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Case Report
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Perspectives and Risk Factors in the Return-to-Sports Decision after Knee Surgery in a Male Elite Handball Player: A Case Report

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Abstract

We present the case of 28 years old male elite Handball Player with a first ACLR (Anterior Cross Ligament Reconstruction) under surgery on the 21st of January 2019 in Hungary and a posterior surgery on January 22th, 2020 in Barcelona-Spain with Re-tensing and reconstruction of the popliteus tendon and lateral collateral ligament. The reason of the second surgery was the ligament instability of the lateral and collateral posterior of the right knee and a residual laxity of the anterior-posterior cross Ligaments.

After 6 months of the first post-operative rehabilitation in Amsterdam the handball Player visited our clinic in Bucharest in August 27th, 2019 by petition of the Dinamo Handball team manager to be re-evaluated and complete his rehabilitation until he will be able to reach the level to return to competition and play the national and European league with the Dinamo Handball team Bucharest.

The main objective of our Case report is to show the importance to provide further screening and prevention programs to find possible inter-individual presence of risk factors" in the context of the return-to-sports decision after injury.

Keywords: Sport injuries; Handball injuries; ACL reconstruction; ACL prognosis; Sport rehabilitation; Post rehabilitation; Rehabilitation post surgery

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Introduction

We have reviewed the most relevant articles on handball injuries and their prevention. The injuries affected most frequently the lower extremity (42%), followed by injuries of the head (23%), upper extremity (18%) and trunk (14%). The most frequent diagnosis was contusion of head (14%) or ankle sprain (8%). The majority of injuries were caused by contact with another player.

To prevent injuries, a functional inert stability is necessary, but definitions and objective measures are lacking [1]. "The noted differences once again bring focus to the inter-individual presence of risk factors".

These attributes have to be considered in further screening and prevention programs, as well as in the context of the return-to-sports decision after injury.

Scientific overview of ACL ruptures

First we must to analyze what are the consequences of an ACL rupture. Once the diagnosis is clear, the clinician should inform the patient of the injury and known consequences. For many individuals, their ACL-injured knee will never feel as it did before the injury. More than five years after ACL rupture, knee pain, symptoms, recreational limitations, and impaired QOL are common [2].

Many individuals do not return to sport and adopt a physically inactive lifestyle, and fear of re-injury is likely to be a contributing factor in this decision of further concern is the high rate of re-injury, which is associated with worse long-term outcome [3].

This highlights the importance of identifying modifiable risk factors for poor outcome in ACL-injured individuals, and implementing personalized management strategies to optimize long-term outcome and QOL across the lifespan [4].

Case Presentation

A 28-year-old professional handball player has performed an ACLR (Anterior Cross Ligament

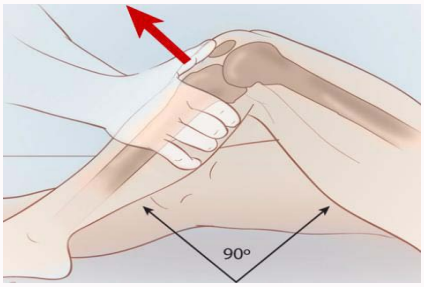

Figure 1: Anterior drawer Test. The patient lies supine on a plinth with their hips flexed to 45 degrees, his/her knees flexed to 90 degrees and feet flat on the plinth. The examiner sits on the toes of the tested extremity to help stabilize it. The examiner grasps the proximal lower leg, just below the tibial plateau or tibiofemoral joint line, and attempts to translate the lower leg anteriorly. The test is considered positive if there is a lack of end feel or excessive anterior translation relative to the contralateral side.

Figure 2: The Lachman test is a medical test used to examine the anterior cruciate ligament of the knee and is recognized as the most sensitive and specific clinical trial for the detection of anterior cruciate ligament rupture, even greater than with the anterior drawer test.

