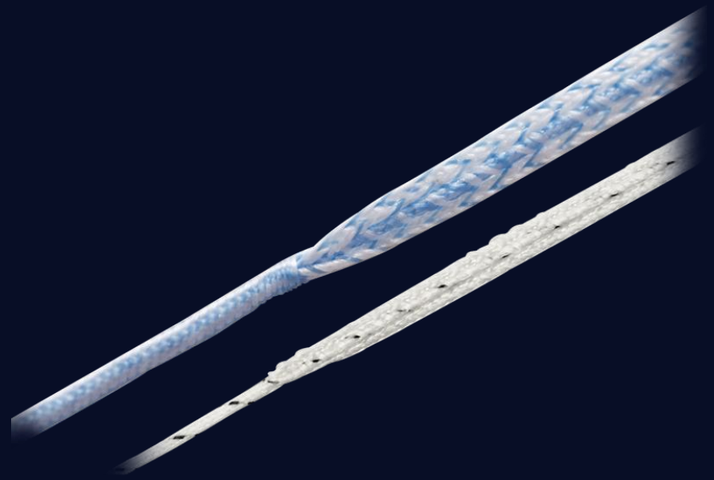
Knee Ligament Reconstruction with FiberTape® Reinforcement



A safe construct with favourable outcomes in knee ligament reconstruction

Presented by: Ahmed Mabrouk, Michael Risebury, Sam Yasen

Disclosures

Ahmed Mabrouk and Michael Risebury have no disclosures.

Sam Yasen is an Arthrex Consultant.

Introduction: The Concept

Reinforcement vs Augmentation

Reinforced ligament reconstruction places an inelastic suture tape adjacent to the graft.

This facilitates independent loading with higher load to failure.

FiberTape® Properties

2mm wide, non-biodegradable ultra-high molecular weight polyethylene.

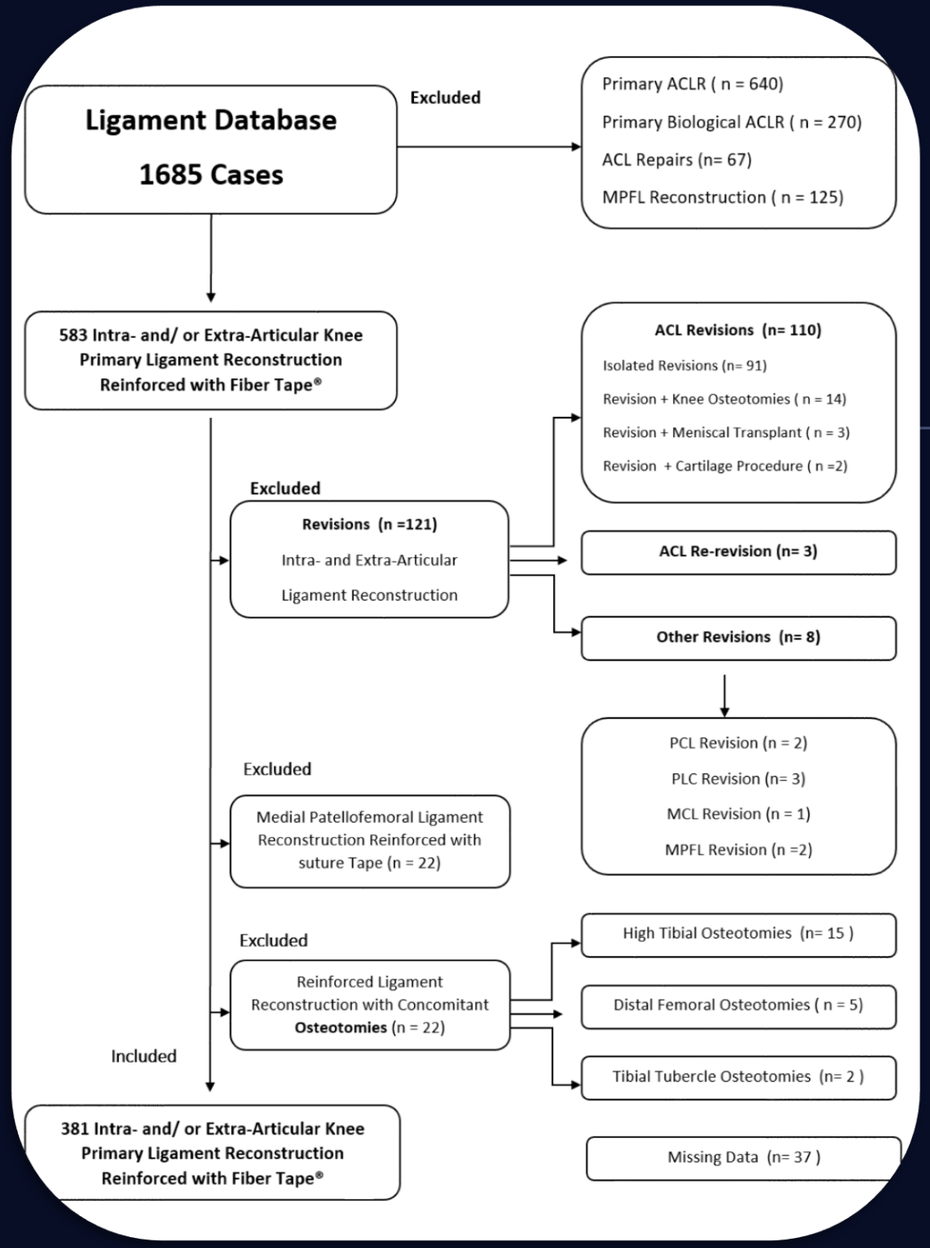
Contains terephthalate core with braided polyester jacket.

