

Paper I

SINGLE-SESSION ALCOHOL SCLEROTHERAPY IN BENIGN SYMPTOMATIC HEPATIC CYSTS

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Abstract

Purpose: To evaluate the results of single-session alcohol sclerotherapy in benign symptomatic liver cysts.

Material and Methods: Ten cysts (volume 200–4800 ml) in 10 patients were treated by percutaneous catheterization and injection of 96% ethanol at a dose of 10% of the cyst volume but never more than 100 ml. The treatment was applied for a maximum of 20 min, after which the alcohol and catheter were removed.

Results: A satisfactory reduction in cyst volume was achieved in all patients. In 8 patients there was a re-accumulation of fluid during the first period after therapy, followed by a significant reduction in volume on later follow-up examinations. Except for pain, there were no complications.

Conclusion: Sclerotherapy as a single-session procedure resulted in a significant reduction in cyst volume in all 10 patients. The postprocedural re-accumulation of fluid seen in 8 patients proved to be temporary. It was not necessary to repeat the sclerotherapy procedure in any patient.

Key words: Liver, cysts; interventional procedure; sclerotherapy.

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Simple hepatic cysts are usually unilocular, lined by a single layer of cuboidal bile duct epithelium (6). They represent remnants of biliary ducts that do not communicate with the biliary tree (17). The cysts are congenital or developmental in origin and they gradually increase in size during lifetime. The small liver cysts seldom cause clinical symptoms but the larger cysts may cause hepatomegaly, pain, local bulging, cosmetic problems, early satiety, biliary duct compression or acute abdominal symptoms from cystic rupture (to mention only the most important symptoms and signs) (5, 8, 10, 16, 17). Aspiration without the use of a sclerosing agent results in the recurrence of all liver cysts within 2 years (12). Therefore – until the introduction of the method of percutaneous sclerotherapy – surgery has been the only method of definite treatment. A body of favorable results with percutaneous sclerotherapy has been reported (1, 3, 4, 7, 9, 11, 13–15, 17). However, there has not been sufficient investigation into

whether it is really necessary to repeat sclerotherapy procedures in a great proportion of the patients, as claimed by some authors (1, 17). Our experience with the first patient in our series (Table 1, case 4) led us to suggest that a postprocedural pattern of partial collection of fluid, followed later by a fluid resorption, might be common in the majority of patients. The conclusion that a single-session procedure would be sufficient, even if the postprocedural refilling of the cyst was significant, would represent progress in procedural practice. This was the main topic of the present investigation.

Material and Methods

During the period 1993–1995, we treated 10 symptomatic liver cysts in 10 patients (9 women and 1 man, aged 33–82 years, mean 61 years). The cyst volumes ranged from 200 ml to 4800 ml (mean 1375 ml). The time of observation was 7.8–42.0

Table 1

Ten patients treated by single-session alcohol sclerotherapy, ranged according to cyst volume

Pat/Age/Sex	Presenting symptoms*	Original volume, ml	Final volume, ml	Follow-up, months
1/63/F	A, B	4800	959	7
2/69/M	A, B	2700	212	18
3/82/F	A, B	2000	0	17
4/71/F ⁺	A, B, E	1752	1	42
5/38/F	A, B, C	680	29	8
6/61/F	A, B, C	680	27	12
7/76/F	A	450	0	14
8/74/F	A	275	0	17
9/40/F	A, D	210	42	11
10/33/F	A, B	200	1	15
Mean values		1375	126**	17.3

* A: Upper abdominal pain. B: Upper abdominal mass. C: Biliary duct compression. D: Early satiety. E: Abdominal emergency due to rupture of the cyst.

** Mean volume reduction 90.8% (range 77–100%).

⁺ The first patient treated.

months, mean 17.3 months (Table 1, Fig. 1). Patient data were registered prospectively.

