

Treatment of Meniscal Tears

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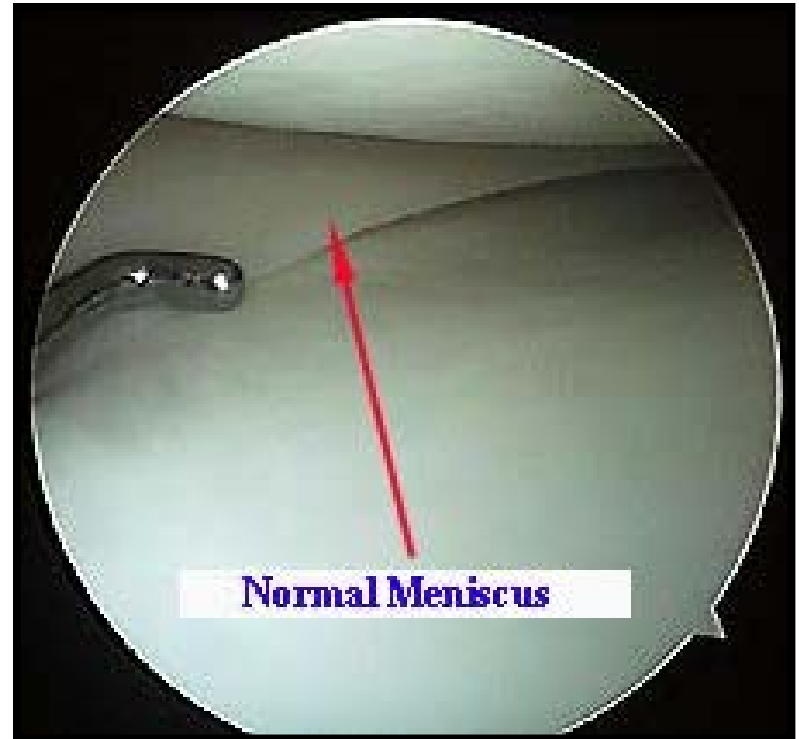
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Medical Director Holmes Sports Medicine

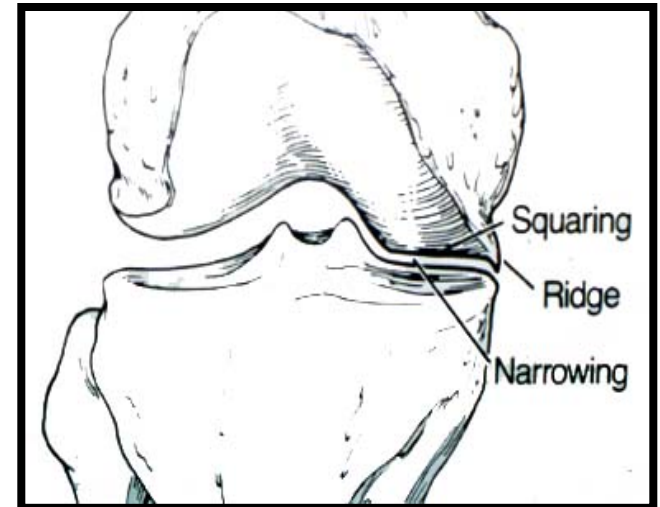
Introduction

- Meniscus is integral in knee biomechanics
- Preservation is essential
- Meniscal surgery continues to evolve



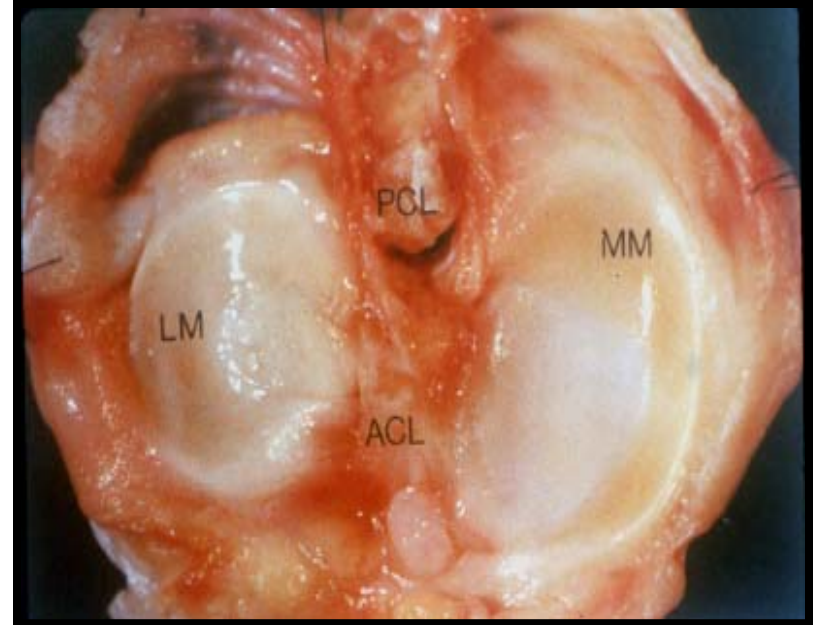
Introduction

- Sutton (1897)
- King (1936)
- Fairbanks (1948)
 - Osteophyte formation
 - Flattening of marginal half of femoral surface
 - Joint space narrowing



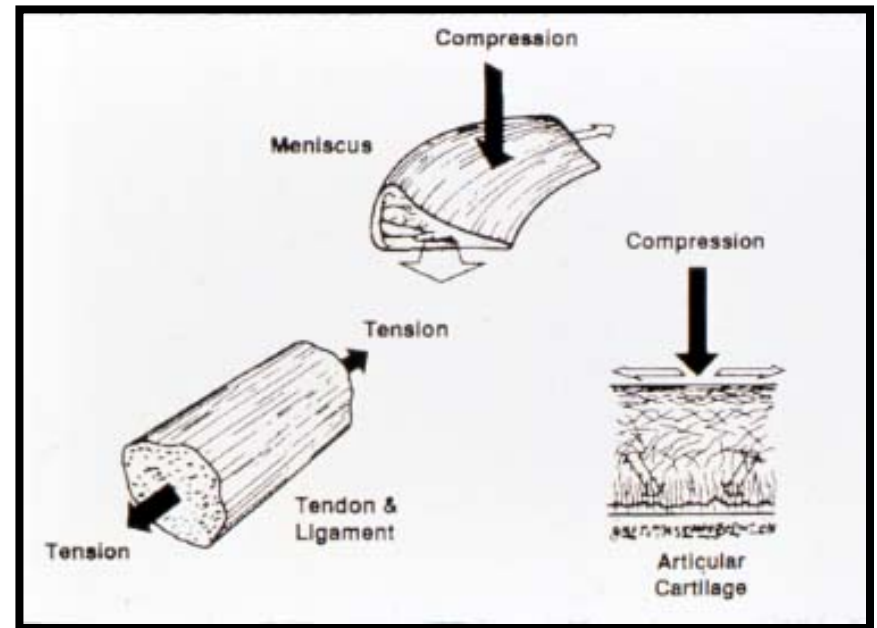
Meniscal Function

- Shock absorption
- Force transmission
- Lubricates joint
- Nutrition to chondrocytes
- Provides stability



Meniscal Biomechanics

- ‘Hoop stress’
- Maintains shape and structure when axially loaded
- Increases surface area
- Decrease force per unit area



