

SECONDARY HYPERPARATHYROIDISM CORRECTION WITH MINIMALLY INVASIVE INTERVENTION

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Aim:

To show the efficacy of local vitamin D3 injection in parathyroid glands in early resistant to medical treatment secondary hyperparathyroidism, when 1 or 2 enlarged parathyroid glands visualized with estimated volume lower then 0,5 sm³.

Methods:

46 series of local injection of paricalcitol in the parathyroid gland under ultrasound guidance were performed in **37 patients** with CKD 5D, receiving renal replacement therapy by dialysis (16 - HD 21 - CAPD) with manifestations of secondary hyperparathyroidism resistant to medical therapy. Only patients with 1 or 2 glands visualized with estimated volume 0,5 sm³ or lower and significant blood flow by color Doppler were included. In all patients at the start of injections anemia was corrected (Hb - 116,4±14,7 g/l) and dose of dialysis was sufficient (KT/V HD - 1,7±0,2, KT/V PD - 2,3±0,5).

Table 1. Patients characteristics.

Indicator	Value
Sex, f	27(73%)
Age, years	43±14
Duration of dialysis, months	40±29
Dialysis modality, HD/PD	16/27

Table 2. Medical treatment at the start of injections.

Medication	N patients	% of patients	Average Dose
Alphacalcidol	35	95%	2.76 mcg/week
Paricalcitol	2	5%	14.25 mcg/week
Cinacalcet	7	19%	30 mcg/day

After obtaining informed concern the series of 5 ultrasound guided injections of paricalcitol (5 mcg/ml) with 2-3 days intervals were performed. The needle position was confirmed by the changes in echo signal in gland during injection and by absence of blood flow by Doppler after injection.

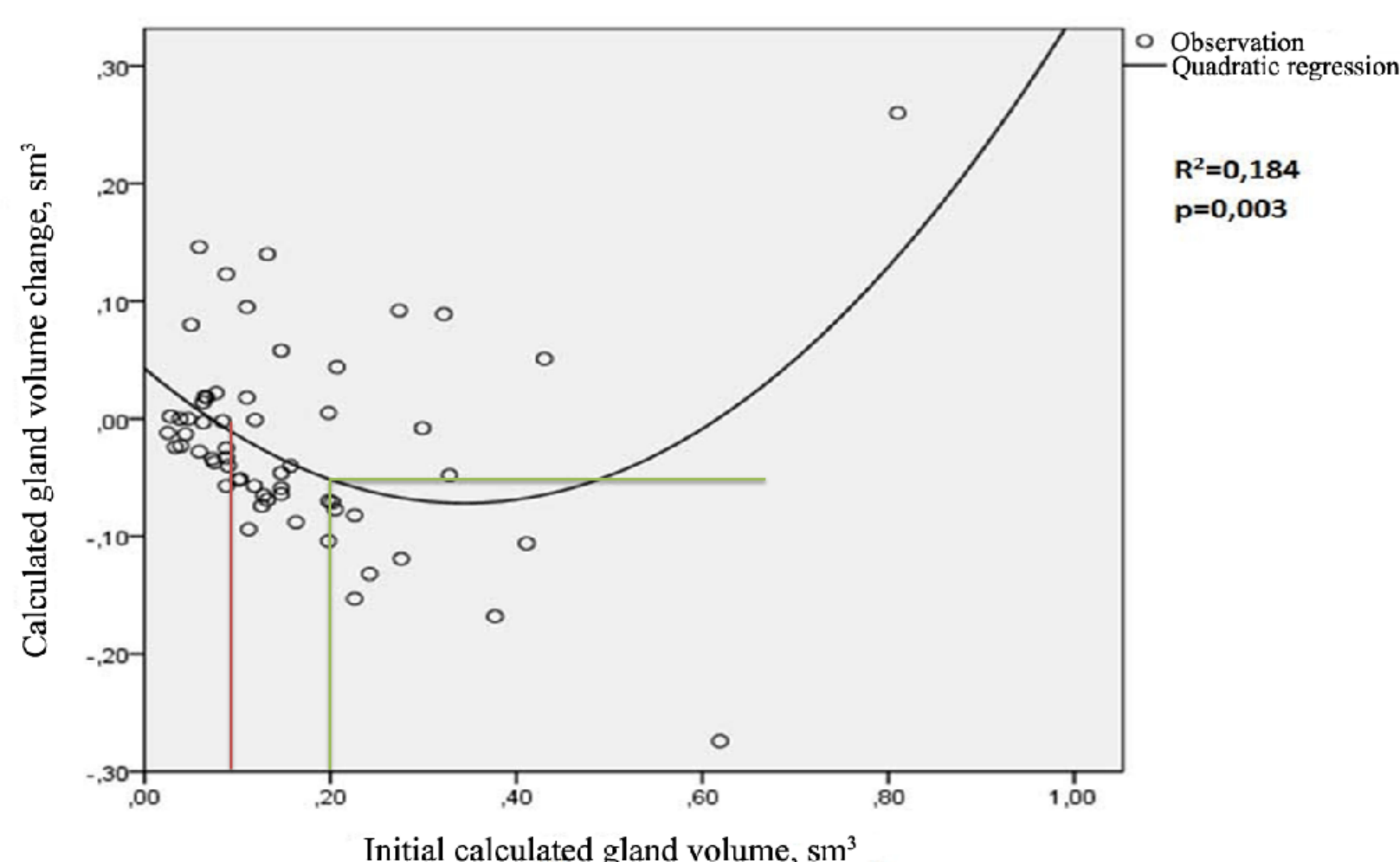
Results:

