

Elderly Orthopaedic Trauma

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Objectives

- Review the etiology and problems in the elderly fracture patient
- Brief review of current thinking on Vitamin D
- Case presentation and patient interview

Causes of Elderly Fractures

- Decreased Bone Quality
- Decreased: Flexibility / Muscle Strength / Balance / Vision / Hearing etc
- Low energy falls
- Preserved Active Lifestyles



Spectrum of Trauma Energy in the Elderly

High energy

- Normal bone
- Osteoporosis



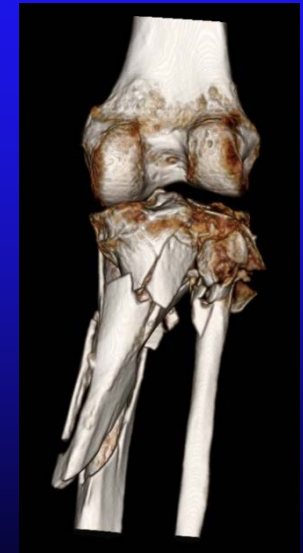
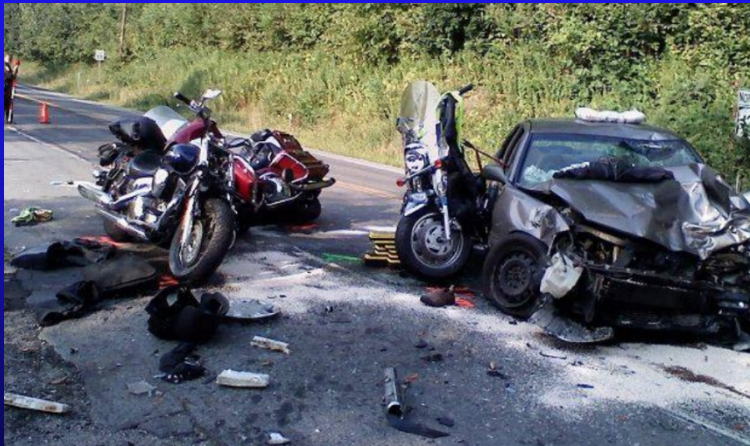
Low energy

- Osteoporosis



Problems in Elderly Fractures

- Osteoporosis – difficult reconstruction
- Multiple Medical Co-morbidities
- Previous Total Joint Replacements
- Limited Resources / Caretakers
- Healthcare System Problems (\$\$)



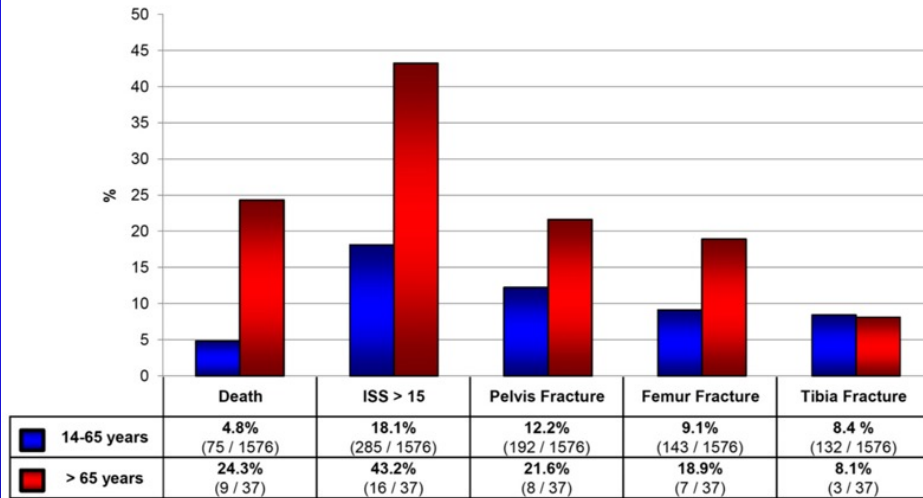
CURRENT CONCEPTS REVIEW

High-Energy Skeletal Trauma in the Elderly

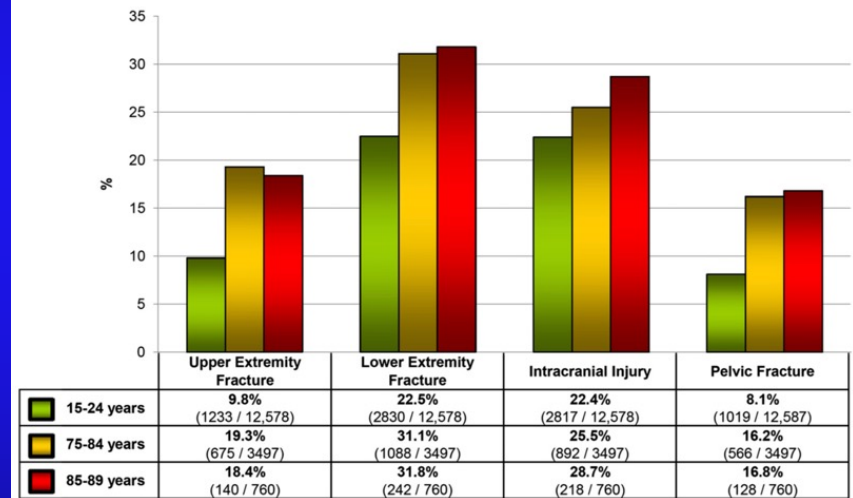
Julie A. Switzer, MD, and Steven R. Gammon, MD

JBJS 2012

High-Level Falls:
Mortality, >15 ISS and Incidence of Fractures According to Age Group



Pedestrian Trauma Injuries with Significantly Higher Rates in Older Compared to Younger Individuals

