

Effectiveness of single-session ultrasound-guided percutaneous ethanol sclerotherapy in simple breast cysts

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PURPOSE

We aimed to evaluate the effectiveness of single-session ultrasound-guided percutaneous ethanol sclerotherapy in simple breast cysts.

METHODS

From January 2002 to January 2014, 35 simple breast cysts (mean volume, 8.2 mL; range, 4–33 mL) in 28 females (mean age, 39 years) were evaluated. In a single session, all cysts were aspirated using 20G needles, refilled with 99% ethanol (90% of the volume of the aspirated fluid), and reaspirated completely after 10 minutes of exposure under ultrasound guidance. Follow-up ultrasonography examinations were performed at one week, one month, three months, and six months for all patients and 12 months, 18 months, and 24 months for available patients. Follow-up duration varied between 6 and 24 months (mean, 15 months).

RESULTS

The technical success rate of ultrasound-guided percutaneous ethanol sclerotherapy was 97%. The needle tip was dislocated and ethanol was given into the breast parenchyma in one patient (3%). One cyst (3%) was reaspirated at the first week follow-up due to intracystic hemorrhage. Of the 34 cysts treated, 25 (74%) completely responded to therapy and were no longer detectable on follow-up examinations. Eight cysts (24%) significantly decreased in size and then completely disappeared at six months. At the end of the follow-up period, the clinical success rate reached 100%, and none of the cysts were visible. Except mild to moderate sensation of burning or pain which disappeared or subsided significantly in a couple of minutes, no other complications were observed in patients.

CONCLUSION

Ultrasound-guided ethanol sclerotherapy is a fast, safe, and highly effective method in the treatment of simple breast cysts.

Simple breast cysts are common findings on breast imaging (1, 2). Ultrasonography is sufficient to make the diagnosis of a simple cyst when the following criteria are met: an anechoic lesion with very thin walls and posterior acoustic enhancement. Since these lesions do not have a malignant potential, routine follow-up without any intervention is suggested (1–4). When a woman with breast cyst suffers of lump, pain, and/or anxiety, aspiration of the cyst could be performed for symptomatic relief (2, 4). However, since recurrence rates of up to 80% were reported after aspiration of simple breast cysts, minimally invasive treatments such as postaspiration injection of air or other sclerosing agents such as ethanol and detergent sclerosing solutions were conducted as alternative regimens (5–8). The purpose of this study was to evaluate the outcomes of ultrasound-guided single-session ethanol sclerotherapy of simple breast cysts.

Methods

Informed consent was obtained from all patients before ethanol sclerotherapy. In addition, the ethics committee at our institution approved this retrospective study.

From January 2002 to January 2014, 35 simple breast cysts in 28 females were treated. Mean volume of the cysts was 8.2 ± 3.7 mL (range, 4–33 mL). Mean age of patients was 39 ± 6 years (range, 21–54 years). Twenty-two patients had a single cyst, five patients had two cysts, and one patient had three cysts. Symptoms were lump (19 cysts in 17 patients, 61%) and pain (9 cysts in 8 patients, 29%). Three patients were asymptomatic.

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A simple breast cyst was defined as an anechoic, fluid-filled space with imperceptible walls with or without very thin septa showing posterior acoustic enhancement on ultrasonography. Thirty-three cysts were palpable at manual examination. None of the cysts had been treated before. Hormonal status and medication history of the patients were disregarded. Patients with simple cysts ≥ 4 mL in volume requesting treatment were asked to have either sclerotherapy or simple aspiration, and all cysts were treated upon patients' requests including asymptomatic ones.

Multiple ultrasound machines (Logiq 200 Pro, Logiq 5, or Logiq 9, General Electric; iU22, Philips; Aixplorer, SuperSonic Imagine) with 10 to 15 MHz linear transducers were used. Exact location of the cysts was noted by using clock face localization, distance from the nipple and distance from the skin surface. The size of each cyst was calculated by multiplying the three orthogonal diameters by 0.5, before and after sclerotherapy.

