

Failed parathyroidectomy: The road ahead

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ABSTRACT

Persistent hyperparathyroidism due to failed parathyroidectomy is an uncommon but challenging problem as re-operation carries higher complication and failure rates. Re-operations can often be performed via a minimally invasive approach by experienced surgeons after localisation using requisite imaging techniques, the preferred sequence of which is still under evolution. A carefully planned operation with additional adjuncts is of utmost importance as parathyroidectomy remains the only curative treatment option.

Key words: Parathyroidectomy, Re-operative parathyroidectomy

Majority (95%) of patients with primary hyperparathyroidism (HPT) are cured at initial operation by an experienced surgeon. Despite this success rate, persistent and recurrent HPT remain challenging clinical entities. Though it may seem that the variable anatomy of the parathyroid glands and ectopic location of the adenomas may be responsible for failed operations, surprisingly, the most common cause of persistent and recurrent hyperparathyroidism (HPT) after parathyroidectomy is a missed abnormal parathyroid gland.^[1,2] Inexperience on the part of the operating surgeon is a major cause of persistent or recurrent hyperparathyroidism because of the lack of knowledge of parathyroid embryology and knowing the usual and unusual hiding places of the parathyroid glands; failure to recognize and adequately treat multiple-gland disease, failure to locate and excise the ectopically located adenoma, particularly the mediastinal adenoma; presence and persistence of supernumerary glands; errors on frozen-section examination; incomplete excision of invasive parathyroid carcinoma and finally parathyromatosis.

Because re-operative parathyroidectomy has higher complication and failure rates than initial parathyroidectomy,^[3,4] preventing persistent or recurrent HPT by resecting all

adenomas during the initial surgery is important. Preventing failure of parathyroidectomy is important because repeated parathyroid exploration is associated with more complications, including recurrent laryngeal nerve injury and hypocalcemia, and fewer cures compared with initial exploration.^[3,4] In order to reduce the failure rates, the general dictum is that minimally invasive or focused parathyroidectomy should only be done in cases where the imaging (ultrasound and sestamibi) are concordant while in all other cases including familial HPT, bilateral exploration should be done.

Reported cure rate after re-operative parathyroidectomy varies from 87% to 93%.^[2,5] Therefore, these procedures should be undertaken after careful review of previous operative and pathology reports by an experienced surgeon in a center that can provide expert pre-operative localization, intra-operative biochemical monitoring, and cryopreservation of parathyroid tissue. Because gland locations are predictable, experienced surgeons can often perform re-operations via a minimally invasive approach. Imaging studies play a critical role in the re-operative patient. Surgeons should not perform a blind exploration in the re-operative neck because a positive imaging study can almost always be obtained and is a major guide during surgery. The quality of both the imaging studies and their interpretation vary dramatically between institutions, and not all studies are created equally. It is recommended that sequential studies be obtained either by or in close communication with an experienced parathyroid surgeon. The goal of localization through imaging is to obtain an adequate road map to guide the surgeon. Localization procedures supplement this

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information and help direct the re-operative approach. When complementary noninvasive studies, such as ultrasound, sestamibi, and magnetic resonance imaging are negative, equivocal, or discordant, invasive tests (e.g., selective venous sampling for parathyroid hormone levels) are warranted. Intra-operative ultrasound and gamma-probe localization are of questionable value, but intra-operative parathyroid hormone assays help facilitate these challenging repeat dissections. The preferred sequence of imaging continues to evolve, and significant institutional variation exists. Usually, USG and a sestamibi with single photon emission CT. If these are not convincing, a 4-D CT scan has emerged as the next study.

Data on the ability of Tc99m-MIBI-SPECT to detect and localize residual hyperactive parathyroid tissue in patients with persistent primary hyperparathyroidism are particularly scarce. The available literature do suggest that the predictive value of this technique falls dramatically from 80% or higher before initial surgery for single gland disease (SGD) to as low as 50% before re-operative parathyroidectomy for persistent PHPT.^[6-8] Although the precise cause for this remains unclear, it is likely to be multifactorial, and probably includes disturbances in the local vascular supply caused by previous surgery, as well as differences in gland pathology and size ultimately affecting radiopharmaceutical uptake. In view of limitations of pre-operative investigations, a carefully planned operative procedure, often employing additional adjuncts, is critical. Intra-operative PTH assay is one of them. It allows the surgeon to confirm that the incident parathyroid gland removed is the only source of abnormal PTH secretion and thereby terminate the operation, obviating unnecessary and potentially harmful additional exploration. It also permits *ex vivo* aspiration of excised tissue confirming PTH levels that are extraordinarily high (greater than 1000 pg/ml), thus proving that the tissue is a parathyroid gland and not a lymph node or ectopic thyroid tissue. This technique eliminates the need for intra-operative frozen-section consultation, thereby saving time and expense.^[9] In addition, in difficult explorations, one can perform bilateral intra-operative internal jugular vein sampling for PTH to determine whether an ipsilateral gradient is present, thereby guiding the surgeon to the site of the occult parathyroid abnormality.^[10] A variety of other operative adjuncts has been described. These include use of an intra-operative monitoring device to confirm the functional integrity of the recurrent laryngeal nerve (IONM) as well as employment of a gamma probe after the iv administration of technetium-labeled sestamibi.^[11,12]

In the re-operative neck, a lateral approach is frequently employed, mobilizing the plane between the medial borders

of the ipsilateral sternocleidomastoid muscle and the lateral border of the strap muscles.^[13] Patients who have sufficiently convincing pre-operative imaging are candidates for a minimally invasive parathyroidectomy, even in the re-operative setting. Although a variety of techniques have been developed, employing regional anesthesia (cervical block) in the conscious but sedated patient, thereby permitting to follow the quality of the patient's voice (recurrent nerve function) during surgery.^[14]

Although controversy exists regarding indications for re-operative treatment for persistent or recurrent HPT, parathyroidectomy remains the only curative treatment option. Surgery should be considered first-line treatment in most circumstances.

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