

# Editorial Commentary: Independent Suture Tape Reinforcement Could Be a Part of the Holy Anterior Cruciate Ligament Grail Puzzle?



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**Abstract:** The quest for improvement of anterior cruciate ligament (ACL) reconstruction results is a continuous struggle as we endeavor different technique adjustments that could form a missing piece of the holy ACL grail puzzle. Independent suture tape reinforcement (ISTR) is a small addition to the familiar ACL reconstruction technique with the potential to improve reconstruction results. Biomechanical studies show a decreased graft elongation and increased ultimate load to failure with ISTR. Clinical studies are scarce. In contrast to the ACL augmentation results in the 1980s, 2 retrospective comparative studies do not report negative results, which would support further research. Larger clinical trials will have to prove whether this small addition to ACL reconstruction will have a positive impact on ACL reconstruction results. For now, it is promising to note that no “red flags” have been described for ACL reconstruction with ISTR.

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We are all familiar with clinical anterior cruciate ligament (ACL) reconstruction results and their room for improvement, for example, the graft rupture rate of 3% to 8%, up to 10% to 28% in high-risk populations, the long rehabilitation period of 9 months or more, the return to preinjury level of sports for only 50% to 65% of recreational athletes, and the redo surgery rate for any reason up to 28%.<sup>1,2</sup> Despite all the dedicated ACL research, no other ligament has more publications. We have to push for further improvement. Could independent suture tape reinforcement (ISTR) be one of the new pieces of the ACL puzzle?

With great interest I read “Hamstring Autograft Anterior Cruciate Ligament Reconstruction Utilizing an All-Inside Technique With and Without Independent Suture Tape Reinforcement” by Parkes, Leland, Levy, Stuart, Camp, Saris and Krych.<sup>3</sup> This study describes a 1:2 matched cohort comparison of patients who

underwent hamstring autograft ACL reconstruction with (36 patients) and without (72 patients) ISTR with a minimum follow-up of 2 years. Fourteen percent of the patients in both groups had a reoperation, 1 patient (3%) in the ISTR group, and 4 patients (6%) in the control group experienced graft failure. No significant differences were observed between both groups in rates of complications, reoperation, ACL failure, and the excellent patient-reported outcome measures. One of the limitations mentioned in the study is the sample size. To detect a difference in graft failure, the sample size needed to be 1290, with 430 patients in the ISTR group.

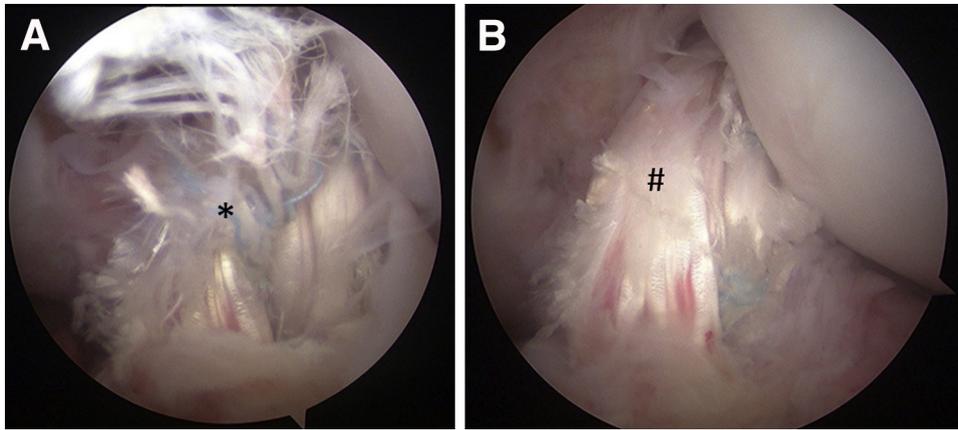
In my opinion, the main conclusion of this study is that there are no “red flags” in the ISTR group. There was no significant failure difference and 0% effusion in both groups. This is in contrast with the results in the 1980s, when the use of augmentation led to high rates of failure and noninfectious knee synovitis/effusion.<sup>4</sup> In the last decade, the ISTR technique has been used in various joints for ligament repair, among which ACL repair. The results of the developer of the ISTR technique on 42 ACL repair patients show an acceptable/low re-rupture rate of 4.8% 2 years postoperatively, although the Marx activity scale was significantly decreased compared with preoperatively.<sup>5</sup> van der List et al.<sup>6</sup> describe no statistically significant or clinically relevant differences in subjective outcomes comparing

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**Fig 1.** (A) Anterolateral portal view. Left knee, a ruptured independent suture tape reinforcement (\*) after a rotational trauma of the knee, 1-year post-reconstruction. (B) Left knee, after removal of the ruptured independent suture tape reinforcement, with the ACL graft (#) still intact.

27 ACL repairs with ISTR versus 29 ACL repairs without ISTR, with failure rates of 7.4% and 13.8% ( $P = .672$ ), respectively. Literature on ACL reconstruction with the ISTR technique is scarce. Biomechanical studies show a potential advantage for ACL reconstruction with ISTR with a decreased graft elongation and increased ultimate load to failure.<sup>7,8</sup> Besides the previously mentioned study by Parkes et al., the only other clinical ACL reconstruction ISTR study describes an 1:1 matched cohort comparison study with 30 ACL reconstruction patients with ISTR and 30 ACL reconstruction patients without ISTR. Improved patient-reported outcome measures, less pain, and a greater percentage of and earlier return to preinjury activity level are reported in the ISTR group.<sup>9</sup>

As mentioned in the biomechanical and clinical ISTR studies, an important technical issue is not to over-constrain the ISTR. The primary tension should be on the graft. The ISTR should act as a secondary safety belt to provide biomechanical support during the proliferation, maturation, and ligamentization graft healing phases. One patient I treated with an all-inside quadrupled semitendinosus reconstruction with ISTR experienced a new rotational trauma 1 year post-operatively. An arthroscopy showed a ruptured suture tape with an intact graft (Fig 1). We will never know whether the graft would have been ruptured if it was not for the suture tape, but I believe that ISTR could have a protective effect on the ACL graft.

Two clinical retrospective comparative studies with a short follow-up do not justify the use of the ISTR technique in daily practice. Larger clinical studies/randomized controlled trials are needed to deliver proof that additional ISTR has an advantage and leads to better outcomes compared with the classic ACL reconstruction to justify the extra cost. Currently, no “red flags” have been described for ACL reconstruction with ISTR, so further research is justified.

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