

## RENAL HYPERPARATHYROIDISM AFTER TOTAL PARATHYROIDECTOMY

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### Abstract

*Renal hyperparathyroidism (HPTH) is first treated with vitamin D supplements and later parathyroidectomy is required; usually total removal of the four glands with self-transplantation and rarely partial resection is performed. We introduce a case of end-stage renal disease (ESRD) with very high parathormone (PTH) levels long-time after total parathyroidectomy without auto-implant, lacking the evidence of anatomical parathyroid presence. A 59-year-old female with ESRD since the age of 38 and hemodialysis performed until the present day. The vitamin D supplementation was not adequate thus 8 years ago PTH was found increased (of 2070 pg/mL, normal: 15-65pg/mL), requiring surgery (total parathyroidectomy). Patient experienced low PTH values immediately after surgery. Further vitamin D and calcium supplements were offered and the values of total calcium remained low-normal while PTH assays were no longer done until recently. Currently, an elevated PTH of 1622 pg/mL with normal total calcium and severe vitamin D deficiency was found confirming once again renal HPTH. The imagistic tests did not reveal suggestive parathyroid masses at cervical and mediastinal computer tomography, both by using <sup>99m</sup>Tc PERTECHNETATE and SESTAMIBI parathyroid scintigraphy. Anterior cervical ultrasound suggested two right remnants of 4 mm, probably parathyroids. The best treatment for this moment is the adequate correction of vitamin D deficiency so daily oral vitamin D3 1000 UI, calcitriol 0.75 µg, and calcium carbonate 1500 mg were started. Three months later PTH decreased at 900pg/mL. If PTH might have a good response to the medication, surgery may be delayed. Moreover, the lack of adequate parathyroid masses identification will increase the surgical approach difficulty requiring intra-operative localisation on a patient already associating multiple comorbidities.*

**Keywords:** parathyroidectomy, vitamin D, hemodialysis

### Introduction

Hyperparathyroidism (HPTH) is considered secondary if hypovitaminosis D is correctable and tertiary if there is an autonomous secretion

of parathyroid glands; however, most surgeons do not use this endocrine specification and, generally, HPTH accompanying end-stage renal disease (ESRD) or renal HPTH is considered secondary [1]. If vitamin D supplementation is

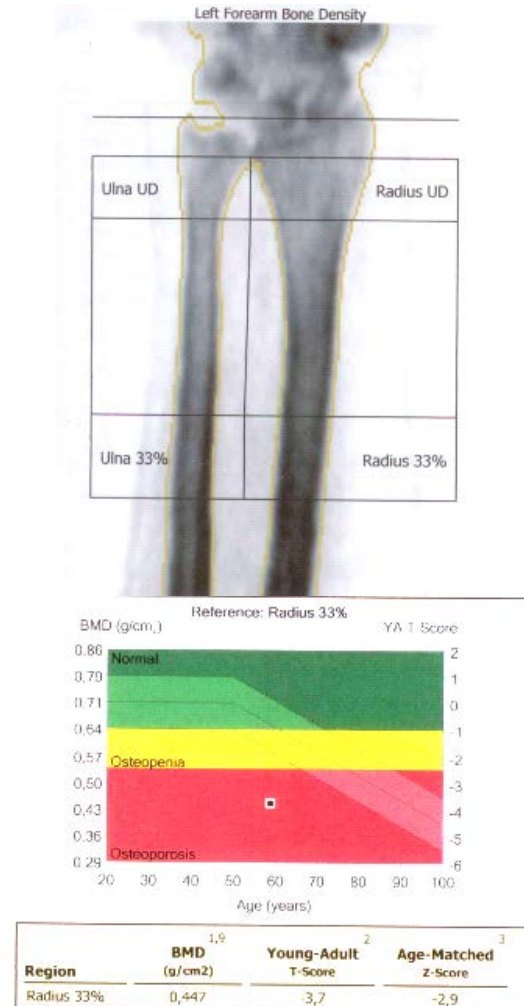
not enough to correct high levels of parathormone (PTH), the parathyroid surgery is useful; the majority of ESRD cases will have a total parathyroidectomy with auto-transplantation but there are subjects with a subtotal resection [2]. We aim to introduce an atypical case with renal HPTH recurrence long time after a total parathyroidectomy procedure for ESRD- associated HPTH; the diagnosis was established based on high levels of parathormone (PTH) despite the lack of clear imagery data for localisation.