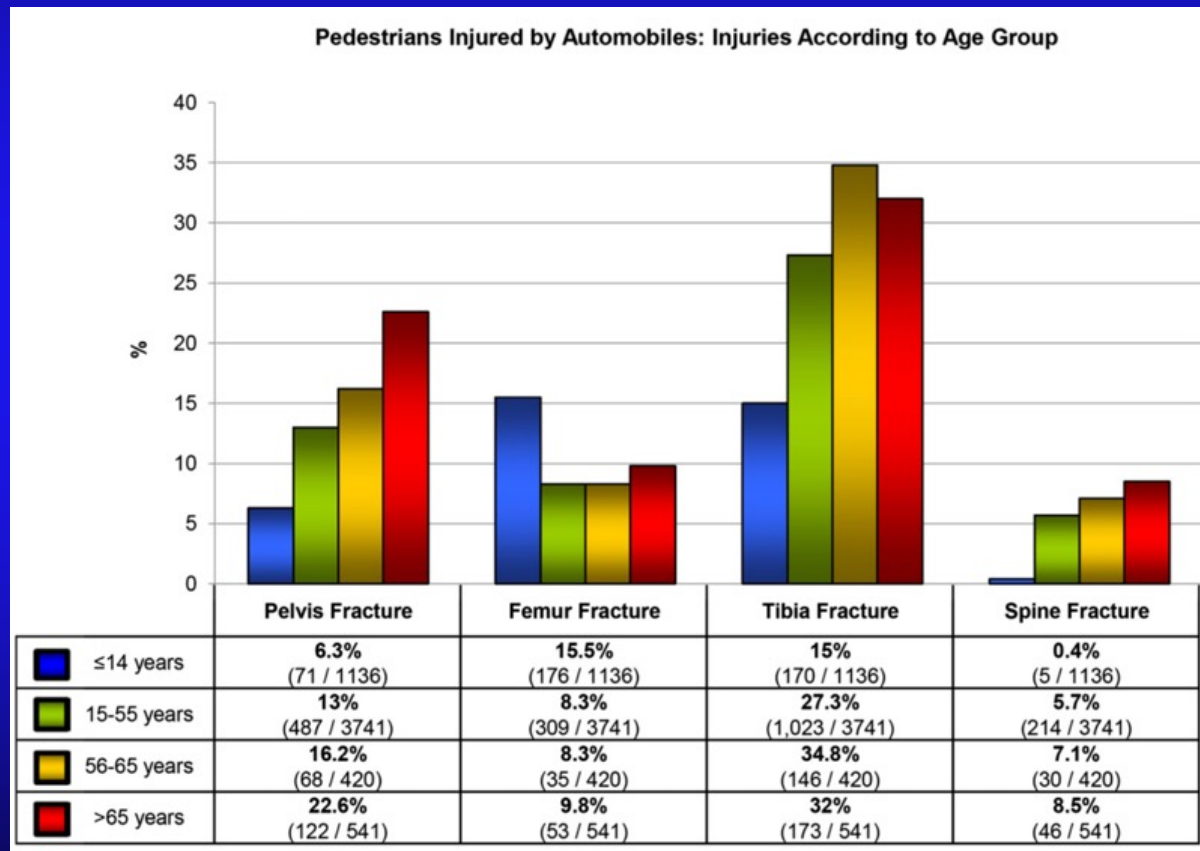


CURRENT CONCEPTS REVIEW

High-Energy Skeletal Trauma in the Elderly

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CURRENT CONCEPTS REVIEW

High-Energy Skeletal Trauma in the Elderly

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JBJS 2012

Despite the increasing prevalence of high-energy skeletal trauma in the elderly (i.e., sixty years or older), there is a **lack of prospective data regarding best care for these injuries.**

Elderly patients with multiple injuries are often **under triaged** to trauma centers and **under resuscitated.**

Aggressive early resuscitation can improve outcomes in elderly patients who have sustained skeletal trauma.

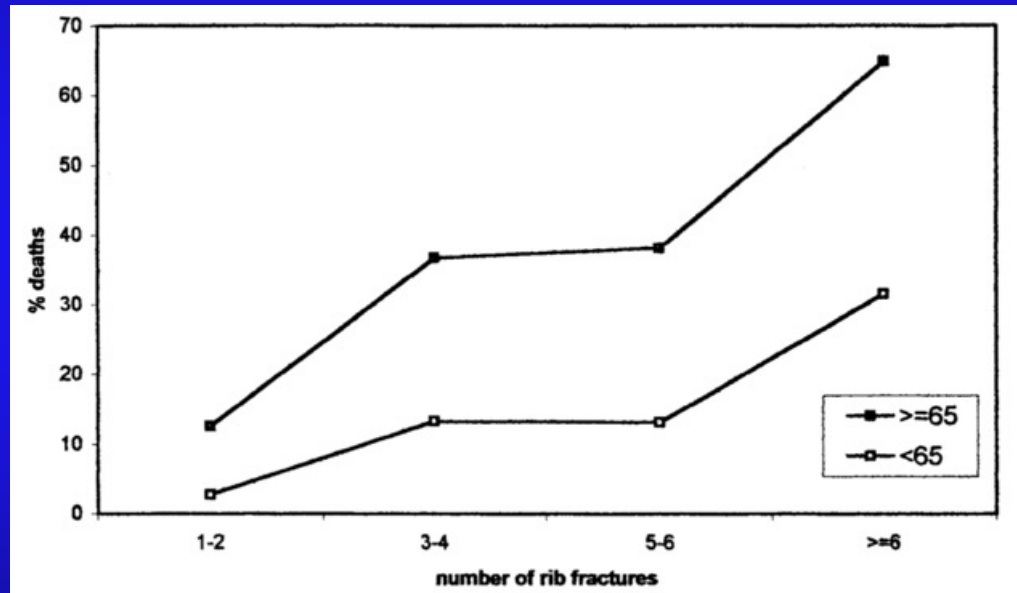
Co-management by orthopaedic surgeons and geriatricians of elderly patients with skeletal trauma can lead to a lower length of hospital stay, lower readmission rates, shorter time to operation, lower complication rates, and lower mortality.

Elderly Trauma Patients with Rib Fractures Are at Greater Risk of Death and Pneumonia

Eric Bergeron, MD, Andre Lavoie, PhD, David Clas, MD, Lynne Moore, MSc, Sebastien Ratte, MD, Stephane Tetreault, MD, Jacques Lemaire, PhD, and Marcel Martin, MD

