Revision Reconstruction of the Pediatric and Adolescent Anterior Cruciate Ligament – A Case Series

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BACKGROUND

ACL injuries in active youth pose a challenging clinical problem. As non-operative treatment of these injuries results in predictably poor outcomes, most of these patients are offered surgical reconstruction. These patients are also very high risk for graft failure. While techniques for primary reconstruction of the pediatric ACL as well as the higher re-tear rates compared to the adult population are well described, revision reconstruction of the ACL in this population is not well reported. The purpose of our study was to present a series of revision reconstructions performed at our center over a six-year period in the pediatric and adolescent population.

METHODS

This was a retrospective review of all revision ACL reconstructions performed by two senior surgeons at our institution over 6 years. Patients were excluded if they underwent initial ACL reconstruction after age 18. Age, gender, primary sport, intraoperative findings from both the initial & revision surgeries including surgical technique, graft size, presence of meniscal / chondral injuries, and concomitant pathologies addressed were collected. Data relevant to their rehabilitation following their index procedure, including issues with physical therapy, nonadherence to postoperative precautions, and delayed recovery were also collected.

RESULTS

DEMOGRAPHICS

Thirty patients were included in the study with an equal number of male and female patients. Mean age at initial surgery was 15.9 years, with mean age at revision reconstruction of 17.8 years. Soccer (n=12), football (n=8), and basketball (n=5) were the most common sports.

INDEX SURGERY

The majority of patients in this cohort underwent transphyseal or adult-type reconstructions with only 2 patients undergoing physal-sparing procedures. Hamstring autograft (HA) was used in the majority of patients (n=20) followed by patellar tendon autograft (PT; n=4). Allograft was used alone in 3 patients, and as an augment in an additional 3 patients. Average graft diameter was 8.0mm for the initial procedure (7.6 mm in females, 8.36 mm in males, p=0.036). Fifty-six percent of patients had meniscal surgery at the time of their index operation. Mean time to re-tear was 368 days, with mean time from initial surgery to last recorded surgery of 739 days. Nine patients had documented non-compliance with their prescribed postoperative physical therapy , and 8 patients reported delayed recovery including prolonged stiffness or instability.

REVISION SURGERY

In contrast, PT was used as the graft in the majority of revisions (n=16) followed by HA (n=11). Allograft alone was used in 3 revisions. Mean graft diameter was 8.98mm with no gender difference. Forty-seven percent of patients underwent meniscal surgery. Three patients in this series underwent staged reconstruction with bone grafting of the tibial and femoral tunnels, with an additional 5 patients being identified that had undergone only the first stage of a planned two-stage revision. There were three re-tears in this patient cohort: one who underwent revision with BTB allograft, one who underwent initial revision with hamstring autograft, and one of whom was noncompliant with postoperative protocols and elected to not undergo revision.

DISCUSSION / CONCLUSIONS

Participation in high-risk cutting and pivoting sports as well as post-operative non-compliance are risk factors for re-tear in this population.

The majority of the patients with ACL graft failure treated at our institution were able to be adequately treated with a single revision procedure with conversion from a soft tissue graft to a bone-patella tendon graft being the most common procedure. However, a number of our patients required either staged reconstructive operations or additional procedures at the time of revision reconstruction. There were three graft re-tears in this cohort with no re-tears in patients who underwent reconstruction with BTB autograft.

Although revision reconstruction can be performed successfully, clinicians should counsel patients who undergo primary reconstruction that participation in high-risk sporting activities as well as non-compliance post-operatively can lead to ACL graft tear.

![Figure 1. Graft type by surgery](image-url)