No premedication or local anesthetic medication was used. The apparatus used for sclerotherapy consisted of one empty injector, one injector filled with absolute alcohol, and a stopcock (Fig. 1). Under sterile conditions, a 20G needle was introduced into cyst cavity under real-time ultrasound guidance (Fig. 2a). Most of the cyst volume was aspirated until a minimum safe residual volume was achieved with needle in it (Fig.

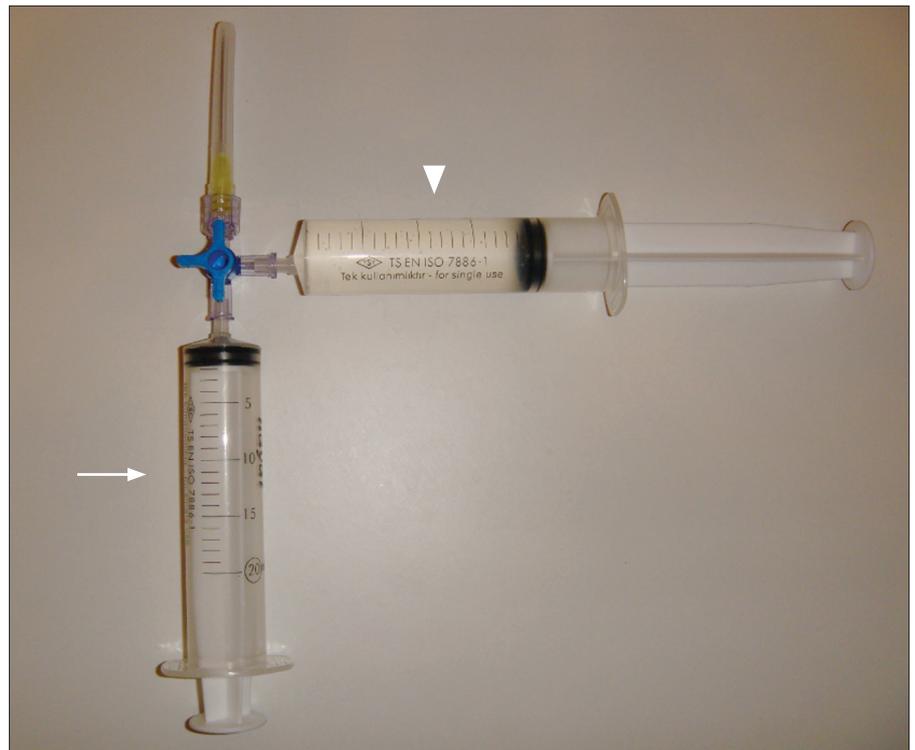


Figure 1. Apparatus for sclerotherapy. Most of the cyst volume is aspirated with the empty injector (arrow) and then alcohol (90% of the volume of the aspirated fluid) is given into cavity via the stopcock attached to the injector filled with alcohol (arrowhead).

2b). Without removal of the needle, 99% ethanol (90% of the volume of the aspirated fluid) was given into cavity under ultrasound guidance using a three-way stopcock (Fig. 2c). The cysts were reaspirated completely after 10 minutes of exposure (Fig. 2d). The aspirates of the initial 21 cysts were examined cytologically, whereas the rest of the aspirates were not. The same radiologist performed all procedures and measurements. Follow-up ultrasonography examinations were also performed by the same radiologist at one week, one month, three months, and six months for all patients and 12 months, 18 months, and 24 months for available patients. Mean time of observation was 15 ± 3 months (range, 6–24 months).

Results

The procedure was technically successful in all but one patient (97%). The needle tip was dislocated outside the residual cyst cavity after the initial aspiration and less than 0.5 mL of ethanol was given into the breast parenchyma in one patient. The patient suffered from mild pain in the injection area, which subsided in ten minutes. No medication was needed. The cyst in this patient was not visible at follow-ups.