J Trauma.2003;54:478–485

7 years: 4325 blunt trauma patients



After adjusting for ISS and co-morbidity

Patients > 65 with rib fractures: 4x increased odds of dying

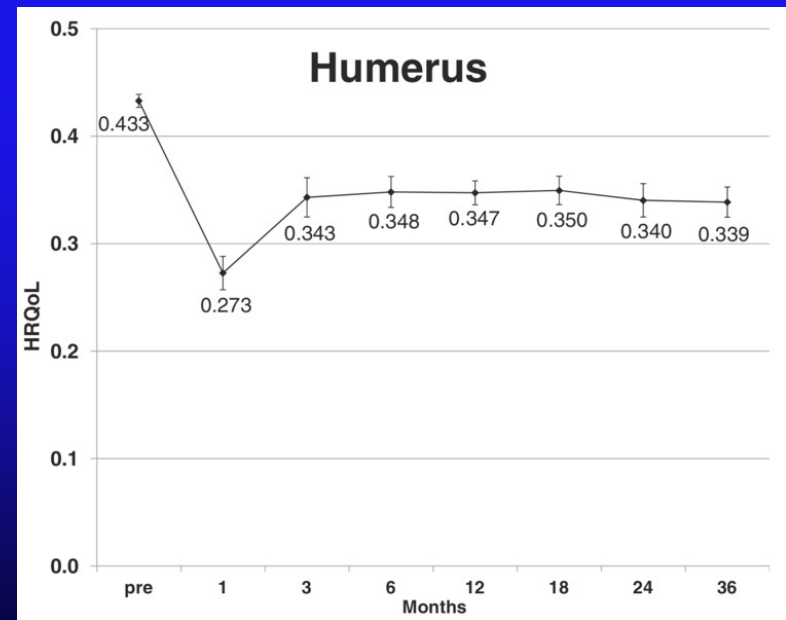
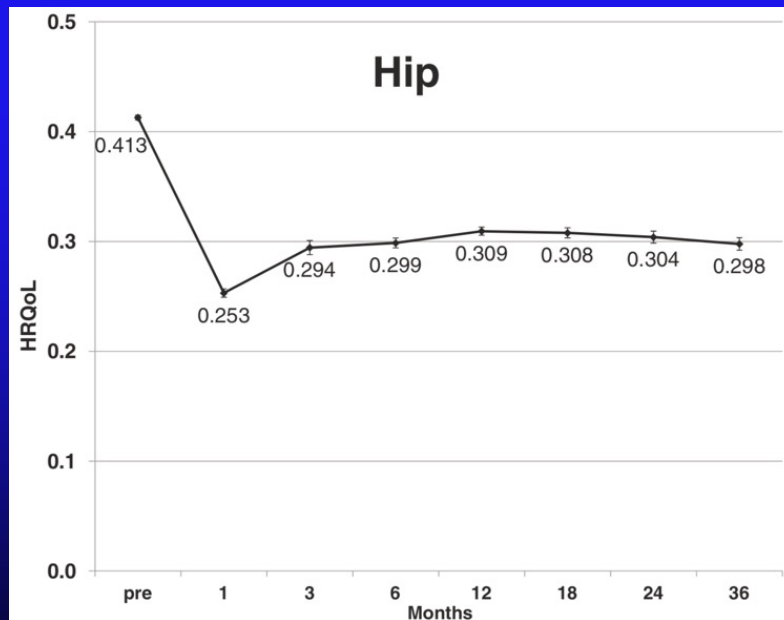
Elderly patients with rib fractures - special attention

Loss of health related quality of life following low-trauma fractures in the elderly

Jean-Eric Tarride^{1,2*}, Natasha Burke^{1,2}, William D. Leslie³, Suzanne N. Morin⁴, Jonathan D. Adachi⁵, Alexandra Papaioannou^{2,5}, Louis Bessette⁶, Jacques P. Brown⁶, Louisa Pericleous⁷, Sergei Muratov^{1,2} and Robert B. Hopkins^{1,2}

BMC Geriatrics(2016) 16:84

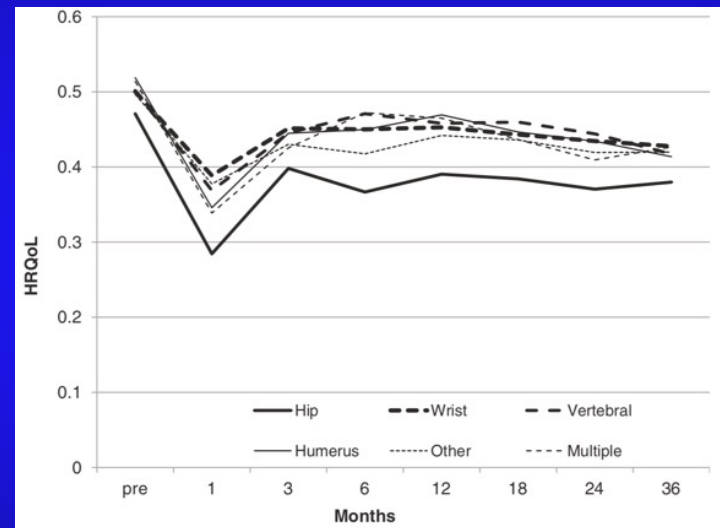
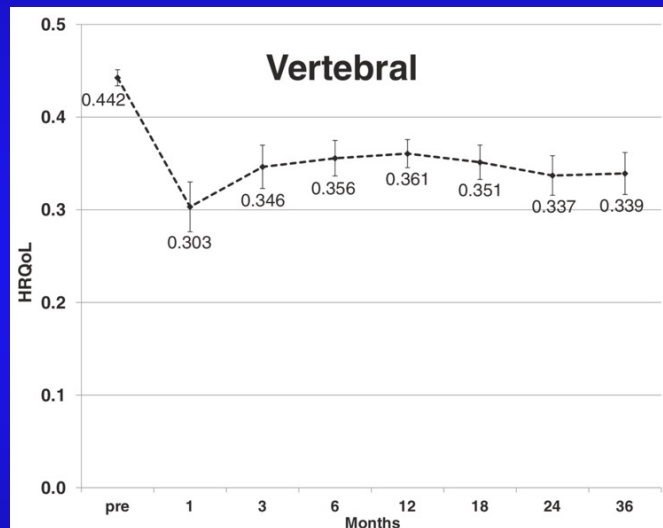
Canada: 23,655 pts with pre and post injury HRQoL
2007 – 2011: 3 year follow up



Loss of health related quality of life following low-trauma fractures in the elderly

Jean-Eric Tarride^{1,2*}, Natasha Burke^{1,2}, William D. Leslie³, Suzanne N. Morin⁴, Jonathan D. Adachi⁵, Alexandra Papaioannou^{2,5}, Louis Bessette⁶, Jacques P. Brown⁶, Louisa Pericleous⁷, Sergei Muratov^{1,2} and Robert B. Hopkins^{1,2}

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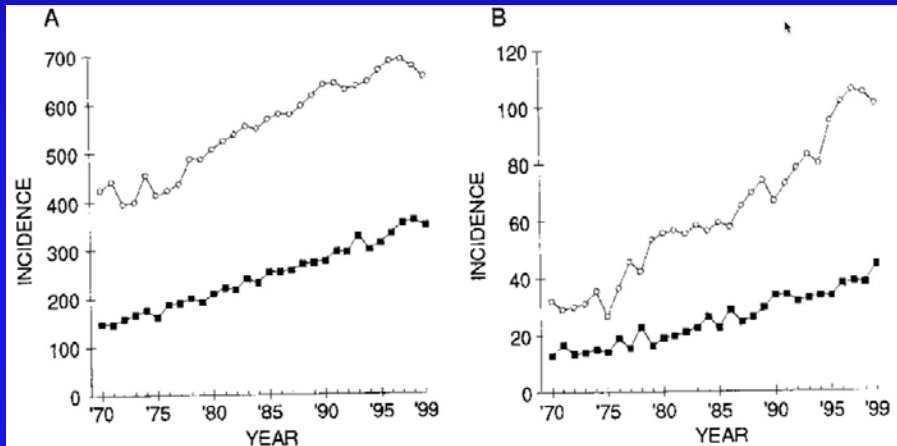


Among patients living in LTC or Home care situations:
Fractures – even low energy have a significant QoL impact for years after the injury

Why Is the Age-Standardized Incidence of Low-Trauma Fractures Rising in Many Elderly Populations?

