



The Prognostic Importance of Pathologic Fracture in Limb Salvage Surgery for Osteosarcoma

Danielle Greig MD, Rishi Trikha MD, Erik Geiger MD, Troy Sekimura BS, Erik Geiger MD, Jeffrey J Eckardt MD, Nicholas M Bernthal MD
Department of Orthopaedic Surgery, University of California, Los Angeles

INTRODUCTION

Pathologic fracture (PF) has historically been regarded as a poor prognostic factor in patients with primary bone sarcoma, and is often considered an indication for primary amputation. Current literature is mixed regarding the prognostic importance of PF in patients with osteosarcoma (OGS) who undergo limb salvage surgery, and there is limited literature on the impact of PF on implant survival.

OBJECTIVES

- To determine whether the presence of PF impacts overall survival, the development of distant metastases, or local recurrence (LR) in patients who undergo limb salvage surgery with endoprosthetic reconstruction for OGS
- To determine whether implant survival is affected by the presence of a PF at the time of surgery

METHODS

A retrospective review of 304 consecutive patients who underwent limb salvage surgery with endoprosthetic reconstruction for OGS at UCLA between December 1980 and December 2019 was performed.

Implant failure was defined by revision of stemmed components or amputation.

RESULTS

The average follow-up of surviving patients was 13.0 years (range: 0.2 – 37.7 years).

Table 1: Characteristics and Outcomes Associated with Pathologic Fracture in Osteosarcoma

	Pathologic Fracture (n=17)	No Pathologic Fracture (n=287)	P-Value
Mean Age (yrs)	24.7	22.4	0.52
Sex (M/F)	52.9%/47.0%	57.1%/42.9%	0.73
Tumor Stage (I/II/III)	11.8%/76.5%/11.8%	8.3%/80.2%/11.5%	0.88
High Grade IIA/IIB	11.8% (2)	6.6% (19)	0.33
Mean Tumor Necrosis	74.7%	69.5%	0.46
Incidence of Distant Metastases (n)	35.2% (6)	38.3% (110)	0.80
Incidence of LR (n)	17.6% (3)	9.4% (27)	0.27
Died of Disease (n)	29.4% (5)	31.0% (89)	0.89

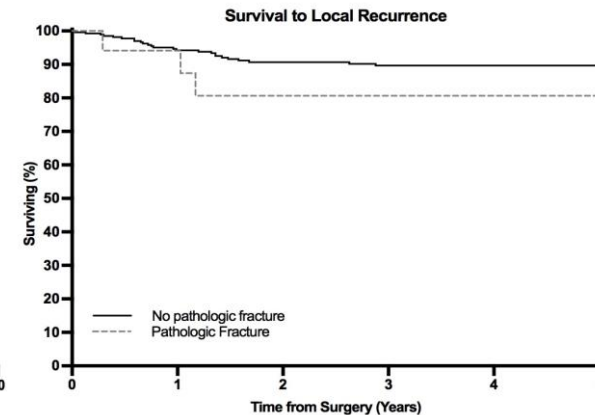
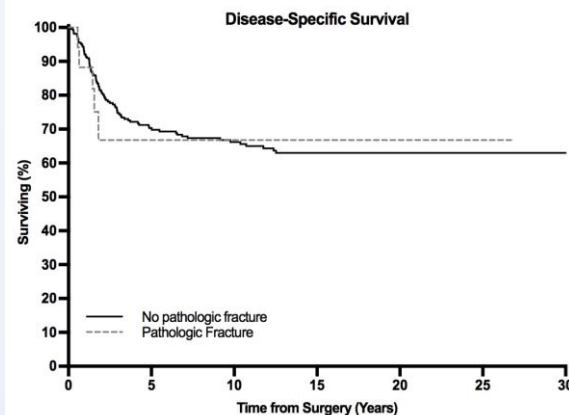
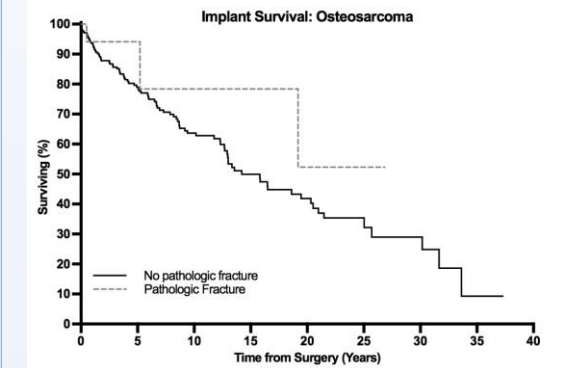


Figure 1A-B: Disease-specific survival following limb salvage surgery for osteosarcoma was similar in patients with a pathologic fracture compared to patients without a pathologic fracture (p=0.80) (Figure 1A), while survival to local recurrence was lower (p=0.25) (Figure 1B).

Table 2: Modes of Implant Failure

	PF (n=17)	No PF (n=287)	P-Value
Soft Tissue	0.0% (0)	0.0% (0)	1
Aseptic Loosening	0.0% (0)	10.8% (31)	0.23
Structural Failure	17.6% (3)	11.8% (34)	0.71
Infection	0.0% (0)	2.1% (6)	1
Tumor Progression	0.0% (0)	8.0% (23)	0.63
Total	17.6% (3)	32.8% (94)	0.28



CONCLUSIONS

- PF in patients with OGS who undergo limb salvage surgery does not significantly impact patient or implant survival, and is not associated with an increased risk of metastasis
- Limb salvage surgery can be performed in patients with PF with excellent long-term survival
- The risk of LR may be higher in the presence of PF, but larger studies are needed to determine the significance of this finding