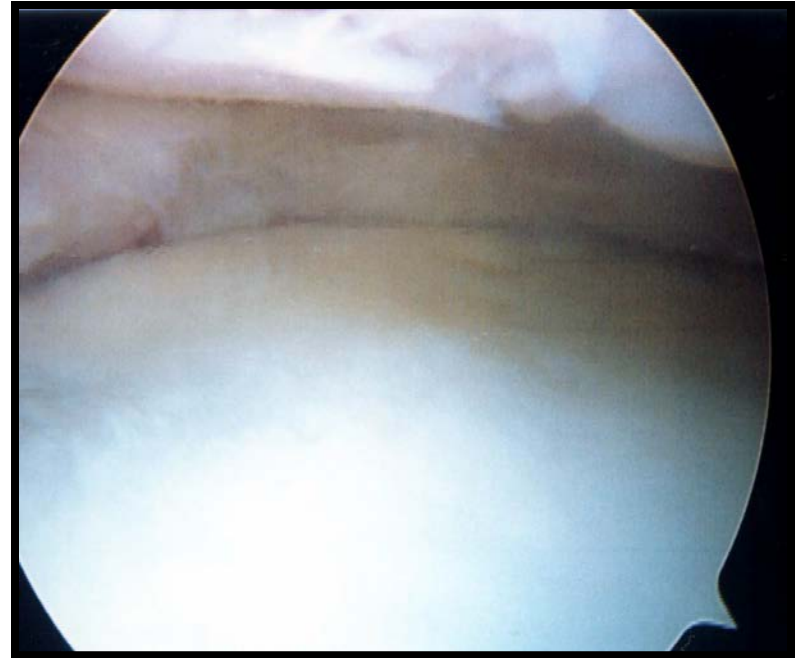
Meniscal Deficiency

- Decrease in surface area
- Increase force per unit area
- Decreases shock absorption
- Results in degeneration



Historical Treatment Options

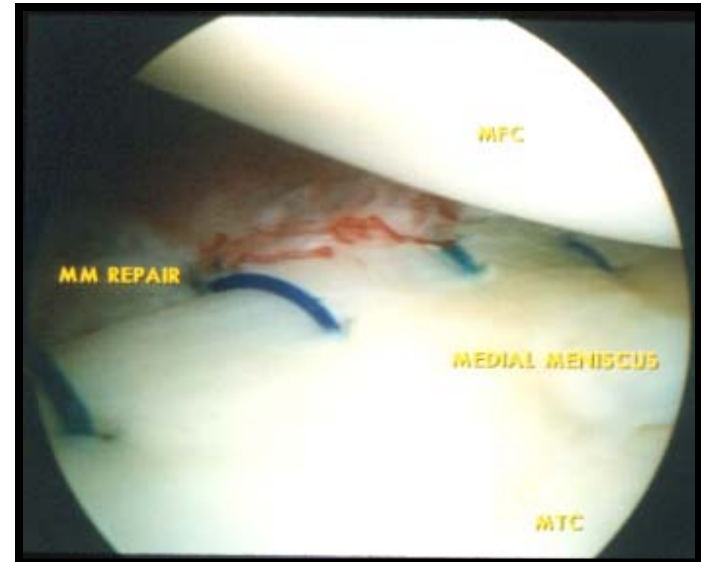
1. Total meniscectomy
2. Partial meniscectomy
3. Meniscal repair



The bottom line is to
preserve the meniscus
whenever possible!

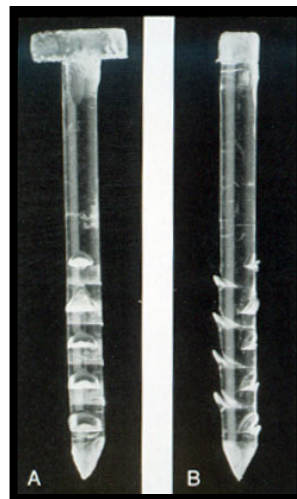
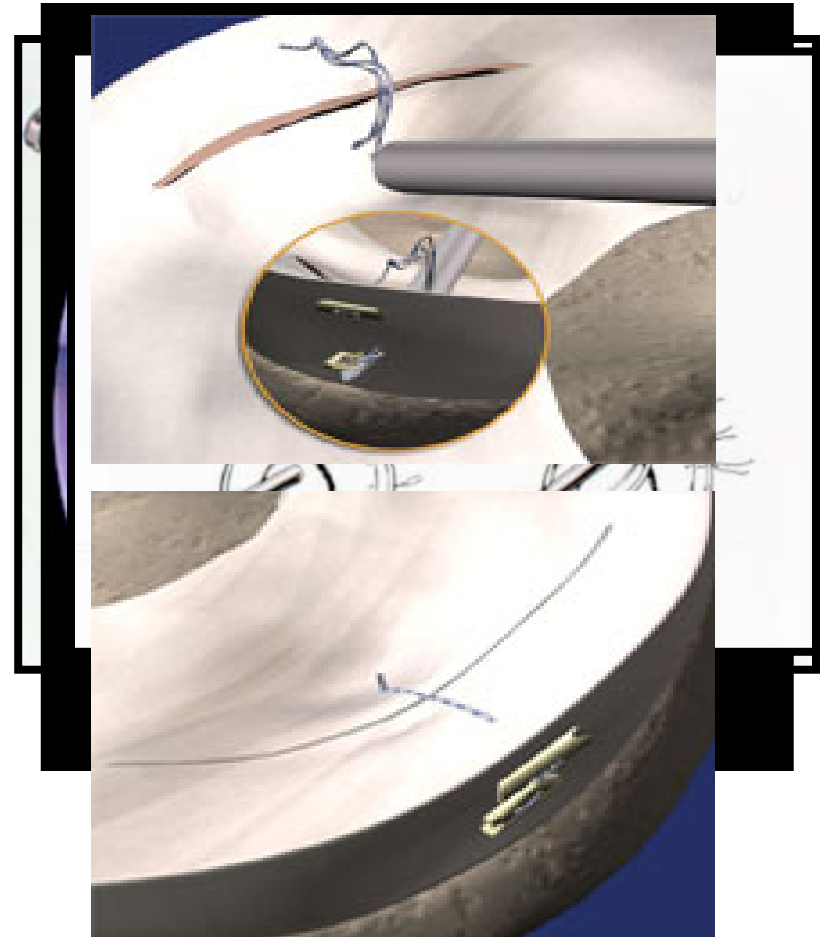
Meniscal Repair

