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Use of teriparatide to prevent severe hypocalcemia after parathyroidectomy in dialysis-dependent patients: a feasibility study

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Background and Aims: Hungry bone syndrome is a common postoperative complication after parathyroidectomy (PTx) for severe secondary hyperparathyroidism (SHPT). We aimed to conduct a feasibility study to assess the potential impact of teriparatide on the course of postoperative hypocalcemia after PTx in dialysis-dependent patients.

Method: We performed a randomized controlled pilot study in 20 dialysis-dependent patients with severe SHPT undergoing total parathyroidectomy with autotransplantation of parathyroid tissue. Patients were randomized to receive either 20 mcg teriparatide (Forsteo) subcutaneously on day 1 after surgery in addition to standard postoperative care (n=11) or standard postoperative care alone (n=9). Severe postoperative hypocalcemia was defined as an ionized serum calcium level of less than 0.8 mmol/l during the first 3 days after surgery.

Results: Patients in the two groups did not differ in terms of pre- and postoperative laboratory data, including PTH, corrected total calcium, ionized calcium and alkaline phosphatase levels – Table 1.

Severe hypocalcemia was observed in 6 patients in the teriparatide group (55%) and in 4 patients (44%) in the control group (p=0.99). The proportion of patients with symptoms of hypocalcemia was higher in patients not receiving teriparatide (67% vs 27%, p=0.17), although these differences did not reach statistical significance.

All post-PTx patients received standard supplementation according to local protocol, including calcium carbonate 20 gr/day, active vitamin D 2 mcg/day per os, and intravenous calcium gluconate supplementation on demand for symptoms of hypocalcemia (e.g. numbness, tingling, or cramps).

Total elemental calcium requirement after surgery (which may serve as a surrogate for the severity of hungry bone syndrome) was higher in patients receiving standard treatment alone (41 [Q1-Q3: 33; 49] grams per hospitalization vs 33 [Q1-Q3: 25; 40] grams in the teriparatide group, p=0.0375) – Fig. 1.

The total length of hospital stay was 4 ± 1 days in teriparatide group and 5 ± 2 in control group, p=0.36.

Conclusion: In dialysis-dependent patients after PTx, we observed a trend towards an alleviation of postoperative hypocalcemia after single injection of teriparatide in addition to routine care. Further studies with larger sample sizes are needed to confirm these preliminary results.

Table 1: Participants' main clinical and laboratory data.

Characteristic	Teriparatide + (n=11)	Teriparatide - (n=9)	p-value
<i>Before PTx:</i>			
PTH, pmol/l [*]	163 [136; 208]	236 [123; 305]	0,82
Corrected total serum calcium, mmol/l ^{**}	2,3 ± 0,27	2,38 ± 0,15	0,48
Alkaline phosphatase, U/l [*]	186 [106; 390]	126 [93; 607]	0,77
<i>After PTx:</i>			
PTH, pmol/l [*]	0,7 [0,4; 1,2]	1,3 [0,7; 4,6]	0,09
Corrected total serum calcium, mmol/l ^{**}	1,66 ± 0,24	1,77 ± 0,26	0,33
Ionized serum calcium, mmol/l [*]	0,78 [0,63; 0,85]	0,83 [0,64; 0,92]	0,57
Severe hypocalcemia, n (%)	6 (55%)	4 (44%)	0,99
Symptoms of hypocalcemia, n (%)	3 (27%)	6 (67%)	0,17
Total calcium supplement, grams per hospital stay period [*]	33 [25; 40]	41 [33; 49]	0,0375
Days after surgery ^{**}	4 ± 1	5 ± 2	0,36

PTH, parathyroid hormone; PTx, parathyroidectomy

^{*}Data expressed as Me [Q₁; Q₃]

^{**}Data expressed as mean ± SD

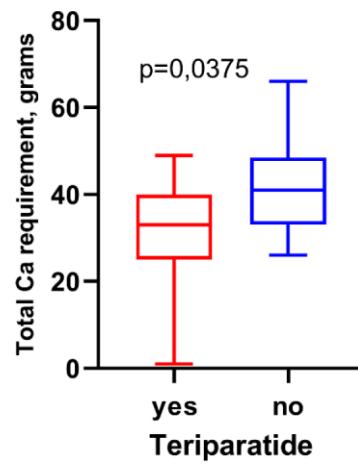


Figure 1. Total calcium requirement in dialysis-dependent patients underwent total parathyroidectomy received (red) or not received (blue) teriparatide after surgery.