Mediastinal parathyroid adenoma

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Abstract

We present two cases that developed clinical, biochemical and radiological evidences of primary and secondary hyperparathyroidism. In the first case the adenoma was removed through a transcervical incision and in the second case the supernumerary adenoma was removed through sternotomy. Post operatively, patients had normal serum calcium and iPTH with complete disappearance of symptoms.

Introduction

Primary hyperparathyroidism is most commonly due to an adenoma, while hyperplasia is the underlying etiology in secondary hyperparathyroidism. Most adenomas are located in the neck, while a small proportion descend and remain in the mediastinum. Majorities of adenomas can be removed through the cervical incision. But in a small number of patients, mediastinal exploration is needed.

We present two cases in which a deeply located mediastinal adenoma was resected transcervically, while a supernumerary mediastinal adenoma required sternotomy.

Case 1

A 60 year old female with Sheehan's syndrome on replacement therapy presented with generalized bone pain for few months. Systemic review was unremarkable. Basic blood investigations and chemistry were within norml limits. Both serum calcium and iPTH were elevated, 3.0 mmol/L (2.0-2.6) and 1248 pg/mL (15-65), respectively. Neck ultrasound showed a 1 cm nodule in the right thyroid lobe together with a mass at the lower pole of the right thyroid lobe. Technetium Thallium (99m Tc-201 Th) subtraction scintigraphy demonstrated a parathyroid adenoma at the lower pole of right thyroid lobe with suspicion of another one at the upper pole. Neck exploration through a cervical incision revealed a nodule in the right thyroid lobe with normal looking upper parathyroid

gland. Additionally a mediastinal adenoma on the right side of anterior mediastinum was deeply located, below the division of innominate artery into common carotid and subclavian arteries, [Figure 1]. The mass was dissected sharply and delivered intact, together with right lobectomy and isthmectomy. Post-operatively patient developed transient hypocalcemia which was treated with calcium. Histopathology confirmed a parathyroid adenoma and multi nodular goiter.

Case 2

A 29 year old female patient suffering from end stage renal disease (ESRD) secondary to essential hypertension had living unrelated renal transplant. Three months following renal transplant, she had generalized bone pain and soft tissue calcification. Her complete blood count (CBC), renal (graft) function tests, clotting profile and liver function tests were within normal limits. Biochemical tests revealed high serum calcium 3.1 mmol/L (2.0-2.6); low serum phosphorous 0.6 mmo1/L (0.9-1.5); low serum magnesium 0.5 mmo1/L (0.7-1.1); high serum alkaline phosphatase 1264 u/L (64-306) and elevated iPTH 1493 pg/mL (15-65). Neck ultrasound failed to show enlarged parathyroids. Technetium thallium (99mTc-201Th) subtraction scintigraphy demonstrated a large parathyroid ademona at the lower pole of the right lobe of thyroid gland. She was managed with subcutaneous injections of calcitonin 100 units daily resulting in partial lowering of serum calcium. Bilateral neck exploration revealed four normal looking parathyroids. Three and a half parathyroidectomy was performed. We were not convinced that the adenoma was removed. A thorough exploration of the superior mediastinum, carotid sheath, para-oesophageal and retro-oesophageal regions failed to show the adenoma. Frozen sections showed normal parathyroid tissues. Post-operative serum calcium and iPTH were still high. The patient was started on one alpha 4 mcg three times weekly but without benefit since the patient refused any further surgical exploration. Eight months later, she presented with severe generalized aches, big brown tumour of the right mandible and broken left tibia [Figure 2]. Re-evaluation showed high serum calcium, alkaline phosphatase and i-PTH. Sestaemibi parathyroid scan demonstrated the same previous adenoma at the same location [Figure 3]. Magnetic Resonance Imaging (MRI) revealed a 3 cm mass located between innominate bifurcation and apex of right lung, behind right subclavian artery [Figure 4], extending from just behind the right sternoclavicular joint to the thoracic spine. The mass was completely excised through sternotomy with preservation of the right vagus, recurrent laryngeal and phrenic nerves [Figure 5]. [Figure 6] shows the resected adenoma with intact capsule (a) and a yellow cut surface (b).

Post-operatively patient developed right basal atelectasis which resolved with chest physiotherapy and antibiotics. She also developed hungry bone syndrome which was corrected by intravenous calcium infusion. Her serum iPTH returned to normal on 3 rd post operative day. Histopathology confirmed a parathyroid adenoma [Figure 7]. Two months after surgery, her brown tumor of the jaw showed marked spontaneous regression with progressive healing of the tibial fracture.

Discussion

Autonomous hyperpathyroidism is common in patients with ESRD. The treatment of choice is either subtotal parathyoidectomy or total parathyroidectomy with autologus autotransplantation. [1] Surgical resection is the treatment of choice for mediastinal parathyroid adenoma. In the majority of patients, this can be achieved through a transcervical incision. In up to 30% of cases, supernumerary parathyroid glands are present. [2],[3],[4] Most of them are adjacent to the Thymus and are resected through transcervical incision. However, for deeply located adenomas surgical excision with sternotomy, thoracotomy or via video-assisted thoracic surgery (VATS) is required. The advent of accurate pre-operative localization with ultrasound, computed tomography (CT) and Sestamibi scan and the rapid intraoperative PTH assay have changed the traditional four gland exploration to less invasive approaches directed at removal of the abnormal gland. The lower parathyroids with the thymus may be found commonly within the antero superior mediastinum. On the other hand, the superior parathyroids may be located in the posterior mediastinum. [3],[5] Para-oesophageal or retrooesophageal parathyroid tumours arise from superior parathyroid glands, have normal blood supply from the inferior thyroid artery and are not embryologically considered ectopic. [3],[5]

Two percent of mediastinal parathyroid adenomas are situated below the thoracic inlet requiring mediastinal exploration. [6],[7] This exploration can be achieved through sternotomy or thoracotomy with their associated morbidity of up to 21%. [8],[9] These complications include respiratory failure, pneumonia, atrial fibrillation, bleeding, infection and phrenic nerve injury. [10] Preoperative localization is the key to successful parathyroid resection. [11] The sensitivity of US in detecting an adenoma is 60-90%, while Sestamibi scan has a sensitivity of 70-80%. [12] Anatomic localization by CT scan and confirmation of its physiological function as being parathyroid with Sestamibi scanning is ideal. [13] CT/Sestamibi fusion scans (Sestamibi single photon emission computed tomography, Sestamibi SPECT) are now available to facilitate this and allow directed approach with a sensitivity approaching 87%. [12] In the first case, the adenoma was successfully removed through the traditional cervical incision, which is the incision of choice for resecting majority of adenomas located in the mediastinum. In the second case MRI and Sestamibi scan showed the adenoma clearly lying low in the mediastinum which cannot be approached transcervically. Therefore, a sternotomy was done and the adenoma was completely resected with preservation of the surrounding blood vessels and nerves. Post operatively, patient developed chest infection which was treated with antibiotics and chest physiotherapy. VATS is therefore the ideal procedure of choice because of excellent visualization and lower morbidity.

Minimal invasive radio-guided parathyroidectomy (MIRP) with gamma probe is very successful alternative to transcervical parathyroidectomy. [13]

In conclusion, missed or supernumerary mediastinal parathyroid adenomas requires accu rate preoperative localization. Minimal invasive procedures should be offered to patients

to avoid the complications of sternotomy and thoracotomy.

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