Percutaneous Ethanol Injection Therapy for Secondary Hyperparathyroidism in an Elderly Tracheostomized Hemodialysis Patient

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Abstract

Hyperparathyroidism, either secondary or tertiary, is a major complication of end stage renal disease (ESRD). It can result in renal bone disease if left untreated. Although surgical parathyroidectomy remains the treatment of choice, the appropriate therapy to treat hyperparathyroidism in specific patient groups such as tracheostomized patients has not been elucidated. We present a case of secondary hyperparathyroidism (SHPT) in a tracheostomized chronic hemodialysis patient. Surgical intervention with parathyroidectomy was indicated due to the poor response to medical treatment; however, in light of the surgical and anesthesia-related risks, the patient was referred for percutaneous ethanol injection therapy (PEIT). After 6 sessions of PEIT, her serum levels of intact parathyroid hormone, total calcium, and phosphate showed an apparent improvement and remained within the range proposed by the kidney disease outcomes quality initiative guidelines until the end of the treatment course without complications. Therefore, PEIT might be a suitable treatment for SHPT, even in elderly tracheostomized hemodialysis patients.

KEY WORDS: secondary hyperparathyroidism, parathyroidectomy, percutaneous ethanol injection therapy, tracheostomy, hemodialysis

Introduction

Secondary hyperparathyroidism (SHPT) is a major problem in end-stage renal disease (ESRD), and it can result in renal bone disease if left untreated. Although surgical parathyroidectomy remains the treatment of choice, the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (K/DOQI) clinical practice guidelines proposes parathyroidectomy should be recommended in hemodialysis patients with severe hyperparathyroidism (persistent serum levels of intact parathyroid hormone (i-PTH) > 800 pg/mL) associated with hypercalcemia and/or hyperphosphatemia and is refractory to medical therapy (2). However, the appropriate therapy to treat SHPT in specific patient groups such as tracheostomized patients has not been clarified.

We report a case of SHPT successfully treated with percutaneous ethanol injection therapy (PEIT) in an elderly tracheostomized hemodialysis patient. After six sessions of PEIT, the serum levels of i-PTH, total calcium, and phosphate were controlled well, and no complications occurred. These findings suggest the use of PEIT for aggressive treatment of SHPT, even in elderly tracheostomized hemodialytic patients.

Case Presentation

A 76-year-old Asian woman had a history of ESRD on maintenance hemodialysis for 8 years. She had undergone tracheostomy 5 years ago for the treatment of subdural hemorrhage-related chronic respiratory failure. In May 2008, the patient was diagnosed
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as severe SHPT, which was characterized by elevated i-PTH (812 pg/mL), hyperphosphatemia (6.3 mg/dL), and hypocalceminemia (8.4 mg/dL). Medical therapy for SHPT was initiated with intravenous administration of active vitamin D (Calcitriol) 1 mcg three times weekly. However, vitamin D-related severe hypercalcemia (19.1 mg/dL) was noted after 2 months. Therefore, the intravenous Calcitriol dosage was reduced to 1 mcg per week. After 5 months of medical treatment, there was no decrease in her serum level of i-PTH. Subsequently, parathyroid sonography and technetium-sestamibi parathyroid scan were performed, revealing a single hyperfunctioning parathyroid gland in the right parathyroid region. Surgical intervention with parathyroidectomy was indicated due to the poor response to medical treatment; however, in light of the surgical and anesthesia-related risks, the patient was referred to our hospital for PEIT.

The laboratory tests conducted on the patient’s arrival revealed the following findings: serum i-PTH, 732 pg/mL; total calcium, 11.3 mg/dL; and phosphate, 4.2 mg/dL. Color Doppler echography of the parathyroid revealed the presence of a large parathyroid adenoma (2.23 cm) (Fig. 1A) with an obvious polar-arch vascularity (Fig. 1B). PEIT was performed with a 22-gauge percutaneous transhepatic cholangiography needle, which was guided by direct real-time ultrasonography (Fig. 2). The patient underwent 6 sessions of PEIT, in two months without complications such as paralysis of the recurrent laryngeal nerve, hematoma, or symptomatic hypocalcemia. Her serum levels of i-PTH (224 pg/mL), total calcium (9.6 mg/dL), and phosphate (4.8 mg/dL) showed an apparent improvement after PEIT and remained within the range proposed by the K/DOQI guidelines until the end of the treatment course.