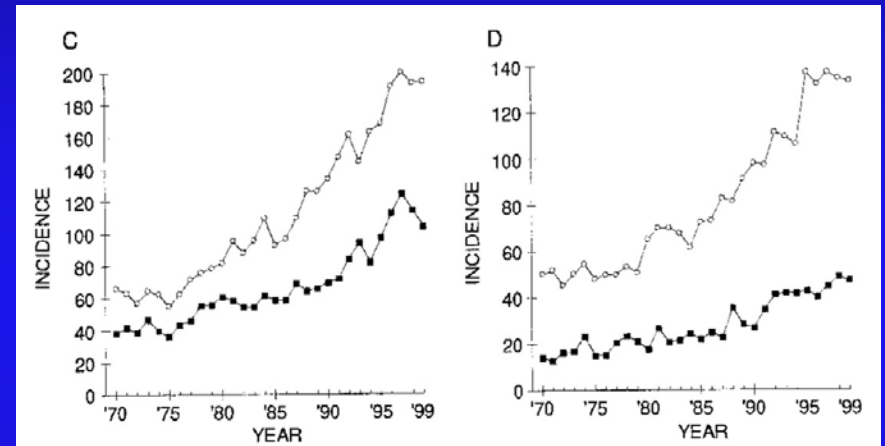
PEKKA KANNUS,^{1,2} SEPPÖ NIEMI,¹ JARI PARKKARI,¹ MIKA PALVANEN,¹ ARI HEINONEN,¹
HARRI SIEVÄNEN,¹ TEPPÖ JÄRVINEN,² KARIM KHAN,³ and MARKKU JÄRVINEN²

JOURNAL OF BONE AND MINERAL RESEARCH
Volume 17, Number 8, 2002



Hip

Pelvis



Ankle

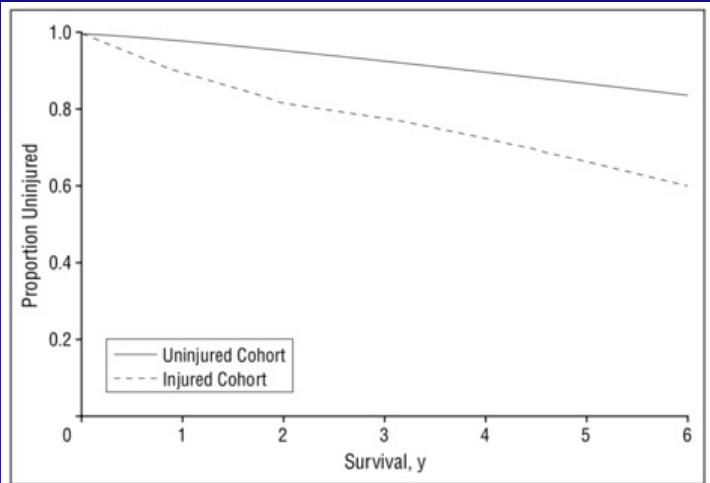
Prox Hum

Two possibilities:

- Age adjusted fall in bone density over time
- Real increase in the incidence of falls over time

Recurrent Trauma in Elderly Patients

Gerald McGwin, Jr, MS, PhD; Addison K. May, MD; Sherry M. Melton, MD;
Donald A. Reiff, MD; Loring W. Rue III, MD



Risk of trauma-related hospitalization among previously injured and

Table 3. Crude and Adjusted RRs and 95% CIs for Injury-Related Hospitalization Among the Injured and Uninjured Cohorts*

Cohort	Injury Rate per 1000 Person-years	RR (95% CI)	
		Unadjusted	Adjusted†
Uninjured	25.27	Reference	Reference
Injured	79.22	3.13 (1.95-5.02)	3.25 (1.99-5.31)

Patients > 70 years of age or older in 1985

100 injured and 400 matched un-injured patients

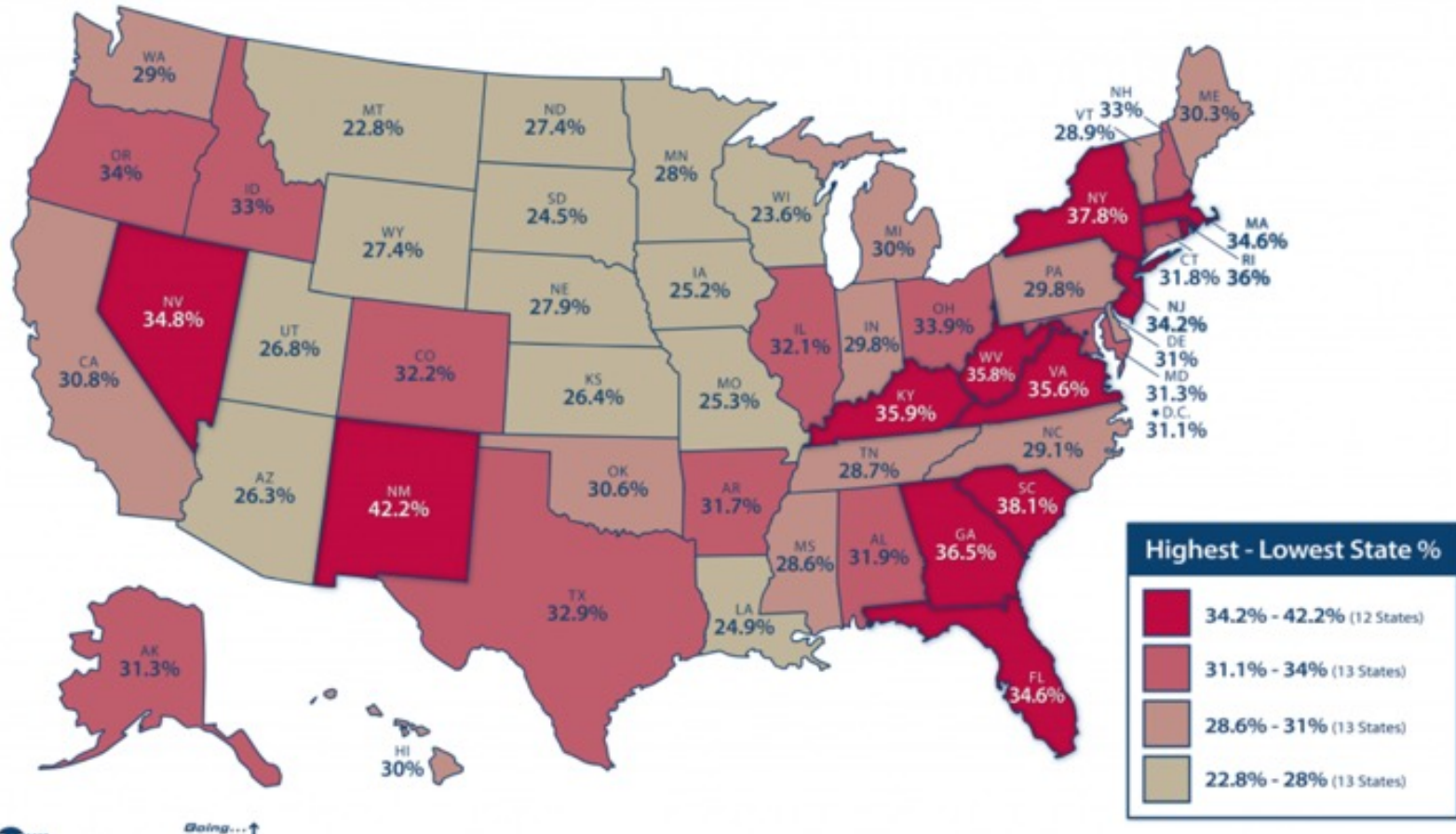
Followed for 6 years - injured cohort 3.25 times as likely to be re-injured compared to the un-injured cohort

