

Spindle Length Does Not Impact Aseptic and Mechanical Failure Rates in Endoprostheses Using Compressive Osteointegration: A Multi-Institutional Study

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INTRODUCTION:
Endoprosthetic reconstruction can treat significant bone loss secondary to metastatic disease, fracture, and failed arthroplasty. Compressive osteointegration has been shown to have different failure patterns as compared to cemented or pressfit implants. Multiple surgeon-determined options for osseointegration exists, including short (5cm) versus standard (9cm) intramedullary spindle length. To our knowledge, there is no data comparing outcomes between the two configurations. We aimed to determine whether spindle length influenced failure rates through a multi-institutional study.

METHODS:
Patients who underwent reconstruction of the lower extremity with the Compress implant from 2004-2019 at four sarcoma centers in Oregon and California were retrospectively reviewed. Mechanical failure and aseptic loosening rates, as defined by the Henderson classification, were compared between short and standard spindle lengths using regression models.

RESULTS:
In total, 403 compress implants from four institutions were included: 144 with short and 259 with standard spindle lengths. Reconstruction of the proximal femur (93, 23%), distal femur (271, 67%), and proximal tibia (39, 10%) was included. Patients with short spindle reconstruction were more likely to have more primary bone tumors (OR 2.30, 95% CI: 1.47-3.58) and decreased follow up (37.5 vs. 73.9 months; p<0.001). Spindle length was not associated with an increased risk of mechanical failure (OR 1.31, 95% CI:0.52-3.34) or aseptic loosening (OR 0.89, 95% CI:0.30-2.64) overall and among implant location subgroups.

DISCUSSION AND CONCLUSION:
Spindle length was not found to be associated with an increased risk of mechanical or aseptic failure in the largest cohort of endoprostheses utilizing compressive osseointegration.

Table 1. Patient Characteristics and Failure Rate Univariate Regression Analysis Amongst Treatment Groups

Characteristic	Short Spindle N = 144	Standard Spindle N = 259	P-value
Age in Years	36.8 ± 21.6	45.7 ± 22.9	<0.001
Follow Up Time in Months	37.5 ± 35.7	73.9 ± 149.6	<0.001
Gender			
Male	82	143	0.74
Female	62	116	
Location			
Proximal Femur	22	71	<0.001
Distal Femur	92	179	
Proximal Tibia	30	9	
Diagnosis			
Primary Bone Tumor	106	142	0.001
Metastatic Bony Disease	7	19	
Infection	12	54	
Other	19	44	
Radiation	4	38	<0.001
Chemotherapy	82	127	0.11
Aseptic Loosening			
Proximal Femur	0	0	0.96
Distal Femur	4	8	
Proximal Tibia	5	1	
Mechanical Failure			
Proximal Femur	1	1	0.38
Distal Femur	4	6	0.68
Proximal Tibia	1	0	0.58