In another patient, a recurrent hypoechoic cyst having almost the same volume of the initial cyst with some debris and mobile echoes in it was seen at the first week follow-up. This cyst was totally aspirated under ultrasound guidance. The aspirated brownish colored fluid was sent for cytologic examination. Hemorrhage was diagnosed with no sign of malignant disease. During 24 months of follow-up no cystic or solid breast lesion was diagnosed in this patient.

Of the 34 cysts treated successfully with ethanol, 25 (74%; mean volume, 6.6 ± 1.9 mL; range, 4–11 mL) completely responded to therapy and were never seen on follow-up examinations. Eight cysts (24%) significantly decreased in size from a mean volume of 12.9 ± 4.3 mL (range, 7–33 mL) to 1.4 ± 0.5 mL with an 89% mean volume loss (Fig. 2e). Residual volume of these cysts reached its maximum at first week follow-up in seven cysts and at first month follow-up in two cysts. Mean maximum residual volume of all cysts treated was 0.4 mL with a 95% mean volume loss. None of the cysts were visible at six-month follow-up.

Mild to moderate sensation of burning or pain was observed in all but one patient and it disappeared or subsided significant-

Main points

- Prior to sclerotherapy, exact location of the cysts is noted to correctly differentiate a recurrence from a nearby pre-existing and/or newly developed cyst.
- Subtotal aspiration of the cyst before alcohol injection needs to be performed carefully so that tip of the needle remains in the cyst cavity.
- Real-time ultrasound guidance is needed especially in the beginning of alcohol injection so that injection into the cyst cavity is confirmed and accidental injection into breast parenchyma is limited if it happens.
- In our study most of the treated cysts showed complete immediate response and the rest became invisible within six months.
- Single-session percutaneous ultrasound-guided alcohol sclerotherapy is a fast, safe and highly effective method in the treatment of simple breast cysts.

