

# What has evolved in the Management of Anterior Cruciate Ligament Injuries First Half of 2020 When World was facing the Pandemic and the So-Called “New Normal”

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## Introduction

We are at the beginning of 2021 and we have been trying to leave the last year in hindsight. Dr. Bruce Reider [1], Editor in Chief, The American Journal of Sports Medicine in his editorial in May 2020, has very well put forth how the sports medicine practice changed in the time when we were grappling with the pandemic. Some interesting articles and updates have been published in this period to enlighten us about where we stand in this continuous evolution of the way we manage our patients with anterior cruciate ligament (ACL) injuries.

## Partial ACL Tears

We often come across patients with partial ACL injuries and in general there is a tendency to conserve these patients. However, are these partial ACL tears documented on MRI, actually partial tears or there is a possibility that they can be complete tears? Jog et al. [2] have correlated findings of examination under anesthesia (EUA), MRI findings, and arthroscopic findings to understand this further. They had a sample size of 95 patients, and among the 40 patients who

were diagnosed as partial tears on EUA, only 11 patients (27.5%) had partial ACL tears on arthroscopy, whereas 29 patients (72.5%) had complete tears. It's interesting to note that when we plan to keep the intact bundle in situ, and reconstruct the damaged bundle, we should consider potential microscopic injury that may have happened to the bundle that appears to be intact and this damage may not always be visible on visual inspection. If there was a force strong enough to rupture single bundle, there would be high possibility that the second bundle is deformed permanently.

## Ramp Lesions (Meniscocapsular Junction Injuries)

There has been a lot of analysis on why some patients have postoperative pain, why there is rotary instability, and what are the reason for variation in pivot shift tests, and one of the prime reasons for this has been attributed to the presence of Ramp lesions (tears at the meniscocapsular junction of posterior horns) associated with ACL injuries. Alexander Bumberger et al. [3] in their meta-analysis concluded that the Ramp lesions may be missed on standard

as you need to repair the unstable Ramp lesions.

Mouton et al. [4] have studied 275 patients with primary as well as revision ACL reconstruction (ACLR) and evaluated the difference in the clinical findings in control group without Ramp lesions and study group with Ramp lesions. They found out that there was no difference in results of Lachman's test between both the groups, however, there was significant difference in pivot shift tests when there was presence of Ramp lesions. Hence, they concluded that there is higher dynamic rotatory instability when there is an ACL injury associated with Ramp lesions.

In another study on risk factors for the Ramp lesions, Kim et al. [5] have concluded that the presence of bony contusion on the posteromedial tibial condyle, chronic ACL injuries, steeper medial tibial and meniscal slope, gradual lateral slope, and varus knee alignment >3 degrees are high-risk factors for the presence of Ramp lesions. These factors have a diagnostic value sensitivity of 75.8% and specificity of 71.7%, irrespective of the presence of Ramp lesions in MRI findings.

## Graft Options and Their Benefits

Nyland et al. [6] conducted a meta-analysis and compared the outcomes of ACLR reconstruction with quadriceps tendon (QT) graft (17 studies) and hamstring tendon (HT) graft (61

anterior portals and additional posteromedial portal is helpful in diagnosing the Ramp lesions. For stable Ramp lesions, debridement and trephination are the treatment of choice, where-

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studies). He analyzed them on various parameters and found that although the difference between the anterior laxities in terms of Lachman's test is insignificant between QT and HT groups, there is a significant difference in post-operative rotatory instability (pivot shift test) and there was reduction in the failure rates with QT grafts as compared to the HT grafts. When these two groups were compared for their modes of fixation (suspensory vs. compressive), there were significantly better outcomes with QT graft fixed with the compression devices over HT graft fixed in either compression or suspensory fixation. However, direct comparisons between HT autografts with suspensory or compression femoral fixation showed that compression HT autograft femoral fixation displayed higher failure rates than suspensory fixation, thus favoring suspensory fixation of HT grafts.

Choice of graft in adolescent patients has always been a point of debate. Gagliardi et al. [7] have studied 81 patients in the age group of 10–18 years, operated with ACLR with QT-patellar bone autograft (QPA). They concluded that ACLR with QPA is a relatively simple to perform, with excellent post-operative stability and good clinical outcomes. They found that 87.9% (95% CI, 81.4–94.9%) of individuals had returned to play at 3 years follow-up.

