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Abstract Title: Percutaneous Bone Marrow Aspirate Concentrate Injection for Complete Anterior Cruciate Ligament Tear: A Minimally Invasive Alternative to Surgery

Introduction: Complete Anterior Cruciate Ligament (ACL) tears often necessitate surgical reconstruction, which come with significant recovery time and potential complications. This case presents a non-surgical alternative using percutaneous Bone Marrow Aspirate Concentrate (BMAC) injection, a promising regenerative therapy that has shown potential in ligament healing. While BMAC has been explored in limited studies, its role in ACL tear management remains under investigation. This case highlights the successful use of BMAC in treating a complete ACL tear, demonstrating its potential as a minimally invasive, cost-effective alternative that may reduce surgical risks and improve functional recovery.

Case Presentation: A 31-year-old male presented with right knee pain following a soccer injury involving pivoting and lateral contact. Initially, he managed the pain with an over-the-counter brace and physical therapy. However, persistent instability led to an MRI, which confirmed a complete ACL tear with small medial and lateral meniscus tears, as well as collateral ligament strains. On the physical exam, he exhibited knee instability with positive Lachman's and Anterior Drawer tests. Ultrasound findings further revealed mild quadriceps and patellar tendinopathy with a small infrapatellar effusion.

Given the risks associated with ACL reconstruction surgery, the patient opted for a non-surgical approach and underwent a percutaneous BMAC injection under fluoroscopic and ultrasound guidance. The injection targeted the ACL, patellar tendon, quadriceps tendon, and meniscus. At his 6-week follow-up, he had regained full range of motion and began rehabilitation exercises without pain. By 6 months, the patient reported complete pain resolution and resumed running. An 8-month follow-up MRI demonstrated structural healing of the ACL, and he was cleared for progressive return to sports.

Conclusion: This case draws attention to the benefits of percutaneous BMAC injection as an alternative to ACL reconstruction surgery, demonstrating pain relief, functional recovery, and structural healing. While surgical repair remains the standard treatment for complete ACL tears, this case challenges conventional management by demonstrating successful ligament healing without the risks associated with surgery. Limited literature exists on the long-term outcomes of BMAC for ACL tears, making this report a valuable addition to emerging evidence. Future studies should further investigate patient selection criteria and refine protocols to optimize non-surgical treatment options for ACL injuries.