The symptoms and signs were: abdominal pain in all 10 patients; local mass in 7; biliary duct compression in 2; and early satiety caused by compression of the stomach and the duodenum in 1 patient (Table 1). One woman (aged 70 years) was admitted as an abdominal emergency with clinical signs of peritonitis. Laparotomy revealed the spontaneous rupture of a large cyst in the right lobe of the liver. Thirty-six days later the fluid in the cyst had re-accumulated to a volume of 1752 ml, and sclerotherapy was performed (Table 1, case 4).

Only 1 patient had 1 solitary cyst. The number of cysts in the other patients were: 4 cysts in 1 patient; 10–20 cysts in 4 patients; 21–40 cysts in 2 patients; and more than 40 cysts in 2 patients.

None of the patients had polycystic kidney disease. Some small cysts were seen in the kidneys in 2 of the patients; but none in the remaining 8 patients.

Volume measurement of the cysts was made either by measuring the cystic content when the cyst was drained or by calculating the volume by measuring the greatest diameter (d1) of the cyst and 2 diameters (d2 and d3) as near to 90° to d1 as possible. Then the volume of the cyst was calculated according to the formula for the volume (V) of an ellipsoid: $V = d1 \times d2 \times d3 \times 0.523$. Either CT or ultrasonography (2) examinations were used for these measurements.

A diagnostic emptying of the cyst was considered necessary in patient 10 because the relationship between the cyst and the clinical symptoms was uncer-

tain. When the cystic fluid re-accumulated, the symptoms re-appeared. The indication for therapy was then obvious.

Coagulopathy, communication between the cyst and the biliary tree, extravasation of contrast medium into the peritoneal cavity, and failure to aspirate the injected contrast medium were considered contra-indications to sclerotherapy.

Liver function tests were made before and after the procedure.

The patients were admitted to hospital the day before or early in the morning on the same day as the procedure was performed. A dose of 50–100 mg of pethidine and 0.6 mg of atropine were injected i.m. 30–45 min before the procedure. The patient was placed on an angiographic table. Under ultrasound guidance, the needle tip was placed into the cyst. A 1.2-mm-diameter 20-cm-long needle (Cook SDN 18-20-T) was usually preferred. The puncture was made through 1–3 cm of liver tissue in order to reduce the possibility of leakage from the cyst. Then a stiff Amplatz guide wire (Meda, Amplatz extra stiff, 90 cm) was introduced into the cyst, initially under ultrasonographic guidance and immediately continued by fluoroscopic control. After dilatation with a 2.3-mm dilator, a 2.3-mm-diameter 30-cm-long pig-tail catheter (PBN Medicals, Denmark) was pushed into the cyst as far as possible. The catheter was fixed to the skin by multiple strips of strong adhesive tape to secure its position during patient movement. Fluid was collected for cytology or bacteriological examination.

After the complete emptying of the cyst, an injection of Omnipaque 300 mg I/ml mixed with an

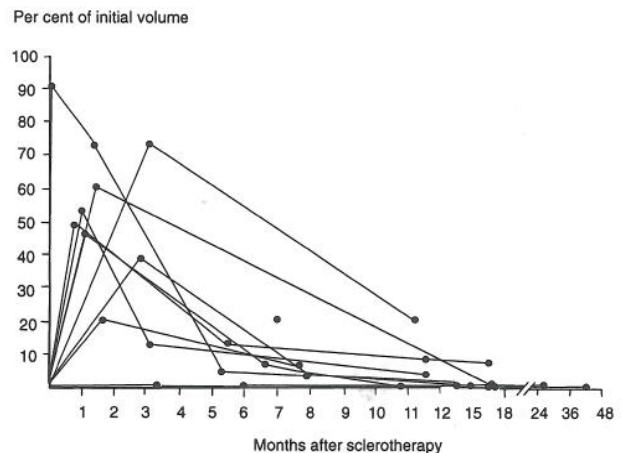


Fig. 1. Cyst volume in 10 patients following single-session percutaneous alcohol sclerotherapy. In 8 patients a new postprocedural collection of fluid in the cyst was seen which was followed by a satisfactory reduction in cyst volume in all 8 patients. In all 10 patients, a satisfactory volume reduction was achieved.