Trauma is a recurrent disease

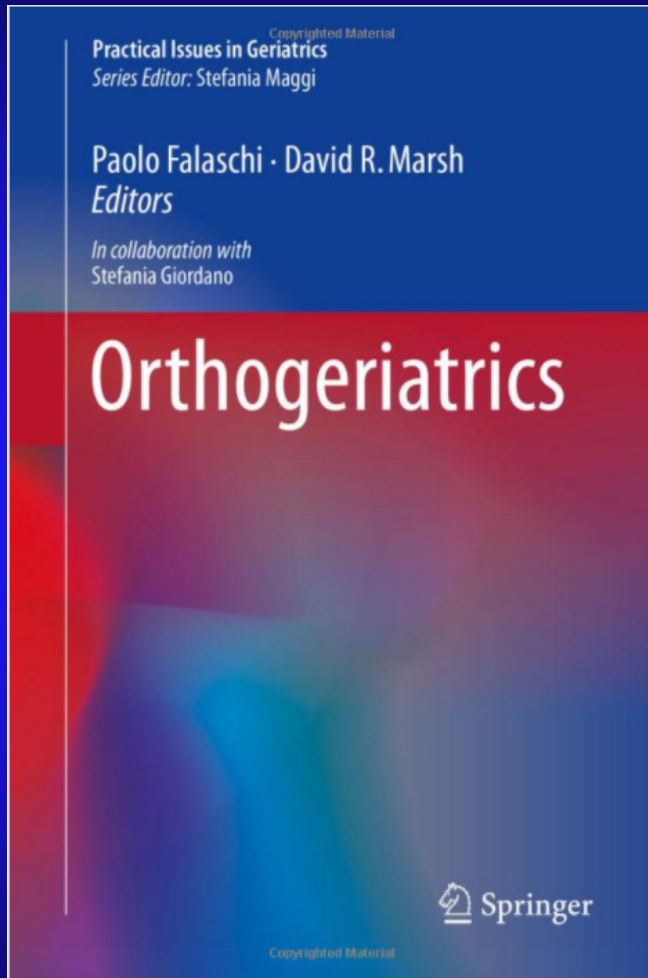
Ongoing risk factors – incomplete rehabilitation

