

# Periop bone optimization for orthopaedic surgery patients

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# Silver Tsunami in Orthopaedics

- Aging population with osteoporosis and low bone mass
- Aging population with osteoarthritis and spinal stenosis
- Patients desiring independence and high levels of physical function well into their geriatric years
- Improvements in instrumentation make surgical candidates of patients who historically would not have been surgical candidates
- Wide acceptance of the success of spine and total joint surgery

# So what do I do with these patients?

- Surgeons sending patients for bone optimization
  - Preop
  - Postop
  - Postop after trouble
  - Postop after disasters

NO CLEAR EVIDENCE OR PROTOCOL TO FOLLOW

So what do we do?

Saturday  
night  
transfer...

And, yes, its  
infected, too



# Total Joint Arthroplasty

- Prevalent disease even just on DXA
  - Two studies, but small patient populations (199 and 53)
  - Rate of osteoporosis 23% /28%
  - Rate of osteopenia (low bone mass) 43% /45%
  - Either way that is 2/3 of the patients!
- Can we give guidance to the surgeon regarding
  - Implant fixation choice
    - Cemented vs uncemented
  - Fracture risk
  - Any prep that can optimize outcomes

# Joint related problems

- Ingrowth of bone into porous coated implants
  - Worry about implant subsidence
  - General concept to cement for poor quality/quantity bone
    - Most hemiarthroplasty in patients over 80 now cemented
  - Intraop biopsy study showed only minor relationship between quality of cancellous bone and implant subsidence

# Joint related problems

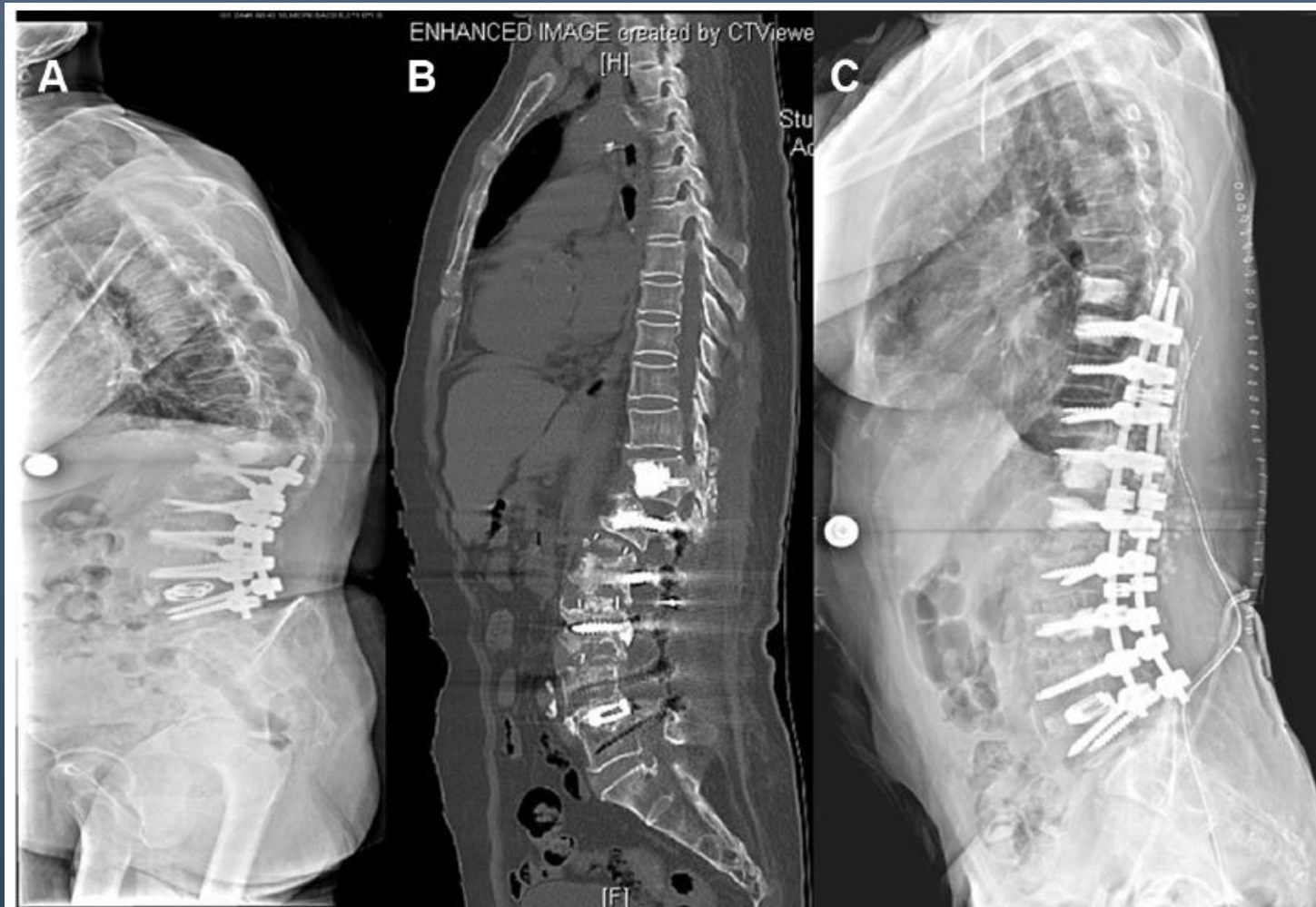
- Periprosthetic fracture
  - In first 5 years after joint replacement
    - 0.9% primary/ 4.2% revision for THA
    - 0.6% primary/ 1.7% revision for TKR
  - Females over age 70 at highest risk
  - Fracture through guidepin holes from navigated knees
  - Now seeing bisphosphonate associated periprosthetic fractures
    - Difficult to get to heal
  - Stress shielding
    - Decreased bone mass adjacent to TKR at 4 years



# Remember the importance of Vitamin D

- Three studies now have shown decreased rate ACUTE periprosthetic joint infection with normal Vitamin D levels
  - Infected patients Vitamin D in low 20s compared to high 30s in controls
  - On average infected patients had lower calcium levels and lower albumin levels

If at first you don't succeed...



