

Concurrent Meniscal Hypoplasia & ACL Agenesis: An Anomaly of the Knee

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Background

- Congenital anomalies of the knee are uncommon with discoid menisci being the most frequently identified with a prevalence of 4.88 per 100,000 orthopaedic patients.¹
- Literature on hypoplasia of the meniscus and anterior cruciate ligament (ACL) agenesis as separate entities is limited; but often associated with incidental discovery and other syndromic conditions.^{2,3,4}
- This case highlights an instance of these congenital anomalies coexisting,

Case Presentation

HPI

- 16 year old, otherwise healthy male presented to clinic with **right knee** pain swelling and instability following a non-contact basketball injury in which he felt his knee “give-out” while attempting a lay up
- Similar episode 6 weeks prior at a trampoline park

Physical Exam

- 2B-grade anterior drawer and Lachman test

Imaging

- MRI consistent with a pivot-shift injury associated with ACL tear, with involvement of the medial meniscus (Figures 1 & 2).

Plan and Differential Diagnosis Pre-Surgery

- Chronic ACL rupture with suspected medial meniscus injury given history of 2 episodes of trauma to the knee and physical examination
- Developmental anomalies of the ACL and medial meniscus were not considered
- Plan for right knee arthroscopy with the primary goal of ACL reconstruction.

Imaging



Figure 1. Sagittal MRI demonstrating pivot-shift bone marrow edema pattern and suspected medial meniscal insufficiency with lack of meniscus fragment



Figure 2. Sagittal MRI showing absent anterior cruciate ligament in expected anatomical location

Intervention & Outcomes

Right Knee Arthroscopy

- ACL reconstruction using quadriceps tendon autograft with internal bracing
- Grade 3 pivot shift revealed under anesthetized examination, leading to anterolateral ligament reconstruction using gracilis allograft tissue
- Tear of posterior horn and lateral meniscus was identified and repaired
- **Displaced medial meniscus fragment anticipated but not found**
- In addition, there was a **lack of residual native ACL fibers** in the intercondylar notch
- These intraoperative findings raised concern for congenital deficiency of both the ACL and medial meniscus rather than a traumatic etiology as previously thought

Outcomes

- Overall, patient's postoperative course and recovery was uncomplicated
- Patient was cleared to return to basketball approximately 12 months postoperative
- To date, patient has returned to all previous activities including weightlifting, running, and basketball

Discussion

- This case demonstrates concurrence of medial meniscus hypoplasia and agenesis of the ACL that remained asymptomatic until trauma
- Subclinical course and ambiguity in radiological interpretation may be barriers to presurgical diagnosis.^{1,2,5,6}
- 77% of ACL-deficiencies are associated with meniscal injury, most commonly the medial meniscus.⁷
- Prevalence of post-traumatic osteoarthritis is as high as 87% in those with chronic ACL-deficiency.^{8,9}
- It remains unknown of if this same risk seen in traumatic etiology remains in a case of congenital absence of the ACL and hypoplasia of the medial meniscus and raises important considerations for these anomalies
- Lack of pain nor instability prior to injury brings to light possible adaptive stabilizing capacity of the knee in absence of typical supportive structures

Conclusion

- **Overall, this case underscores the importance of recognizing congenital meniscal and ligamentous deficiencies as distinct entities, as they may be present but missed on imaging.**
- Recognizing such congenital anomalies is pertinent for accurate diagnosis and preoperative planning.
- This case also highlights potential gaps in the literature regarding our understanding of the knee's ability to stabilize itself as well as risk factors that those with congenital anomalies of the knee may present with.

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