

Anterior Cruciate Ligament Injury: A Consideration for Internal Brace Ligament Augmentation

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Received: March 20, 2017; **Published:** March 22, 2017

Keywords: Orthopedic Surgery; Internal Brace Ligament Augmentation; Anterior Cruciate Ligament; Knee Anatomy; ACL Repair; ACL Reconstruction

Abbreviations

ACL: Anterior Cruciate Ligament; IBLA: Internal Brace Ligament Augmentation

As orthopedic surgery continues to evolve, it is indicated to reevaluate the surgical management of the anterior cruciate ligament (ACL) injury. Surgeons are searching for methods to shorten recovery time and to preserve mechanical neuro-sensory function. In doing so, they must choose whether to repair, or to reconstruct the ligament. Anatomical discoveries of the knee have led to the recent innovation of the internal brace ligament augmentation (IBLA) technique that may be used to repair, rather than to reconstruct, the ACL [1]. This new technique utilizes a bridging concept that employs knotless bone anchors and braided suture tape to buttress the ligament so that it is stronger and more durable (Figure 1) [2].

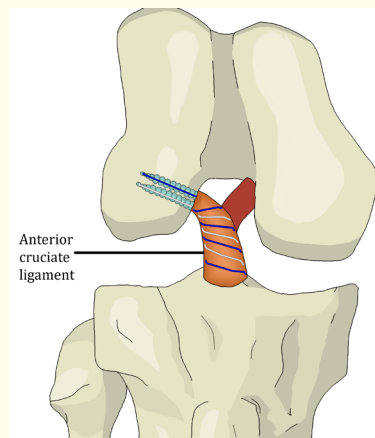


Figure 1: Internal Brace Ligament Augmentation Utilized in Anterior Cruciate Ligament Repair.

An anatomical depiction of the anterior cruciate ligament repaired using internal brace ligament augmentation. Two knotless sutures are anchored to the lateral intercondylar ridge of the femoral attachment point of the anterior cruciate ligament. The braided suture tape provides a lattice upon which the ligament can naturally rehabilitate.

ACL injuries are commonly encountered in the clinical practice of orthopedics. In the United States alone, it is estimated that approximately 400,000 ACL reconstructions are performed each year [3]. A higher prevalence of ACL injuries is observed in those that are athletic and young [3]. As these patients tend to be of working age, ACL injuries place a large economic burden on society [1]. Therefore, an expedient and successful recovery is beneficial to both the patient, and also to society.

ACL injuries often necessitate arthroscopic surgical intervention. When doing so, there is an emphasis to retain the biomechanical and neurological function of the ACL [4]. In order to achieve these goals, research has sought to better comprehend the complex nature of the knee so that the surgically operated ligament can match the native architecture of the ACL [4]. As such, modernized techniques are being developed that emphasize an anatomical approach to ACL management [4]. Consequently, many options have been developed to surgically manage this injury.

Currently, reconstruction of the ACL with tendon or ligament autograft is the gold standard for surgically addressing this pathology [2,5]. During this procedure, the surgeon will completely remove the ligament, or its remnants, which will be replaced with a graft. Despite the widespread use of this technique, it is not without limitations. Utilization of an autograft permits preserved function of the knee joint, however harvesting the autograft from the hamstring leads to significant weakness in 10% of cases [6], while harvesting the autograft from the patellar tendon often leads to anterior knee pain [7]. Additionally, patients that undergo ACL reconstruction do not retain a “normal” feeling of the knee, which is due to removal of the natural proprioceptors located in the discarded ACL [1,2]. This may lead to altered knee kinematics, which can further contribute to the development of early-onset osteoarthritis [1,2]. Moreover, ACL reconstruction is associated with a variable and lengthy recovery time [1].

Reconstruction of the ACL ligament is commonly performed despite having sufficient tissue left over to consider repairing the ligament [1]. Traditionally, ACL repair has been labeled inadequate because previous studies have established revision rates as high as 24% [8]. However, recent research by MacKay, *et al.* and other authors, has demonstrated increased success rates of ACL repair when it is coupled with IBLA [1,2]. Furthermore, better outcomes may be appreciated in a proximal lesion that is surgically repaired within six-weeks of injury [1,2].

Repairing the ACL using IBLA provides numerous advantages. The preservation of the natural proprioceptors of the ACL allows patients to experience a closer to “normal” feeling of the knee joint after surgery [1]. This can prevent the unwanted sequelae of altered gait kinematics and subsequent osteoarthritis [1,2]. Additionally, this method promotes revascularization of the native ligament, which can promote natural healing and a faster recovery [9]. Moreover, the internal brace itself can act as a secondary stabilizer to the ligament, which may prevent re-injury [2,9]. Ultimately, the IBLA approach promotes accelerated rehabilitation and a faster return to activities [1,2,9].

In addition to augmenting ACL repair, the IBLA technique has been demonstrated to be efficacious in many other capacities. Research by Smith *et al.*, denoted the capability of the internal brace as an adjunct during ACL reconstruction [9]. While Kindya, *et al.* demonstrated the remarkable performance of the knotless suture anchor with suture tape when repairing the quadriceps tendon [10] The IBLA may also be utilized during other surgical procedures, such as repairing or stabilizing the Achilles tendon, thumb, knee, elbow, or acromioclavicular joints. More research is indicated on this topic to determine long-term outcomes using the IBLA approach.

Funding Sources

None to report.

Financial Disclosures

None to report.

Conflicts of Interest

None to report.

Ethical Approval

None to report.

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Volume 5 Issue 4 March 2017

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