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Case Report

Comprehensive management of anterior cruciate ligament and medial meniscus tear in a young female: a case report

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ABSTRACT

Anterior cruciate ligament (ACL) and medial meniscus (MM) tears are prevalent knee injuries, especially among young athletes, significantly impacting joint stability and function. This case study presents the clinical evaluation, diagnostic imaging, and surgical management of a 25-year-old female with a complete ACL tear and grade III medial meniscus tear. The patient's clinical presentation, including pain and instability following a sports injury, was corroborated by magnetic resonance imaging (MRI) findings, revealing the severity of her injuries. Arthroscopic surgery, involving ACL reconstruction and meniscus repair, was performed with successful postoperative recovery. This case underscores the critical role of detailed assessment and advanced imaging in diagnosing complex knee injuries, highlighting the efficacy of arthroscopic techniques in facilitating optimal recovery and restoring knee function.

Keywords: ACL, Knee injuries, Medial meniscus tear, Arthroscopic surgery, ACL reconstruction

INTRODUCTION

Knee injuries involving the anterior cruciate ligament (ACL) and meniscus are prevalent, particularly among young adults and athletes.[1] The ACL and medial meniscus are crucial for maintaining knee stability, and their tears often result from sports-related activities involving sudden stops and changes in direction.[2-4] These injuries can lead to significant morbidity, affecting joint stability, function, and overall quality of life.[5,6] Accurate diagnosis and timely intervention are crucial for restoring knee function and preventing long-term complications.[7] This case study details the clinical presentation, magnetic resonance imaging (MRI) findings, and surgical management of a young female patient with complex knee injuries, aiming to provide insights into effective treatment strategies.

CASE REPORT

The patient, a 25-year-old female, presented with pain and swelling over the right knee following a twisting injury sustained during a sports activity. She reported difficulty in weight-bearing and instability in the knee, specifically mentioning a sensation of the knee "giving way" during physical activities.

Past medical history

The patient had no significant past medical history and no known comorbidities.

Physical examination

Upon examination, the patient was found to be in fair general condition with stable vital signs. A detailed knee examination revealed a positive Lachman test and anterior drawer test, indicating ACL instability.

Additionally, there was joint line tenderness, suggestive of a possible meniscal injury. No abnormalities were detected in the respiratory and central nervous systems.

Diagnostic imaging

An MRI of the right knee was performed, revealing: mild joint effusion extending to the suprapatellar recess, normal alignment of bones with normal marrow signal characteristics and intact bone cortices, longitudinal intrasubstance hyperintensity in the medial meniscus with a grade III tear in the posterior horn, both horns of the lateral meniscus displayed normal signal intensity, complete disruption of ACL fibers, indicative of a complete tear, and buckling of the PCL, anterior translation of the tibia measuring 8 mm, normal signal intensity in the quadriceps and patellar tendons, intact medial and lateral collateral ligaments, and normal signal intensity in the gastrocnemius and soleus muscles.

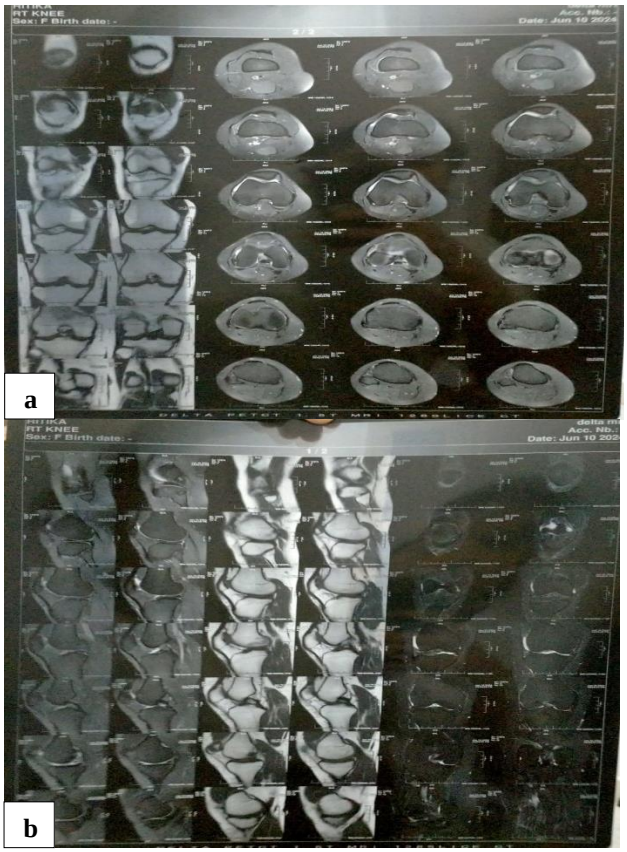

Figure 1 (a and b): Magnetic resonance imaging of patient's right knee.

