

PERCUTANEOUS ETHANOL INJECTION: A NON-SURGICAL APPROACH TO MANAGING BENIGN CYSTIC THYROID NODULES - INSIGHTS FROM A CANADIAN PUBLIC HEALTHCARE EXPERIENCE

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INTRODUCTION

There exist many treatment options for benign cystic thyroid nodules including percutaneous ethanol injection (PEI); however, the gold standard for treating such nodules is elusive, varying across countries according to their particularized guidelines and experiences^{1,2}.

AIM

On account of PEI's seldom use in Canada's public healthcare system, our study aims to evaluate its efficacy and safety in treating benign cystic and benign predominantly cystic thyroid nodules, as well as its economic advantages when compared to alternative modalities.

METHODS

Study Design

- This is a single-center prospective study conducted at the Jewish General Hospital in Montreal, Canada, between February 2021 and October 2022.
- 25 patients with benign cystic or benign predominantly cystic nodules underwent PEI.
- Patients were evaluated 1, 6, and 12 months after treatment, and compressive symptoms, aesthetic complaints, volume reduction of cystic portion of the post-treatment nodule, and complications were recorded and reviewed.

PEI Technique³

1. Under ultrasound guidance, insert a 16-20 G needle into the center of the cystic area using a trans-isthmus approach.
2. Aspirate as much internal fluid as possible and remove residual debris or colloids by saline irrigation.
3. Slowly inject an appropriate amount of 95-99% ethanol into the cystic space (usually around 50% of the aspirate volume).
4. If necessary, re-aspirate ethanol for pain relief.

RESULTS

Pre-Treatment Assessment

- Average score of 5/10 for compressive symptoms and 3.5 for aesthetic concerns reported on a visual analog scale
- 50% of patients had a visible nodule in their neck
- Mean size of nodules was 3.78 cm (range=2.6 cm-10.2 cm), and 90% were predominantly cystic

Post-Treatment Assessment

- One month (n=25): 44% of patients no longer had a cystic component, 94% of patients no longer had compressive symptoms or aesthetic concerns, mean volume reduction was 40.1% (range=20%-80%)
- 6 months: (n=25) 57% of patients no longer had a cystic component, 100% of patients no longer had compressive symptoms or aesthetic concerns, mean volume reduction was 65% (range=50-80%), 43% of patients received a second treatment
- 12 months (n=15): 100% of patients no longer had a cystic component, compressive symptoms or aesthetic concerns, mean volume reduction was 75% (range=60%-90%)

Cost Comparison

- Uneventful hemithyroidectomy cost: \$6168.51
- PEI cost: \$332.27/injection
- Cost savings/patient in Quebec's public healthcare system: \$5503.97 (assuming optimal non-surgical treatment comprises 2 PEIs)
- Concomitant complications of a hemithyroidectomy result in lost productivity, prolonged hospitalization, medications, and follow-up consultations

CONCLUSION

Our study suggests that PEI is an effective and safe alternative to more costly procedures for treating benign cystic and predominantly cystic thyroid nodules. In the Canadian public health care system, averting futile surgery represents significant cost savings for provincial governments while simultaneously improving patient quality of life.

Initial Injection

- Mean volume of ethanol injected was 4.2 mL
- Mean volume drained was 13.08 mL
- No complications