Falls in the US

Percentage Of Adults Aged **65+** Who Have Fallen And Sustained An Injury

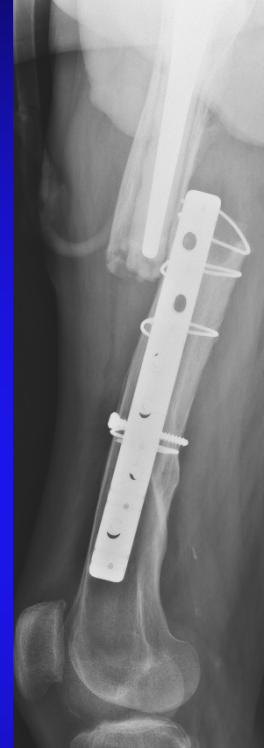


Fractures in the Elderly

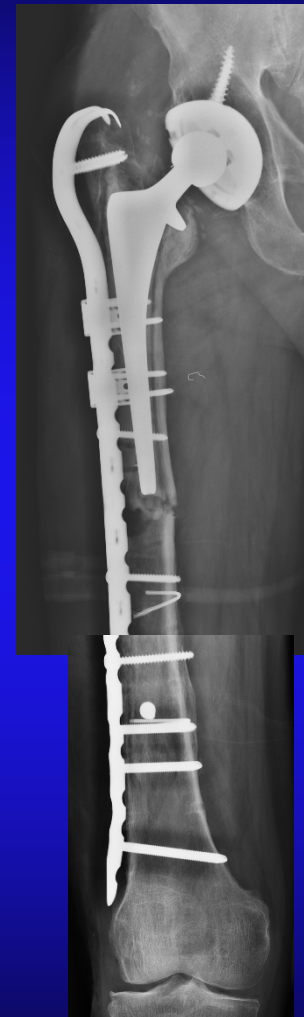
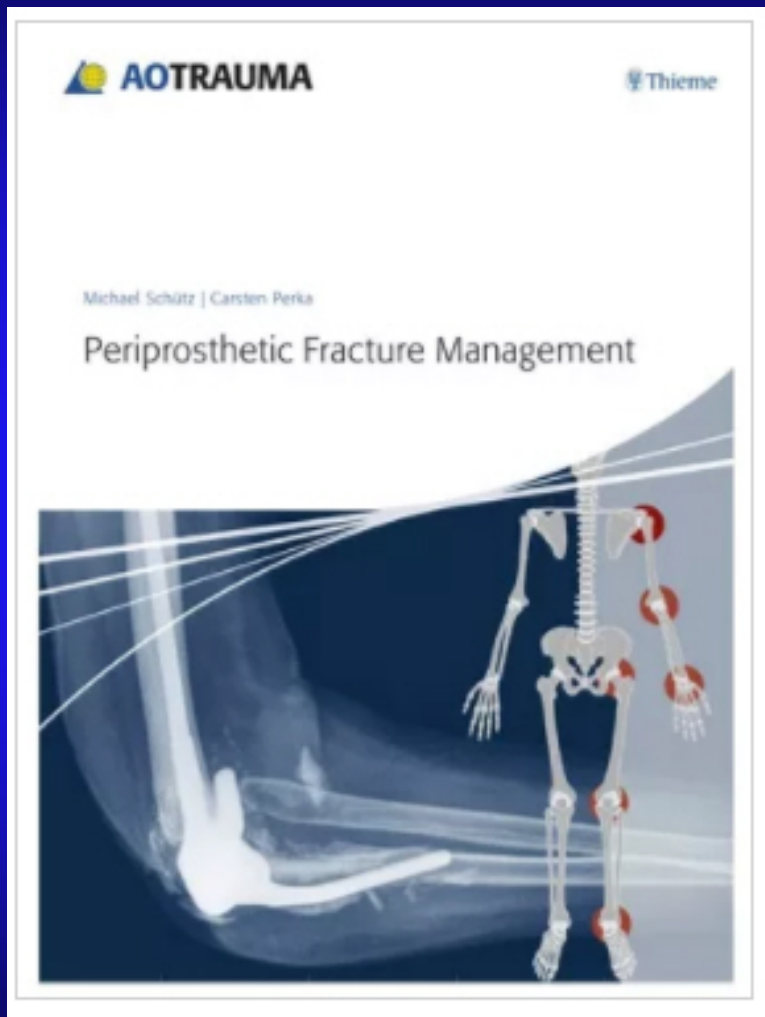


Recognition of coming epidemic
Tremendous interest
Prevention / Treatment
Educate other physicians
Sub-specialization in orthopedics

Periprosthetic Fractures



Periprosthetic Fractures



Vitamin D

- Fat Soluble
- D₃ cholecalciferol D₂ ergocalciferol
- Three step synthesis:
 - skin (UVB) radiation
 - liver
 - kidney

Vitamin D

Functions in the body:

- Calcium uptake in the intestinal tract
- Bone metabolism
- Immune system
- Muscle function
- Central nervous system
- *Possible* effect on cancer risk
- Others

Vitamin D

Normal levels: 32 – 100 ng/ml

Incidence of deficiency in our clinics ~ 50 to 75%

Most at risk:

Obese, dark skinned, gastric bypass, renal disease

We define serum levels:

20-32 ng/ml	mild deficiency
10-20 ng/ml	moderate deficiency
< 10 ng/ml	severe deficiency

Why the Epidemic?

- Sun avoidance
- Widespread use of sunscreens (UVB)
- Not plentiful in most foods (Salmon)
- Increase in obesity
- Optimal human levels only recently appreciated
- Widespread measurement only recent

Vitamin D

Dosing recommendations

- High dose if severe deficiency (prescription)
- 50,000 IU 1-3x/week x 8 weeks then
- Over the counter vitamin D₃
- 1000 to 2000 IU / day – completely safe
- Up to 5000 IU / day may be safe
- Target serum values 30– 45 ng/ml

Vitamin D

- Fundamental function of the active metabolites is the intestinal absorption of calcium and in the process – bone mineralization.
- First controlled clinical trial of vitamin D supplementation the incidence of fracture fell after several months...
long before any change in bone density could occur

What is going on here?

Vitamin D

Osteoporosis International 2015

“Beneficial Effects of Vitamin D on Falls and Fractures: Is Cognition rather than Bone or Muscles behind these Benefits”

- Vitamin D is a neurohormone with multiple effects in the central nervous system
- Vitamin D receptors identified in the brain
- Improved cognition and coordination and balance may allow a patient to avert a fall which prevents the fracture
- Bone density improves as well but may actually be a secondary effect

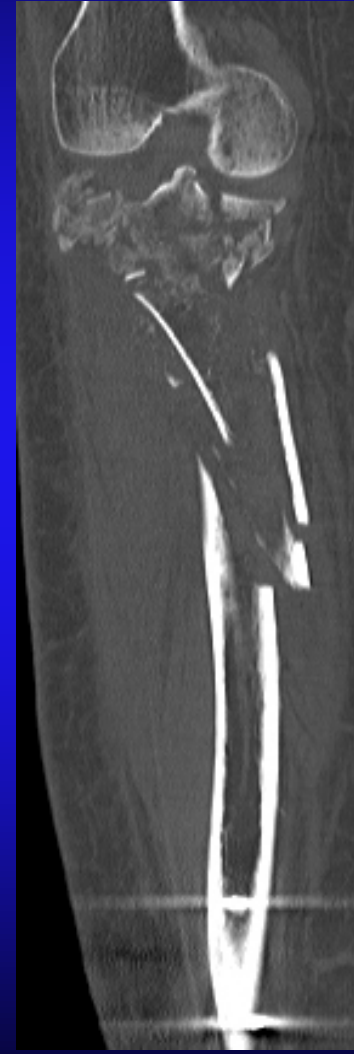
Questions?

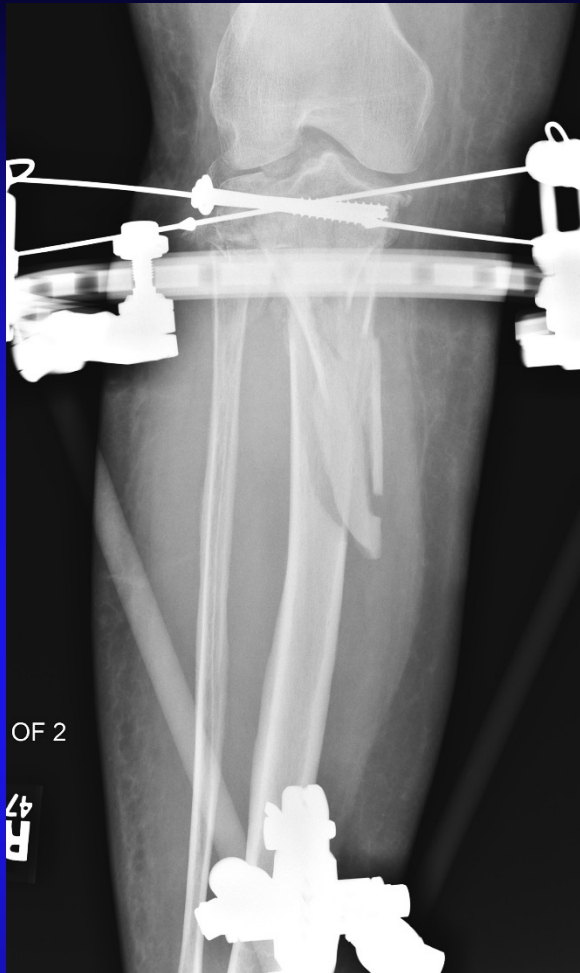
On to our patient

Donna Mountfort

- 72 yo retired school teacher
- Previously healthy – former smoker
- Visiting South Carolina
- Struck by a car crossing the street
- Sustained severe injuries to both proximal tibia's (just below knee)
- Originally treated at the University of South Carolina and referred to Penn State for rehabilitation and discussion of further surgery
- Vitamin D level 13 ng/ml on admission