Surgical intervention

The patient underwent an arthroscopic all-inside ACL reconstruction with fiber tape internal brace procedure, utilizing a quadriceps graft with a diameter of 10 mm. The graft was fixed using a combination of TRRT-IB, ABS loop, concave button, and swivel lock for optimal stability. In addition to the ACL reconstruction, the medial meniscus tear was repaired using a zone navigator to ensure precise placement, and suture tape was employed for stabilization. The surgery was performed under general anesthesia, allowing for a thorough examination and confirmation of the MRI findings.

Figure 2: Postoperative image of patient's right knee (follow-up).

Postoperative care

Postoperative care included standard protocols for pain management, physical therapy, and knee immobilization. The patient's recovery was uneventful, and she was discharged after three days.

Follow-up and outcomes

At the six-week follow-up, the patient showed significant improvement in knee stability and range of motion. Rehabilitation focused on strengthening exercises and proprioceptive training, with the goal of returning the patient to her pre-injury activity levels.

DISCUSSION

This case highlights the critical role of MRI in diagnosing knee injuries, providing detailed information that is essential for planning surgical intervention.[8] The successful use of arthroscopic techniques allowed for precise reconstruction of the ACL and repair of the medial meniscus, leading to favorable postoperative outcomes. Our findings align with previous studies, which have shown similar positive outcomes in young patients undergoing arthroscopic ACL and meniscus surgery.[9]

The patient in this case study was a 25-year-old female who presented with symptoms typical of ACL and medial meniscus tears, including knee pain, swelling, and instability following a sports-related injury. These presenting symptoms are consistent with the findings of a study by Frobell et al which identified pain, swelling, and instability as common indicators of ACL and meniscus injuries in young athletes.[10] The positive Lachman and anterior drawer tests further supported the diagnosis, as these physical examination findings are well-documented indicators of ACL tears.[11]

MRI played a crucial role in confirming the diagnosis and determining the extent of the injuries. The imaging revealed a complete ACL tear, a grade III tear of the medial meniscus, and associated knee effusion. This level of detailed imaging is critical for surgical planning, as emphasized by a study by Sanders et al which demonstrated that MRI findings correlate strongly with intraoperative findings and are essential for successful surgical outcomes.[12]

The treatment protocol for this patient included arthroscopic ACL reconstruction using a quad pro graft and medial meniscus repair with a fiber stitch technique. This approach is supported by literature, such as the study by Smith et al which demonstrated that early surgical intervention in young athletes with ACL and meniscus tears significantly improved functional outcomes and reduced the risk of long-term complications.[13] In our case, the use of a quadriceps graft and advanced fixation techniques provided optimal stability, which is consistent with the findings of Cohen et al that highlight the importance of quadriceps tendon for graft option in ACL reconstruction success.[14]

Postoperative outcomes for our patient were favorable, with significant improvement in knee stability and range of motion observed at the six-week follow-up. This is in line with the findings of a study by Rodríguez-Roiz et al which reported that patients who underwent arthroscopic ACL reconstruction and meniscus repair showed substantial functional recovery and high satisfaction rates.[15] The emphasis on rehabilitation, including strengthening exercises and proprioceptive training, is supported by the consensus in the literature that comprehensive postoperative rehabilitation is crucial for optimal recovery.

Overall, this case underscores the importance of integrating detailed clinical assessment, advanced imaging, and skilled surgical intervention to achieve optimal outcomes in patients with ACL and meniscus tears. The positive correlation of our findings with previous case reports and studies reaffirms the effectiveness of current treatment protocols and highlights the need for continued research to refine surgical techniques and rehabilitation protocols.

CONCLUSION

The management of ACL and meniscus tears requires a multidisciplinary approach involving detailed clinical assessment, advanced imaging, and skilled surgical intervention. This case study underscores the importance of integrating these elements to achieve optimal patient outcomes. The significance of this study lies in its detailed documentation of the surgical technique and postoperative care, contributing to the existing knowledge on the management of complex knee injuries. Future research should focus on long-term outcomes and the potential for improved rehabilitation protocols. A limitation of this study is the lack of long-term follow-up data, which would provide further insights into the durability of the surgical repair and overall patient satisfaction.

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