- Preferred treatment
- Repairs do fail



Meniscal Repair Options

1. Inside-out repair
2. Outside-in repair
3. Inside-in repair
 - Meniscal arrows/darts
 - FastFix



Meniscal Repair

Need options for failed
meniscal repair and/or
previous meniscectomy

Case Presentation

- 25 y.o.
- Soccer
- 2 yrs. media

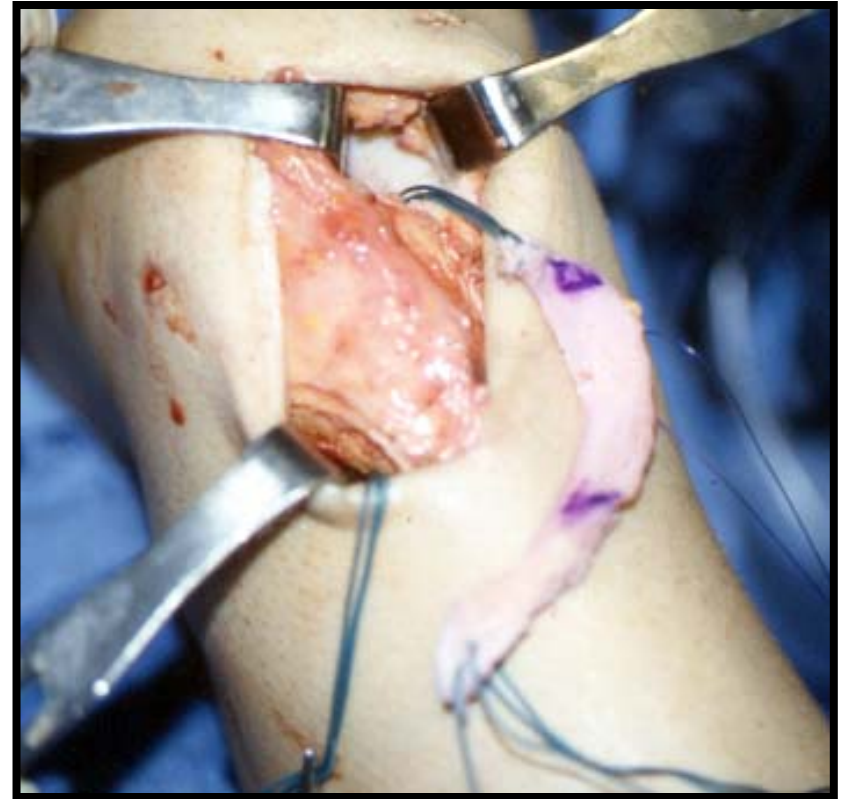


pic findings

Meniscal Allografts

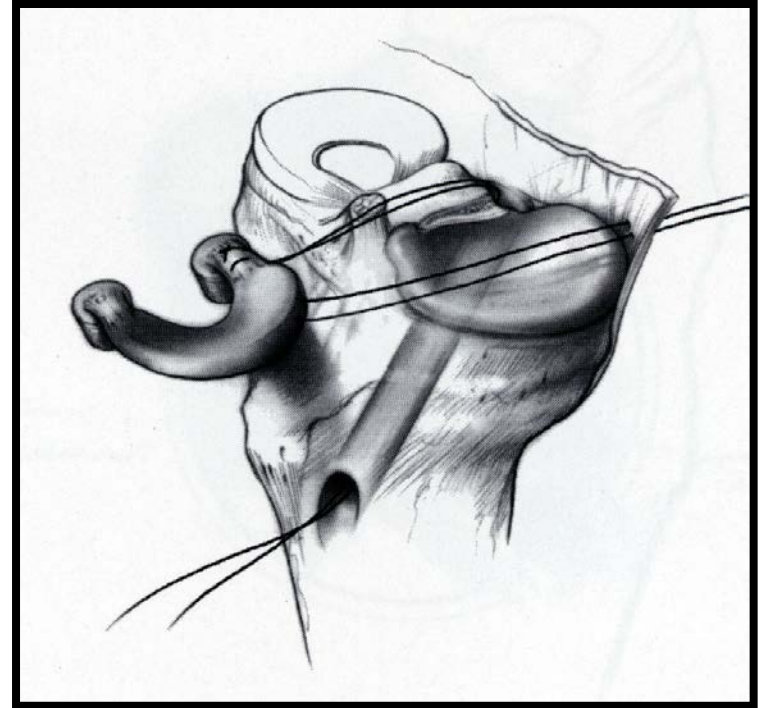
Meniscal Allografts

- First meniscal transplant 1984 by Milachowski (Germany)
- Multiple animal models have been evaluated



Goals of Meniscal Allograft

- Relieve pain and swelling
- Improve secondary stability
- Prevent progression of articular lesions and arthrosis



Meniscal Allograft Indications

- Symptomatic meniscal deficiency
- Intact primary stability
- Acceptable alignment
- Minimal articular disease
- Age less than ~ 40



Contraindications

- Chronic ligamentous instability
- Arthrosis > grade III
- Advancing age
- Severe malalignment
- Arthroplasty candidates



Meniscal Allograft Immunology

- “Immunologically privileged”
- Extracellular matrix
- HLA typing????
- Local rejection
- Knowledge limited



Graft Preservation

- Fresh
 - Most immunogenic, difficult logistics
- Fresh frozen
 - Reduced antigenicity
- Freeze dried (lyophilization)
 - Shrinkage reported
- Cryopreserved
- Cell viability
 - Host cells rapidly repopulate the transplanted cells in all types



Graft Sizing

- Essential for incorporation and restoration of function
- Ideally within 5% of anatomic
- Utilizes plain radiographs, MRI and CT scanning
- Lack of standardized sizing protocol



Meniscal Allograft

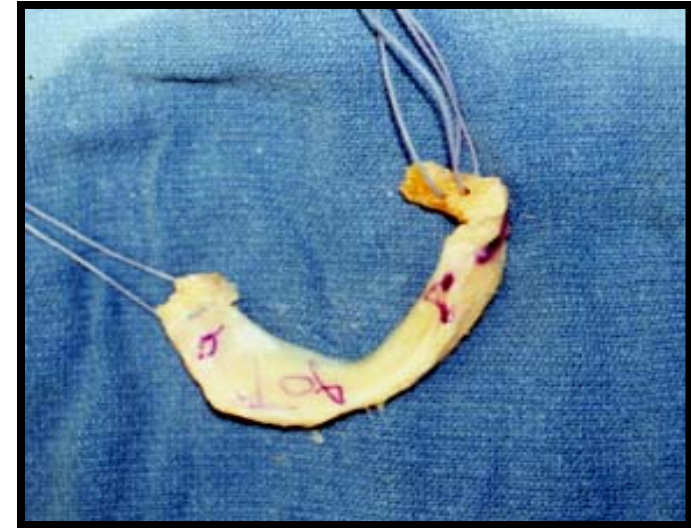
- Patient evaluation:
 - Plain radiographs
 - Alignment
 - Stability
 - MRI vs. staging arthroscopy



Surgical Technique

Surgical Techniques

1. Bone Plug techniques
 - Medial meniscal allograft
 - Double bone plug
 - Single bone plug
2. Keyhole technique
 - Lateral meniscal allograft
3. Non-bone plug techniques



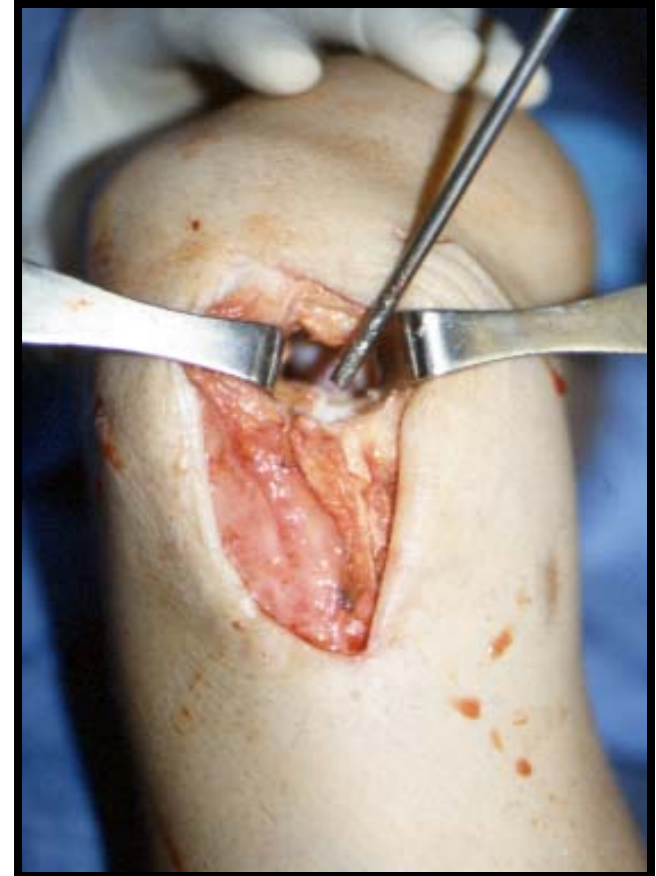
Surgical Techniques

- Keys to success:
 1. Bed preparation
 2. Appropriate sizing
 3. Anatomic placement
 4. Secure fixation
 5. Joint stability
 6. Normal alignment



Surgical Technique

- Arthroscopically assisted
- Medial or lateral arthrotomy
- Concomitant ligament reconstruction
- Osteotomy



