

ENHANCED CALLUS FORMATION AFTER TERIPARATIDE TREATMENT IN A MALE PATIENT WITH MULTIPLE PELVIC FRACTURES AND OI



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EIN UNTERNEHMEN DER VINZENZ GRUPPE WIEN

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conflict of interest disclosure: no

Objectives:

A 78-year-old man suffering from osteogenesis imperfecta (type IV by Sillence) was admitted to St. Vincent Hospital Vienna due to severe pelvic pain following fivefold pelvic fracture (os pubis ramus superior and inferior both sides and os sacrum) suffered three months earlier.

Since the pelvic fracture, the patient was immobile, confined to a wheel chair and dependent on analgetics due to chronic pain. His earlier fracture history consisted of multiple non-vertebral fractures after inadequate traumata. The vertebra had been stabilized with PLIF.

The X-ray and multislice computed tomography (MSCT) of the pelvis showed dislocated fractures of os pubis ramus superior and inferior on both sides and os sacrum without any adequate callus formation at the fracture sites (figure 1: a,b). DXA Bone Mineral Density measurements have demonstrated moderately decreased T-scores at different sites (table 1). The values at the lumbar spine could not be evaluated due to the prior orthopedic surgery (figure 2).

The structure analysis with HR-pQCT (SCANCO) showed profound inhomogeneity of the network and a significantly reduced cortical thickness of radius (0.43 mm) and tibia (0.25 mm). However, the number of trabeculae, trabecular thickness and trabecular separation were in normal range.

Laboratory investigations showed an increase of alkaline phosphatase (335 U/l; reference range 40-129 U/l). Calcium, Phosphate, Parathyroid hormone, Vitamin D, type 1 collagen cross-linked C-telopeptide (CTX) and amino terminal propeptide of type I procollagen (PINP) were in normal range. Secondary metabolic bone disorders were excluded by thorough clinical investigations and blood analysis.

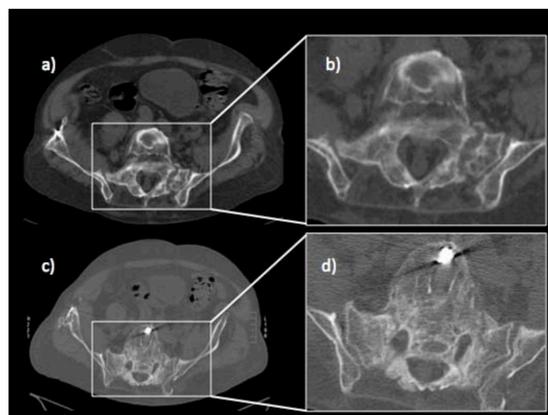


Figure 1: Monitoring of fracture healing by pelvic multislice computed tomography (MSCT): a) Axial overview at baseline b) zoom to bilateral sacrum fractures (li>re) at baseline c) Axial overview after 6 weeks treatment with teriparatide d) zoom showing healing in progress with fracture gap narrowing, new bone and callus formation.

Methods:

Due to its bone anabolic effects, a treatment with teriparatide 20 µg once daily was initiated to potentially support fracture healing. The duration of treatment was six weeks. Additionally, supplemental therapy of calcium (1000mg daily) and vitamin D (800IE daily) were initiated.

Results:

After six weeks of treatment with teriparatide, marked increase of callus formation at every fracture site could be demonstrated by computed tomography (Figure 1: c, d). In addition pelvic pain decreased significantly and the patient could reduce analgetics. The patient got back his mobility, did not need a wheel chair anymore and could stand and walk without walking frame. Serum including calcium, phosphate, vitamin D and PTH remained during and after treatment in normal range. Type 1 collagen cross-linked C-telopeptide (CTX) and amino terminal propep-

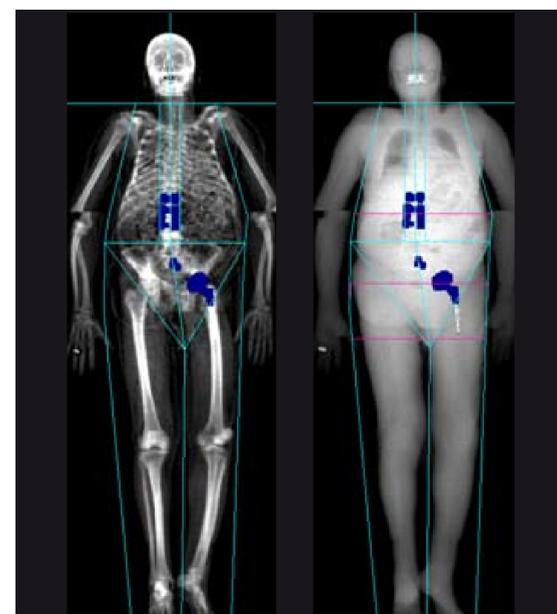


Figure 2: DXA body scan of a 78 year old man with OI type IV

tide of type I procollagen (PINP) were increased, as a sign of response to inductive therapy.

Discussion:

Numerous studies have shown the effects of teriparatide on increased bone formation and BMD, on reduction of vertebral and non-vertebral fracture risk in men, postmenopausal women and patients with glucocorticoid-induced osteoporosis. Furthermore intermittent PTH treatment appears to produce more stable callus by increasing callus volume, bone formation and mechanical stability at different fracture sites [1]. In numerous preclinical studies on different animal species these positive effects of PTH on fracture healing have been published. [2-5]

Conclusion:

Apart from vertebral fracture prevention and increasing of bone mineral density, teriparatide (PTH 1-34) increases callus formation after 6 weeks of treatment and may be able to accelerate intracortical bone remodeling after fracture, also in patients with OI. Currently, no pharmacological treatments are available for fracture healing. Particularly in OI patients with high fracture risk and recurrent fractures, teriparatide could be used for supporting fracture healing.

Measuring site	BMD [g/cm ²]	T-Score
Radius 33%	0.798	-1.9
Right Total Hip	0.780	-2.4
Right Neck	0.642	-3.3
Calscan	0,265	-3,9

Table 1: BMD and T-Score of radius, hip total, hip neck and calcaneus

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