Discussion

To our knowledge, this is the first case of successful PEIT in the treatment of SHPT in an elderly tracheostomized hemodialytic patient. The serum levels of i-PTH, total calcium, and phosphate were stable in the subsequent outpatient follow-up for 2 years.

Hyperparathyroidism, either secondary or tertiary, is a major complication in patients with ESRD. Although medical treatment has made some advancement, some patients may suffer from drug-resistant hyperparathyroidism, and surgical intervention is the recommended treatment modality for such patients (3, 4). According to the K/DOQI guidelines, parathyroidectomy is recommended in patients presenting with severe hyperparathyroidism associated with hypercalcemia and/or hyperphosphatemia, and unresponsive to medical therapy (2).

![Fig. 1. (A) Parathyroid sonography reveals hypoechoic parathyroid mass (2.23 × 1.84 cm) (B) Color Doppler showed obviously polar arch vascularity. M = parathyroid mass.](image1)

![Fig. 2. Ethanol injection was guided by direct real-time ultrasonography.](image2)

The guidelines also suggest effective surgical therapy can be accomplished by subtotal or total parathyroidectomy with parathyroid tissue autotransplantation. In addition to the indications listed above,
Parathyroidectomy has been recommended in patients with an enlarged parathyroid gland (volume > 500 mm³), high bone-turnover disease, progressive ectopic calcification, calciphylaxis, or anemia resistant to erythropoietin, to prevent cardiovascular complications (5). In the presented case, surgical intervention is necessitated by the enlarged parathyroid adenoma, severe hyperparathyroidism, hyperphosphatemia, hypercalcemia, and unresponsive to medical therapy.

Parathyroidectomy results in an immediate decrease in the serum i-PTH level; however, as with any surgery, there is some degree of operative risk (6). Although thaeostomy is neither a contraindication for parathyroidectomy nor a factor that increases surgical difficulty, the existence of thaeostomy did increase the possibility of postoperative infection (7-9). In one prospective, randomized, controlled trial, Ong et al. found even an extended course of antibiotic therapy did not prevent postoperative pulmonary infections in the thaeostomized patients who underwent head and neck surgery (10). Therefore, the associated immunocompromised status of this hemodialysis patient increased the significance of postoperative infections in the assessment of the therapeutic strategy. Moreover, both the anesthesia-related risks and the advanced age of the present patient were also considered. Based on the classification proposed by the American Society of Anesthesiologists, the physical status of the patient could be classified as class IV (a patient with severe systemic disease that is a constant threat to life) (11). In addition, in cases of elderly patients undergoing parathyroidectomy with bilateral neck exploration, surgical mortality and morbidity have been reported to be as high as 9% (12). Thus, in light of the abovementioned reasons, we chose PEIT to treat the patient’s SHPT.

PEIT was introduced as an alternative therapy to parathyroidectomy (13). The ethanol injection induces coagulation necrosis in the gland and causes local small-vessel thrombosis, thereby resulting in a 50%-80% success rate (14, 15). However, it is less effective in ectopic parathyroid adenoma (16) and severe hyperparathyroidism eventually requires parathyroidectomy. The major concern about ethanol injection before parathyroidectomy is fibrosis and adhesion caused by ethanol-induced inflammation. This would complicate the subsequent surgery and make it even more risky. However, in our experience, the use of real-time ultrasound guidance to position the needle tip at the central portion of the adenoma and minimized extravasation of ethanol ensured PEIT would not complicate subsequent parathyroidectomy (17). In addition, PEIT was probably the best combination for treatment of recurrent and persistent secondary hyperparathyroidism following subtotal parathyroidectomy (18).

Conclusion

PEIT is a safe and effective method for treating SHPT in thaeostomized hemodialysis patients. This approach facilitates the aggressive treatment of SHPT, thereby preventing subsequent complications, even in thaeostomized patients.

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References


