LASER PHOTOCOAGULATION OF BENIGN THYROID NODULES IS NOT FIRST-LINE THERAPY IN MOST PATIENTS

Døssing H, Bennedbæk, FN, Hegedüs, L. Long-term outcome following interstitial laser photocoagulation of benign cold thyroid nodules. Eur J Endocrinol 2011;165:123-8. Epub May 6, 2011.

BACKGROUND

Benign nodular thyroid disease is very common in adults. Approximately 20% to 30% of patients who undergo needle biopsy of a solitary nodule will have thyroid surgery for the treatment of thyroid carcinoma or for the diagnosis of cytologically indeterminate or suspicious lesions (1,2). The remaining 70% to 80% of patients with a solitary thyroid nodule are usually treated nonsurgically. If the nodule is especially large, growing, or associated with compressive symptoms, then thyroid surgery is the standard treatment (3), but there are alternative therapies, including percutaneous alcohol ablation, radiofrequency and interstitial laser photocoagulation (ILP). The purpose of this study is to evaluate the long-term efficacy of ILP treatment to reduce the volume of benign thyroid nodules.

METHODS AND RESULTS

During the 9-year period ending in 2008, 78 euthyroid patients with a solitary, solid, scintigraphically cold and cytologically benign nodule were treated with ILP therapy. All patients reported local obstructive symptoms or had cosmetic concerns. All patients had normal thyrotropin (TSH) levels, from 0.3 to 4.0 mU/ ml and a negative basal calcitonin level. Using a 12-MHz linear ultrasound probe with a needle guide, a laser fiber 0.4 mm in diameter was guided into the thyroid nodule through the lumen of an 18-gauge needle. After the needle tip was confirmed to be within the nodule, the needle was withdrawn 2 cm, leaving the end of the laser fiber in direct contact with the tissue. During laser treatment with an output power from 1.5 to 3.5 W using a continuouswave infrared (820 nm) diode laser, necrosis of the tissue was visible as an irregular echogenic area that increased in volume over the treatment time. When the echogenic area stopped increasing in size, the laser fiber was placed in another part of the nodule; this was repeated until all the accessible parts of the nodule were treated.

Using ultrasonography, the nodule volume was calculated before and after the treatment. The overall median nodule volume decreased from 8.2 ml (range, 2 to 25.9) before treatment to 3.5 ml (range, 0.6 to 17.6) after 12 months (P<0.001) and 4.1 ml (range, 0.6 to 33) at the end of the study (P = 0.001). There was a median reduction in nodule volume of 51% (-195% to 95%). The median treatment duration of the ILP was 900 seconds (range, 292 to 2400), with an overall median energy deposited of 2100 J (range, 438 to 7200), corresponding to 242 J/ml of nodule (range, 21 to 960). There was no significant correlation between thermal energy deposited per nodule volume or the treatment time and the reduction in nodule volume. Using regression analysis, the initial size of the nodule could not predict a successful outcome, but there was a trend for a larger fractional reduction in the size of the nodules that were initially <10 ml. Six of the 78 patients had thyroid surgery 6 months after ILP and 3 patients were lost to follow-up. The mean length of follow-up for the remaining 69 patients was 67 months (range, 12 to 114). An additional 21 patients had thyroid surgery at 12 to 24 months because of an unsatisfactory response. Thus, 27 of 75 patients (36%) required surgery despite having undergone ILP. Initially, 74 patients had pressure symptoms; 84% resolved after ILP. A total of 46 patients had cosmetic symptoms that eventually disappeared in 72%. Both the pressure symptoms and the cosmetic symptoms corrected with nodule-volume reduction after ILP. The serum TSH and antithyroid peroxidase antibody levels did not change during follow-up. The only side effect was moderate pain in 33% of patients that lasted up to 4 days and was alleviated with mild analgesics. None of the patients had vocal-cord palsy, hypocalcemia, hypothyroidism, local infection, or hematoma. The treatment was well tolerated, and all but 1 patient said they would undergo another ILP treatment if offered.

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CONCLUSIONS

Ultrasound-guided ILP results in good reduction in pressure symptoms in 84% of patients and reduction of cosmetic symptoms in 72% with a benign solitary solid, cold thyroid nodule. The median reduction in

nodule volume was 51% and was best in nodules <10 ml in size. Thyroid function remained normal, and no complications occurred as a result of the treatment other than moderate pain for up to 4 days.

COMMENTARY • • • • •

Ultrasound-guided ILP results in apparently good reduction in pressure symptoms and volume of benign solitary solid, cold thyroid nodules. The reduction in size was not predictable, and ultimately 36% of patients required thyroidectomy despite having undergone ILP because of an unsatisfactory response. The median reduction in nodule volume was 51%, but the median treatment time was 15 minutes and could last up to 40 minutes with local anesthesia without sedation. This is a very long time for the clinician and for the patient in a busy clinic.

This therapy seems somewhat unpredictable, as the volume reduction was not associated with the time of therapy, the joules delivered, or the size of the nodule. Finally, the therapy worked best for smaller nodules that medically are not usually necessary to remove. The specialized, expensive laser equipment, time to treat, and use of an 18-gauge needle will limit this treatment to specialized centers. It might be considered in patients who are medically unstable for surgery or who refuse surgery.

- Stephanie L. Lee, MD, PhD

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