Determination of parathyroid hormone levels in fine needle aspirates of ectopic parathyroid glands

Sir,

Progressive image technologies are improving the accuracy for determining the localization of enlarged parathyroid glands (PTGs) in hyperparathyroidism (HPT). However, the identification of an unusually located cervical nodule as an ectopic PTG remains uncertain. The measurement of parathyroid hormone (PTH) in the aspirated material with a fine needle has shed light on this diagnostic difficulty [1–4]. Here, we report two cases who developed recurrent renal HPT by ectopic PTGs after a long-term interval of ‘total’ parathyroidectomy (PTX).

Case 1. A 72-year-old woman described her progressive shoulder pain and kyphosis in August 2000. She had been treated with haemodialysis therapy for 17 years and had a history of total PTX with autotransplantation in her right forearm in 1990. Laboratory data revealed a high level of intact PTH and alkaline phosphatase (ALP) under normal calcaemia, indicating secondary HPT (Table 1). Since her ALP level had been normal after the PTX until January 1998, we diagnosed this case as recurrent HPT. Casanova test was negative, suggesting that her HPT was not due to overgrowth of the autotransplanted PTG. Ultrasonography (USG) revealed a hypoechoic nodule (10.0 × 6.6 × 12.2 mm) inside the upper right lobe of her thyroid gland. Technetium99m (Tc99m)-methoxyisobutylisonitrile (MIBI) accumulation in the late phase (3 h after injection) was observed at the same site as that by the USG. In order to confirm this intrathyroidal nodule as the responsible PTG, we performed aspiration biopsy with 22G needle under USG guidance. Successful aspiration tap (<0.05 ml) was subjected to cytology. After that, we rinsed the syringe with the needle in 1 ml of normal saline, and then we measured intact PTH and thyroglobulin contents in the saline (Table 1). We found an extremely high level of intact PTH in the aspirates.

Case 2. A 53-year-old man, under maintenance dialysis for 32 years, was referred to us in August 2001 because of recurrent HPT by undefined PTG(s) in spite of multiple USG examinations and Tc99m-MIBI scintigraphy. Total PTX with autotransplantation in his left forearm, together with left hemi-thyroidectomy due to thyroid cancer, had been performed in 1984. Since his intact PTH increased again up to more than 500 pg/ml in 1994, the autotransplanted PTGs were removed thoroughly by multiple surgeries. However, his secondary HPT was hardly controlled, as shown in Table 1, resulting in his right hip fracture. In another USG performed by us, we found a round shaped nodule between the left common carotid artery and the left jugular vein (9.8 × 5.8 × 10.7 mm). Magnetic resonance imaging (MRI) showed low intensity in the T1-weighted image and relatively high intensity in the T2-weighted image, consistent typically with an enlarged PTG. To confirm this as the responsible PTG, we performed aspiration biopsy by the same method as in Case 1. The aspirates were informative enough to identify this nodule as the ectopic PTG (Table 1).

Comment. Both cases had recurrent HPT by unusually located PTGs after a long-term interval of ‘total’ PTX; one was inside the thyroid gland in Case 1 and the other between the common carotid artery and the jugular vein in Case 2. We confirmatory identified the unusually located cervical nodules as the responsible PTGs by the determination of PTH levels in the fine needle aspirates. Perhaps, it could be
better to rinse the needle in distilled water to favour the lysis of cells. Nevertheless, we found a markedly high level of intact PTH in the aspirates even after dilution with 1 ml of normal saline, as described by others [5–7].

Fine-needle aspirations under guidance of either USG or computed tomography (CT) have been reported to provide high diagnostic accuracy in parathyroid adenoma [1–4]. This method could be also very useful for identifying the nodule as an ectopic PTG, even when the sample is very small. Although the cut-off line of PTH level in aspirates has to be determined in a larger scale study, this technique seems to have a high specificity in the previous report [5–7]. In addition, the most recent PTH assay could promise more rapid diagnosis to identify a cervical nodule as an enlarged PTG [8].

Recent diagnostic imaging techniques, including USG, scintigraphy, MRI and CT, make it easier to find an enlarged PTG. When pieces of resected PTG(s) have been autotransplanted into the forearm muscle, Casanova study is useful for considering the cause of recurrent HPT by the autotransplanted PTG [9]. Otherwise, we have to search the active PTG with a series of diagnostic techniques in the cervical area as well as thoracic cavity. Although USG and Tc99m-MIBI scintigraphy are comparatively sensitive tests [10], it is still difficult to confirm the lesion, especially in case of an ectopic PTG, after total PTX. Then, USG guided fine needle aspiration again emerges as a conclusive technique [5,6]. We recommend the measurement of PTH level in aspirates to verify an ectopic PTG, especially after regular PTX.


<table>
<thead>
<tr>
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<th>Case 1</th>
<th>Case 2</th>
<th>Normal range</th>
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<tbody>
<tr>
<td>Serum Calcium* (mg/dl)</td>
<td>10.3</td>
<td>10.1</td>
<td>8.5–10.5</td>
</tr>
<tr>
<td>Phosphorus (mg/dl)</td>
<td>3.4</td>
<td>7.6</td>
<td>2.4–4.5</td>
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<tr>
<td>ALP (IU/l)</td>
<td>1489</td>
<td>353</td>
<td>100–303</td>
</tr>
<tr>
<td>Intact PTH (pg/ml)</td>
<td>630</td>
<td>1200</td>
<td>13–65</td>
</tr>
<tr>
<td>Thyroglobulin (ng/ml)</td>
<td>5238</td>
<td>ND</td>
<td>–</td>
</tr>
</tbody>
</table>

*Corrected with serum albumin; **Samples were measured after dilution with 1 ml of normal saline; ND, not detected.