equal volume of saline was given, and radiographs were taken in different positions. This was done in order to ensure that there was: no communication with the biliary ducts; no leakage of contrast medium into the peritoneal cavity; and no problems regarding aspiration of the injected contrast agent. Then 96% ethanol was injected into the cyst. The volume of alcohol was 10% of the cyst volume but never more than 100 ml (9, 12). Each patient slowly changed position twice, from supine to prone in both clockwise and anti-clockwise directions, in order to ensure contact between the alcohol and every aspect of the cystic wall.

In 7 patients, the alcohol was left in the cyst for 10 min, after which all alcohol was evacuated. Then the same amount of alcohol was injected again – for another 10 min – during the same session. Thus the total time of exposure to alcohol was 20 min. In 3 patients, the alcohol was injected only once – for 7, 8 and 10 min respectively – because the patients experienced pain during the procedure.

The catheter position was checked repeatedly by fluoroscopy during the procedure. All alcohol was evacuated and the catheter was then removed immediately under continuous aspiration in order to minimize the possibility of alcohol leakage into the peritoneum. After the procedure, the patient rested in bed for 4 h. The patients were all hospitalized for at least 24 h.

For cyst volume control, CT was preferred in cases of multiple cysts. Ultrasonography was considered an acceptable method when there were few cysts.

Results

Cyst volume before treatment was 200–4800 ml (mean 1375 ml) and after treatment 0–966 ml (mean 126 ml). Volume reduction was 77–100% (mean 90.8%) (Table 1). In 9 patients, the cyst volume was

checked 2 or more times after sclerotherapy. In 8 of these patients, a common pattern of postprocedural re-accumulation of cystic fluid was seen which was later followed by a satisfactory volume reduction (Fig. 1). This pattern was first seen in our first patient (case 4). She had a 1752-ml cyst in the right liver lobe (Fig. 2a) and 24 days after sclerotherapy there was a new collection of fluid in the cyst, 45% of the original volume (Fig. 2b). At 7 months after the procedure, the volume was 105 ml and at 17 months only 1 ml – a volume reduction of approximately 100% (Fig. 2c).

In patient 7, there was no documentation of re-accumulation of fluid after sclerotherapy because the volume reduction was 99% at 3, 6 and 13 months after the procedure.

In patient 1, the cyst volume was checked only once after therapy, at 7.1 months. At that time the volume was 959 ml, 20% of the original 4800 ml. On ultrasonography at this time, a network of echodense structures was seen within the cyst, a known sign of efficient sclerotherapy (9). On doubtful indication, liver resection was performed in this patient 1 month later. Histology found a pronounced fibrosis in the cystic wall.

During or immediately after alcohol instillation, pain was severe in 1 patient, moderate in 4, slight in 4, and not present in 1. There were no other complications.

Eight patients experienced improvement of their clinical symptoms after sclerotherapy. The remaining 2 patients were treated surgically despite sclerotherapy having reduced the cystic volume: in patient 1 sclerotherapy of the 4800-ml cyst resulted 7 months later in a volume reduction of 80%. Pain and hepatomegaly were the main indications for therapy in this patient. Her symptoms did not improve convincingly after sclerotherapy, and her abdominal discomfort was also unchanged after liver resection performed 8 months after sclerotherapy.



Fig. 2. Patient 4, a woman aged 71 years. a) The 1752-ml cyst was exposed to alcohol for 7 min. b) At 24 days after sclerotherapy, a new collection of fluid in the cyst was seen. The cyst volume was 854 ml, 45% of the original volume. c) At 17 months after sclerotherapy, the remnant of the cyst (→) was seen only in this CT image. Volume reduction was close to 100%.

