

Ultrasound Guided Single Dose Percutaneous Ethanol Injection of Benign Cystic and Mixed Solid and Cystic Thyroid Nodules

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The management of benign cystic and mixed solid and cystic thyroid nodules remains controversial. We intended to evaluate the effect of ultrasound guided single dose percutaneous ethanol injection in the treatment of benign cystic and mixed solid and cystic thyroid nodules. We studied 12 patients with purely cystic and 20 patients with mixed solid and cystic thyroid nodules demonstrated by ultrasonography. The diameter of the nodules and the thyroid functions of the patients were recorded. Under direct sonographic control a 20-gauge needle was inserted into the nodule and material was aspirated. Then 96% sterile ethanol was injected on the basis of the aspirated fluid volume. The patients were reevaluated 1, 2, 3 and 6 months later. The mean diameter of the cystic thyroid nodules was 35.5 ± 8.0 mm before the treatment and was 10.3 ± 4.0 mm 6 months later. The difference was statistically significant ($p < 0.001$). The mean diameter of the mixed thyroid nodules was 28.5 ± 6.0 mm before the treatment and was 24.8 ± 6.0 mm 6 months later. The difference wasn't significant ($p > 0.5$). We concluded that ultrasound guided single dose percutaneous ethanol injection is a safe, low-cost and effective procedure in the treatment of benign cystic thyroid nodules.

Key words: Percutaneous ethanol injection, cystic and mixed thyroid nodules

Introduction

Thyroid nodules have been found to occur in 4% or more of the general population (1-3). Six percent to 25% of hypofunctioning thyroid nodules have been found to be purely cystic and 12% mixed solid and cystic (3-5). Such lesions are most often benign, although thyroid carcinoma may occasionally present as a purely cystic nodule (6). The management of benign cystic and mixed solid and cystic thyroid nodules remains controversial. Aspiration, thyroidectomy and percutaneous ethanol injection (PEI) are treatment modalities used for those nodules (7-10).

Ultrasound guided PEI was first proposed by Livraghi in 1990 as a possible therapy for autonomously functioning thyroid nodules. The procedure is performed on out-patients, is rapid, there is no need of anaesthesia and is low-cost. In cystic nodules complete fluid removal is performed, and thereafter ethanol is injected on the basis of the aspirated fluid volume. PEI is significantly superior to aspiration alone in inducing volume reduction of cystic thyroid nodules, and the recurrence rate is only 2.5-5% (10).

We intended to evaluate the effect of ultrasound guided single dose PEI in the treatment of benign cystic and mixed solid and cystic thyroid nodules.

Materials and Methods

Twelve patients with purely cystic and 20 patients with mixed solid and cystic thyroid nodules

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demonstrated by ultrasonography were included in the study. The patients were not given any therapy before. The patients were given information about the procedure. The diameter of the nodules and the thyroid functions of the patients were recorded. Under direct sonographic control a 20-gauge needle was inserted into the nodule and material was aspirated with the patient supine, neck extended. No local anesthetic was used. Then 96% sterile ethanol was injected on the basis of the aspirated fluid volume. Ultrasound examination and PEI procedure were carried out by the same operator using a real-time scanner (Toshiba Tosbee, Otawara-shi, Tochigi-Ken, Japan) with a 7.5-MHz probe. The patients were reevaluated 1, 2, 3 and 6 months later.

Values are given as mean \pm standard deviation. Student's t-test was used for statistical analysis. A p value lower than 0.05 was accepted as meaningful.

Results

The mean age of the patients with cystic nodules was 37.8 \pm 8.9 years and the mean age of the patients with mixed nodules was 35.8 \pm 7.2 years. Prior to PEI, malignancy was ruled out by fine needle aspiration in all patients.

In the cystic group, the mean free T4 was 14.2 \pm 2.2 pmol/L and the mean TSH was 1.2 \pm 0.3 mU/L. In the mixed group, the mean free T4 was 15.2 \pm 3.4 pmol/L and the mean TSH was 1.9 \pm 0.5 mU/L. Any significant difference was not found in the investigation of thyroid function tests in the following evaluations.

The patients did not have a complication of the procedure. No patients had grossly bloody aspirates.