Reconstruction) under surgery on the 21st of January 2019 in Hungary, and post-operative rehabilitation as first-line of treatment during 6 months.

We meet him in our sport rehabilitation clinic in Bucharest in August 27th, 2019 by petition of the Dinamo Handball team manager with the aim to evaluate his physical condition and the stability of the right knee regarding to decisions to let him back to competition.

We start evaluating the patient surgery report and the related factors associated with a ACL-rupture outcome.

Perspectives and first conclusion

- By the evidence-based rehabilitation and present phase of the player we recommend starting an immediate Post-rehabilitation with the intention to return to competition in a maximum of 10 weeks by completing 9 months after surgery which is indicated in the ACL reconstruction.

- The surgical report is in Hungarian Language signed by Dr Beres Gory.

- The report shows a partial lateral meniscectomy in the internal meniscus which is considered in terms of stability a posterior risk of lack of stability.

First orthopedic screening

August 27th, 2019: First Knee Screening after surgery (21/01/2019) 6 months after surgery.

- Anterior Drawer Test (Figure 1)

- Lauchman test (Figure 2)

Figure 3: The varus or adduction stress test evaluates the Lateral Collateral Ligament (LCL). To perform this test, place the knee in thirty degrees of flexion. While stabilizing the knee, adduct the ankle. If the knee joint adducts greater than normal (compare with the uninjured leg), the test is positive.

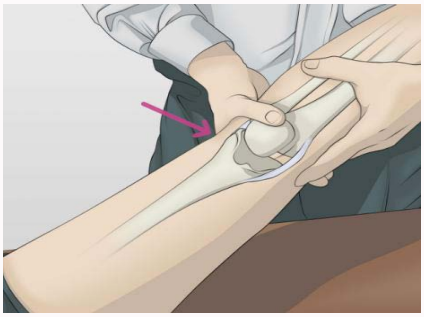

Figure 4: The valgus or abduction stress test evaluates the Medial Collateral Ligament (MCL). To perform this test, place the knee in thirty degrees of flexion. While stabilizing the knee, abduct the ankle. If the knee joint abducts greater than normal (compare with the uninjured leg), the test is positive.

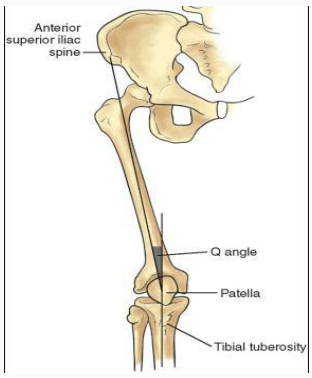

Figure 5: The morphological evaluation shows a partial deviation of the Q Angle in the knee (>15 degrees) Increase in Q angle is associated with: Femoral anteversion. External tibial torsion. Laterally displaced tibial tubercle. An increased Q angle places more stress on the knee joint, as well as leading to increased foot pronation.

- Varus Stress Test (3)

- Valgus stress test (4)

- Q angle (5)

- Figure 3 and 4

- The morphological evaluation shows a partial deviation of the Q Angle in the knee (>15 degrees) increase in Q angle is associated with: Femoral anteversion. External tibial torsion. Laterally displaced tibial tubercle (Figure 5). An increased Q angle places more stress on the knee joint, as well as leading to increased foot pronation.

Figure 6: The most effective way to decrease a high Q angle and to lower the biomechanical stresses on the knee joint is to prevent excessive pronation with custom-made functional orthotics. One study found that using soft corrective orthotics was more effective in reducing knee pain than was a traditional exercise program.

- The most effective way to decrease a high Q angle and to lower the biomechanical stresses on the knee joint is to prevent excessive pronation with custom-made functional orthotics. One study found that using soft corrective orthotics was more effective in reducing knee pain than was a traditional exercise program (Figure 6).
- No lower limb asymmetries was found
- No pelvic or Spine deviation was found

Results of our first knee screening

The knee shows enough stability in the entire test that we have performed. (all orthopaedic test (1-4) pivot test, speed antero-posterior, run and stop in 2, 4, 6 and 8 meters, changes of direction associated with speed, jumps, explosive speed, Half Squads, full Squads, death lifts, press leg, open chain exercises for quadriceps and isquiotibiales).