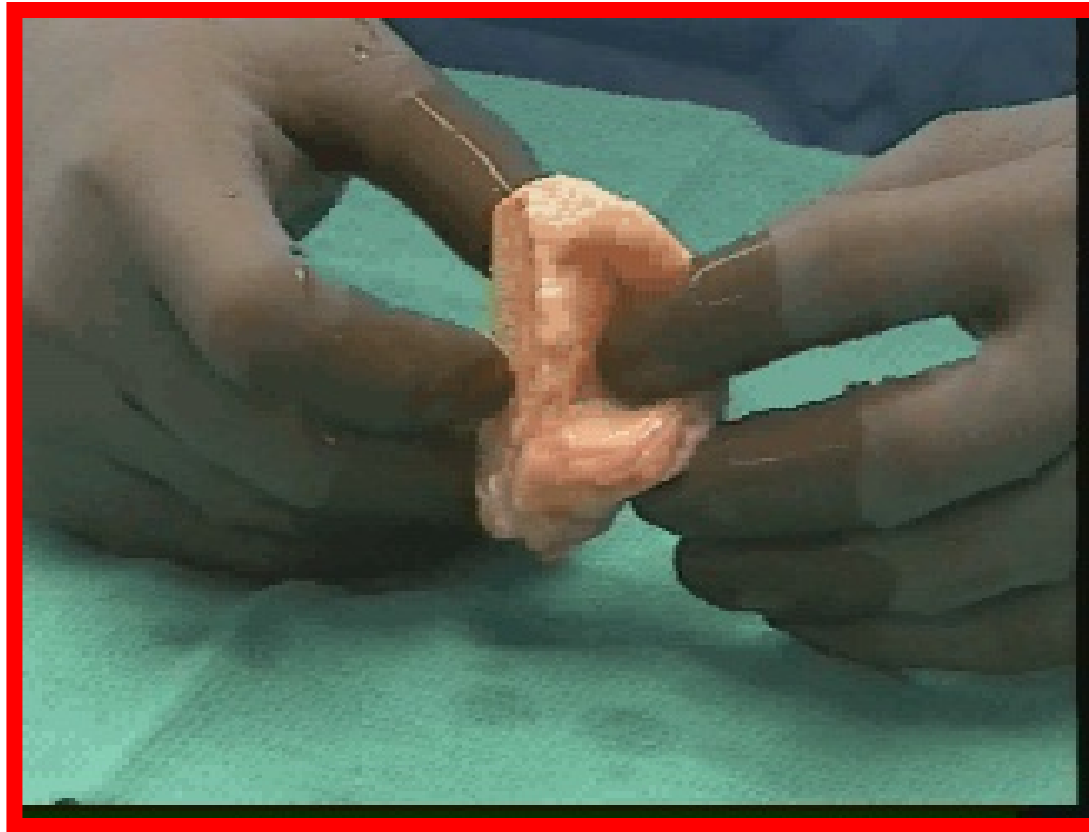
Bone Plug Surgical Technique

- Root identification



Bone Plug Surgical Technique

- Graft preparation



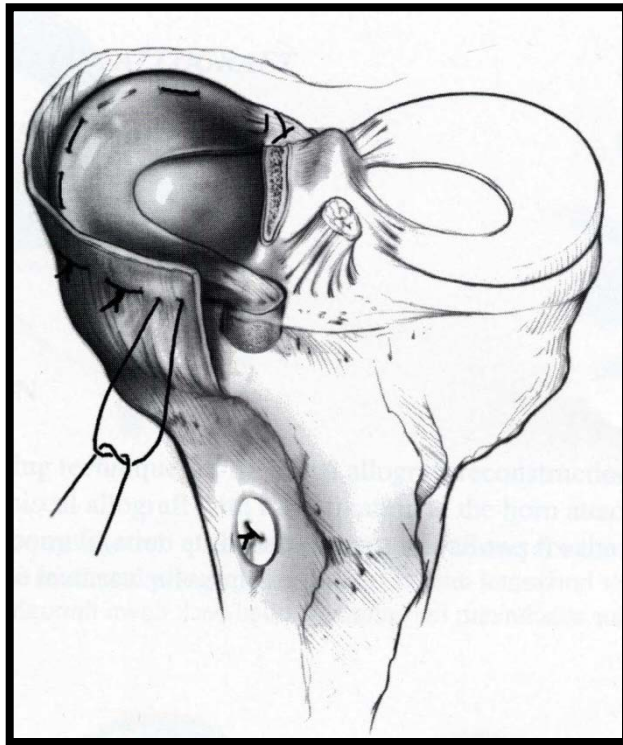
Bone Plug Surgical Technique

- Graft passage

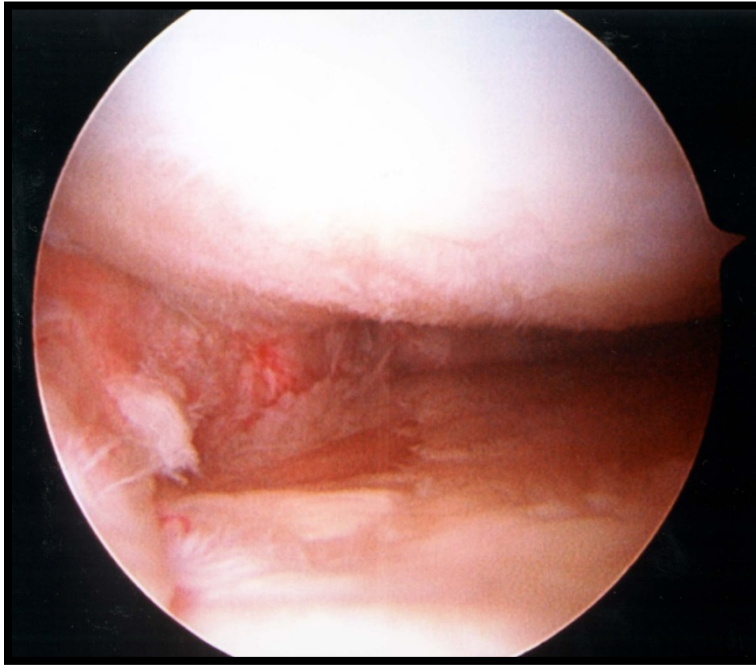


Bone Plug Surgical Technique

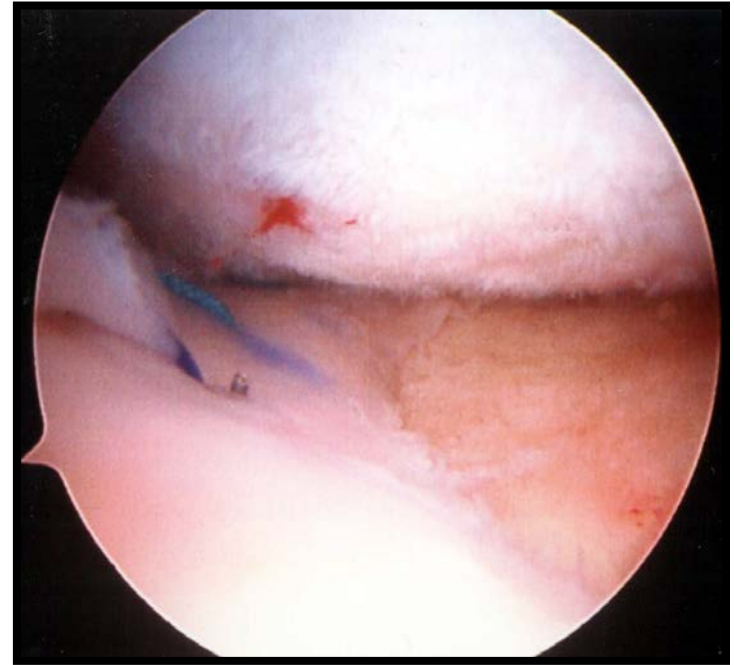
- Final placement and graft fixation