Study Purpose

To report clinical outcomes and complications in knee ligaments reconstruction.

Hypothesis: lower graft-rupture rate and favourable outcomes.

Patients and Methods



Patient Selection

381 cases included in the study

Surgical Techniques

Extra-articular and intra-articular methods

Outcome Measurement

Patient reported outcomes and complications rate

Patient Demographics

Total Cases

381 primary ligament reconstructions with FiberTape® reinforcement.

Demographics

Mean age: 30.5 ± 12.3 years. Gender: 64.6% males, 35.4% females.

Patient Groups

Group I: ACL (n=234), Group II: Multi-ACL (n=92), Group III: Other-Ligaments (n=55).

Follow-up

Mean follow-up: 8 ± 2.8 years (range 7.7–8.3).

Autograft Preparation

Autograft Harvest

Suitable autograft tissue extracted for reconstruction.

Reinforcement

High-strength suture tape passed through fixation device.

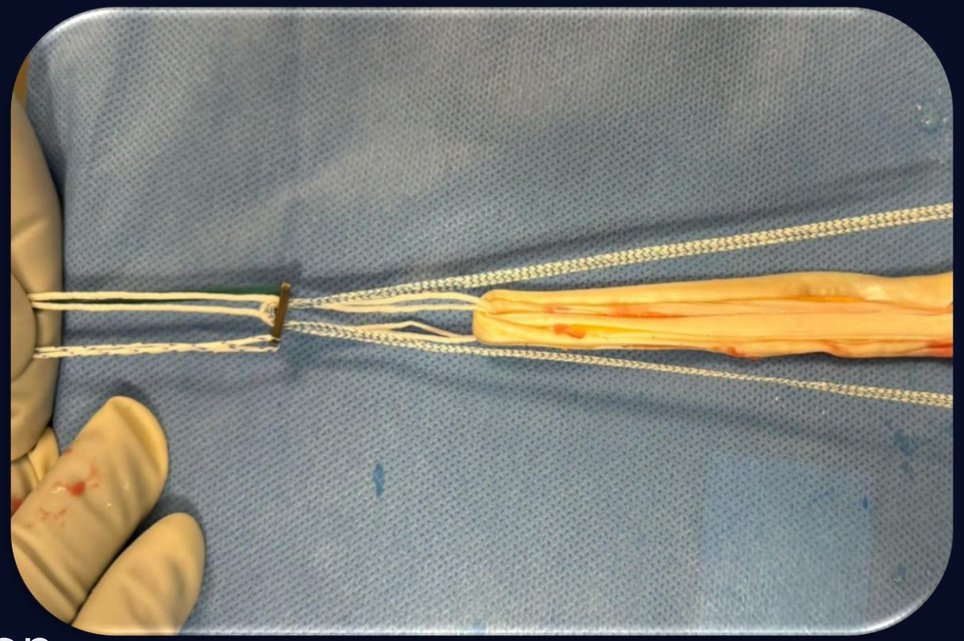
Separate Tensioning

Allows independent fixation and optimal tensioning.

Independent Design

Both graft and tape remain free on tibial side.

Intra-articular Ligament Reconstruction



Independent Passing

Suture tape passed through proximal fixation button.

Positioning

Tape laid alongside graft without direct attachment.

Tensioning

Tape independently tensioned and anchored using PEEK-SwiveLock® device.

Extra-articular Ligament Reconstruction

Graft Preparation

Graft stretched and pre-tensioned on preparation station.

Suture Tape Placement

Tape laid on graft and attached at ends only, remaining slightly slack.

Fixation

Typically fixed using PEEK interference screws at both attachment sites.

In extra-articular reconstruction, the graft is pre-tensioned with suture tape laid on top. Intra-articular reconstruction involves independent passing of the suture tape through fixation devices.

Arthroscopic Visualisation

Intercondylar Notch View

Arthroscopic image of the right knee showing key structures.

PCL Reconstruction

Reconstructed posterior cruciate ligament visible in position.

