

# Tibial Tunnel Widening Following Anterior Cruciate Ligament Reconstruction: A Retrospective 7-Year Study Evaluating the Effects of Initial Graft Tensioning and Graft Selection

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## Introduction

- ▶ Tunnel widening is an accepted phenomenon following anterior cruciate ligament reconstruction (ACL-R)
- ▶ The amount of tension applied to the graft at the time of fixation may exacerbate tunnel widening
- ▶ We hypothesized:
  - ▶ 1) Patients who underwent ACL-R with hamstring (HS) autografts would exhibit more tibial tunnel widening than those with bone-patellar tendon-bone (BTB) autografts
  - ▶ 2) Patients with high-tension autografts would undergo greater tibial tunnel widening than those with low-tension autografts over 7-year follow-up.

## Methods

- ▶ 90 patients undergoing ACL-R with either BTB or HS autograft were randomized into two initial graft tension protocols:
  - ▶ High Tension (over-constrained by 2 mm AP laxity; n=44)
  - ▶ Low Tension (normal tension; n=46)
- ▶ 70 patients had post-surgical data
- ▶ 45 available for review at 7 years
- ▶ Tunnel widening was assessed via AP radiographs at 1, 3, and 7-year follow-up (Figure 1)
- ▶ Patient reported outcomes (Knee Osteoarthritis Outcome Score; SF-36v2) were also compared

Figure 1

AP radiograph demonstrating tunnel measurement (yellow line)

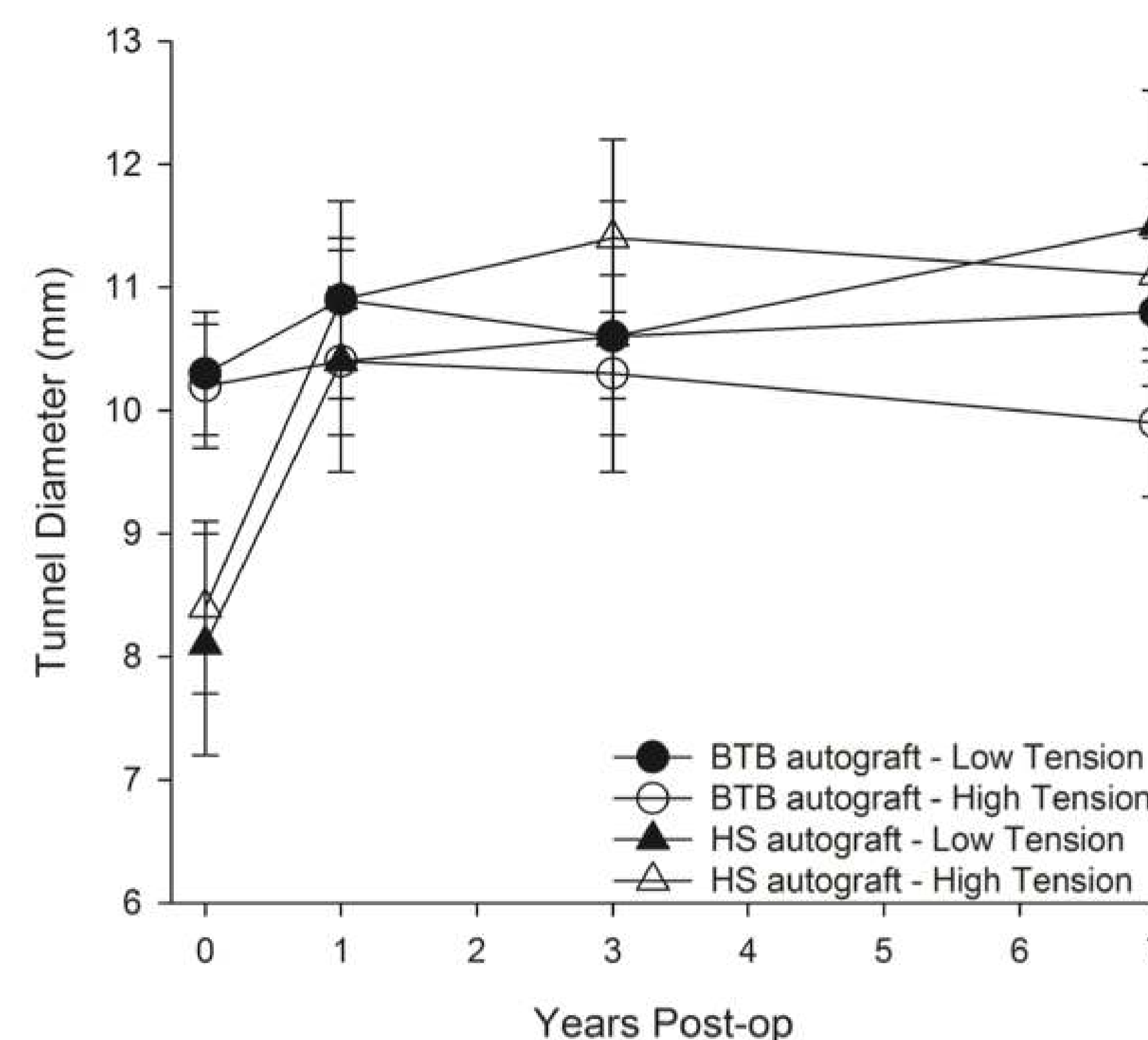


## Results

- ▶ The mean  $\pm$  95% confidence intervals of the initial and final diameters for the BTB autografts were:
  - ▶  $10.3 \pm 0.5$ mm (Low-tension)  $\rightarrow$   $10.8 \pm 0.6$ mm
  - ▶  $10.2 \pm 0.6$ mm (High-tension)  $\rightarrow$   $9.9 \pm 0.6$ mm
- ▶ The initial diameters for HS autografts were:
  - ▶  $8.1 \pm 0.9$ mm (Low-tension)  $\rightarrow$   $11.5 \pm 1.1$ mm (Low-tension)
  - ▶  $8.4 \pm 0.7$ mm (High-tension)  $\rightarrow$   $11.1 \pm 0.9$ mm (Figure 2)