Donna Mountfort – R Knee







Left Knee



Left Knee



Dec 3, 2015

Right Knee

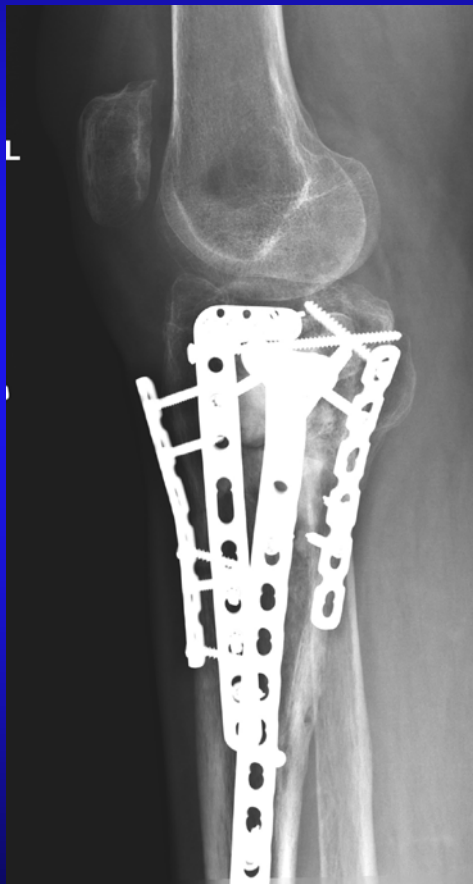
Dec 22, 2015

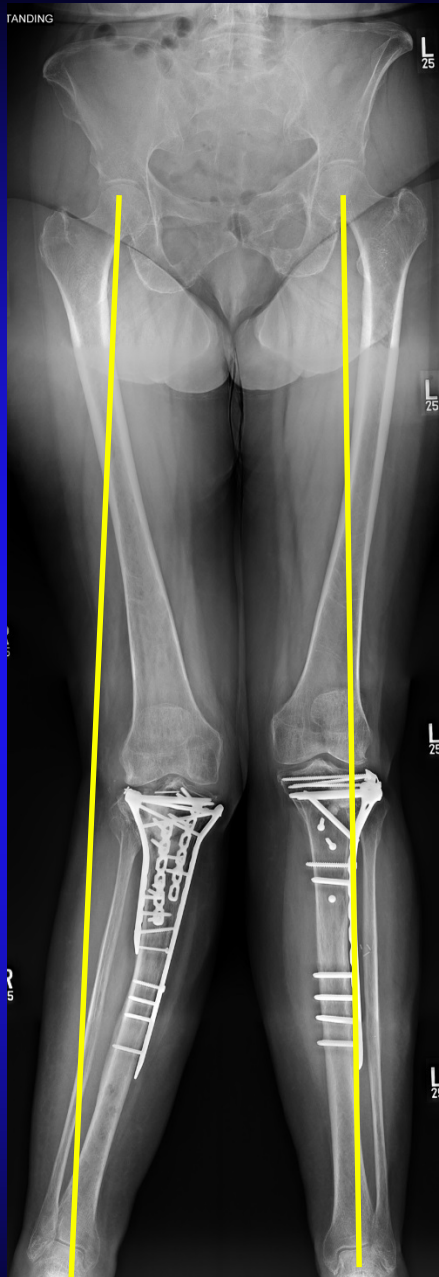


Post Op

Right

Left

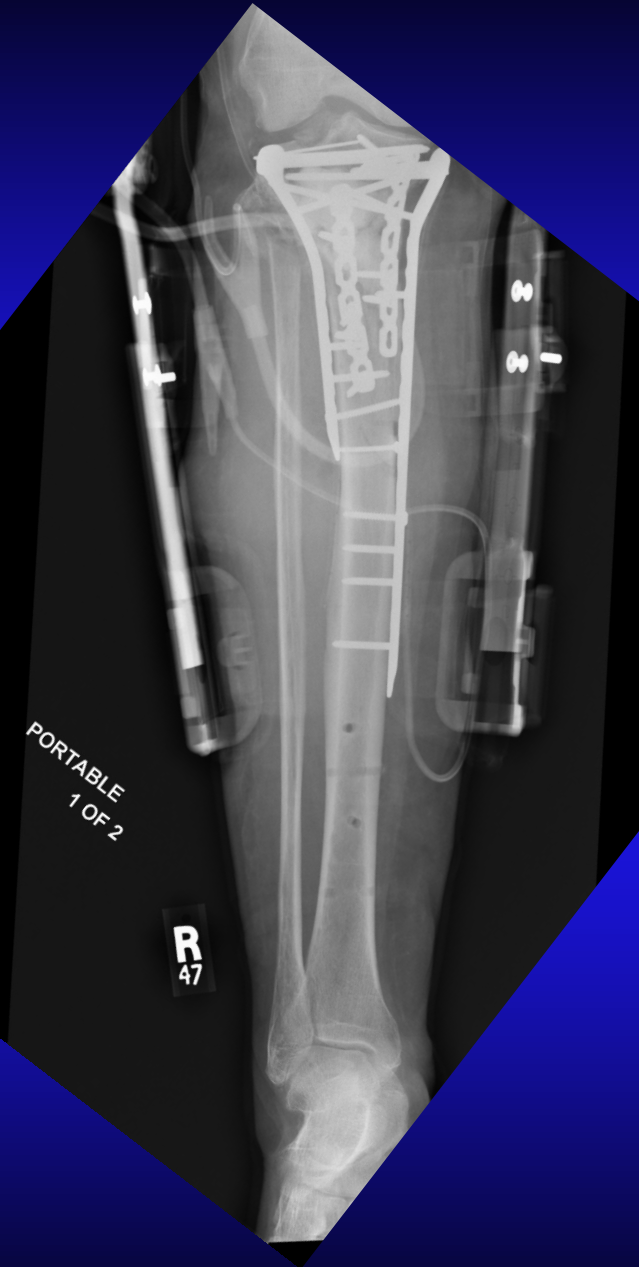




Lets try a brace!

