

Vitamin D Levels in Hip Fractures

Rationale and Guidelines for Rapid Substitution Therapy



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Introduction

- Assessment for and treatment of osteoporosis required after hip fracture
- Osteoporosis treatment requires adequate calcium and vitamin D levels

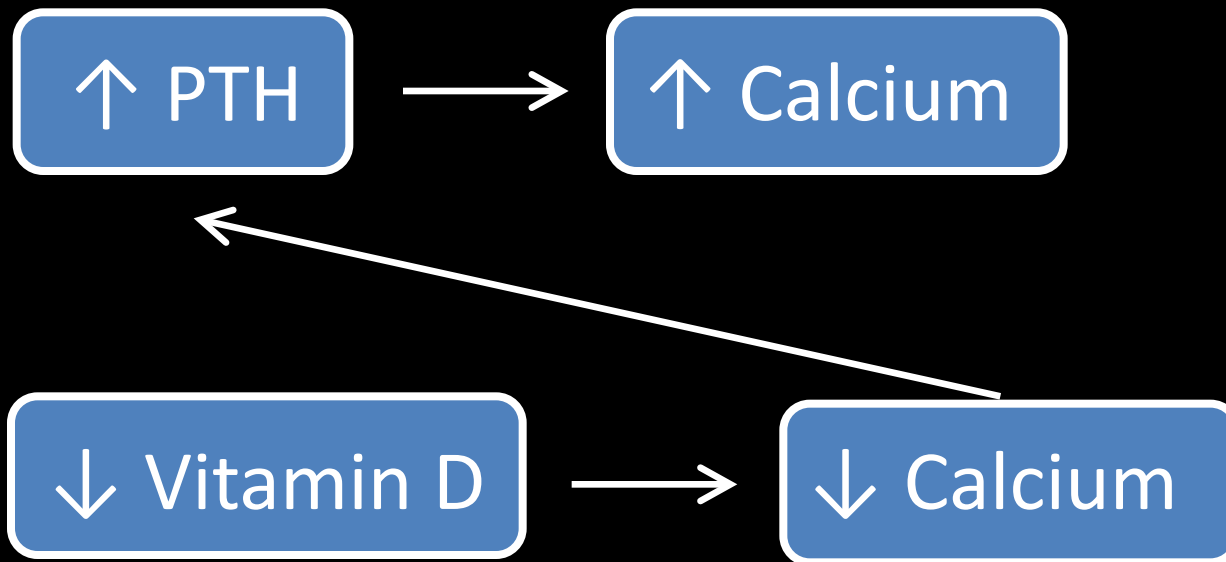
Aim of Study

- Determine vitamin D levels in patients with hip fracture
- Develop guidelines on how to safely and effectively substitute vitamin D levels with high dose oral vitamin D3 (cholecalciferol)

Functions vitamin D

- ↑ intestinal calcium absorption
- ↑ osteoclast activity
- ↑ renal calcium reabsorption

Calcium regulation



Materials & Methods

- Consecutive hip fractures over 18 months
- Circulating 25-hydroxyvitamin D levels
- Substitution therapy with 50,000 IU oral cholecalciferol for 3 or 7 days

Definition vitamin D levels

- Sufficient: > 75 nmol/L
- Insufficient: $25 - 75$ nmol/L
- Deficient: < 25 nmol/L

Results: vitamin D levels

381 patients
(387 hip fractures)

95 men – 286 women
mean age = 83 years

27 sufficient

mean = 91 (SD 20) nmol/L
range = 75 – 171 nmol/L

22/27 on
supplements

354 insufficient / deficient

mean = 26 (SD 18) nmol/L
range = <10 - 74.4 nmol/L

156 insufficient

204 deficient

Substitution: 50,000 IU – 3 days

- N = 14

30 nmol/L

14 days
→
p < 0.0001

81 nmol/L

SD = 16

range = < 10 – 56

SD = 17

range = 47 – 108

Only 2/3 above 75 nmol/L

Substitution: 50,000 IU – 7 days

- N = 54

31 nmol/L

16 days
→
p < 0.0001

131 nmol/L

SD = 24

range = < 10 – 113

SD = 30

range = 85 – 243

Fourfold increase
100% above threshold

Substitution: 50,000 IU – 7 days

Calcium

2.19 mmol/L

SD = 0.13
range = 1.94 – 2.50

16 days
→
p < 0.0001

2.33 mmol/L

SD = 0.17
range = 1.84 – 2.78

Corrected
Calcium

2.47 mmol/L

SD = 0.09
range = 2.21 – 2.60

16 days
→
p = 0.0002

2.54 mmol/L

SD = 0.12
range = 2.18 – 2.81

No clinical or biochemical side effects

Costs

- Vitamin D analysis: 7.5 €
- 50,000 IU vitamin D
 - 100 tablets: 29 €
 - 7 days: 2 €

Algorithm

CC < 2.6

- 50,000 IU – 7 days
- Adcal D3 – 2x/d – for life
- Monitor calcium at 1/12

CC 2.6 – 2.8

PTH levels normal
and EGFR > 30

PTH raised
and/or EGFR < 30

- Treat slowly: 50,000 IU 1x/week
- Monitor calcium and renal function
- Consider stopping Adcal D3
- Stop treatment if CC > 2.8

CC > 2.8

Specialist referral

Conclusion

- All patients with hip fracture have insufficient or deficient vitamin D levels
- 50,000 IU oral cholecalciferol for 7 days
 - Rapid → Achieved during admission
 - Cheap → 2 € - No vitamin D analysis
 - Consistent → 100% patients
 - Safe ? → No side effects