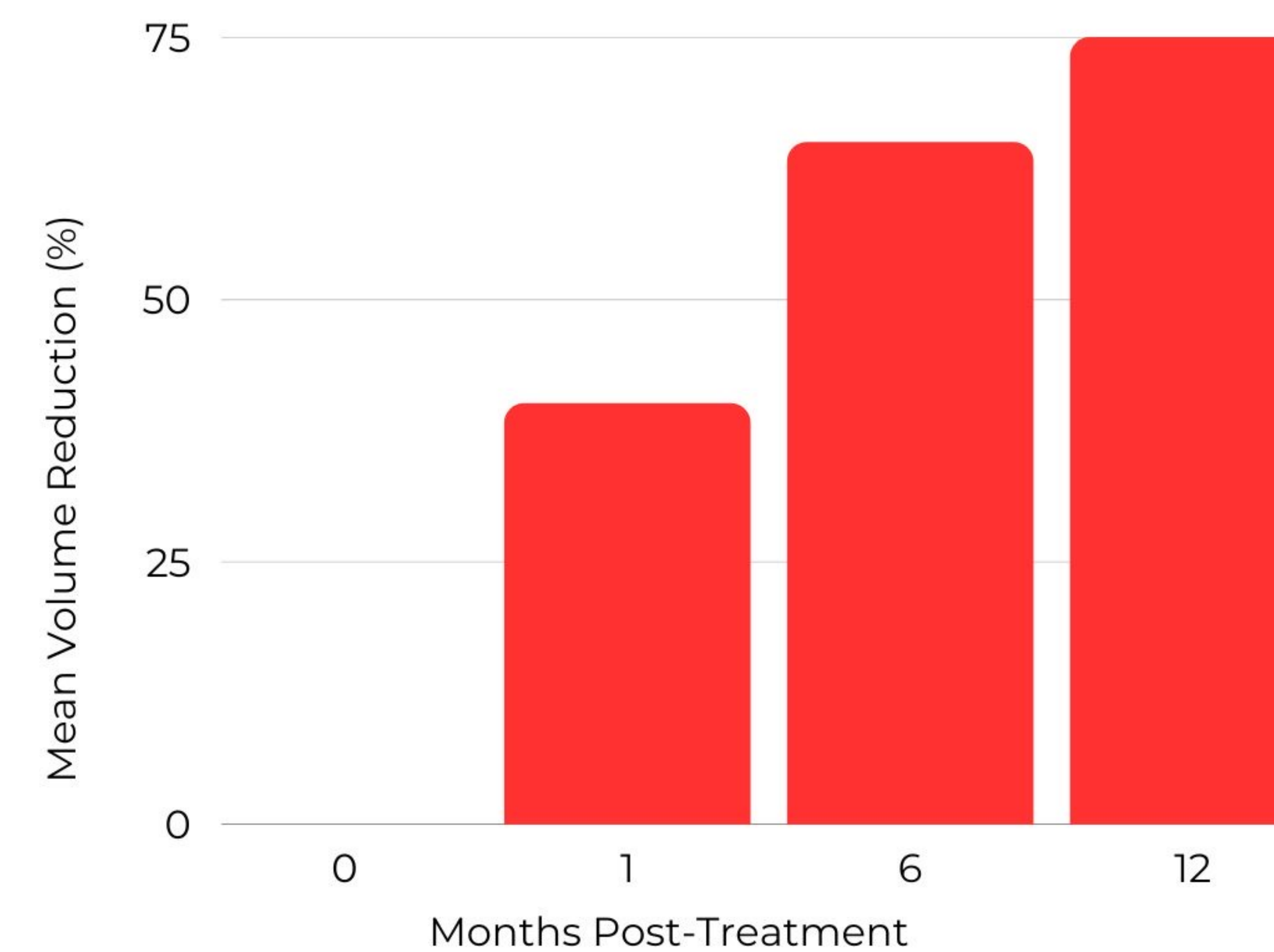


Figure 1. Average volume reduction of cystic portion of the nodule on ultrasound at 1, 6, and 12 months after initial injection

DISCUSSION

- Our study demonstrated that 6 months post-treatment, at least 50% volume reduction was achieved without recurrence, as well as complete resolution of compressive symptoms and aesthetic concerns.
- Mean volume reduction was highest for purely cystic nodules (85%-95%) and lowest for predominantly cystic nodules with a solid component (<20%).
- No adverse events were recorded with initial injection and second injection, when applicable.
- Four RCTs cited in the 2015 American Thyroid Association guidelines reported success rates for PEI ranging from 75% to 85% when compared to placebo⁴.
- The Quebec government achieved substantial cost savings of \$5503.97 per patient, while simultaneously enhancing their quality of life.

STUDY LIMITATIONS

- Small sample size
- Optimal volume of ethanol injection and duration between treatments are contentious in the literature
- Study timeline coincides with the COVID-19 pandemic

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