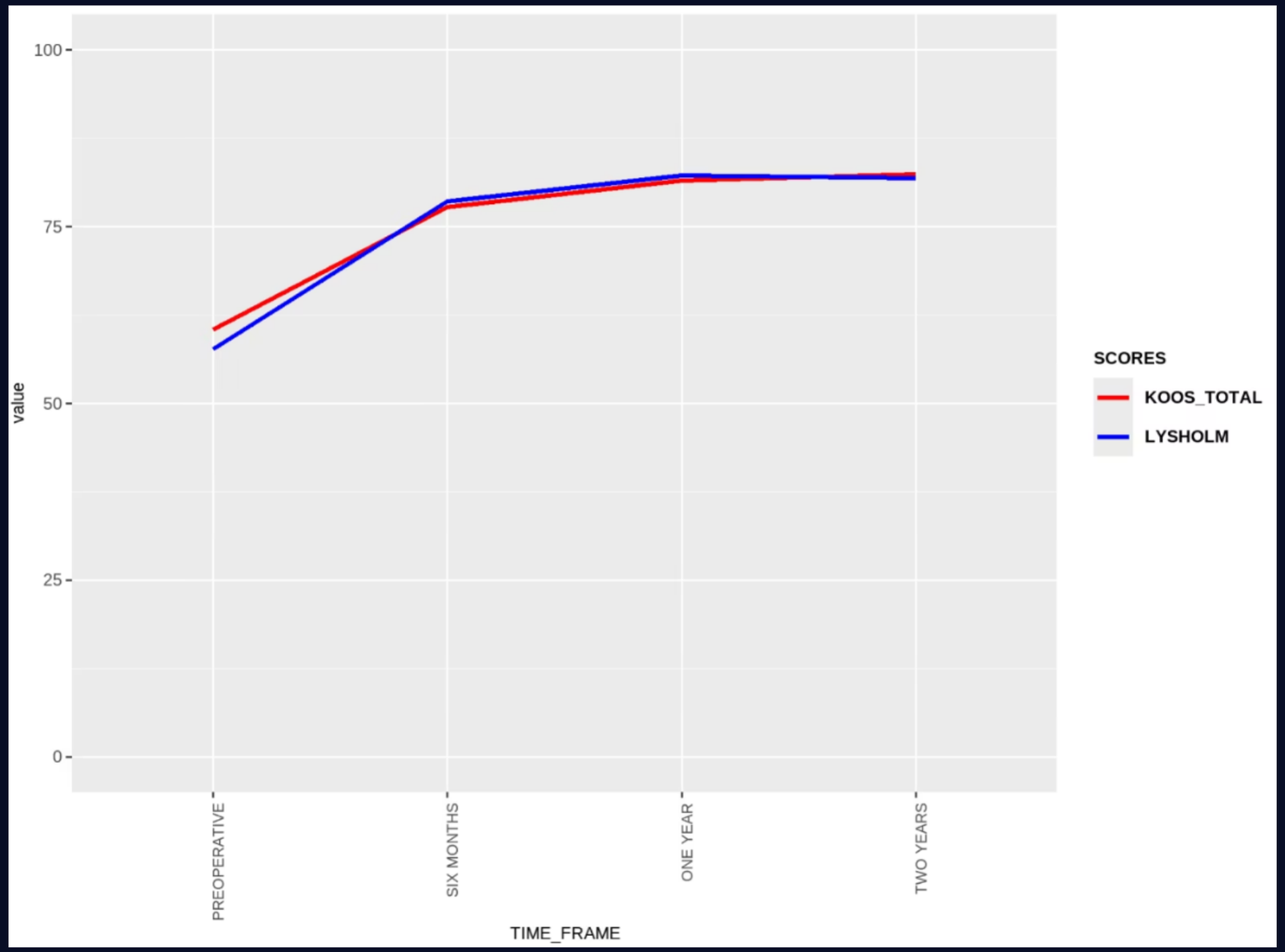
Suture Tape Reinforcement

High-strength suture tape clearly visible alongside the graft.

Probing Assessment

Probing hook placed between structures to demonstrate separation.

Patient Reported Outcomes



There was significant clinical improvement across all PROMs from preoperative to the 24 months postoperative mark with continuous significant progressive improvements (All $p < 0.05$)

120

Complications

3.7%	3.1%	1.3%
Complication Rate	Reoperation Rate	ACL Re-rupture Rate
14 cases reported complications	12 cases required reoperation	Only 5 cases experienced graft failure

Conclusion:

Knee ligament reconstruction with high-strength suture tape reinforcement yields a safe graft-suture construct that translates into favourable clinical outcomes for both intra-articular and extra-articular ligament surgery, with a very low complications rate including a low graft rupture rate.

Knee Ligament Reconstruction with FiberTape® Reinforcement
A Safe Construct with Favourable Outcomes

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Introduction

Reinforced ligament reconstruction is a concept based on the technique of placing an inelastic suture tape adjacent to the graft in a way that facilitates independent loading of the tape and the graft with a consequent higher