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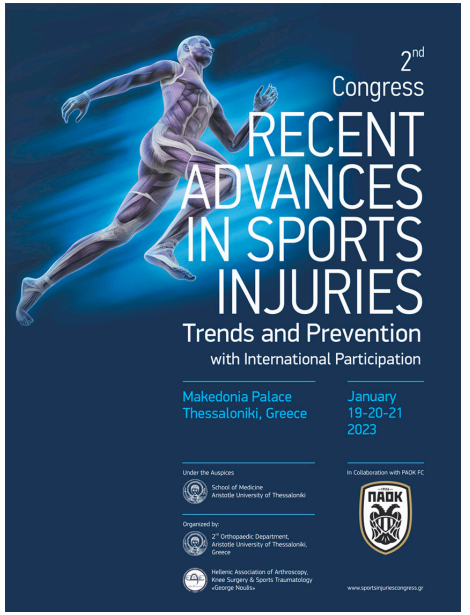


# Return to play after meniscus suturing: Professional athlete rehabilitation

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# Clinical Case

18 years old

Professional football player

Professional football team

Left Back (LB)

- Official game
- Claiming the ball
- Right Knee
- Pivot
- Medial meniscus injury

# Clinical Examination

- Edema
- Pain
- Inability to fully extend the knee
- Positive tests :
  1. McMurrays
  2. Thessaly
  3. Apley's

*Which is the best rehabilitation programme for a meniscus suturing?*

# Surgery

- Knee arthroscopy
- Thigh tourniquet
- Standard knee arthroscope
- All inside technique posterior horn meniscal repair (3 sutures)
- Outside in technique meniscal body repair ( 2 sutures)
- Trochlea drilling for blood supply to the repair


# *Rehabilitation Programme*

***PHASE I: IMMEDIATE POST-OP (0-3 WEEKS AFTER SURGERY)***

| | |
|---|---|
| **Rehabilitation Goals** | • Protect repair<br>• Reduce swelling, minimize pain<br>• Restore patellar mobility<br>• Restore full extension<br>• **Flexion < 90 degrees**<br>• Minimize arthrogenic muscle inhibition, re-establish quad control, regain full active extension<br>• Patient education<br>  • Keep your knee straight and elevated when sitting or lying down. Do not rest with a towel placed under the knee.<br>  • Do not actively bend your knee; support your surgical side when performing transfers (i.e. sitting to laying down)<br>  • Do not pivot on your surgical side. |
| **Weight Bearing** | *Walking*<br>• **Brace locked, crutches**<br>• **Partial weight bearing**<br>• When going up the stairs, make sure you are leading with the non-surgical side, when going down the stairs, make sure you are leading with the crutches and surgical side. |



| | |
|---|---|
| **Interventions** | *Swelling Management*<br>• Ice, compression, elevation (check with MD re: cold therapy)<br>• Retrograde massage<br>• Ankle pumps<br><br>*Range of motion/Mobility*<br>• Patellar mobilizations: superior/inferior and medial/lateral<br>• Seated assisted knee flexion extension and heel slides with towel<br>  ○ ****Avoid active knee flexion to prevent hamstring strain on the posteromedial joint*<br>• Low intensity, long duration extension stretches: prone hang, heel prop<br>• Seated hamstring stretch<br><br>*Strengthening*<br>• Quad sets<br>• NMES high intensity (2500 Hz, 75 bursts) supine knee extended 10 sec/50 sec, 10 contractions, 2x/week during sessions—use of clinical stimulator during session, consider home units distributed immediate post op<br>• Straight leg raise<br>  ○ **Do not perform straight leg raise if you have a knee extension lag<br>• Hip abduction: side lying or standing<br>• Multi-angle isometrics 90 and 60 deg knee extension |
| **Criteria to Progress** | • Knee extension ROM 0 deg<br>• Knee flexion ROM 90 degrees<br>• Quad contraction with superior patella glide and full active extension<br>• Able to perform straight leg raise without lag |

