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Case Report

Tackling the wanderer: the mouse parathyroids

Manish Munjal, Japneet Kaur*, Amanjit Singh, Amanjot Kaur, Rishi Porshia, Shubham Munjal, Anmol Bains

Department of ENT, DMCH, Ludhiana, Punjab, India

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***Correspondence:**
Dr. Japneet Kaur,
E-mail: drjapneetkaur@gmail.com

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ABSTRACT

Parathyroid surgery in aching, groaning, moaning, presentation has a successful outcome with intraoperative PTH descalating to less than 50% of the preoperative value. The inferior parathyroids are commonly not at the expected location with respect to the thyroids. Surgical pointers and wide exposure are the key to quick access with minimal collateral tissue trauma.

Keywords: Parathyroidectomy, Hyperparathyroidism, Parathyroid gland

INTRODUCTION

The four parathyroids are located in relation to the superior and inferior poles of the lobes of the thyroid, of either side. Adenomas with hyperactivity of any lobe can be identified by the sestambi scan conventionally. MRI imaging assists in localising the adenoma and provides a road map to the same. Ultrasonography is user specific and can be done prior to an MRI. Surgical access to the adenoma via the lateral or the midline approach can identify it, from its fiery red cherry color and an oval shape. Typically the adenoma is in proximity and inferior to the inferior pole of the thyroid. A vein and an artery ligation can wind up the surgery. Quite often the inferior parathyroid adenoma s may be "wandering" and lost beneath the fascial tissues. The overlying tissues obscure the cherry colour of the adenoma. Therefore in these situations a "combing" procedure is suggested. Whereby proceeding from a distal location, the vertebral body/spine is palpated and proceeded towards the inferior pole and upwards as the case may be. A fleshy feel, on the preverterbral region suggests presence of the adenoma and tissue planes have to be further dissected to identify the texture, prior to lifting if out of the bed.[1] In our two representative cases, an inferiorly and a superiorly situated adenoma was traced out, easily. Superior parathyroid glands are found at the cricothyroid junction approximately 1cm superior to the juxtaposition of the recurrent laryngeal nerve (RLN) and the inferior thyroid artery in eighty percent of the cases.

CASE REPORT

Inferiorly placed parathyroid

A 17 year old individual was admitted under urological services with nephrolithiasis serum PTH levels were raised and fluctuating levels of calcium. An oblique incision was given along the anterior border of sternocleidomastoid transecting the superficial fascia with the platysma. A plane developed between the thyroid gland and the carotid sheath. The middle thyroid vein was ligated and the thyroid rotated medially to identify the tracheooesophageal region. The parathyroid could not be discerned in the soft tissues at the area just inferior to inferior pole of the thyroid at the level of the sternoclavicular joint as suggested by the preoperative MRI. Blunt tissue dissection was uneventful.

The fiery red typical appearance of the parathyroid adenoma was not to be seen. Therefore, soft tissues were palpated at the level of the clavicle to identify the vertebral body. The sensitive pulp of the distal digit of the Index finger could discern a fleshy circumscribed tissue deep beneath the investing layer. The oval mass could be rolled over the vertebral body. Under high power loupe magnification, with a sharp dissection a plane was created and a fiery cherry red oval mass 3X2cm could be identified at an inferior site and delivered. Intraoperative PTH level fell from 264 to 131 immediately post operative period and day 1 it was 65. Haemostasis maintained and an indwelling drain inserted. Post extubation vocal cords were mobile. Post operative serum calcium levels were 9.8 (Figure 1).

Figure 1: A) Coronal section showing parathyroid adenoma located inferior to inferior pole of the thyroid, B) Axial section showing parathyroid adenoma located inferior to inferior pole of the thyroid.

Case 2: superiorly placed parathyroid

A 45 year male patient too presented with nephrolithiasis. The results of a physical examination of the head and neck were within the normal limits, and no palpable neck masses were detected but the computed tomography revealed the parathyroid adenoma located superior to the inferior pole of thyroid gland. Preoperative PTH was 164 which fell to 45 on the post operative day 1. Surgical resection was performed using a collar incision, and the tumour was found to originate from the right lower parathyroid gland, with no infiltration into the surrounding structures as the parathyroids were palpated and were found to be at slight superior location to the inferior pole of the thyroid and the superior cornea of the thyroid could be palpated after removal of the adenoma. Grossly, the surgical specimen was 2x3 cm in size (Figure 2). Post extubation vocal cords were mobile.