load to failure of the construct. This is different from ligament augmentation where both the ligament and suture tape are tensioned and loaded dependently. Dependent augmentation had high failure rate reported in the literature. The reinforced reconstruction technique was previously described by the senior authors and has been in use since 2011.

FiberTape® is an inelastic 2mm wide non-biodegradable long chain ultra-high molecular weight polyethylene tape with a terephthalate core and braided polyester jacket. The concept and application of the reinforcement technique has been further highlighted in the literature.

The purpose of this study was to report the clinical outcomes and complications rate of a large series of knee ligaments reconstruction reinforced with a high-strength suture tape. It was hypothesized that suture tape reinforcement would yield a lower complication rate including a lower graft-rupture rate and favourable patient reported outcome measures.

Patients and Methods

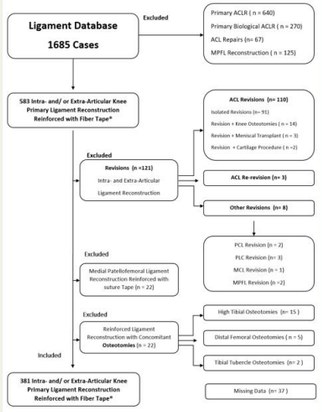

Figure 1: Patient Flow Chart

Intra-articular ligament reconstruction involves independent passing of the suture tape through the proximal fixation button (typically an adjustable loop cortical suspensory fixation device), or passing the suture tape through the proximal fixation loop.

