Full Thickness Anterior Cruciate Ligament Repair with Autologous Stem Cells

Bodor Clinic
Regenerative Spine & Sports Medicine

Marc Raj DO, Jameel Khan MD, David Suarez MD, Marko Bodor MD

CASE DESCRIPTION:

A 48 year old former professional cyclist presented for evaluation and treatment of a complete tear of the left anterior cruciate ligament (ACL) incurred 6 weeks prior while downhill skiing. He had anterior tibial translational instability and severe impairment of functional mobility. He was offered an ACL reconstruction but desired a less invasive approach.

SETTING

Outpatient Private Practice Clinic

RESULTS

MRI showed a complete proximal third mid-substance ACL tear and partial PCL tear **(Fig 1.)** Bone marrow aspirate concentrate (BMAC) was obtained from the posterior iliac crests, 3 x 10^6 total nucleated cells/ml x 5 ml. Using C5-1 MHz curvilinear ultrasound visualization in the short axis **(Figs. 2 & 3),** BMAC was injected using an in-plane approach into and immediately adjacent to the proximal and distal ACL. He wore a functional knee orthosis for 6 weeks and started physical therapy at 4 weeks. He was able to do a single left leg squat at 6 weeks.

At 6 months he reported no pain and return to in-line sports. There was no anterior tibial laxity. MRI at 6 and 12 months showed complete healing of the anteromedial but not posterolateral bundle of the ACL **(Figs 4-5).**

IMAGING

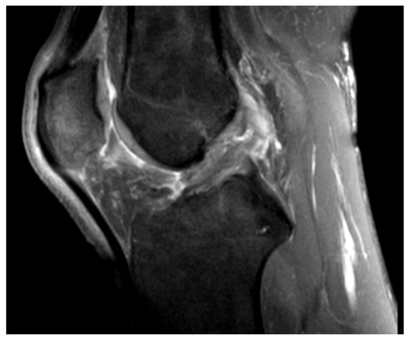

Figure 1: Sagittal T2 MRI showing complete proximal third mid-substance ACL tear

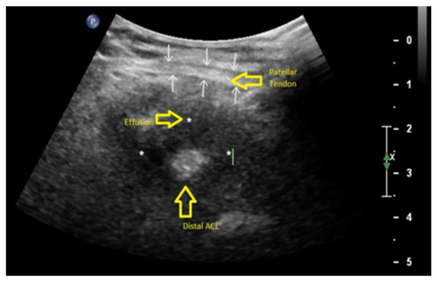

Figure 2: C5-1 MHz curvilinear ultrasound short axis view of patellar tendon, synovial fluid and distal ACL.

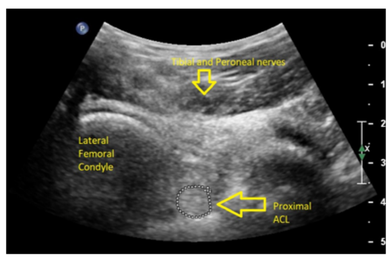

Figure 3: C5-1 MHz curvilinear US short axis view of proximal ACL at intercondylar notch.

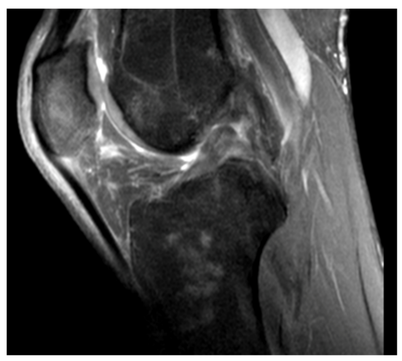

Figure 4: Sagittal T2 MRI 6 months after BMAC treatment showing increased signal within the anteromedial bundle of the ACL.

Figure 5: Sagittal T1 MRI 1 year after BMAC treatment showing complete healing of the anteromedial bundle of the ACL.

DISCUSSION

The standard approach for ACL injuries in high-performing athletes is surgical reconstruction using autograft or allograft. Biologic treatments are being investigated as alternatives.[1,2] This case demonstrates the potential for complete healing of at least one of the bundles of the ACL. In the future, we hope to do a randomized controlled trial of BMAC and rehabilitation versus rehabilitation only for ACL disruptions.

CONCLUSION

Ultrasound-guided BMAC injection may potentiate healing of complete rupture of the ACL in which the fibers are aligned and within 1 cm of each other.

REFERENCES:

1. Murray MM, Flutie BM, Kalish LA, et al. The Bridge-Enhanced Anterior Cruciate Ligament Repair (BEAR) Procedure: An Early Feasibility Cohort Study. *Orthopaedic Journal of Sports Medicine*. 2016;4(11):2325967116672176. doi:10.1177/2325967116672176.
2. Centeno CJ, Pitts J, Al-Sayegh H, Freeman MD. Anterior cruciate ligament tears treated with percutaneous injection of autologous bone marrow nucleated cells: a case series. *Journal of Pain Research*. 2015;8:437-447. doi:10.2147/JPR.S86244.

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