Perioperative Management of Symptomatic Hyperthyroidism due to Graves Disease in a 10-Year-Old Child Presenting for Total Thyroidectomy

T. Pessin, M.D., A. Borucki, M.D., I. Tkachenko, M.D.
Comer Children’s Hospital, The University of Chicago Medical Center

Introduction

Hyperthyroidism in the pediatric population is rare and is nearly always due to Graves’ disease. Anti-thyroid medications are the first line treatment. If these fail or patients are unable to tolerate radioactive iodine therapy, thyrotoxicosis is the treatment of choice. Goals of perioperative management of these patients include: induction of a euthyroid or hypothyroid state with medications preoperatively, performing a sympathetic-attenuating anesthetic technique, and observing for signs of thyrotoxicosis.

Case Presentation

A ten-year old female with history of mild persistent asthma presented for total thyroidectomy due to symptomatic hyperthyroidism. Her symptoms included a midline neck mass, weight loss, increased appetite, hair loss, palpitations, dysphagia, and heat intolerance. Labs revealed TSH of 0.01, free T4 of 3.19. Ultrasound of the thyroid revealed enlarged right and left lobes with diffuse echogenicities. Biopsy of the thyroid revealed Graves disease. She was initially started on methimazole and developed a severe rash, and later also developed an allergic rash on oral potassium iodide drops (SSKI).

The patient was admitted five days prior to surgery for an allergy pretreatment regimen, SSKI and titration of propranolol. Propranolol was titrated up to 40 mg BID to achieve heart rates less than 100 bpm.

Preoperative vitals were: BP=113/59, HR =109, RR = 22, SpO2=100%. There were no signs of airway compromise or compressive symptoms. Anesthesia was induced with a combination of sevoflurane, propofol, and fentanyl to achieve a deep plane of anesthesia. The trachea was sprayed with 4% lidocaine prior to intubation. Sevoflurane was used for maintenance. Vecuronium was titrated to train of four monitoring. Metoprolol was titrated as needed to treat tachycardia. Bronchosospasm did not occur intraoperatively. The thyroid was excised, and the patient was successfully extubated upon completion of the procedure. She was discharged home on postoperative day one.

Discussion

One of the foremost concerns in the hyperthyroid pediatric patient presenting for surgery, is the potential for precipitation of thyrotoxicosis or “thyroid storm” secondary to physiologic stress response. Prevention and early recognition of thyroid storm are paramount, as mortality can be up to 20-30%.

Preoperatively, both symptoms and biochemical markers direct anti-thyroid treatment to maintain a euthyroid state. In pediatric patients, risks of therapy may outweigh benefits, especially for propylthiouracil which is associated with liver toxicity and propranolol which can provoke bronchoconstriction. Intraoperative management includes continuation of beta-blocker therapy, minimizing sympathetic stimulation, and observing for signs of thyrotoxicosis such as tachycardia, hyperpyrexia, acidosis, and cardiac arrest.

Thyrotoxicosis can be misdiagnosed as malignant hyperthermia, both as result in a highly sympathomimetic state. Differences suggesting thyroid storm include: less than expected acidosis, decreased creatinine phosphokinase, and lack of response to dantrolene. Thyrotoxicosis treatment includes decreasing production and peripheral conversion of thyroid hormones, antagonizing peripheral adrenergic effects, and supportive therapy.

Conclusion

The anesthetic management of pediatric patients undergoing thyroidectomy for symptomatic hyperthyroidism consists of preoperative attainment of euthyroid state, limitation of sympathetic stimulation, and intraoperative vigilance for signs of thyrotoxicosis.

References