Figure 2

Change in tunnel width over time BTB versus HS



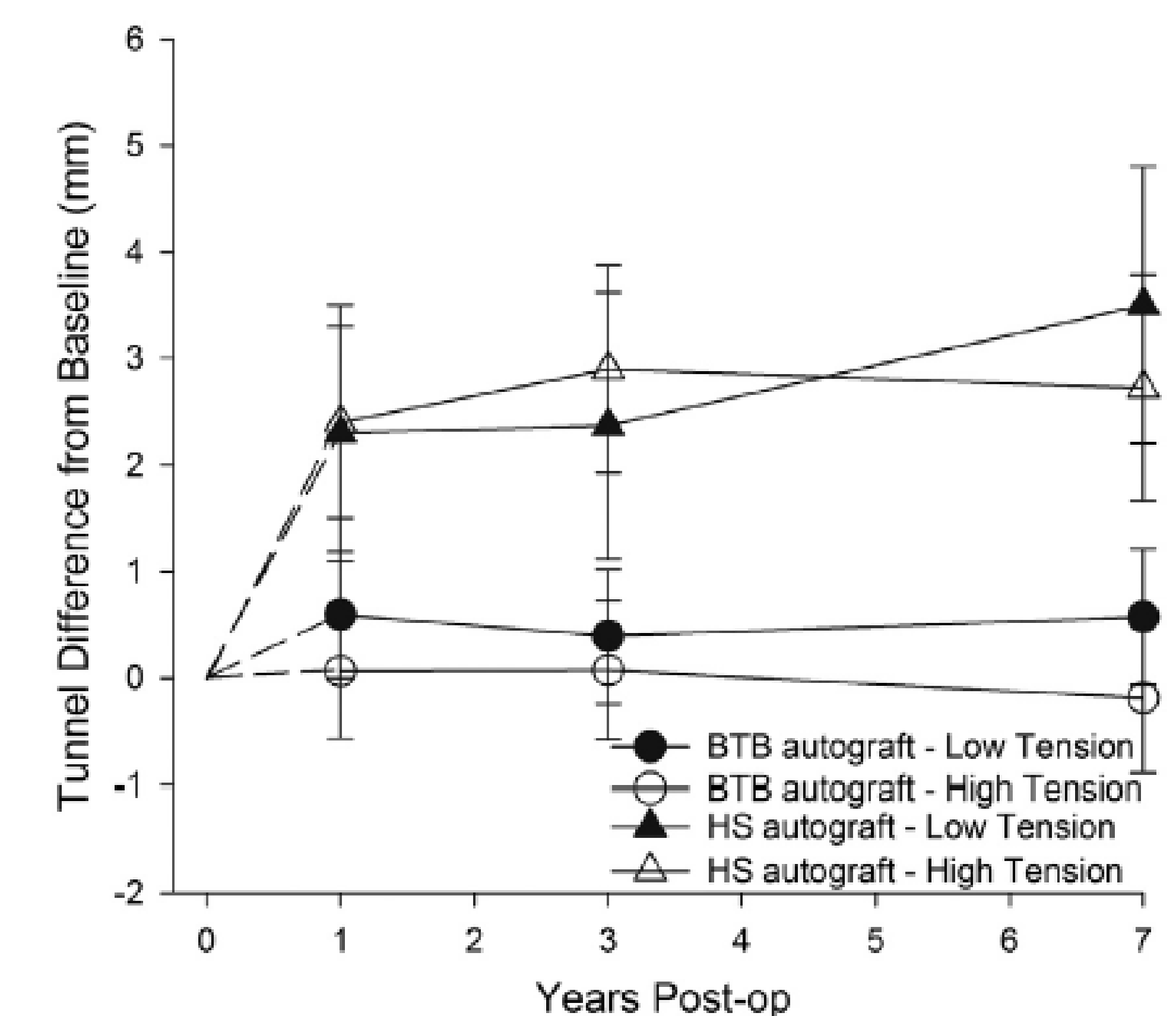
- ▶ For HS autografts, mean tunnel diameters significantly changed over time ( $p < .001$ ); no significant changes were observed in BTB autografts ( $p = .29$ )

- ▶ Within the HS autograft group, tunnel diameters significantly increased in the first year ( $p < .001$ ) increasing 28% and 30% for the low-tension and high-tension groups, respectively.

- ▶ After year one, subjects with HS autografts showed a small but significant width increase ( $p = .029$ ).
- ▶ Change in diameter of the HS autograft group remained significantly greater than the BTB group at all time points for both tension groups ( $p < .05$ ) (Figure 3)
- ▶ No differences in patient reported outcomes were found between tension groups or graft types

Figure 3

Change in tunnel size from baseline over time



## Discussion

- ▶ The most important finding of this study is that **tunnel widening was dictated by graft type, not the initial graft tension applied at the time of fixation**
- ▶ Patients who underwent ACL reconstruction with **HS autograft had significantly more tunnel widening than those with BTB autograft** regardless of the initial graft tension condition
- ▶ Patient reported outcomes were not significantly different between graft types or tension groups at 7 years

## Clinical Relevance

- ▶ Tibial tunnel widening in HS grafts occurs most rapidly in the first post-operative year, and continues up to at least 7 years post surgery