

## Pathologic Femur Fractures on Call

An Overview an Update

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November 3, 2018  
Kenneth Gundie, MD. | Assistant Professor, Orthopaedic Oncology, OHSU & Portland VA

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## Disclosures

I have no relevant financial disclosures.

But while any gems have come from those kind enough to teach,  
The deficiencies are my own.



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## Take-Away Points

1. Metastatic bone disease is **not** a pre-terminal event
2. If there is pain with every step → Act!
3. In select cases, resection may be curative or otherwise advantageous

*Pathologic Femur fractures are common and manageable, but feel free to reach out if questions*



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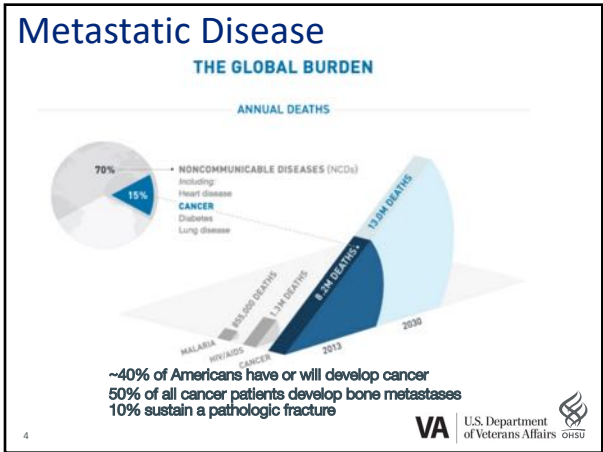
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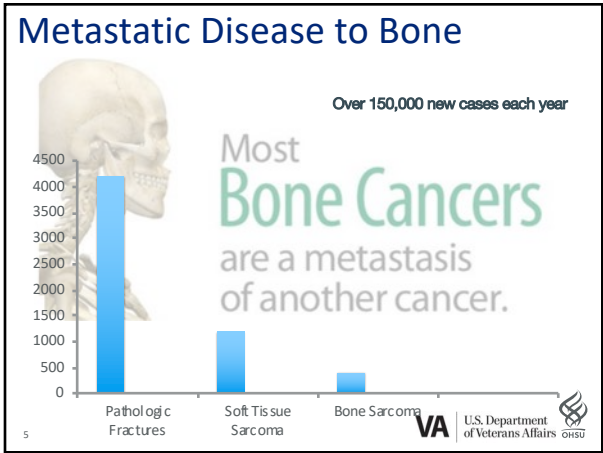
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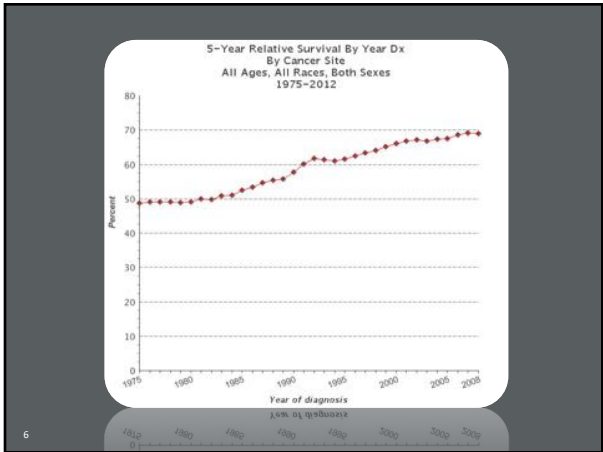
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Median survival of patients with bone mets from breast cancer?   
 24 months; 5-year survival 20%   
 **Bone metastases are not a Pre-terminal event**   
 40 months; 5-year survival 25%   
 *In contrast, patients with liver mets from breast cancer – median survival 3 months*

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A Few Principles of Metastatic Disease Surgical Treatment

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Treatment should allow for immediate function.



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### Plan for Radiation...

- Prostate**
  - Radiosensitive + Blastic
  - 44% Fracture Healing
- Breast**
  - Radiosensitive
  - 37% Fracture Healing
- Lung**
  - Radioresistant
  - 0% Fracture Healing

**But don't plan on Union**

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### Fracture Fixation: Nonmetastatic vs Metastatic

Bone Heals,  
Or Hardware  
Breaks

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Hardware Breaks,  
Or patient succumbs

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### What next?



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Scenario:  
no known malignancy



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Scenario:  
prior malignancy  
(eg., melanoma), no  
evidence of disease prior to  
the fracture



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Scenario: current  
prostate cancer,  
no known metastatic  
disease to bone

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Scenario:  
lung cancer,  
biopsy-proven widespread  
metastatic disease to bone



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**Bottom Line**

Ask yourself what the consequence will be if the pathology comes back as a sarcoma.

If patient has curable disease or the possibility of prolonged survival, you need to know the pathology.