Bone Plug Surgical Technique



Pre-Operatively

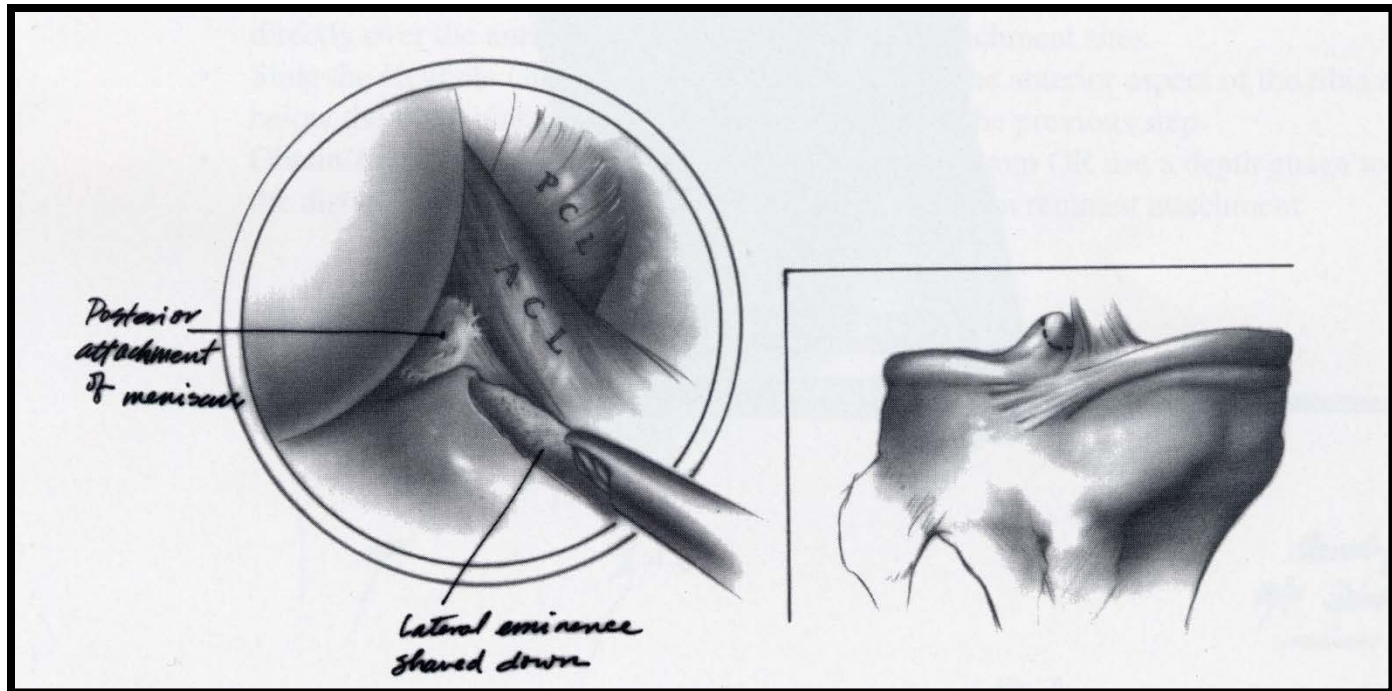


Post-Operatively

Keyhole Surgical Technique

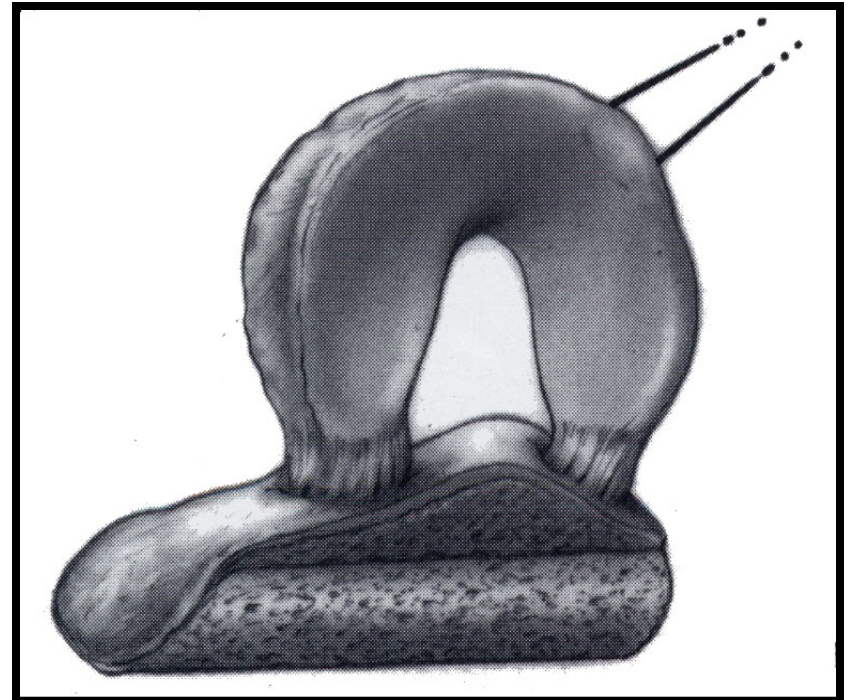
Keyhole Surgical Technique

- Bed preparation
- Take down of tibial eminence



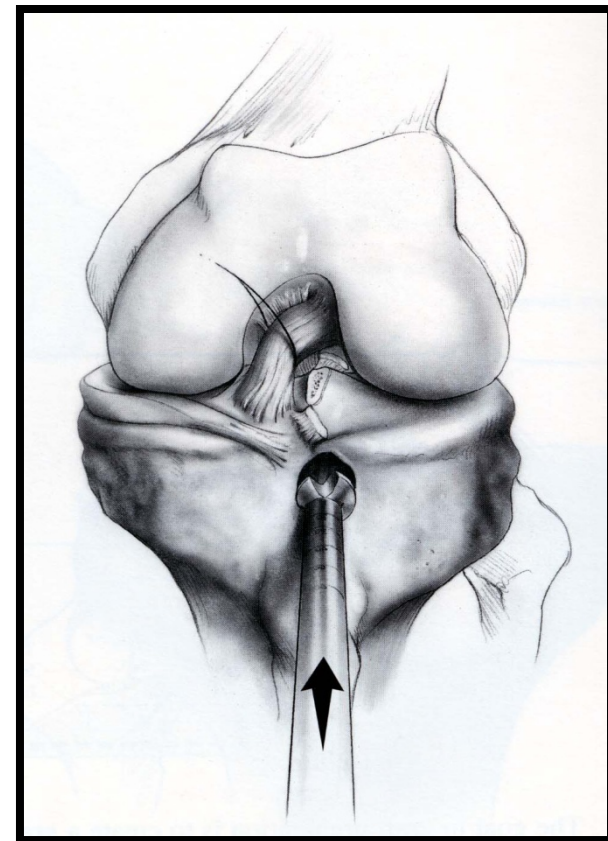
Keyhole Surgical Technique

- Graft preparation



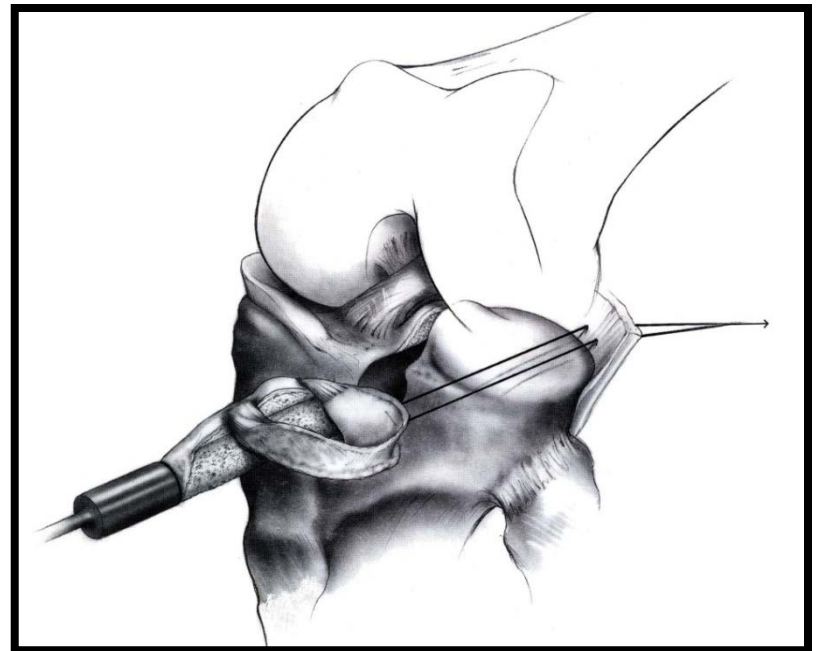