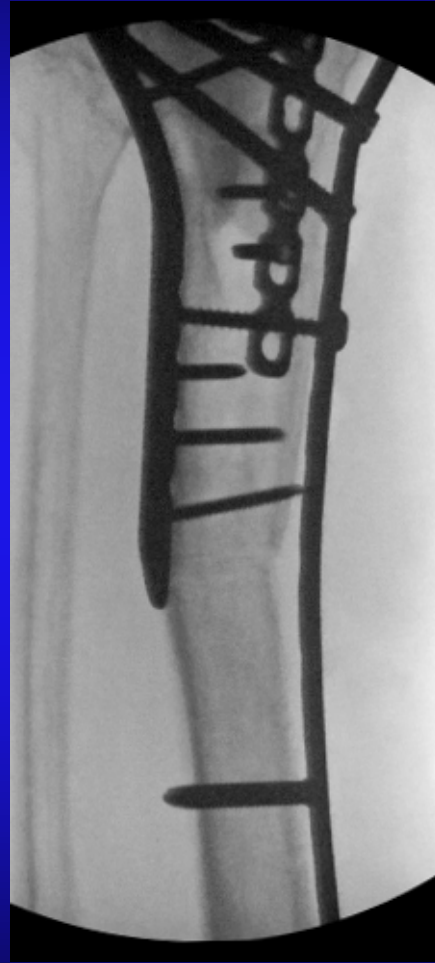


OH! NO! TO THE BRACE

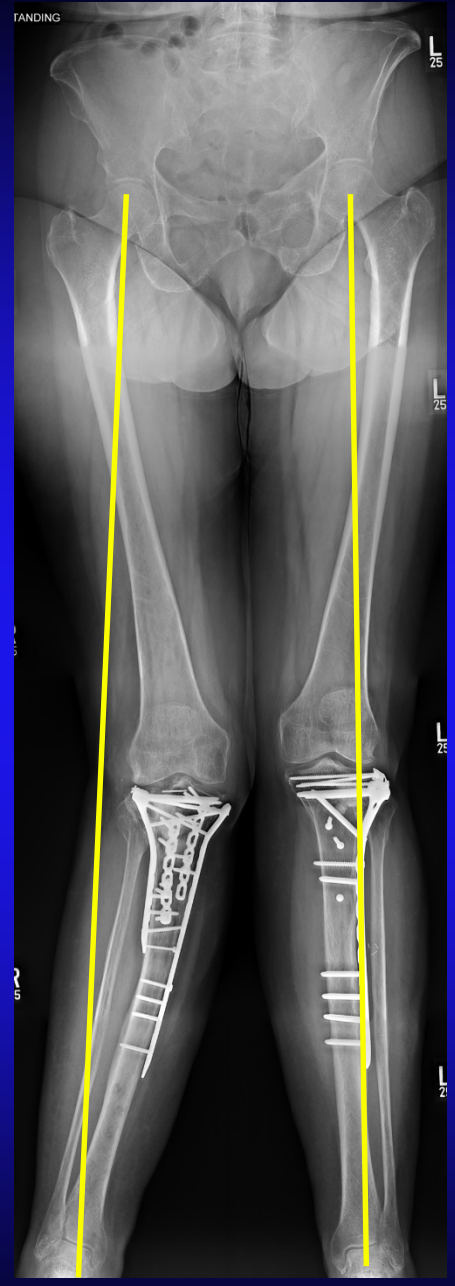
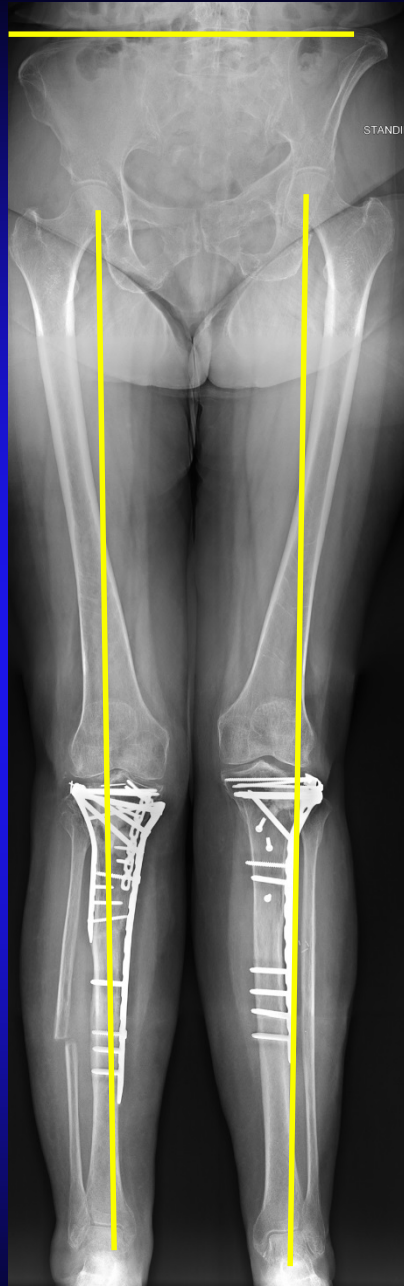


Let's try a brace, says Dr. Reid
It MIGHT help with the pain
Down the hall, to Lawall
There MIGHT be relief to gain
After instructions on how to wear and
Trying to remember which straps go where
Dick and I worked together to place everything right
Making sure that nothing fit too tight
The bulky inner knee pad caused an awkward gait
Redistributing some of my hefty weight
Crooked walking threw my hips out of line
The outer pad hit a painful spot not too fine
Strap one with a hard part over the calf
Securing strap two behind gave us quite a laugh
Strap three went directly over an already painful thigh
Causing more nerve pain but I didn't cry
Strap four agitated the metal sticking out
Strap five was the only one that I have no complaints about
Strap six yet another tightening over the thigh
A torturous contraption, now I do want to cry
Another option according to Dr. Reid
Straightening the leg is what I need
Decision is made, the surgery is a go
For after the holidays, so Ho! Ho! Ho!

Osteotomy to re-align right leg (2 years after injury – Jan 2018)



Vitamin D level increased to 35 ng/ml



Lets Talk to Donna and
Dick Mountfort

Thank You!