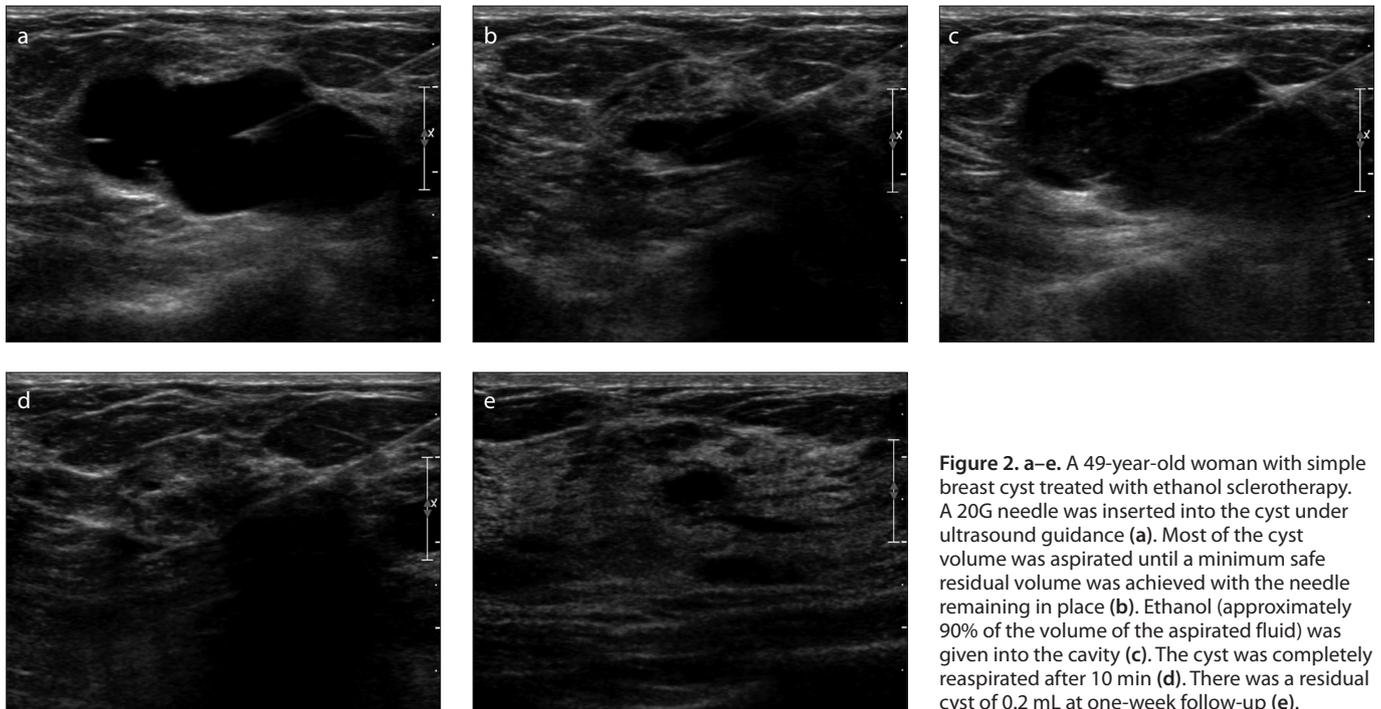


Figure 2. a–e. A 49-year-old woman with simple breast cyst treated with ethanol sclerotherapy. A 20G needle was inserted into the cyst under ultrasound guidance (a). Most of the cyst volume was aspirated until a minimum safe residual volume was achieved with the needle remaining in place (b). Ethanol (approximately 90% of the volume of the aspirated fluid) was given into the cavity (c). The cyst was completely reaspirated after 10 min (d). There was a residual cyst of 0.2 mL at one-week follow-up (e).

ly in a couple of minutes. No other local or systemic complications were observed in any patients. No medication was needed. Out of eight patients complaining of pain, five became asymptomatic, two mentioned significant relief, whereas no change in pain was noted in one. None of the aspirates were bloody. The aspirate of the initial 21 cysts sent for cytologic examination came back negative for malignancy.

Discussion

Our results suggest that single-session percutaneous ultrasound-guided alcohol sclerotherapy is a fast and highly effective method in the treatment of simple breast cysts. It also seems to be a very safe choice of treatment when some basic rules of sclerotherapy procedure are followed.

Cysts are among the most common type of breast masses. Simple cysts are epithelium-lined, fluid-filled, round or oval structures that are thought to occur secondary to obstructed ducts and could be seen in 37.5% of the first round of screening ultrasonography exams (1, 2). This percentage may increase over the years and/or in symptomatic patients. Peak incidence is between the ages of 35 and 50 years (1–4). Although natural history of cysts is to develop and regress, in a given year, up to 12% of the cysts may increase in size (9). Since simple cysts are mostly asymptomatic and have no malignant potential,

routine follow-up without intervention is suggested (1–4). If a woman with breast cyst suffers of lump, pain or anxiety, aspiration of the cyst could be performed for symptomatic relief (2–4).

Simple aspiration of the breast cysts with or without imaging guidance has been used to treat this common entity for decades (10). However, since recurrence rates of up to 80% were reported after aspiration of simple breast cysts, minimally invasive treatments such as postaspiration injection of air or sclerosing agents such as ethanol and sclerosing detergents were conducted as alternative regimens (5–8). Although higher success rates were reported in studies conducted at pre-ultrasound era, 84% success rate was reported with postaspiration injection of air in comparison to 20% success rate with simple aspiration in a comparative study using ultrasonography (5). Injection of air into cyst cavities is not a routine procedure in most practices, however.