Interventions showed a *statistically* significant reduction in PTH levels by 22.7% (190 pg / ml, 95% CI - 87 ÷ 293, p = 0,001). Significant differences in the trends of PTH before and after the intervention during 6 and 12 months where observed. There was no difference between phosphate levels before and after injection, but there were statistically significant differences in phosphate levels trends before and after series of local injections during 6 and 12 months. No difference in the calcium and alkaline phosphatase levels and in the trends before and after injections was observed.

Significant reduction of the maximal linear dimension (an average of 17.1%) and the downward trend in the estimated volume (average 12.5%) were revealed while ultrasound control at 6 months after injections. Regression analysis showed a statistically significant dependence of the gland volume changes upon the calculated gland volume before the intervention in the quadratic regression model..

The largest decrease in volume was noted at baseline calculated gland volume from 0.2 to 0.5 cm³. Gland volume reduction did not occur if calculated volume was less than 0.1 cm³. The magnitude of PTH levels changes did not depend on the baseline calculated parathyroid gland volume.

In all cases local pain observed after injection, mostly from 30 min to 2 hours. Two patients had pain duration more then 24 hours and needed NSAIDs. In 4 cases local hemorrhage observed after injection, with no need for additional therapy. There was no cases with symptoms of recurrent laryngeal nerve injury.



Conclusions:

Local VDRA injections in parathyroid glands can be used for restoration of sensitivity to medical treatment in early advanced secondary hyperparathyroidism with estimated gland volume lower then 0.5 and more then 0.2 sm³.

Table 3. Lab changes after injections.

Indicator	Before injections	After injections	Paired difference (95% CI)	t	Significance (2-sided)
PTH, pg/ml	838±287	648±352	190±330 (87; 293)	3.73	0.001
Ca, mmol/l	2.29±0,15	2.32±0.17	0.03±0.14 (-0.01; 0.07)	1.43	0.16
P, mmol/l	1.89±0,41	1.89±0.47	0.002±0.32 (-0.10; 0.10)	0.03	0.98
Alc. Ph., mcat/l	1.62±0,57	1.60±0.78	-0.03±0.44 (-0.18; 0.13)	-0.33	0.74

Table 4. Changes in Lab 6-months and 1-year trends before and after injections.

Indicator trend	Before injections	After injections	Paired difference (95% CI)	t	Significance (2-sided)
PTH, 6 months trend, pg/ml/month	62±48	(-32)±79	-94±101 (-138; -50)	-4.47	<0.001
PTH, 1 year trend, pg/ml/month	37±49	(-8)±49	-45±74 (-73; -16)	-3,18	0.004
Ca, 6 months trend, mmol/l/month	0.005±0.044	0.16±0.094	0.01±0.11 (-0.03; 0.05)	0.62	0.540
Ca, 1 year trend, mmol/l/month	0.004±0.017	0.016±0.091	0,01±0,10 (-0.18; 0.04)	0.82	0.419
P, 6 months trend, pg/ml/month	0.007±0.071	(-0.033)±0.094	-0.04±0,11 (-0.07; -0.04)	-2.25	0.030
P, 1 year trend, pg/ml/month	0.011±0.04	(-0.025)±0.096	-0.04±0.10 (-0.68; -0.02)	-2.20	0.034
Alc. Ph., 6 months trend, mmol/l/month	0.016±0.119	0.025±0.175	0.01±0.20 (-0.08; 0.10)	0.20	0.845
Alc. Ph., 1 year trend, mmol/l/month	0.016±0.109	0.031±0.093	0.02±0.14 (-0.04; 0.07)	0.59	0.557

Table 5. Gland size changes 6 month after injections.

Indicator	Before injections	After 6 months	Paired difference (95% CI)	t	Significance (2-sided)
Calculated gland volume, sm ³	0.12 (0.07;0.21)	0.09 (0.05;0.20)	0.02±0.08 (-0.01; 0.04)	1.9	0.06
Maximal lineal size, mm	7.8 (6.6;10.1)	7.0 (5.8;9.6)	0.91±2.13 (0.35;1.46)	3.28	0.002