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*So how do we avoid fractures in metastatic bone disease?*

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**TABLE 1. Mirels' Rating System for Prediction of Pathologic Fracture Risk**


Score	Site	Nature	Size <sup>1</sup>	Pain
1	Upper extremity	Blastic	<1/3	Mild
2	Lower extremity*	Mixed**	1/3-2/3	Moderate
3	Peritrochanteric	Lytic	>2/3	Functional

A score > 8 points indicates a high fracture risk, and need for consideration of prophylactic fixation

But it is **not** reliable between orthopaedic surgeons or even orthopaedic oncologists!  
(Bone Joint J 2018;100-B:1100-5.)

**Weight-bearing pain, also known as pain with every step = High risk for pathologic fracture!**




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*Prophylactic stabilization is...*

- A faster recovery
- Less painful
- More predictable
- Less expensive
- PMID: 27020430

*... than fixing pathologic fractures*




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*Prophylactic stabilization is...*

Maybe associated with improved survival?

**Prophylactic Stabilization Of Metastatic Femoral Lesions Has A Survival Benefit Compared To Pathologic Femur Fracture Fixation**

Travis Philipp MD, Jacob Mikula BS, Yee Doung MD, James Hayden MD PhD, Kenneth Gundie MD

October, 11, 2018 | MSTR Annual Meeting, NYC | PRESENTED BY Travis Philipp, MD

*... than fixing pathologic fractures*




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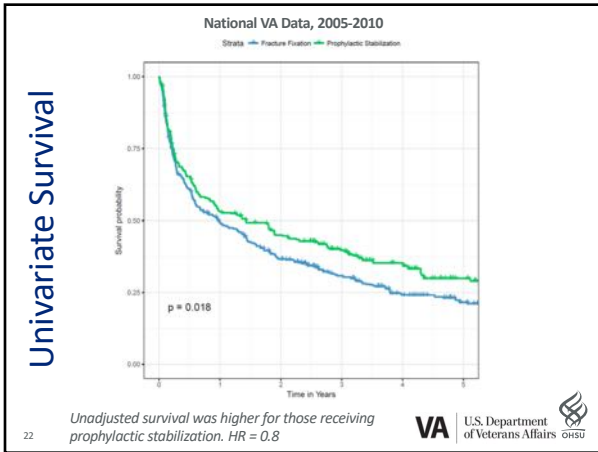
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Proportional Hazards Models

Variable	Hazard Ratio	P Value
<b>Treatment of Metastatic Lesion</b>		
Prophylactic Stabilization	<b>0.75</b>	0.002
Pathologic Fracture Fixation	Ref	
<b>Gagne Comorbidity Score</b>		
	4.0	<0.001
<b>Site</b>		
Hematologic	Ref	
Kidney	3.0	<0.001
Liver	6.6	<0.001
Lung	4.2	<0.001
Prostate	1.8	<0.001

Improved survival persisted when adjusted for comorbidity and primary cancer diagnosis.

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**Own the Bone!**

*After surgery if not before...*

1. Bone strengthening agent
2. Referral for Radiation

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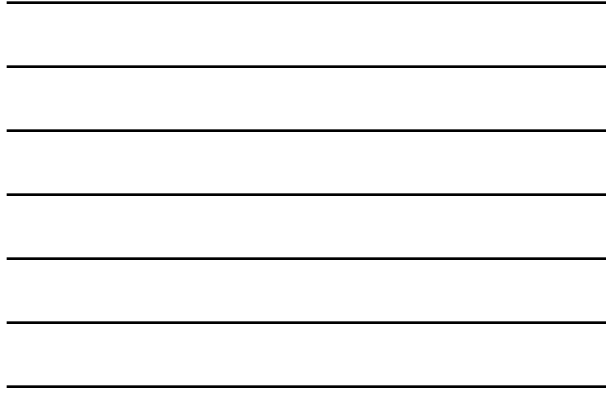
### Own the Bone!

**Patterns of Radiation Referral After Femoral Stabilization in Metastatic Disease**  
 Andrew R Summers BS, Travis Philipp MD, David Putnam MD, Phillip Lam BS, Kenneth Gundie MD

**National VA Data, 2005-2010**

Patients with completed pathologic fractures were less likely to be referred than those stabilized prophylactically, though rates in both groups were high (73 vs 80%, p=0.02).

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*What about arthroplasty for proximal femur metastatic disease?*



Contents full available at [onlinelibrary.wiley.com/doi/10.1002/jor.23679](http://onlinelibrary.wiley.com/doi/10.1002/jor.23679)

**The Journal of Arthroplasty**  
[www.arthroplastyjournal.org](http://www.arthroplastyjournal.org)

Review  
**Treatment Modalities for Pathologic Fractures of the Proximal Femur: Peritrochanteric Region: A Systematic Review and Meta-Analysis of Reoperation Rates**  
 David S. Putnam, MD<sup>1,2</sup>, Travis C. Philipp, MD<sup>1,2</sup>, Phillip W. Li, Kenneth R. Gundie, MD<sup>1,2</sup>

