



# **PEDIATRIC SURGERY Update** © **Vol. 51 No. 05 NOVEMBER 2018**

## **Graves Postoperative Hypocalcemia**

Grave's thyrotoxicosis is initially managed with antithyroid blocking agents, followed by surgery and/or radioiodine therapy. In children if medical therapy fails, total thyroidectomy is the next treatment of choice. Overall the most common complication after total thyroidectomy is hypocalcemia or tetany which occurs with a greater incidence in patients with Graves disease when compared with the same procedure in children with nodular disease or thyroid cancer. Most cases of postop hypocalcemia are transient with less than 5% permanent. Several mechanisms for the development of hypocalcemia in Graves disease after total thyroidectomy are proposed. They include parathyroid hormone (PTH) insufficiency related to injury, devascularization or inadvertent removal of the parathyroid glands. Also, increase release of thyrocalcitonin during gland manipulation. This are not the principal mechanisms of hypocalcemia. The most principal mechanism of hypocalcemia after Graves thyroidectomy is rapid reversal of an osteodystrophy that existed before surgery caused by the elevated thyroid hormone level. Grave's children develop a negative calcium level and loss of bone in the hyperthyroid state something that is partially reversed with antithyroid blocking therapy known as recalcification tetany or hungry bone syndrome. When the excess secretion of hormone is eliminated with surgery the extent of bone restoration will be replenish with calcium hence lowering the ionized calcium blood levels and causing symptoms of tetany. With excess hormone there is reduced calcium bowel absorption in addition to bone resorption due to osteoclast activation and loss of calcium in the urine. Also, antithyroid drug therapy causes calcium and vitamin D deficiency. Twofold increase rate of a negative calcium slope in the first six hours after surgery or very low iPTH levels ( $< 10$  pg/ml) predicts severe hypocalcemia. Risk factors that enhance the state of postop hypocalcemia are younger age and obesity. Preoperative calcium supplementation for Graves children before surgery replenishes calcium body stores and reduces symptomatic hypocalcemia. Teriparatide (PTH 1-34) therapy in post-thyroidectomy patients can control and prevent symptomatic hypocalcemia and reduce hospitalization (THYPOS trial).

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## Non-invasive Thyroid Follicular Neoplasm

Papillary thyroid cancer (PTC) is the most common histologic thyroid cancer in children. Follicular thyroid carcinoma (FC) is the second most common thyroid cancer in children occurring less than 5% of the time. FC is associated with TSH elevation, iodine deficiency areas and radiation exposure. FC is a tumor composed of neoplastic follicles rather than papilla but with follicular cells showing nuclear features characteristic of papillary thyroid carcinoma. Two subtypes of FC are recognized: encapsulated or minimally invasive FTC and widely invasive FC. Encapsulated FC has increased its incidence during the past 10 years. It is a tumor with an indolent behavior. In 2012 the National Cancer Institute revised this pathology and determined to call it Non-invasive follicular neoplasm with papillary-like nuclear features (NIFTP) if it reflected the following characteristics: follicular growth pattern, lack of invasion, nuclear features of papillary carcinoma comprising less than 1% of the tumor, absent psammoma calcifications, the lesion had clonal origin determined by findings a driver mutation (biologically a neoplasm) and a very low risk of adverse outcome. NIFTP also has a lack of common somatic mutation like BRAF and/or RAS. Studies have found that NIFTP has a low recurrent rate over the years, low metastatic rate, can be managed with lobectomy only obviating the need for completion thyroidectomy and subsequent radio-iodine therapy. This proposed reclassification will reduce overtreatment of this condition and the psychological and clinical consequences associated with a diagnosis of cancer. NIFTP is a surgical disease and its diagnosis can only be rendered upon excision and depends totally on adequate or entire sampling of the interface between tumor and its capsule/periphery to exclude invasive characteristics. To ensure a lack of infiltrative or invasive growth the entire tumor capsule/periphery should be submitted for histologic evaluation. A diagnosis of NIFTP cannot be rendered using fine needle aspiration cytology only. Lymph nodes metastasis are incompatible with NIFTP.

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## Renovascular Hypertension

Renovascular hypertension (RVH) in children if untreated leads to ischemic nephropathy, chronic kidney disease, myocardial infarction, stroke and encephalopathy. RVH is defined as high blood pressure which results from a lesion reducing blood flow to part or all of one or both of the kidneys associated with alteration in the renin-angiotensin mechanism. Incidental hypertension in an asymptomatic child is the most common presentation of RVH. Younger children are more likely to have neurological sequelae like seizures, left ventricular hypertrophy, congestive heart failure, lethargy or poor growth. The most common cause of RVH in children is renal artery stenosis caused by fibromuscular hyperplasia (FMH) and Takayasu arteritis. Syndromes such as Neurofibromatosis, Williams, tuberous sclerosis and vasculitis comprised other less common causes of RVH. FMH is a non-atherosclerotic, non-inflammatory idiopathic angiopathy affecting medium-size arteries. Mid-aortic syndrome is another etiology of RVH referring to localized narrowing of the distal thoracic or abdominal aorta involving the renal vessels as well. Diagnosis of RVH includes Doppler ultrasound, CT-angiography Scan and MRI, though digital subtraction angiography is the gold standard. More than 50% of RVH arterial lesions are bilateral. Management of RVH entails medical, surgical or endovascular options. Medical management only has the least opportunity of cure. Surgical management includes revascularization, bypass or nephrectomy. Endovascular options developed in the adult population are increasing use in children. This endovascular options include mainly percutaneous balloon angioplasty. The use of stents is reserved for severe or recurrent stenosis or management of complications. Open surgical intervention has a higher rate of cure higher than 70%. Angioplasty is often utilized for short arterial narrowing while open surgery is used for long diffuse arterial narrowing or complete occlusion of renal arteries. Residual hypertension is found in one-third of the children managed surgically or percutaneously. Other postop morbidity includes aortic rupture, dissection, bleeding, thrombosis and graft stenosis. Management should be individualized.

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