Keyhole Surgical Technique

- Tunnel drilling



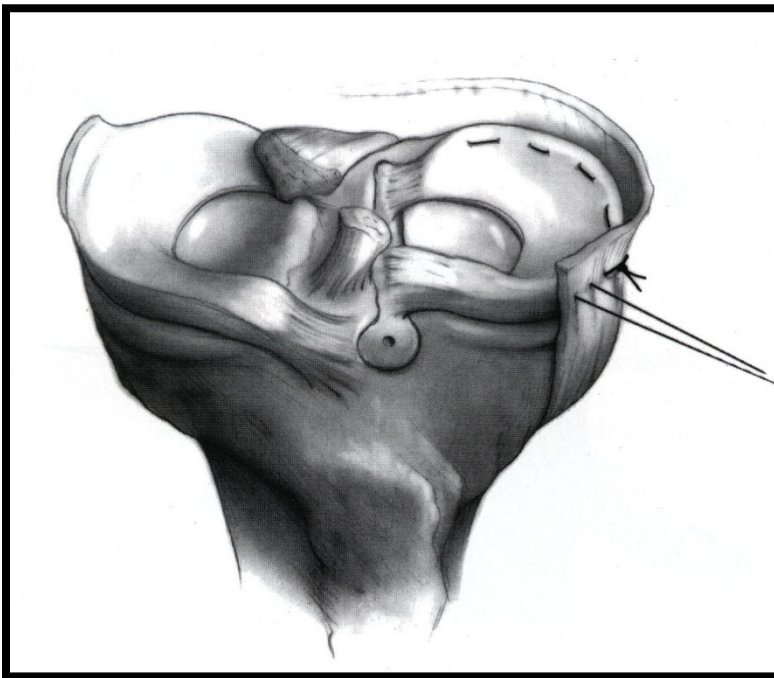
Keyhole Surgical Technique

- Passing of completed graft



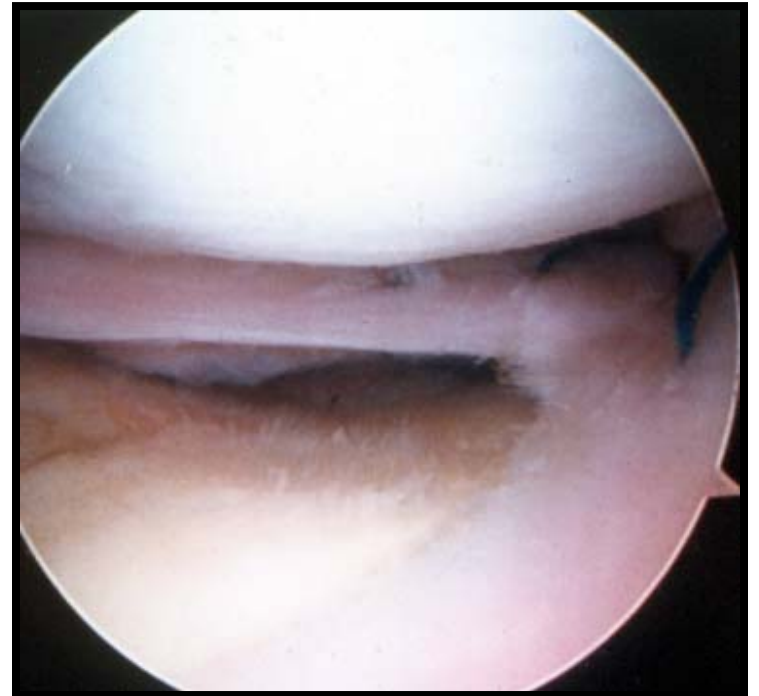
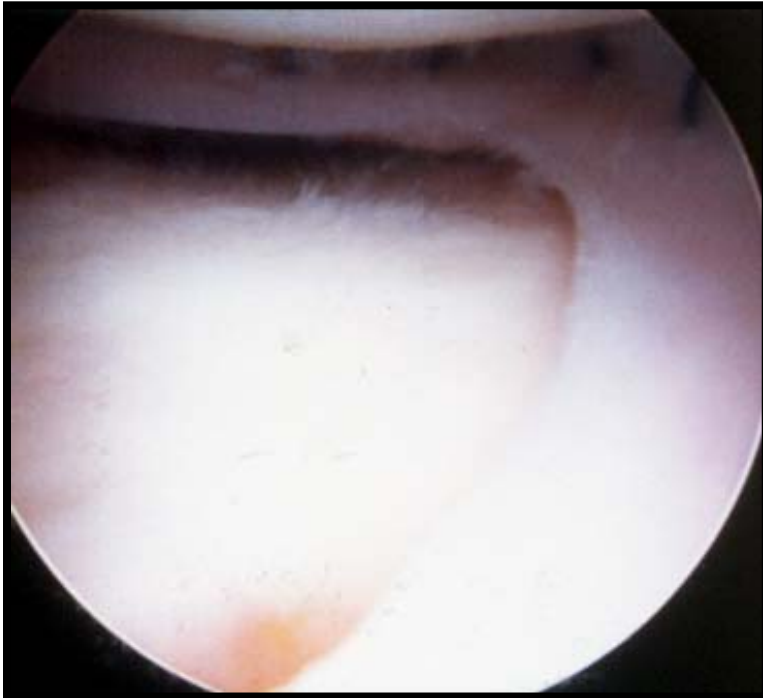
Keyhole Surgical Technique

- Securing the graft



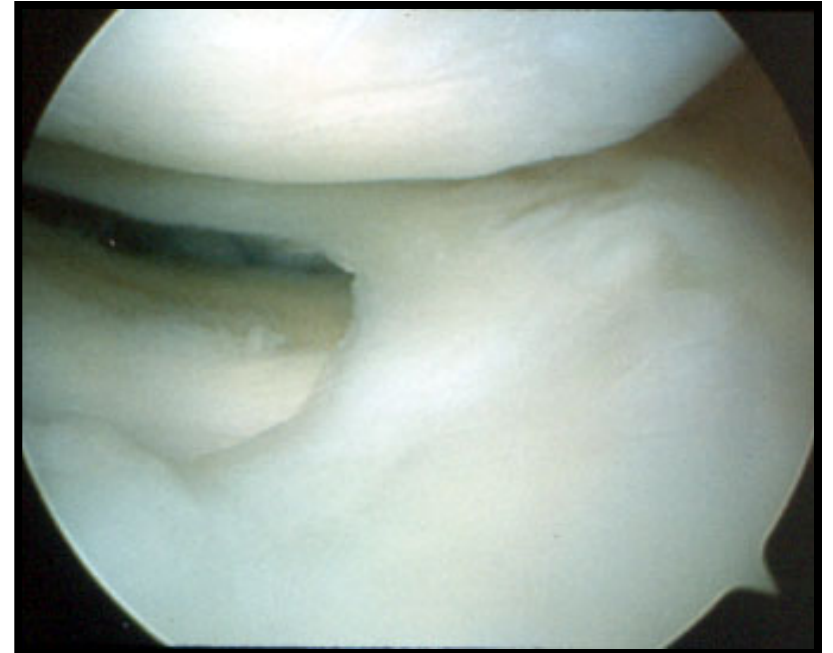
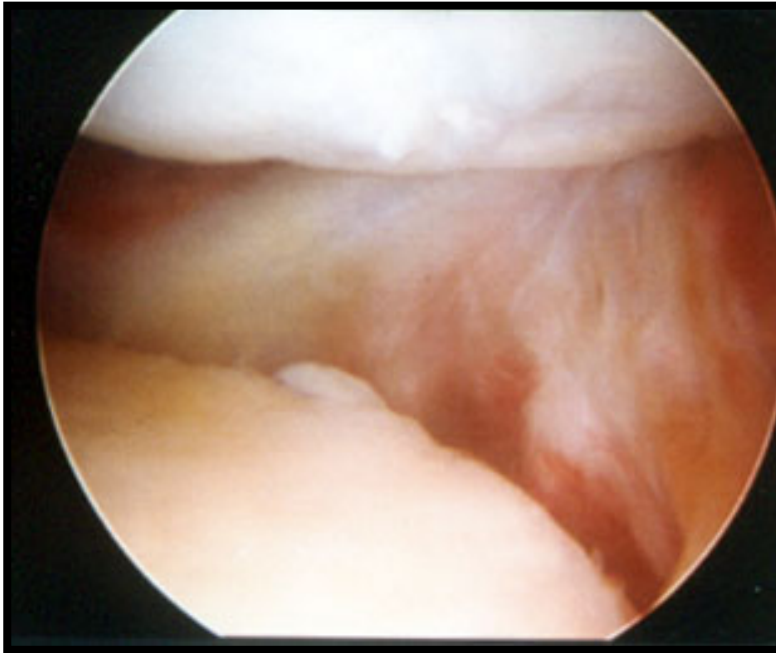
Keyhole Surgical Technique