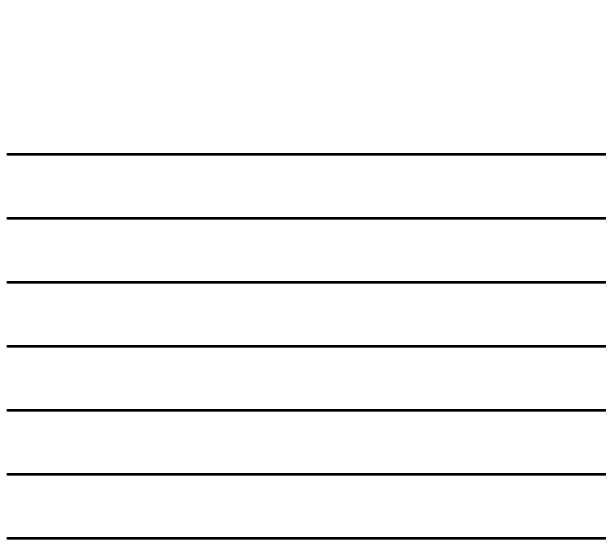
**Figure 1: Pooled reoperation rate for intramedullary nailing**

Study	Num. Reoperations	Total n	Proportion	95% CI	Weights
Yu-2016	2	55	0.04	(0.01, 0.12)	7.8%
Guo-2016	1	55	0.02	(0.00, 0.11)	7.8%
Li-2017	0	84	0.00	(0.00, 0.19)	11.3%
Houdek-2017	0	10	0.00	(0.00, 0.46)	0.5%
Putnam-2017	0	80	0.00	(0.00, 0.11)	0.5%
Taylor-2016	1	12	0.08	(0.01, 0.17)	6.9%
Choi-2015	1	12	0.08	(0.01, 0.17)	6.9%
Fisher-2015	4	42	0.10	(0.04, 0.20)	3.4%
Harvey-2013	12	46	0.26	(0.15, 0.41)	13.3%
Wardlaw-2012	12	82	0.15	(0.08, 0.24)	17.2%
Zachari-2011	3	33	0.09	(0.03, 0.22)	6.3%
Hallam-2009	0	6	0.00	(0.00, 0.39)	1.7%
Wang-2008	0	24	0.00	(0.00, 0.20)	3.1%
Wash-2005	0	12	0.00	(0.00, 0.42)	0.2%
Assal-2000	-	-	-	-	0.0%

**Figure 2: Pooled reoperation rate for patients treated with endoprosthesis reconstruction**

Study	Num. Reoperations	Total n	Proportion	95% CI	Weights
Yu-2016	0	54	0.00	(0.00, 0.17)	8.6%
Guo-2016	0	54	0.00	(0.00, 0.17)	8.6%
Li-2017	0	85	0.00	(0.00, 0.20)	12.3%
Houdek-2017	0	10	0.00	(0.00, 0.36)	0.6%
Putnam-2017	0	80	0.00	(0.00, 0.16)	0.6%
Taylor-2016	0	12	0.00	(0.00, 0.47)	0.3%
Choi-2015	0	12	0.00	(0.00, 0.47)	0.3%
Fisher-2015	0	42	0.00	(0.00, 0.20)	1.4%
Harvey-2013	14	113	0.12	(0.07, 0.20)	14.5%
Wardlaw-2012	4	107	0.04	(0.01, 0.10)	13.0%
Zachari-2011	4	15	0.27	(0.12, 0.50)	8.8%
Hallam-2009	0	6	0.00	(0.00, 0.39)	1.7%
Wang-2008	0	24	0.00	(0.00, 0.19)	3.1%
Wash-2005	0	12	0.00	(0.00, 0.39)	0.2%
Assal-2000	-	-	-	-	0.0%

*Reoperations rate about the same.*



**Bottom Line**

If it is a fracture you'd treat with arthroplasty, do (cemented) arthroplasty.

In the peritrochanteric area, there are advantages and disadvantages to each.

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**When should negative-margin resection be considered?**

Renal cell carcinoma with late (>12 months) solitary bone met – ~30% cure  
 PMID: 20598157, 17671020, 10697316

Possibly similar approach in isolated/oligometastatic breast (PMID 24803881),  
 case reports in lung cancer (PMID 16401990).

*Is this the future of treatment responsive metastases?*

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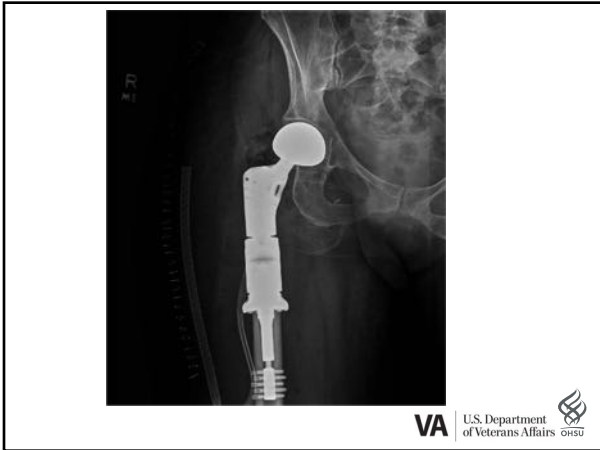
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### Take-Away Points

1. Metastatic bone disease is **not** a pre-terminal event
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*Pathologic Femur fractures are common and manageable, but feel free to reach out if questions*

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## Questions/Discussion



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