Title:

Does the Use of Pre-operative SSKI Actually Reduce Vascularity and Improve Surgical Outcomes for Total Thyroidectomy in Graves' Disease?

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Research/Protocol Hypothesis

We hypothesize that the pre-operative use of SSKI (potassium iodide oral solution) reduces the hypervascularity of the thyroid gland in Graves' disease patients undergoing total thyroidectomy, thus reducing blood loss, operative time, and complications.

Scientific Abstract

Patients with Graves' disease who undergo total thyroidectomy are often treated with a 7-14 day pre-operative course of SSKI. This concentrated solution of potassium iodide not only helps to convert patients from a hyperthyroid to euthyroid state, but also is thought to reduce the vascularity of the thyroid gland for surgery. However, there is no published literature evaluating whether there is a true quantitative decrease in vascularity with SSKI treatment. In this prospective, randomized study, we aim to quantify if there is any change in vascular flow with SSKI treatment and if this difference results in a clinically significant difference in surgical outcomes.

Methods

Patients will be randomized into two treatment groups – those who receive SSKI for 7 days before surgery and those who do not. To assess vascular flow within the thyroid gland, all patients will get a baseline neck ultrasound when evaluated in the office, as well as a second ultrasound in the operating room before surgery. Using 3D imaging software, we will quantify the vascular flow in the ultrasound images and compare baseline images with the OR images to assess if there is a difference in vascular flow between these timepoints. Other endpoints we will measure are: estimated blood loss in surgery, total operative time, postoperative complications including rates of recurrent laryngeal nerve injury, hypoparathyroidism, hematoma, infection rates.

Study Description

Study Purpose and Rationale

Patients with Graves' disease and goiters tend to have very vascular thyroid glands, which increases operative bleeding risks/rates. Many surgeons treat these patients with preoperative SSKI which is believed to decrease the vascularity, which in turn may decrease bleeding risks. However, there has been no quantitative data published on whether this is a real effect with true clinical benefit, in either animal or human models with SSKI. There have been some studies in Europe studying Lugol's solution, a different formulation of iodine, which show some decreased vascularity using color Doppler or measurements of CD34 cells (1,2).

Study Design & Procedures

All patients would receive a baseline neck ultrasound on our initial office consultation. We do our own office ultrasounds to assess the pathology ourselves. In this study we would standardize

all patients to have a baseline ultrasound with us to obtain vascular flow imaging no less than 7 days prior to surgery.

Patients would be randomized to either receive 7 days of pre-operative SSKI or not receive any drug (in our current practice at Columbia, all patients with Graves' disease receive SSKI pre-operatively, though this is not standard practice across the country, thus the 'no drug' group would be experimental for research). Prescriptions will be written by the surgeon and filled by the patient at an outside pharmacy.

All patients would receive a second ultrasound on the operating table before surgery to assess for change in vascularity (experimental, as not all patients receive intra-operative ultrasounds before surgery). Both ultrasounds are performed by the surgeon and there is no additional charge for this test.

We would record estimated blood loss, operative length, and other complication rates such as recurrent laryngeal nerve injury, hypoparathyroidism, hematoma, infection (these rates are already recorded for all patients).

Any post-operative procedures and data collection will be standard of care. We will review consented patients' chart if there are any post-op complications. If there are no complications, the data collection will be complete at their post-op appointment.

Study Drugs or Devices

SSKI is potassium iodide oral solution. It is a concentrated form of potassium iodide containing 1g/ml. It is commonly used for lung conditions such as emphysema, bronchitis and works as an expectorant. It works by thinning mucous secretions (phlegm) in the lungs.

Saturated solutions of potassium iodide can be used for hyperthyroidism or thyroid storm, as high amounts of iodide temporarily suppress secretion of thyroxine from the thyroid gland.

Ultrasound will be used to take images of thyroid to measure thyroid volumes, as well as take images of the vascular flow in each lobe of the gland.

Using 3D imaging software, we will quantify the vascular flow in the ultrasound images and compare baseline images with the OR images to assess if there is a difference in vascular flow between these timepoints.

Study Subjects

Inclusion criteria: All patients with Graves' disease who will be undergoing total thyroidectomy.

Exclusion criteria: Age less than 18, previous RAI therapy, previous treatment with SSKI.

Our goal recruitment number for this pilot study is 30 patients.

Statistical Analysis

We believe that a decrease in vascularity of at least 10% would be clinically significant. In order to demonstrate this amount of difference, our pilot study would be adequately powered with at least 40 patients to show a difference of 11% between the two treatment arms. Utilizing the program “Power and Sample Size Calculation v 3.0.43”, a power analysis was conducted setting type I error at 0.05, Power at 0.8, and an experiment to control arm ratio of 2:1. In order to detect a clinically significant change of 10% vascularity in the gland, 20 patients will need to be included in the experimental arm and 10 patients in the control arm.

References

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2. Ansaldo GL, Pretolesi F, Varaldo E, et al Doppler evaluation of intrathyroid arterial resistances during preoperative treatment with Lugol's iodide solution in patients with diffuse