We agree to start the post-rehabilitation program with the objective to bring the handball player in the best condition and adapt him progressively to the level of competition.

We have performed the training program with a complete follow up during 10 weeks before start competition.

The morphological issues and residual laxitud increase the risk of injuries so our program was performed to modify the way he step, jump or land to avoid re-injuries. A higher Q angle is associated with decreased isokinetic knee strength, power output, and torque angles. It is thought that possible high Q angle-related knee joint disorders and sports injuries can be avoided by including proper quadriceps strength exercises in exercise prescriptions to be prepared [5].

The player shows to us his own program of training for his post rehabilitation started by a team of physiotherapist in Amsterdam after his ACL surgery with a follow up online. We analyze the program and we didn't find any contraindication on movements so we start giving him our program considering the most important objectives on the intensity, duration and frequency of exercise dosage of training.

August 27th 2019 first training with the team

We observe the player during the training and he showed a good stability and strength in both knees. He still shows fear during contact (Figure 7).

28-09-2019 14:30 h (post rehabilitation session in our clinic)

Private training session: 45 minutes

Objectives: Dynamic evaluation for both knees.

Warm up with isometric and balance exercises during 10 minutes

Propioceptive exercises with knee flexo-extension with elastic

Figure 7: We observe the player during the training and he showed a good stability and strength in both knees. He still shows fear during contact.

Figure 8: Applying manual techniques to the knee to regain Mobility.

Figure 9: Prevent further knee injury and reduce the risk of knee osteoarthritis.

Figure 10: We offered constant support in this regard from the beginning on an ongoing basis and in private sessions in our clinic.

bands and espalier.

Propioceptive exercises on rotator disk with help.

We start the post-rehabilitation program following the Delaware-Oslo ACL cohort study 2016 with the next criteria [6]:

Objectives

Restore his knee function

Applying varying degrees of muscle strength deficits, altered movement patterns, decreased knee joint proprioception, and increased passive knee laxity. Applying manual techniques to the knee to regain mobility (Figure 8).

Address psychological barriers

Although the functional status of the knee is associated with whether the patient returns to sport problems with the injured knee is only the third most frequently cited reason for not returning to sport.

One of the reasons to not returning to sport between the 8th to 9th month after operation correspond with a fear of re-injury or a lack of trust in the knee.

We provide to the player a continued follow-up and coaching support from the beginning.

Prevent further knee injury and reduce the risk of knee osteoarthritis

By several Scientific evidences the risk for knee re-injury is lower in those handball players who:

1. Complete rehabilitation to the point where they pass functional return to sport criteria before returning to competition.

2. Return to competition later than 9 months after an ACLR [3] (Figure 9).

Observations

1. It is evident that we don't know what kind of rehabilitation the player has done in the first 6 months with precision but it is true that he shows a great muscular condition, strength and flexibility from the beginning. We can affirm that he shows discipline and interest in his recovery every day. Obviously he still shows a lack of speed and coordination in this period.

2. On the other hand and according to evidences the player should have been subjected to play games immediately after 9 months of the surgery (21/01/2019) in case that our medical report doesn't show any contraindication and he start on 6th of November, 2 weeks before to complete the recommended date, so the club respect almost totally the time of recovery.

3. It seems that regularly by his first diagnostic the player was ready to play from 21 November.

We have included in the plan to reduce the risk for knee re-injury an education protocol that includes information on the probable benefit of activity modification.

In our opinion the treatment strategy should include at least 9 months postoperative rehabilitation and return to sport only after passing specific criteria, (pivot test negative and varus stress test no more than level 1 which is considered in his case part morphological and part residual from the previous surgery).