### Preventing Infection in ACLR

Infection control has always been a challenge in orthopedic surgeries, and although the infection rates have reduced considerably, researchers are constantly striving to reduce the infection rates further. Naendrup et al. [8] did a systemic meta-analysis to compare the incidence of post-operative septic arthritis following ACLR between patients receiving routine pre-operative intravenous (IV) prophylaxis only IV infection prophylaxis and patients receiving additional graft soaking in a vancomycin solution (5 mg/ml)

perioperatively. They also reviewed the literature regarding effects of graft soaking in vancomycin solutions on outcomes, complication rates, and tendon properties in ACLR.

In a total of 2099 patients, receiving only pre-operative IV prophylaxis, 44 cases of septic arthritis (2.1%) were documented as compared to no cases of septic arthritis in 2976 patients who received additional soakage of graft in 5 mg/ml vancomycin intraoperatively. The common odds ratio was 0.04 (0.01, 0.16). The authors also concluded that intraoperative soaking of the ACL graft in vancomycin is a safe technique, as demonstrated by no significant difference in the biomechanical properties of the soaked graft (load to failure, tangent modulus of elasticity, etc.). The knee function as evaluated by International Knee Documentation Committee (IKDC) score and Tegner scores is comparable in both the groups further reassuring the safety of the technique.

### Interference Fixation – Bioabsorbable versus Titanium Screws

There have been numerous papers with benefits and drawbacks of bioabsorbable screws over the titanium screws, and the debate continues in all academic discussions. To study this further, Sundaraj et al. [9] have conducted a prospective, randomized controlled trial with 13-year follow-up to compare long-term outcomes of hamstring autograft ACLR using either PLLA-HA screws or titanium screws. There was no statistical difference in subjective knee instability, knee scores, or clinically detectable instability between patients who received either a titanium or a PLLA-HA screw. Both the tibial and femoral PLLA-HA screws showed early evidence of resorption over the first 5 years, and there was complete or nearly complete resorption at the end of 13 years, based on MRI scans. Ossification around the screw was significantly higher with the PLLA-HA screws than the titanium

screws on both the femoral and the tibial sides ( $P = 0.001$ ). At final follow-up (13 years), there was a significant difference in femoral as well as tibial tunnel diameters,  $P = 0.002$  and  $0.004$ , respectively, favoring use of bioabsorbable screws.

### Comparison between Interference Fixation with Screws and Adjustable Cortical Suspensory Fixation

Mayr et al. [10] compared tunnel widening and clinical outcome after ACLR surgery with interference screw fixation and all-inside reconstruction using adjustable cortical suspensory fixation.

The tibial tunnel volume with button fixation was significantly smaller as compared to screw fixation ( $P < 0.001$ ). The femoral tunnel volume with button fixation was significantly smaller at baseline in comparison ( $P = 0.025$ ). However, the differences between the groups were not significant at 6 months and 2 years follow-up.

In terms of clinical outcomes, 1 of 14 patients (7.1%) with screw fixation was graded C in the IKDC objective score, compared to 5 of 16 patients (31.3%) with button fixation ( $p > 0.05$ ). Two of 14 patients (14.3%) with screw fixation had KT-1000 laxity of more than 3 mm, compared with 7 of 16 patients (43.8%) with button fixation ( $P > 0.05$ ).

### Conclusion

Well, we need to evaluate partial ACL tears meticulously and application of clinical acumen may help us probe further whether we are missing a complete tear. ACL injuries more often than not are associated with rotatory instability which has to be detected by the clinician. We should have high index of suspicion for Ramp lesions and arthroscopist should actively look for it to optimize the result. QT graft is coming up as a safe and better alternative to HT graft. We have to open up our minds and refine our techniques to include the QT

graft in our armamentarium. Soakage of graft in vancomycin has been proved to be a safe and effective technique of lowering infection rates in ACL surgery, and should be made a part of our operative steps as a protocol. Although bioabsorbable screws have their own benefits, titanium screws are here to stay. Suspensory fixation with adjustable loops has consistently good outcomes and smaller tunnel diameters and volume as compared to interference screws.

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