To our knowledge, there are two studies regarding sclerotherapy of simple breast cysts. In one study, authors reported a complete success rate of 40% and significant decrease in cyst size in 53% of the cysts after postaspiration injection of absolute alcohol into cyst cavities (7). They found that alcohol injection into cyst cavities produces collapse and fibrosis, thus reducing its recurrence. However, they performed

sclerotherapy on recurrent breast cysts and did not aspirate the absolute alcohol injected into the cyst cavity. In the other study, a detergent sclerosing solution was injected after aspiration of the simple breast cysts (8). They also performed the treatment on recurrent breast cysts and did not aspirate the injected sclerosing agent. In a 36-month follow-up they reported a recurrence rate of 2%. However, their findings seem somewhat questionable for us since they lacked precise sonographic localization of the cysts and mentioned that the two recurrent cysts had a 0.2 mm diameter at the 12-month follow-up, which is beyond the current reach of the breast ultrasound resolution.

Image-guided alcohol sclerotherapy has been used to treat simple renal cysts and liver cysts, as well as cystic thyroid and parathyroid nodules with considerably high success rates for a very long time and is considered as a safe and effective method with few side effects (11–15). This study is similar in many ways to the treatment efforts for renal and liver cysts involving treatment of simple cysts by single-session sclerotherapy using alcohol and reaspiration of the cavity. Our method could also be considered as a simple adaptation of PAIR (puncture, aspiration, injection, and reaspiration) technique used in the treatment of small hydatid cysts of the liver (16). However, to the best of our knowledge, this type of alcohol sclerother-

apy was not performed in the treatment of simple breast cysts before.

Here, we present a 97% technical success rate. We also present an immediate complete success rate of 74% in the treatment of simple breast cysts, while achieving 89% mean volume loss in residual cystic cavities. A 100% clinical success rate was achieved at six months, with one reaspiration due to intracystic hemorrhage performed at first week follow-up. Such minor complications may occur even spontaneously in breast cysts and could be observed in daily practice. Although we had the first 21 aspirates examined cytologically, since cytologic exam has been no longer suggested for simple aspirates, we discarded the rest to avoid false-positive results (1–4).

Our experience showed that there were some important issues in practicing sclerotherapy of breast cysts. First, exact location of the cysts should be noted to correctly differentiate a recurrence from a nearby pre-existing and/or a newly developed cyst. Second, subtotal aspiration of the cyst before alcohol injection should be performed carefully so that tip of the needle should remain in the cyst cavity while adequate amount of the fluid is aspirated. When we calculated total volume of the cysts by the formula ([volume of the first aspiration + volume of aspiration after alcohol injection] – volume of injected alcohol), we found that more than 90% of the cyst volume could be aspirated with a safe residual volume left. This would result in an approximate alcohol concentration of 90% in the cavity after injection. Therefore, previously reported practices with injection of sclerotic agent after total aspiration of cysts may be unnecessarily challenging (7, 8). Third, careful real-time ultrasound guidance is needed especially in the beginning of alcohol injection so that injection into the cyst cavity is confirmed; accidental injection into the breast parenchyma should be limited if it happens. Large amounts of absolute

alcohol injected into the breast parenchyma may result in tissue necrosis. Besides the abovementioned issues, neither the previous studies nor the present study documented any major complication in sclerotherapy of simple breast cysts.

This study has some limitations. First, we performed this method as a first-line treatment. Therefore, success of this procedure may be different in recurrent cysts. Second, this study has no control group to compare with natural prognosis or prognosis of the breast cysts that were simply aspirated. Finally, our follow-up time may not be sufficient to assess the long-term effects of this procedure.

In conclusion, our results suggest that single-session percutaneous ultrasound-guided alcohol sclerotherapy is a fast, safe, and highly effective method in the treatment of simple breast cysts and might be used as the first therapeutic option in symptomatic patients. Further studies with control groups and longer follow-up are needed to assess the effectiveness and long-term effects of this method.

Conflict of interest disclosure

The author declared no conflicts of interest.

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