And as relevant point we have suggested to continue performance of neuromuscular training programs after return to sport, thing that is included in the general training of the team.

We include during the schedule training with the team 1 session per week of neuromuscular program (3R Rehab system) consisting in re-balance, re-education and re-training focusing in coordination

and following several proprioceptive exercises with springs and elastic bands (Figure 10).

He was agree with our plan and we inform to the coach that he was feeling not well yet to start competition at this time (last week of September 2019).

We offered constant support in this regard from the beginning on an ongoing basis and in private sessions in our clinic.

28th august to 29th September (Resume of our first 4 weeks)

At this crucial period the player has performed already

- 18th Trainings with the team.
- 12 private sessions in our clinic.
- 5 private sessions in the handball club (30 min before the general training program with the team).

He didn't refer any complication. Strength was optimus and we work mostly on speed and coordination.

September 23th

First symptoms of pain and inflammation since August 27th.

He refers inflammation in the knee.

We evaluate his right knee and we found both by palpation and by ecography a clear synovitis. The knee doesn't show any injury necessarily but there is a lack of mobility that causes compensation on his biomechanic.

September 25th

We perform an Ecography in the right Knee.

Results

- Horizontal lesion of the posterior corn of internal meniscus. (2 mm, 9 mm)
- Medial ligament: No lesion
- External collateral Ligament: 3 mm, 7 mm Hiper Ecogen Line that shows an old scare from an old injury. No tear is observed.
- Articular Capsule and patellar tendon without injuries.

September 27th

We prescribe an MRI and after having the results we have performed a consultation online with two Specialized Doctors to obtain an stronger argument 1) surgeon Dr. Fahad ALKhalaf from Kuwait Hospital and 2) Dr. Benjamin Fernandez, Sport Medicine Specialist from Oviedo University, Spain. The meeting was done separately.

The surgeon Dr. Fahad observes a meniscal suture (performed during the ACLR) and confirms that there is not any injury in the ligaments. The Sport medicine Doctor Benjamin Fernandez had the same observation.

We have performed a Lachman test and it shows level 1 what mean in his case a primary lack of lateral stability. In conclusion the knee shows partial instability by his already known hyperlaxitute in both knees plus the morphological positive deviation of the Q angle.

As we mention previously an increased Q angle appears to be one factor that causes the knee to be less stable and under more stress.

September 27th

First MRI after the ACLR surgery

RMN Conclusions

The collateral external ligament it is slightly thickened with continuous preservation.

To note the presence of slight changes in the hypersignal PD FS on its deep face at the level of fat between it and the joint capsule.

The collateral external ligament is starting probably" to be affected by compensations in the stabilization of the knee.

At this time the player start private trainings before the train with the team for prevention.

September 28th

Jamali start receiving 30 min private session before training

The training didn't show any discomfort with the velocity test changing the direction and with the pivot test.

He still feel lack of stability in the knee and I suggest using a bandage to prevent injuries. Rigid Tape was the most recommended in this case but finally we decide to apply a soft or thesis to reforce the knee. We didn't find any problem during training and we have attributed his feelings to the fear of re-injury.

First match in November 6th (2 weeks before than the recommended protocol for ACLR surgery)

After the match he fells pain in the knee located anteriorly in the external suprapatellar compartment.

All test performed doesn't shows any lesion. The antero-posterior stability is the same that we measure before using the pivot test.

The lateral stability is affected and shows level 1 in Lachman test as in the beginning in August 28th.

November 18th 2019

He doesn't feel good to play. He say that he feel a lack of stability and little pain, plus inflammation.

We discuss with the first coach of the team and recommend him to allow the player to participate at the game at least 10 min considering the most favorable matches to play under their criteria.

November 21th 2019

The player refers pain again in his knee and we prescribe treatment with anti-inflammatory and analgesics.

November 28th 2019

He receives a private session before training with the team.