Final allograft placement



Keyhole Surgical Technique

- Second look arthroscopy at 12 months



Rehabilitation

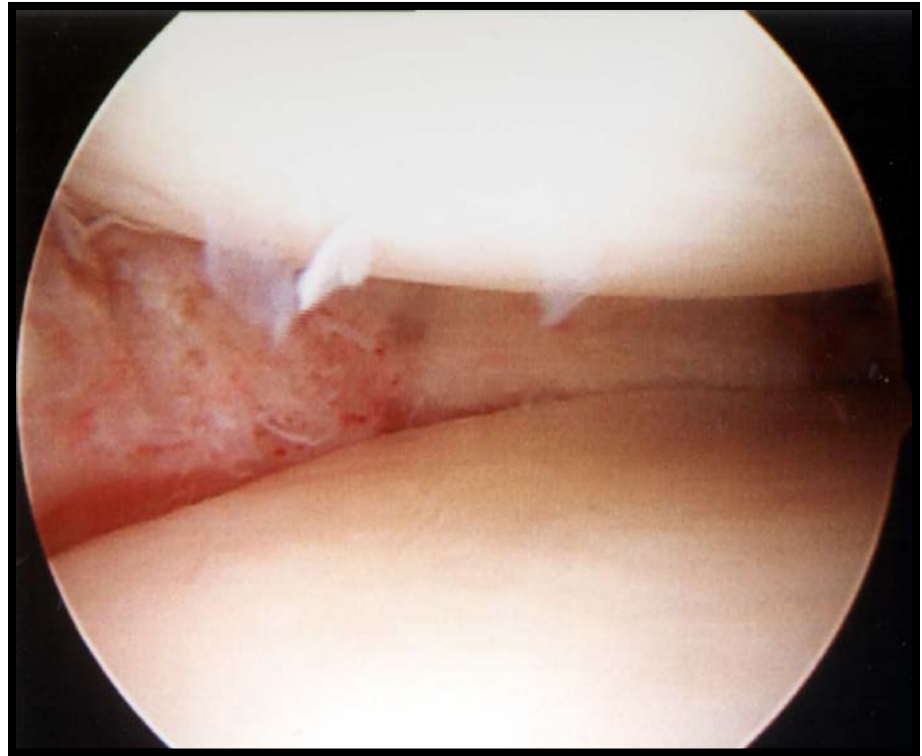
Rehabilitation

- Lack of standardized protocol
- Concomitant surgery
- Protective WB for 6 weeks
- Early limitations in flexion
- Return to activity at 3-6 months
- Full return at 6-9 months



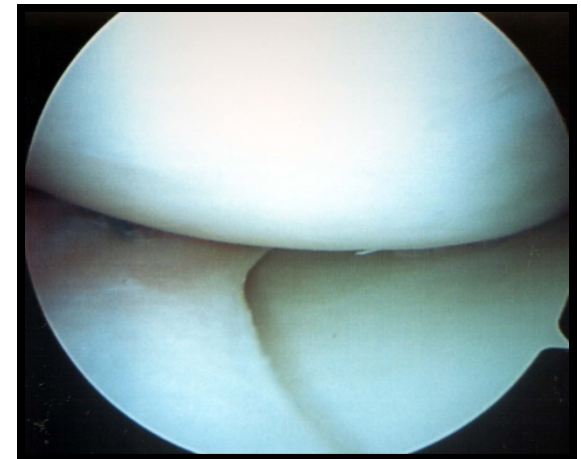
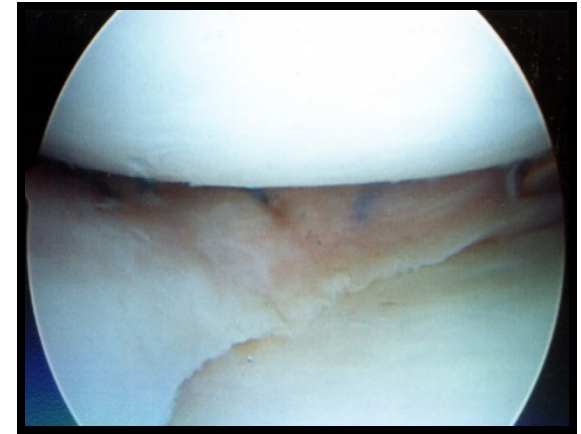
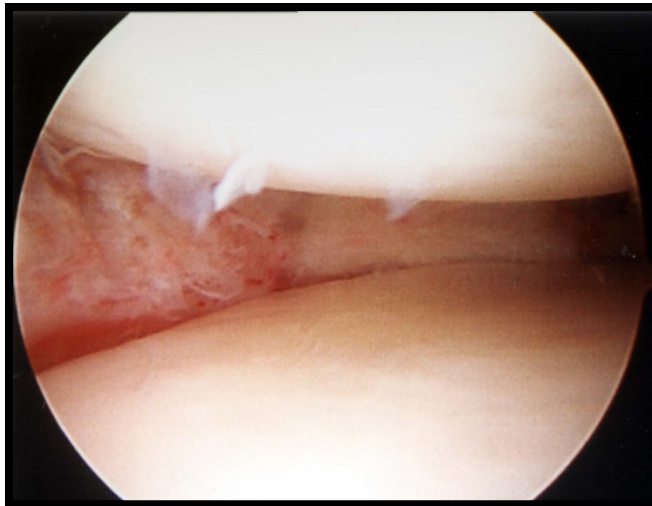
Clinical Case #1

- Case: M.H. 26 y.o. male soccer player
- ~ 2 years S/P MM with MJLT and swelling