**Case presentation**

A 59-year-old non-smoking female has the following medical and surgical history: at the age of 38 she was diagnosed with chronic glomerulonephritis and renal function was progressively deteriorated. RRT (renal replacement therapy) was started at the age of 39 (hemodialysis) and continued until present. While she was under RRT, high blood pressure, dyslipidemia, mild hyperkalemia were diagnosed and partially corrected by medication and different regimes of hemodialysis. She had physiological menopause at age of 45 and 4 years later osteoporosis was confirmed (and further treated for 10 years with oral bisphosphonates, weekly Risendronate and 0.25 µg of daily alphacalcidol). The vitamin D supplementation was not enough so at age of 51, PTH was found extremely high (of 2070 pg/mL, with normal levels less than 66 pg/mL) thus confirming renal HPTH.

Surgery was necessary to avoid the complications of HPTH and total parathyroidectomy was performed with prior computer tomography identification of the four glands. No self-transplantation was considered necessary at that time during the surgical procedure and the patient experienced low PTH values immediately after surgery. Further vitamin D and calcium supplements were offered to the patient and the values of total calcium remained low-normal while PTH assays were no longer done until recently. Currently, an extremely elevated PTH level of 1622 pg/mL (normal ranges between 15 and 65 pg/mL) was found confirming once again renal HPTH. Also, the woman presented normal total serum

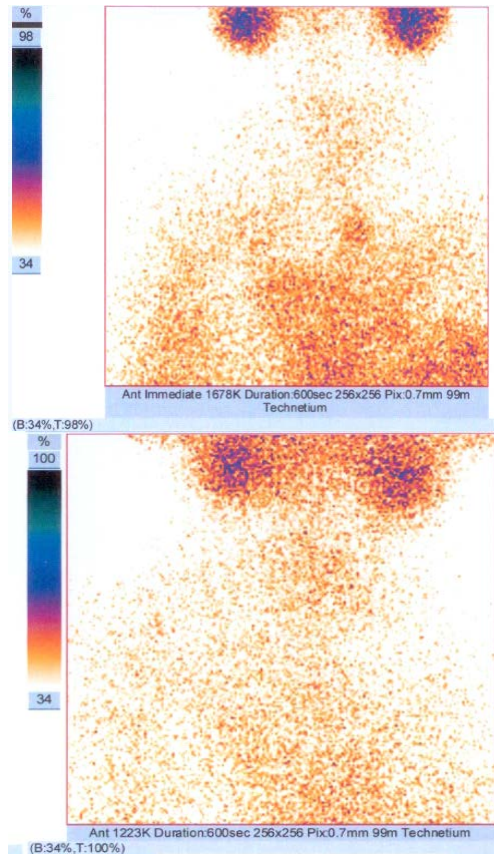
calcium of 9.8 mg/dL (normal ranges between 8.8 and 10.2 mg/dL) and severe vitamin D deficiency reflected by low 25-hydroxyvitamin D of 8.42 ng/mL (normal value above 30 ng/mL). The bone damage also included high levels of bone turnover markers and Dual-Energy X-Ray Absorptiometry (DXA) values suggestive for osteoporosis (Figure 1).