DISCUSSION

Superior parathyroids are intimately associated with the posterior capsule of the superior thyroid pole, and are usually covered by an extension of the pretracheal fascia which envelopes the thyroid gland and connects it to the hypopharynx, esophagus, and the carotid sheath. The relationship of the superior parathyroid glands with the pretracheal fascia allows the glands a certain freedom of movement under this "pseudocapsule". This feature differentiates the parathyroid glands from thyroid nodules, which cannot move freely, because they are enveloped by the true capsule of the thyroid gland.

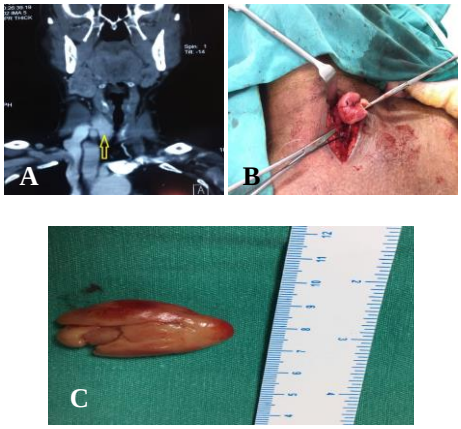

Figure 2: A) parathyroid adenoma located superior to the inferior pole of thyroid gland, B) Intraoperative removal of parathyroid adenoma, C) Removed parathyroid adenoma specimen.

Normal superior parathyroid glands may also be found in the retroesophageal or paraesophageal space in approximately 1% of all instances.[2] These spaces represent the pathways of potential descend of enlarged superior parathyroid glands into the superior and posterior mediastinum.

Emryologically the thymus gland descends from the angle of the mandible to the pericardium, anomalies of migration of the parathymus are responsible for high or low ectopic locations of the inferior parathyroid gland.

Incidence of ectopic inferior parathyroid glands along the carotid sheath, from the angle of the mandible to the lower pole of the thyroid, ranges from 1% to 2%.[3,4] Also, if the separation from the thymus is delayed, the inferior parathyroid gland may be pulled inferiorly into the anterior mediastinum, in which case the thyroid glands are usually within the thymus, at the posterior aspect of its capsule, or still in contact with the great vessels of the mediastinum. Incidence of inferior parathyroids in these locations is noted in 3.9% to 5% of instances.[5,6]

Intraoperatively parathyroid localization can be enhanced by the use of the gamma probe. Radioisotope is injected preoperatively and concentrated within parathyroid tissue and the gamma probe selectively identifies the tissue.[7]

The other intraoperative localization technique utilised is the use of intravenous methylene blue.[8] This involves the preoperative intravenous administration of 5mg/kg methylene blue in saline. The dye is preferentially taken up by the parathyroids particularly when adenomatous or hyperplastic, thus making their identification easier. Intraoperative PTH monitoring (ioPTH) is also a reliable indicator for monitoring successful delivery of parathyroids.[9]

In both of our cases we utilised the cervicovertebral angle, which is the area bordered laterally by the carotid sheath, medially by the trachea and esophagus, anteriorly by the thyroid, and posteriorly by the cervical spine.

This area has the advantage of a tissue plane with relatively little vascularity and fibrosis. This area also allows the examination of the superior mediastinum inferiorly, the retroesophageal compartment medially, and superiorly the hyoid bone, all within planes of dissection that separate with ease.[10]

In the event that parathyroid cannot be located even after bilateral exploration, bilateral thymic delivery and a unilateral total or subtotal lobectomy can be performed. Contralateral lobectomy without definite evidence of an adenoma should not be performed. The wound is washed and closed and imaging studies and a targeted revision procedure are then required to rule out mediastinal location of the ectopic gland.[11]

CONCLUSION

The management of patients with hyperparathyroidism entails a thorough, meticulous approach to diagnosis, treatment planning and development of a comprehensive strategy. Advances in nuclear imaging and facilities to monitor intra-operative serum levels of Parathyroid hormone allow precise surgical approach with minimum morbidity and more accuracy. However, these strategies are merely complimentary and thorough knowledge of surgical anatomy and awareness of various embryological variations is pertinent in deciding the surgical road map for parathyroid surgery.

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