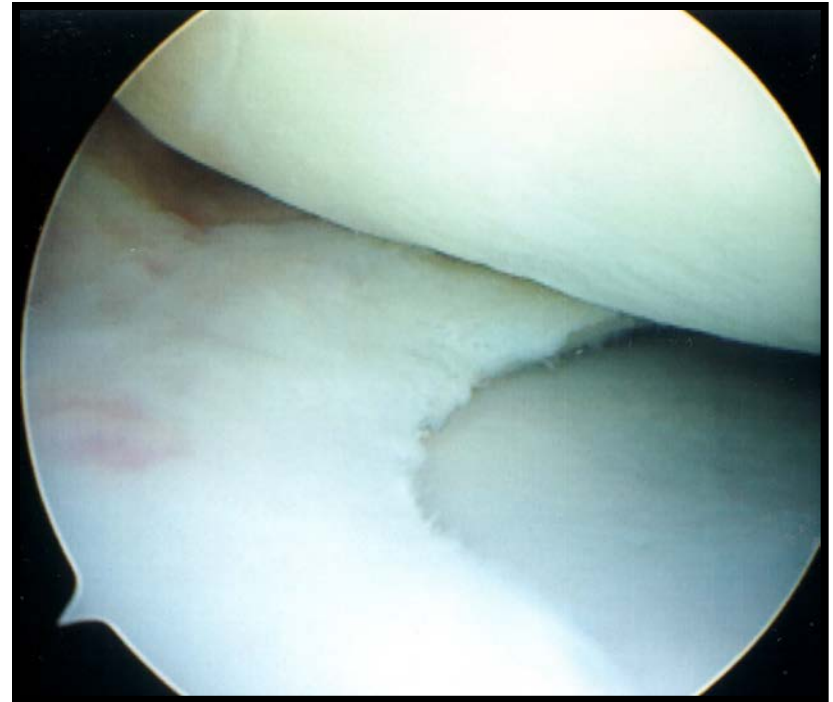
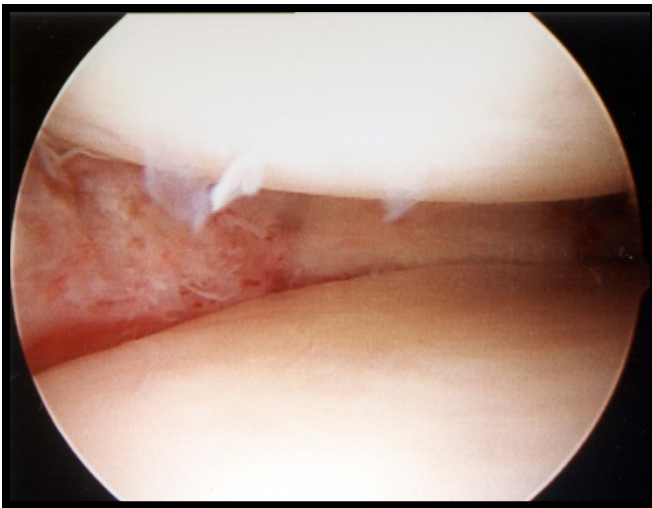
Clinical Case #1

- M.H. Medial meniscal allograft placed February, 2000



Clinical Case #1

- M.H. second look arthroscopy at 6 months



Court Comeback | 'It's my second chance'

Transplant repairs knee

Rare method
uses human
cartilage

By Michael D. Clark
The Cincinnati Enquirer

LIBERTY TWP. — Heather Marucci owes her comeback on the basketball court to a young stranger who died earlier this year.

The Lakota East High School student plays the game she loves again thanks to a rare operation that transplanted human cartilage into her damaged right knee.

Before practice this week, the 16-year-old talked about the gratitude she feels toward the unidentified donor she'll never know.

"It's my second chance. . . . I can play again. If I could talk to the donor's family the very first thing I'd say is 'thank you,'" Heather said.

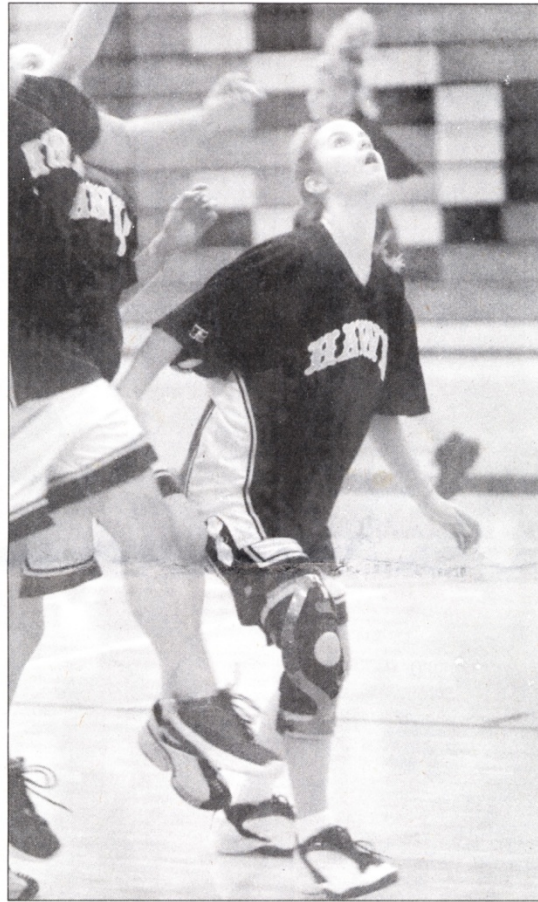
Despite a bulky knee brace, she moves with only occasional hesitation, eagerly joining in the physical play under the basket. Two years ago, she was a freshmen standout for Lakota East's Thunderhawks, not only making the varsity squad, but also leading the team in scoring.

But a knee injury left her in constant pain and sitting on the bench for her entire sophomore season. Three arthroscopic surgeries to repair her torn meniscal cartilage failed and she was facing a life of constant pain and no basketball.

Dr. Angelo Colosimo, director of sports medicine at the University of Cincinnati and team doctor for the Bengals, determined in January that she was a prime candidate for an experimental meniscus transplant.

"Heather is pushing the envelope. There are only a handful of athletes in the country who have had this done and come back to playing athletics," Dr. Colosimo said.

"She is a great athlete and a sweet girl. . . . when we discussed this she looked at me



The Cincinnati Enquirer/MICHAEL SNYDER

Heather Marucci practices with the Lakota East girls basketball team. A brace protects her recently repaired knee.

and said she wanted to play again and asked what I could do," he said.

Lakota East Girls Basketball Coach Cindy Feltman marvels at both Heather's medical miracle and her courage.

"She is a tremendous kid. She won't quit. So many kids nowadays quit, but she

won't," Ms. Feltman said.

Heather is working her way back to full-time varsity play by playing half-games with the Thunderhawks' junior varsity squad.

Heather said her initial reaction to having tissue from a dead person transplanted into her body was fear, "but I wasn't disgusted

by the idea."

Because of organ donor laws, Dr. Colosimo did not identify or discuss the deceased donor with Heather, saying only it was someone of similar age.

"I don't know who it was, but I wish I could thank them," she said.

 Health.

Orthopaedics &
Sports Medicine


BEARCATS.

Clinical Outcomes

- Multiple variations make interpretation difficult :
 - Indications
 - Concomitant injury
 - Surgical techniques
 - Follow-up
 - Definition of success and failure



Clinical Outcomes Summary

- Many factors influence outcome:
 - Degree of arthrosis
 - Concomitant ACL reconstructions
 - Flattening of the femoral condyle
 - Malalignment
 - Bone plug fixation



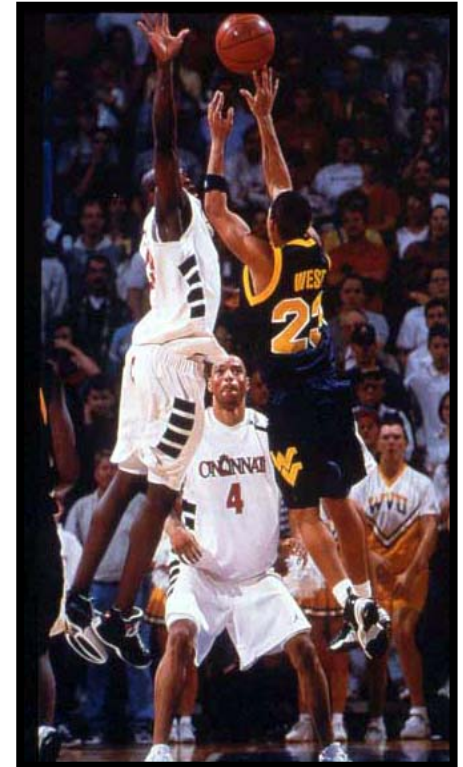
Mechanism of Allograft Failure

- Technical failures:
 - Loss of fixation
 - Lack of bone plug incorporation
 - Poor graft placement
 - Size mismatch
- Biologic failures:
 - Absence of peripheral healing
 - Absence of re-vascularization
 - Lack of chondrocyte viability
 - Graft shrinkage



Future Directions

- Develop accepted standards for:
 - Patient and graft selection
 - Indications for surgery
 - Graft selection and sizing
 - Further immunologic studies
 - Rehabilitation protocol
 - Long term follow-up
 - Bioengineered/Synthetic



Summary

- Vital role of meniscus
- Meniscal allograft transplantation remains investigational
- Allograft reconstruction is technically feasible
- Long term success unknown



Thank You!