Table 2
Hepatic cyst treatment in the literature

Authors, year	Cysts/patients	Sessions/cyst	Alcohol exposure, min	Maximum alcohol volume, ml	Success rate, %
van Sonnenberg et al., 1994	14/*	1-11	20-30	33-50% of cyst volume	88
Andersson et al., 1989	9/9	1-8	10-20	100	89
Bean & Rodan, 1985	6/6	1	20	200	100
Kairaluoma et al., 1989	15/8	1-2**	60	100	100
Larssen et al., 1997 (present investigation)	10/10	1	20	100	100

* 24 cysts in 20 patients treated: 14 with alcohol alone; 10 with tetracycline, doxycycline or a combination of alcohol and tetracycline or doxycycline.

** Cysts treated twice in the first 2 patients and once in the following 6.

Sclerotherapy did not result in abnormalities in the liver function tests in any patient.

Discussion

In a retrospective study, VAN SONNENBERG et al. (17) treated 24 symptomatic cysts in 20 patients: 10 with tetracycline, doxycycline or a combination of alcohol and tetracycline or doxycycline; 14 cysts were treated by alcohol alone. In more than half of these cysts, prolonged catheter drainage and 2 or more injections of alcohol (Table 2) were used. The routine in their investigation was to always leave the catheter in place for drainage. If more than 10-15 ml of fluid was produced by the next day, the sclerotherapy procedure was repeated - if necessary several times - until fluid production had stopped. In 1 case sclerotherapy was repeated 11 times over a period of 44 days. ANDERSSON et al. (1) performed 3.2 procedures per cyst in 9 cysts in 9 patients (range 1-8 procedures per cyst).

Our results correspond well with the results of KAIRALUOMA et al. (9) who treated 15 cysts in 8 patients. Only in their first 2 patients was the sclerotherapy procedure repeated 1 or 2 months after the initial procedure. They found that in larger cysts there was an initial, temporary, new collection of fluid during the first 2 months after sclerotherapy. The cysts then decreased in size for at least 2 years. Owing to this experience, sclerotherapy was performed only once in their next 6 patients, with satisfactory results in all cases. Similar results were reported by BEAN & RODAN (3). KAIRALUOMA et al. injected alcohol 3 times consecutively and we injected alcohol twice consecutively during the same session. In this context these procedural variants are all defined as single-session treatments.

The difference in procedural practice between VAN SONNENBERG et al. (17) and ANDERSSON et al. (1) on one side, and KAIRALUOMA et al. (9), BEAN & RO-

DAN (3) and us on the other side, is probably due to a difference in interpretation as regards the significance of the postprocedural fluid production and as regards the observation time needed to decide whether the sclerotherapy procedure has failed or not. In our patients a pattern of temporary increase in volume was seen in 8 patients. In case 8, the volume of the cyst was 91% of the original volume again 1 day after the procedure, but 5 months later the volume was reduced to 4% and 17 months later to 2% of the original volume.

The alcohol concentration in the blood was measured 1 h after the procedure in 5 of our patients. Because of the low values of alcohol (0.0-0.3 ‰) and because this aspect has been sufficiently investigated by other authors, this test was omitted in the rest of the patients. In large cysts, KAIRALUOMA et al. (9) applied the same volume of alcohol as we did but for 3 times 20 min, i.e. a total of 60 min of exposure time to alcohol during one session. This might explain why the alcohol concentration in the blood in their material was higher than that reported by others: it was elevated in all patients immediately after the procedure (maximum value 1.02 ‰).

Conclusion: In this prospective series, alcohol sclerotherapy was performed as a single-session procedure and proved to be successful in achieving a satisfactory reduction in cyst volume in 10 cysts in 10 patients. A pattern of postprocedural re-accumulation of fluid in the cyst, followed by volume reduction, was seen in 8 out of 10 patients. Contrary to some other authors (1, 17), we conclude that repetition of the sclerotherapy procedure after the first day of treatment is only rarely required.

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