The suture tape is then laid alongside the graft without being directly attached to it and passes freely through the distal fixation device (typically a tibial cortical fixation button with separate orifices to pass the suture tape; TightRope® ABS Button (*Arthrex, Naples, Florida, USA*). Then, the suture tape is independently tensioned and anchored to the bone using a 4.75mm PEEK-SwiveLock® device (*Arthrex, Naples, Florida, USA*).

(Figures 2- 3).

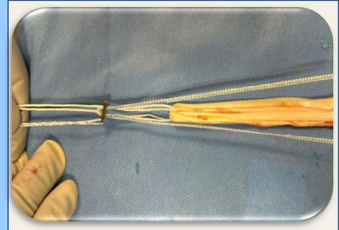

Figure 2: In vitro demonstration of an autograft prepared for anterior cruciate ligament reconstruction reinforced with a high-strength suture tape , which is passed through the button of an adjustable loop cortical suspensory fixation device. Both the graft and the tape will be free on the tibial side to allow independent fixation and tensioning.

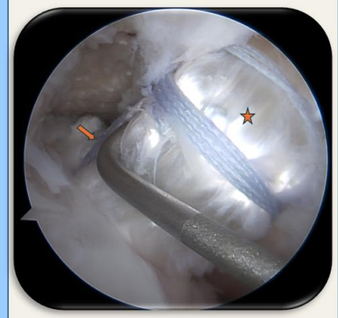

Figure 3: Arthroscopic image of the right knee (intercondylar notch view) showing the reconstructed posterior cruciate ligament (star) reinforced with high-strength suture tape (arrow) and the probing hook in-between.

In extra-articular ligament reconstructions, the graft is stretched and effectively pre-tensioned on a graft preparation station. Then, the suture tape is laid on top of the graft and attached at the two ends over short segment only, such that when tension is removed, the suture tape is slightly slack. This allows the collagen of the graft to load physiologically before additional loading of the suture tape to avoid pathological strain. Extra-articular grafts are typically fixed using PEEK interference screws at both attachment sites.

Results

A total of 381 cases of primary intra-articular and/or extra-articular ligament reconstructions, where one or more ligament was reinforced with high-strength suture tape , were included. The total mean age was 30.5 ± 12.3 years, 64.6% were males and 35.4 % females. The mean follow up for all cases was 8 ± 2.8 years (range 7.7 – 8.3). Patients were allocated into the 3 groups based on the ligament(s) involved: Group I ACL (n = 234) , Group II Multi-ACL (n = 92), Group III Other-Ligament(s) (n = 55). .

Patient Reported Outcome Measures (PROMs)

There was significant clinical improvement across all PROMs from preoperative to the 24 months postoperative mark with continuous significant progressive improvements (All $p < 0.05$) **Figure 4.**

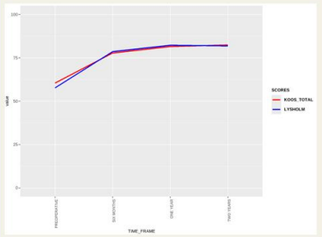

Figure 4: Patient reported outcome measures as assessed by total KOOS and Lysholm scores, preoperatively, and at 6 months, 1 year and 2 years postoperatively.

Complications

Complications were reported in 3.7% (n = 14) of the cases, the total reoperation rate was 3.1% (n = 12) , including 1.3% (n = 5) ACL re-rupture rate. .

Conclusion

Knee ligament reconstruction with high-strength suture tape reinforcement yields a safe graft-suture construct that translates into favourable clinical outcomes for both intra-articular and extra-articular ligament surgery, with a very low complications rate including a low graft rupture rate.

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