| | |
|---|---|
| | • Normalize gait.<br>• Flexion within 10 degrees of contra lateral side.<br>• Safely progress strengthening.<br>• Promote proper movement patterns.<br>• Avoid post exercise pain/swelling. |
| **Weight Bearing** | • May discontinue use of brace/crutches after 6 weeks per MD and once adequate quad control is achieved and gait in normalized. |
| **Additional Interventions**<br>**Continue with Phase I-II Interventions as indicated* | *Range of motion/Mobility*<br>• Supine active hamstring stretch<br>• Gentle stretching all muscle groups: prone quad stretch, standing quad stretch, kneeling hip flexor stretch, standing gastroc stretch and soleus stretch<br>• Rotational tibial mobilizations if limited ROM<br><br>*Cardio*<br>• Stationary bicycle, flutter kick swimming, pool jogging<br><br>*Strengthening*<br>• Partial squat exercise 0-60 degrees<br>• Ball squats, wall slides, mini squats from 0-60 deg<br>• Hamstring strengthening: prone hamstring curls, standing hamstring curls<br>• Lumbopelvic strengthening: bridges on physioball, bridge on physioball with roll-in, bridge on physioball alternating, hip hike<br>• Gym equipment: leg press machine, standing hip abductor and adductor machine, hip extension machine, roman chair, seated calf machine<br>• Progress intensity (strength) and duration (endurance) of exercises<br><br>*Balance/proprioception*<br>• Single limb balance progress to uneven surface including perturbation training |
| **Criteria to Progress** | • No swelling/pain after exercise<br>• Normal gait<br>• ROM equal to contra lateral side<br>• Joint position sense symmetrical (<5 degree margin of error) |

## *PHASE II: INTERMEDIATE POST-OP (3-6 WEEKS AFTER SURGERY)*

| | |
|---|---|
| **Rehabilitation Goals** | • Continue to protect repair<br>• Reduce pain, minimize swelling<br>• Maintain full extension<br>• **Flexion < 90 degrees unless further direction from MD** |
| **Weight Bearing** | *Walking*<br>• **Continue partial weight bearing unless directed otherwise by MD**<br>• **Consult with referring MD regarding unlocking brace** |
| **Additional Interventions**<br>**Continue with Phase I interventions* | *Range of motion/Mobility*<br>• Stationary bicycle; gentle range of motion only (see Phase III for conditioning)<br><br>*Cardio*<br>• Upper body ergometer<br><br>*Strengthening*<br>• Calf raises<br>• Lumbopelvic strengthening: Sidelying hip external rotation clamshell in neutral, plank, bridge with feet elevated<br><br>*Balance/proprioception*<br>• Double limb standing balance utilizing uneven surface (wobble board)<br>• Joint position re-training |
| **Criteria to Progress** | • No swelling (Modified Stroke Test)<br>• Flexion ROM 120 degrees<br>• Extension ROM equal to contra lateral side |

## *PHASE III: LATE POST-OP (6-9 WEEKS AFTER SURGERY)*

| | |
|---|---|
| **Rehabilitation Goals** | • Continue to protect repair<br>• Maintain full extension |



## *PHASE II: INTERMEDIATE POST-OP (3-6 WEEKS AFTER SURGERY)*

| | |
|---|---|
| **Rehabilitation Goals** | • Continue to protect repair<br>• Reduce pain, minimize swelling<br>• Maintain full extension<br>• **Flexion < 90 degrees unless further direction from MD** |
| **Weight Bearing** | *Walking*<br>• **Continue partial weight bearing unless directed otherwise by MD**<br>• **Consult with referring MD regarding unlocking brace** |
| **Additional Interventions**<br>**Continue with Phase I interventions* | *Range of motion/Mobility*<br>• Stationary bicycle; gentle range of motion only (see Phase III for conditioning)<br><br>*Cardio*<br>• Upper body ergometer<br><br>*Strengthening*<br>• Calf raises<br>• Lumbopelvic strengthening: Sidelying hip external rotation clamshell in neutral, plank, bridge with feet elevated<br><br>*Balance/proprioception*<br>• Double limb standing balance utilizing uneven surface (wobble board)<br>• Joint position re-training |
| **Criteria to Progress** | • No swelling (Modified Stroke Test)<br>• Flexion ROM 120 degrees<br>• Extension ROM equal to contra lateral side |

## *PHASE III: LATE POST-OP (6-9 WEEKS AFTER SURGERY)*

| | |
|---|---|
| **Rehabilitation Goals** | • Continue to protect repair<br>• Maintain full extension |

