Graft selection in chronic multiligament injuries

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Primary decision

- Autograft or Allograft?

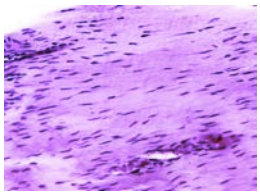
Schechinger et al.

Autograft

- **Advantages**
  - Surgeons are familiar with harvest and preparation
  - No risk of disease transmission
  - No cost addition
  - Can be used from the uninjured knee
- **Disadvantages**
  - Donor-site morbidity
  - Operative time lengthened

Autograft

- Healing and remodeling of autografts are well documented
- Over time, these grafts begin to resemble the normal ligament in vascularity, cellularity and chemical composition
- Amiel: "ligamentization"



Allograft

- **Advantages**
  - Has been used successfully for ligament reconstructions
  - No harvest morbidity
  - Decreased operative time, smaller incisions
  - Reconstruction of multiple ligaments
- **Disadvantages**
  - Transmission of infection disease: HIV (1:1,667,600), Hepatitis, bacterial contamination
  - Increase the overall expense of knee reconstruction
  - Availability
  - Storage options
  - Remodeling process may be slightly prolonged compared with autograft

Advantages and Disadvantages of various graft sources used in knee reconstruction

Graft	Advantages	Disadvantages
BTB autograft	Strong, stiff graft Rigid fixation both ends of graft Bone to bone healing at ends of graft	Anterior knee pain Patellar fracture (rare) Patellar tendon rupture (rare)
Hamstring autograft	Reasonable strength when bundled Little donor-site morbidity	Soft tissue fixation Flexion weakness
Quadriceps autograft	Thick, strong graft Rigid fixation one end of graft Bone-to-bone healing at one end of graft • Minimal donor-site morbidity Concurrent harvest with other portions of procedure possible	Difficult harvest Patellar fracture (rare) Can't be used if B-PT-B also harvested from same knee
Achilles allograft	Abundant collagenous material (width & length) • Bony fixation at one end No donor site morbidity Decreased operative time Smaller incisions	Possible disease transmission Expensive Potentially limited availability
BTB allograft	Bony fixation both ends No donor-site morbidity Decreased operative time Smaller incisions	Not long enough for some reconstructions • Possible disease transmission Expensive Potentially limited availability
Anterior tibialis allograft	Alternative to Achilles and B-PT-B allograft Reasonable strength	Soft-tissue fixation Possible disease transmission Expensive Potentially limited availability

Adapted from Weiss et al.

ACL

- Most surgeons use either BTB or quadrupled hamstring tendons for primary reconstruction
- Other graft sources have been used: quadriceps tendon, various allograft sources
- All options have been shown to work well
- Flexibility regarding the choice of ACL graft

PCL

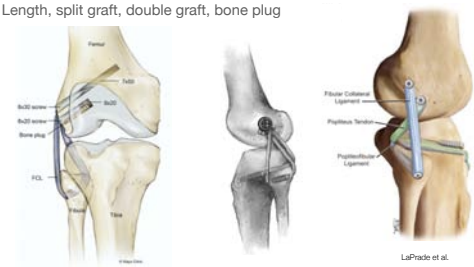
- BTB, Hamstring tendons, Quadriceps tendon, Tibialis anterior allograft and Achilles allograft have all been used for the tibial tunnel technique
- If double bundle reconstruction
  - Autograft: quadriceps tendon
  - Allograft: different options available

PCL

- If Inlay technique
  - Bone plug is required: BTB, quadriceps, Achilles allograft

Lateral reconstruction

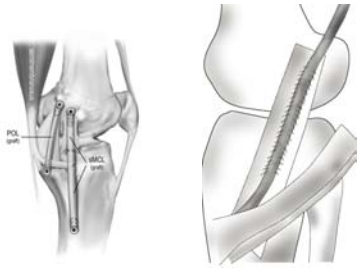
- Different options are possible depending on the surgical procedure
- Length, split graft, double graft, bone plug



LaPrade et al.

Medial reconstruction

- Semitendinosis, left attached distally
- Allografts



Graft decision making

No

Allograft

- Double ligament reconstruction is usually not problematic
- When more than 2 ligaments require reconstruction, the contralateral limb will likely be required for harvest
  - ACL and PCL are usually managed with Hamstrings and BTB or quadriceps from the same knee.
  - Collateral reconstruction with a tendon from the opposite knee

Graft decision making
Allograft

- Easier choice
- Achilles tendon allograft, BTB, Quadriceps tendon and Hamstring tendon can all be used to reconstruct the ACL, PCL, or collateral ligaments
- A combinaison of allograft and autograft is also a raisonable approach in certain scenarios, such as limited availability of allograft tissue

Conclusion

- Various graft sources can be utilized
- The choice of graft is dependent on the preference of the surgeon and patient, as well as the availability of graft sources and the number of ligaments requiring reconstruction or augmentation
- Allografts in multiligament reconstructions +++