The training doesn't show complications and he has performed a 20 m circuit with speed, strength and a grand variety of proprioceptive exercises.

December 11 during the match in competition the handball player refer a torsion that affect his right knee and he has to stop playing.

On December 13th he performs another RMN and the results shows a tear in the posterior corn of meniscus internus. Our collaborators Dr. Fahad, Surgeon and Dr. Benjamin, Sport Medicine

Specialist confirm the same diagnostic. There is also a level I/II distension of the medial Collateral Ligament.

The RMN shows as main complications the lesion degree I/II on the Medial collateral ligament, lesion degree III in posterior corn of Internal Meniscus. Synovitis that affect the interior suprapatellar compartment.

The clinical exploration shows inflammation and lack of stability.

At the same time the patient made a consultation with his surgeon doctor in Hungary and the report shows the next conclusions:

He is recommended to perform a new surgery from the doctor that has performed his first ACLR surgery.

Our patient asks to our team for a recognized Orthopedic Surgeon to do a new consultation and we recommend 2 well known surgeons.

On February 21st he is evaluated by the Dr. Cugat and his team in Barcelona and he decides to do a new surgery following the recommendations of Dr. Cugat.

Discussion

The main objective of presenting this clinical case is to update knowledge in the management of post-operative sports injuries, specifically in the retraining of players after returning to competition. This case aims to guide professionals who are dedicated to sports medicine, including physiotherapists and physical trainers, and also to serve as technical coaches when making decisions about the players returning to competition. Further investigations and to establish clear protocols are necessary considering the inclusion and back to competition of an injured athlete with a background in knee surgery.

Terminology

- Anterior Drawer Test (1)
- Lauchman test (2)
- Varus Stress Test (3)
- Valgus stress test (4)
- Q angle (5)

1. The patient lies supine on a plinth with their hips flexed to 45 degrees, his/her knees flexed to 90 degrees and feet flat on the plinth. The examiner sits on the toes of the tested extremity to help stabilize it. The examiner grasps the proximal lower leg, just below the tibial plateau or tibiofemoral joint line, and attempts to translate the lower leg anteriorly. The test is considered positive if there is a lack of end feel or excessive anterior translation relative to the contralateral side.

2. The Lachman test is a medical test used to examine the anterior cruciate ligament of the knee and is recognized as the most sensitive and specific clinical trial for the detection of anterior cruciate ligament rupture, even greater than with the anterior drawer test.

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4. The valgus or abduction stress test evaluates the Medial Collateral Ligament (MCL). To perform this test, place the knee in thirty degrees of flexion. While stabilizing the knee, abduct the ankle. If the knee joint abducts greater than normal (compare with the uninjured leg), the test is positive.

5. An increased Q angle (1) appears to be one factor that causes the knee to be less stable and under more stress.

Conclusion

Some Evidences related to Jamali Surgery Background and his evolution to a new surgery.

Clinical Report: JAMALI MOORCHAGANI, IMAN

Date of Birth: OCTOBER 11, 1991

Date of Hospitalization: JANUARY 22, 2020

Date of Surgery: January 22, 2020

Surgical report 25/01/2019

Surgeon: Dr. Ramon Cugat Bertomeu

Garcia Cugat Institute. Barcelona, Spain

Pre-operative diagnosis: Instability of the lateral and collateral posterior of the right knee. Residual laxities of the anterior-posterior cross Ligaments.

Operative diagnosis: Right knee affected by partial lateral post-meniscectomy syndrome, insufficiency in the anterior cruciate ligament graft as much as the posterior cruciate ligament, and instability in the capsule of the posterolateral ligamentous complex (posterolateral corner + lateral collateral ligament).

Operative procedure: Revision arthroscopy-debridement of chondral and meniscal joints. Re-tensing and reconstruction of the popliteus tendon and lateral collateral ligament using semitendinosus graft and autologous gracilis. Infiltration of Leukocyte-free PRP intra articular (ACL and PCL) and in the lateral area.

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