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| | |
|---|---|
| | • Normalize gait.<br>• Flexion within 10 degrees of contra lateral side.<br>• Safely progress strengthening.<br>• Promote proper movement patterns.<br>• Avoid post exercise pain/swelling. |
| **Weight Bearing** | • May discontinue use of brace/crutches after 6 weeks per MD and once adequate quad control is achieved and gait in normalized. |
| **Additional Interventions**<br>**Continue with Phase I-II Interventions as indicated* | *Range of motion/Mobility*<br>• Supine active hamstring stretch<br>• Gentle stretching all muscle groups: prone quad stretch, standing quad stretch, kneeling hip flexor stretch, standing gastroc stretch and soleus stretch<br>• Rotational tibial mobilizations if limited ROM<br><br>*Cardio*<br>• Stationary bicycle, flutter kick swimming, pool jogging<br><br>*Strengthening*<br>• Partial squat exercise 0-60 degrees<br>• Ball squats, wall slides, mini squats from 0-60 deg<br>• Hamstring strengthening: prone hamstring curls, standing hamstring curls<br>• Lumbopelvic strengthening: bridges on physioball, bridge on physioball with roll-in, bridge on physioball alternating, hip hike<br>• Gym equipment: leg press machine, standing hip abductor and adductor machine, hip extension machine, roman chair, seated calf machine<br>• Progress intensity (strength) and duration (endurance) of exercises<br><br>*Balance/proprioception*<br>• Single limb balance progress to uneven surface including perturbation training |
| **Criteria to Progress** | • No swelling/pain after exercise<br>• Normal gait<br>• ROM equal to contra lateral side<br>• Joint position sense symmetrical (<5 degree margin of error) |

## *PHASE IV: TRANSITIONAL (9-12 WEEKS AFTER SURGERY)*

| | |
|---|---|
| **Rehabilitation Goals** | • Maintain full ROM.<br>• Safely progress strengthening.<br>• Promote proper movement patterns.<br>• Avoid post exercise pain/swelling. |
| **Additional Interventions** **Continue with Phase I-III interventions as indicated* | *Cardio*<br>• Elliptical, stair climber<br><br>*Strengthening*<br>○ **The following exercises to focus on proper control with emphasis on good proximal stability<br>• Squat to chair<br>• Lateral lunges<br>• Single leg progression: partial weight bearing single leg press, slide board lunges: retro and lateral, step ups and step ups with march, lateral step-ups, step downs, single leg squats, single leg wall slides<br>• Knee Exercises for additional exercises and descriptions<br>• Gym equipment: seated hamstring curl machine and hamstring curl machine<br>• Romanian deadlift |
| **Criteria to Progress** | • No episodes of instability<br>• 10 repetitions single leg squat proper form through at least 60 deg knee flexion<br>• KOOS-sports questionnaire >70% |



| | |
|---|---|
| | • Functional Assessment<br>○ Quadriceps index ≥80%; HHD mean preferred (isokinetic testing if available)<br>○ Hamstring, glut med, glut max index ≥80%; HHD mean preferred (isokinetic testing for HS if available) |

## *PHASE V: EARLY RETURN TO SPORT (3-5 MONTHS AFTER SURGERY)*

| | |
|---|---|
| **Rehabilitation Goals** | • Safely progress strengthening.<br>• Safely initiate sport specific training program.<br>• Promote proper movement patterns.<br>• Avoid post exercise pain/swelling. |
| **Additional Interventions** **Continue with Phase II-IV interventions* as indicated | • Interval running program<br>○ Return to Running Program<br>• Progress to plyometric and agility program (with functional brace if prescribed).<br>○ Agility and Plyometric Program |
| **Criteria to Progress** | • Clearance from MD and ALL milestone criteria below have been met<br>• Completion of jog/run program without pain/swelling<br>• Functional Assessment<br>○ Quad/HS/glut index ≥90%; HHD mean preferred (isokinetic testing if available)<br>○ Hamstring/Quad ratio ≥ 70% with isokinetic testing if available)<br>○ Hop Testing ≥90% compared to contra lateral side<br>• KOOS-sports questionnaire >90%<br>• International Knee Committee Subjective Knee Evaluation >93<br>• Psych Readiness to Return to Sport (PRRS) |

## *PHASE VI: UNRESTRICTED RETURN TO SPORT (6+ MONTHS AFTER SURGERY)*

| | |
|---|---|
| **Rehabilitation Goals** | • Continue strengthening and proprioceptive exercises.<br>• Symmetrical performance with sport specific drills.<br>• Safely progress to full sport. |
| **Additional Interventions** **Continue with Phase II-V interventions* as indicated | • Multi-plane sport specific plyometrics program<br>• Multi-plane sport specific agility program<br>• Include hard cutting and pivoting depending on the individuals' goals<br>• Non-contact practice→ Full practice→ Full play |
| **Criteria to Discharge** | • Quad/HS/glut index ≥90%; HHD mean preferred (isokinetic testing if available)<br>• Hop Testing ≥90% compared to contra lateral side |

# *The three phases of meniscus suturing rehabilitation*

- 1st phase, 1st  - 2nd month
- 2nd phase, 3rd - 4th month
- 3rd phase, 5th - 6th month

# Phase 1

## Week 1

- Therapy
  a. Functional knee brace locked in 30° of flexion
  b. Anti-inflammatory therapy (Tecar Therapy)
  c. Ice 15 minutes

- Exercises
  a. Isometrics
  b. Passive knee flexion

- Goals
  a. Decrease edema
  b. Passive range of motion 0° - 30°
  c. Gait: Touch weight bearing

## Week 2-4

Doctor removes sutures on the 14th day.

