartilage

Tiderius et al., 2003
dGEMRIC

Wucherer et al., 2012
Case Presentation

“Toby”

Courtesy; Loic Dejardin, DVM, MS, DACVS
Case Presentation

“Toby”
TKR Templating
Surgery
Surgery
16 weeks post-TPLO
Making the Decision

Key Data

• Clinical examination
• Deformity (collapse
• Crepitus, pain and ROM

• Radiography
• Arthroscopy

Supporting Data

• Age, intended activity level, insurance status
Reasons to be Conservative

- Infection
- Wear
- MCL disruptions

When these cannot be managed, arthrodesis or amputation are all that remain.
Wear Occurs in Canine and Human TJR
Reasons to be Conservative

• Current “routine” imaging is severely limited in its ability to discriminate the severity of articular cartilage injury
• If lesions are evident, TKR may be indicated
• If lesions are not evident, TKR may still be indicated but additional diagnostics should be undertaken
• Recommendaton would be to directly visualize every joint that is being considered for TKR, unless the available data are absolutely compelling
Questions?
Thank you