## SURGERY

# Teriparatide Accelerates Lumbar Posterolateral Fusion in Women With Postmenopausal Osteoporosis

*Prospective Study*

Seiji Ohtori, MD, PhD, Gen Inoue, MD, PhD, Sumihisa Orita, MD, PhD, Kazuyo Yamauchi, MD, PhD, Yawara Eguchi, MD, PhD, Nobuyasu Ochiai, MD, PhD, Shunji Kishida, MD, PhD, Kazuki Kuniyoshi, MD, PhD, Yasuchika Aoki, MD, PhD, Junichi Nakamura, MD, PhD, Tetsuhiro Ishikawa, MD, PhD, Masayuki Miyagi, MD, PhD, Hiroto Kamoda, MD, PhD, Miyako Suzuki, MD, Gou Kubota, MD, Yoshihiro Sakuma, MD, Yasuhiro Oikawa, MD, Kazuhide Inage, MD, Takeshi Sainoh, MD, Masashi Takaso, MD, PhD, Tomoyuki Ozawa, MD, PhD, Kazuhisa Takahashi, MD, PhD, and Tomoaki Toyone, MD, PhD

- 57 postmenopausal women underwent decompression and fusion at one to two levels
- 29 received daily TPTD 20 mcg/d and 28 received risedronate weekly 17.5 mg/d. Medications were started 2 months prior to surgery and continued for 8 months post-operatively.
- The rate of bone union was 82% in the TPTD group and 68% in the risedronate group
- Bone union was achieved on average at 8 months in the TPTD group and 10 months in the risedronate group
- Symptoms were more improved in the TPTD group but not statistically different

Conclusion: Teriparatide showed better results for the rate of bone union and average duration of bone union compared an with oral bisphosphonate

## SURGERY

# Comparison of Teriparatide and Bisphosphonate Treatment to Reduce Pedicle Screw Loosening After Lumbar Spinal Fusion Surgery in Postmenopausal Women With Osteoporosis From a Bone Quality Perspective

Seiji Ohtori, MD, PhD, Gen Inoue, MD, PhD, Sumihisa Orita, MD, PhD, Kazuyo Yamauchi, MD, PhD, Yawara Eguchi, MD, PhD, Nobuyasu Ochiai, MD, PhD, Shunji Kishida, MD, PhD, Kazuki Kuniyoshi, MD, PhD, Yasuchika Aoki, MD, PhD, Junichi Nakamura, MD, PhD, Tetsuhiro Ishikawa, MD, PhD, Masayuki Miyagi, MD, PhD, Hiroto Kamoda, MD, PhD, Miyako Suzuki, MD, PhD, Gou Kubota, MD, Yoshihiro Sakuma, MD, Yasuhiro Oikawa, MD, Kazuhide Inage, MD, Takeshi Sainoh, MD, Masashi Takaso, MD, PhD, Tomoaki Toyone, MD, PhD, and Kazuhisa Takahashi, MD, PhD

- 62 postmenopausal women undergoing decompression and 1-2 level fusion were given either risedronate 2.5 mg/d, TPTD 20 mcg/d or no medication for osteoporosis. OP medications were given 2 months prior to surgery and 10 months post-operatively
- The incidence of pedicle screw loosening in the teriparatide group was significantly lower than that in the risedronate or the control group (  $P < 0.05$ ). In contrast, the extent of pedicle screw loosening in the risedronate group was not significantly different from that in the control group (  $P > 0.05$ ).

**Conclusion:** Our findings suggest that teriparatide increased the quality of the lumbar spine pedicle bone.

## Teriparatide increases the insertional torque of pedicle screws during fusion surgery in patients with postmenopausal osteoporosis.

Inoue G<sup>1</sup>, Ueno M, Nakazawa T, Imura T, Saito W, Uchida K, Ohtori S, Toyone T, Takahira N, Takaso M.

- Fusion surgery for the thoracic and/or lumbar spine was performed in 29 postmenopausal women with osteoporosis
- Patients were treated with teriparatide (n = 13) or not (n = 16) before the surgery
- Patients received preoperative teriparatide therapy as either a daily (20 µg/day, n = 7) or a weekly (56.5 µg/week, n = 6) injection for a mean of 61.4 days and a minimum of 31 days
- The mean insertional torque value in the teriparatide group was  $1.28 \pm 0.42$  Nm, which was significantly higher than in the control group ( $1.08 \pm 0.52$  Nm,  $p < 0.01$ ).
- There was no significant difference between the daily and the weekly teriparatide groups with respect to mean insertional torque value ( $1.34 \pm 0.50$  Nm and  $1.18 \pm 0.43$  Nm, respectively,  $p = 0.07$ ).

Conclusion: Teriparatide injections beginning at least 1 month prior to surgery were effective in increasing the insertional torque of pedicle screws during surgery in patients with postmenopausal osteoporosis



So let's talk...

What do we do?