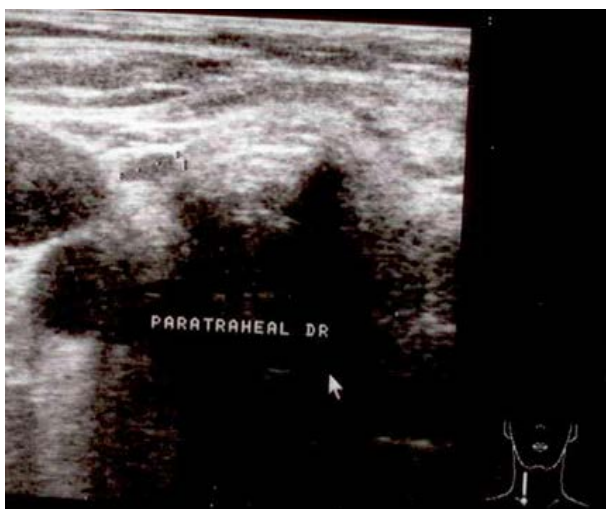
**Figure 1 - Dual-Energy X-Ray Absorptiometry at third distal non-dominant forearm showing a T-score suggestive for osteoporosis**

The imagistic tests did not reveal suggestive parathyroid masses at cervical and mediastinal computer tomography, both by using 99mTc PERTECHNETATE and SESTAMIBI parathyroid scintigram (Figure 2). However, the anterior cervical ultrasound suggested two right remnants of 4 mm, probably parathyroids (Figure 3). The best treatment for this moment is the adequate correction of vitamin D deficiency and daily oral vitamin D3 1000 UI, calcitriol 0.75 µg, and calcium carbonate 1500 mg were started. Three months later PTH

decreased at 900 pg/mL while total calcium remained within normal limits of 9.6mg/dL. If PTH might have a good response to the medication, surgery may be delayed. Moreover, the lack of adequate parathyroid masses identification involves an increased difficulty of surgical approach on a patient already associating multiple comorbidities.



**Figure 2 -  $^{99m}\text{Tc}$  PERTECHNETATE and SESTAMIBI parathyroid scintigram: lack of parathyroid masses identification**



**Figure 3 - Anterior cervical ultrasound: potential parathyroid mass of 4 mm (on the right side)**

## Discussions

Which is the best method of parathyroid surgery for renal HPTH is still controversial and relapse of the condition is expected in some cases with long term survivors under RRT, especially if vitamin D is not adequately corrected by medication as oral vitamin D supplements [3]. Another additional method is to add cinacalcet in cases with high levels of calcium as a consequence of secondary/tertiary HPTH or even caused by high doses of vitamin D itself; the drug has limited side effects but cost issues are expected if National Health Care Programs do not cover the costs [4,5]. In this case, complete parathyroid removal was done and most probably a few cells remained and were continuously stimulated by hypovitaminosis D thus PTH increased to very high levels. However, second surgery is not the first-line treatment but vitamin D therapy, although challenging [6].

For the patient, the decreasing PTH levels 3 months later represent the argument of improving bone metabolism profile. Another practical point in performing parathyroidectomy is the major aspect of pre-operatively localisation which in the mentioned case was not available (by using computed tomography and parathyroid scintigraphy with two types of tracers) thus the intra-operative decision is crucial [7]. Also, before surgery, a magnetic resonance imagery may be used and some reports from literature encourage the use of PET/CT scans to check the potential parathyroid masses [8].

Long-term outcome of renal HPTH involves close follow-up by a multidisciplinary team, including the decision regarding the opportunity and timing of surgery [9,10]. In this female case, the apparently complete parathyroid gland resection without auto-transplantation was decided during the procedure and currently the optimal medication will postpone a secondary surgical approach, an intervention expected to be difficult since there is no imagery evidence of the underlying anatomical parathyroid condition in association with renal HPTH.

## Conclusions

Long-term overstimulation of parathyroid cells remained after total parathyroidectomy for ESRD-related hyperparathyroidism may associate extremely high parathormone levels despite lack of evident masses. Adequate vitamin D supplementation is recommended first but surgery with intra-operative identification of the glands may be necessary if parathormone is resistant to medication.

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