The mean diameter of the cystic thyroid nodules was 35.5 \pm 8.0 mm before the treatment, was 12.2 \pm 3.0 mm 1 months later, was 11.3 \pm 3.0 mm 2 months later, was 10.5 \pm 5.0 mm 3 months later, and was 10.3 \pm 4.0 mm 6 months later. The difference between the mean diameter calculated before the treatment and that calculated 6 months later was statistically significant ($p < 0.001$). The mean diameter of the mixed thyroid nodules was 28.5 \pm 6.0 mm before the treatment, was 26.3 \pm 6.0 mm 1 months later, was 25.5 \pm 5.0 mm 2 months later, was 25.3 \pm 3.0 mm 3 months later, and was 24.8 \pm 6.0 mm 6 months later. The difference between the mean diameter

calculated before the treatment and that calculated 6 months later wasn't significant ($p > 0.5$). The mean diameters calculated in both groups and the comparison of those values are shown in Figure 1.

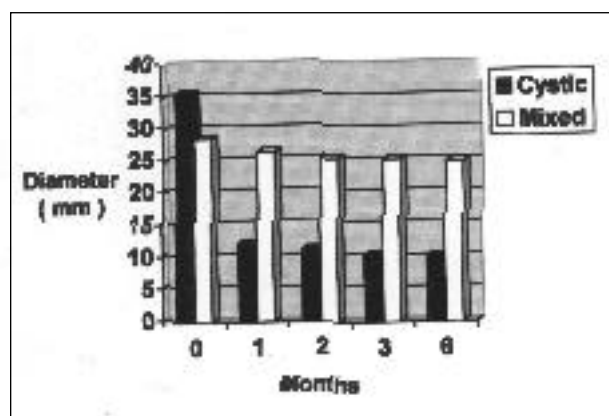


Figure 1. The mean diameters calculated in the cystic and mixed thyroid nodules

Discussion

The management of benign cystic and mixed solid and cystic thyroid nodules remains controversial. Six percent to 25% of hypofunctioning thyroid nodules have been found to be purely cystic and 12% mixed solid and cystic (3-5). We investigated 185 patients with nodular goiter. In our series, 20% of the patients with multiple nodules had cystic nodules and 13.4% of the patients with solitary nodules had cystic nodules (11).

Percutaneous aspiration for thyroid cysts have been used for diagnosis and treatment for many years. Aspiration therapy has been reported to result in a cure in 20% to 90% of cases (3,7,9,12,13).

In 1966, Crile recommended aspiration for treatment of thyroid cysts (12). In 1973, Crile and Hawk first noted the use of a sclerosing agent (sodium tetradecyl sulfate) for thyroid cysts (4).

Another agent used for the treatment of recurrent thyroid cysts is tetracycline (5,14,15). Goldfarb et al (5) obtained a 95% success rate by using this agent.

Zingrillo (7) and Verde (9) examined the efficacy and safety of ultrasound guided percutaneous ethanol injection for the treatment of cystic thyroid nodules. Both of the authors had a success rate of 85%. Recently PEI has been used in the management of solid thyroid nodules. Zingrillo et al (16) studied

the effect of PEI in the treatment of cold, benign, large ($p > 10$ mL) thyroid nodules in 41 patients who either refused surgery or were at poor surgical risk. They observed a significant nodule volume reduction without differences between solid or mixed cold benign nodules. Caraccio et al (17) and Bennedbaek et al (18) studied the effect of PEI in the treatment of benign solid cold thyroid nodules, and they obtained good results similar to Caraccio et al's. We investigated the role of ultrasound guided PEI for the treatment of mixed solid and cystic thyroid nodules in addition to purely cystic nodules. In contrast to the results of the studies mentioned above, mixed nodules did not show a reduction in size after PEI in our study. PEI might result to degeneration of the epithelial tissue in the cystic nodules. Probably parenchymal tissue might not be affected from ethanol in the mixed nodules. We performed PEI in one single dose similar to the studies of Bennedbaek et al (15) and Monzani et al (19). Many other investigators have performed multiple injections of ethanol in the solid and mixed nodules. But our aim was to investigate the effect of single dose PEI in the cystic and mixed thyroid nodules. So, we concluded that ultrasound guided single dose PEI is a safe, low-cost and effective procedure in the treatment of cystic thyroid nodules.

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