The Effect of Extensor Mechanism Repair on Functional Outcome Following Proximal Tibia Replacement

Rishi Trikha MD, Danielle Greig MD, Troy Sekimura BS, Michael Arnold BS, Alexandra Stavrakis MD, Jeffrey J Eckardt MD, Nicholas M Bernthal MD

University of California, Los Angeles, 10833 Le Conte Ave, Los Angeles, CA 90095

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INTRODUCTION

Proximal tibial replacements (PTRs) are becoming an increasingly common surgical option for patients following bone tumor resection. However, there is debate regarding the optimal method of extensor mechanism repair. This study analyzed modes of failure for PTRs as well as postoperative outcomes based on method of extensor mechanism repair.

Objectives

1. To determine modes of failures for a cohort of patients undergoing PTR.
2. To determine how long after surgery PTRs failed.
3. To determine how extensor mechanism repair affects range of motion postoperatively.

METHODS

93 PTRs performed at a single institution by one of two surgeons were retrospectively reviewed. Demographic, failure, extensor mechanism repair and functional outcome data were analyzed. Extensor mechanism repair was performed either by attaching the patella tendon directly to the prosthesis or by reattaching the patella tendon to a transposed medial gastrocnemius flap. Statistical significance was defined as $p < 0.05$ using a Student's t-test.

Table 1: Proximal Tibia Replacement Failures

Mode of Failure	Time to Failure (Years) (Mean/Median)	Percent of Failures
Soft tissue Failure	7.2/7.5	10.8% (4/37)
Aseptic Loosening	15.8/16.6	32.4% (12/37)
Structural Failure	6.1/4.5	21.6% (8/37)
Infection	10.1/11.8	16.2% (6/37)
Tumor Progression	1.8/0.7	18.9% (7/37)
Total	6.79/5.29	39.8% of all implants (37/93)

Table 2: Functional Outcome After Extension Mechanism Reconstruction

	Patella tendon directly to prosthesis (n = 20)	Patella tendon to gastrocnemius flap (n = 48)	P-value
Age (Years) (Mean/Median)	30.9/26.9	29.3/22.1	0.747
Gender (Male/Female)	60%/40%	54.2%/45.8%	0.567
F/u time (Years) (Mean/Median)	10.2/7.0	8.3/8.2	0.33
Extensor lag at ~1 year? (Y/N)	12/7	11/19	**0.032**
Degrees of extensor lag at ~1 year postop (Mean/Median)	15.8/7.5	11.7/0	0.44
Extensor lag at most recent f/u? (Y/N)	13/6	15/27	**0.043**
Degrees of extensor lag at most recent f/u (Mean/Median)	17.1/10	7.9/0	**0.031**

RESULTS

93 PTRs performed on 70 patients were included. Average age at time of first surgery was 26.2 years (range: 10.7–86.7) and average follow-up time was 10.0 years (range: 0.02–34.1). 37 PTRs (39.8%) failed at an average time of 6.8 years after surgery. 10 out of 12 failures due to aseptic loosening occurred greater than 2 years after the time of surgery. 5 out of 6 failures due to infection occurred greater than 2 years after the time of surgery. 8 other PTRs failed structurally failed, 7 failed due to tumor progression and 4 failed due to soft tissue failure. Patella tendon reattachment directly to the prosthesis resulted in a significantly higher rate of extensor lag at the most recent follow-up (68.4%) as compared patella tendon reattachment to a medial gastrocnemius flap (35.7%, $p = 0.043$).

Conclusion

This study determined that PTR failures due to either aseptic loosening or infection tended to occur late. This study also emphasized that careful consideration regarding the method of extensor mechanism repair should be taken on a case by case basis prior to undergoing PTR.