MR Imaging of the Postoperative Knee: Menisci and Ligaments

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Postoperative Meniscus: Knee

- Meniscal Repair / Meniscectomy

MR Imaging Postoperative Meniscus

Problematic: Standard MR imaging criteria tear –may be normal findings postoperatively

- Variable postoperative morphology
- Surfacing short TE intrameniscal signal

Conventional MR Imaging

- Diagnostic criteria
  Surfacing intrameniscal T2W fluid signal (high resolution/SNR imaging)
  Fragmentation, abrupt meniscal contour changes

Direct MR Arthrography

- Imaging contrast imbibition into meniscus = tear
- Potential benefits over conventional MR imaging
  - Distension joint space, Increased intraarticular pressure

Indirect MR Arthrography

- Advocated - Increased conspicuity tears - indirect MR arthrographic effect
  - Assessment meniscal healing – enhancement fibrovascular scar tissue

Diagnostic Signs of Recurrent/Residual Tear Post Meniscal Surgery

- Conventional MR, MR Arthrography - Fragmentation, Surfacing intrameniscal T2W signal
- MR Arthrography - Intrameniscal imbibition contrast material

Persistent Diagnostic Dilema – ↑ intrameniscal signal, ? tear (short TE – Arthrographic acquisitions)

- Potential diagnostic utility CT arthrography (resolution, intrameniscal contrast +/-)

Anterior Cruciate Ligament Reconstruction

- Biologic tissue graft reconstruction
  Bone-patellar tendon-bone , Hamstring tendon (semitend, gracilis)

Graft Placement

- Femoral/tibial tunnels – Goal → Joint stability (ant translation, rotational)
- Single bundle, Double bundle – anatomic reconstructions
  Tech reproducibility, Over-crowding notch, difficulties revision
  Lack of improved (functional, Sx) outcome data vs anatomic single bundle

Early graft signal <1 year - neoligamentization, vascularization (↓ by 1-2 yrs postop)
Variable degrees Persistent ↑ striated graft signal > 1-2yrs can be normal finding
- Joint stability, clinical/functional assessment

MR Imaging ACL Graft

Instability - Graft Disruption

- Complete tears T2W Imaging - Complete discontinuity graft fibers
- Partial tearsT2W Imaging - Partial discontinuity, some fibers intact

Instability - Graft Streching

- Clinical setting instability – intact graft fibers
- Posterior bowing / buckling graft

Instability - Fixation Failure

- Hardware, Graft migration

Limited Range of Motion – Graft Impingement

- Limitation terminal extension → may lead to graft failure
- Tibial tunnel too anterior, mechanical impingement graft -intercondylar notch

MR imaging

- Anteriorly positioned tibial tunnel, Graft kinking/angulation - intercondylar roof
- ↑ T1/T2 signal – within distal graft abutting intercondylar shelf

Limited Range of Motion – Arthrofibrosis

- Limitation terminal extension - 2° to arthrofibrosis anterior compartment knee
- Focal nodular form – "Cyclops Lesion"

MR imaging

- Focal/diffuse ↓T1, T2 signal material anterior compartment knee

Miscellaneous – Tunnel Expansion

- Etiology – Unknown ? Mechanical, ? Inflammatory

Miscellaneous – Ganglion Cyst Formation

- Etiology - ? Degeneration / Partial tearing graft, ? Precursor graft failure

Miscellaneous – Harvest site complications

- Patella baja , Anterior/Posterior medial – knee pain
- Arthrofibrosis, Patellar fracture, Patellar tendonitis/ tendon rupture

Posterior Cruciate Ligament Reconstruction

- Biologic tissue graft reconstruction – similar to ACL reconstruction
- Graft fixation- Femoral / Tibial tunnels, Tibial inlay

MR Imaging PCL Graft

- Graft disruption, Discontinuity graft fibers, Fluid signal traversing graft

Collateral Ligament Reconstruction

- Extraarticular ligaments - Good healing potential
- Collateral Ligament Repair-Reserved – complete lig disruption + other lig injury
- Suturing, Stapling

MR Imaging Collateral Ligament Repair

- Ligamentous thickening acute/chronic, ↑ T2W signal -diminishing over time

- Metallic artifact repair site

References

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