- Therapy
  a. Functional knee brace 0° - 60° RoM
  b. Anti-inflammatory therapy (Tecar therapy)
  c. Mobilization of patella
  d. Ice 15 minutes

- Exercises
  a. Isometrics for quadriceps/ biceps/ adduction/ gluteal muscle
  b. Ankle pumps
  c. Stationary bike for 5 minutes

- Goals
  a. Decrease edema
  b. Passive range of motion $0° - 60°$
  c. Gait: Touch weight bearing

## Week 4-6

- Therapy
  a. Functional knee brace 0° - 90° RoM
  b. Anti-inflammatory therapy (Tecar therapy)
  c. Mobilization of patella
  d. Surgical portal scar mobilization
  e. Stretching and manual mobilization to improve range of motion (especially flexion)
  f. Ice 15 minutes

- Exercises
  a. Isometrics for quadriceps/ biceps / adduction/ gluteal muscle
  b. Ankle pumps
  c. Stationary bike for 10 minutes

- Goals
  a. Decrease edema
  b. Passive range of motion 0° - 90°
  c. Gait: Partial weight bearing (as tolerated)

## Week 6-8

- Therapy
  a. Anti-Inflammatory therapy (Tecar Therapy)
  b. Mobilization patella
  c. Surgical portal scar mobilization
  d. Passive range of motion

- Exercises
  a. Stationary bike for 10 minutes (70°)
  b. Leg Extension 5kg (RoM : 0° - 30°)
  c. Isometrics for quadriceps 5kg
  d. Isometric squat with medicine ball (70° squat)

- Goals
  a. Good mechanics on walking circle
  b. Gradually return to full range of motion
  c. Gradually return to full weight bearing (as tolerated)

# Phase 2

## Week 8-12

- Therapy
  a. Mobilization patella
  b. Full range of passive motion

- Exercises
  a. Stationary bike 10 minutes (up to flexion 90° )
  b. Leg Extension 40kg (RoM : 0° - 90°)
  c. Isometrics for quadriceps 15kg
  d. Squat with olympic bar (70° squat)

- Goals
  a. Squat with 90kg Olympic bar
  b. Full range of motion

## Week 12-16

- Therapy
  a. Mobilization patella
  b. Anti-inflammatory therapy (Tecar therapy)

- Exercises
  a. Stationary bike 10 minutes (110°)
  b. Leg Extension 60kg (RoM : 0° - 110°)
  c. Isometrics for quadriceps 25kg
  d. Squat with Olympic bar (100° squat)

- Goals
  a. Squat with 110kg Olympic bar
  b. Running on the field
  c. Sport training tests without pain

# Phase 3

3 trainings per week

Football player:

- Training on the gym
- Specific programme with PNF (Proprioceptive Neuromuscular Facilitation) exercises
- Specific programme on the field
- Therapy (if it's necessary)

## Week 16-20

### 1st training

- Exercises on the gym
  a. Stationary bike 15 minutes (Full RoM)
  b. Leg extension 70kg (Full RoM)
  c. Leg curl 40kg (Full RoM)
  d. Squats with 100+kg Olympic bar (0° - 90°)
  e. Dead lifts with 60 kg Olympic bar

- Goals
  a) No pain after training
  b) No edema after training

## 2nd training

- Specific programme with PNF exercises
  a) Bossu ball for 2 minutes
  b) Jumps on box
  c) Direction changes
  d) 360° jump
  e) Jumps on the operated knee

- Goals
  a) No pain after training
  b) No edema after training

## 3rd training

- Specific programme on the field
  a) 6′ circuit running
  b) 6′ running with alternating speed every 1′
  c) Direction changes with the ball 10 times for 2′ each time
  d) Short pass and direction changes 10 times
  e) Long passes on different directions 10-12 times

- Goals
  a) No pain after training
  b) No edema after training

## Week 20-24

- Exercises
  a) Reinforcing athlete participation in every training with the team (non contact)
  b) Training to the gym

- Isokinetic test

- Goals
  a) Measurement of the strength of the muscle of the lower limps
  b) Participation in the entire training with the team

# MRI 6 months after the surgery

- Intact repair of medial meniscus
- No signs of bone marrow edema
- No chondral defects

# *Suggestions*
# *Post rehabilitation's programme of the meniscus suturing*

2 times per week

- Training on the gym for lower limps
- Specific PNF programme for the knee

Thank you for your attention!