Percutaneous Aspiration and Alcohol Sclerotherapy for Symptomatic Hepatic Cysts

An Alternative to Surgical Intervention

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Eight patients with 15 symptomatic nonneoplastic congenital hepatic cysts underwent ultrasound-guided percutaneous aspiration and temporary injection of 99% ethanol into the cyst. All cysts were treated at least twice at the same sitting. The volume of alcohol injected varied from 20 to 100 ml, depending on the size of the cyst. A cure was usually achieved with one alcohol sclerotherapy treatment. Only minor side effects such as transient pain and temperature elevation occurred. No recurrences were found during a follow-up period of 12 to 32 months. The results indicate that aspiration and alcohol sclerotherapy is a feasible alternative to surgical intervention in patients with symptomatic nonneoplastic congenital hepatic cysts. We recommend it as the treatment of choice in cases with high surgical risk or polycystic liver disease.

ULTRASOUND (US) AND COMPUTED TOMOGRAPHY (CT) have revealed that the prevalence of hepatic cysts is higher than previously suspected, and occasionally these cysts become large enough to be symptomatic.[1,2] Aspiration alone has not been effective for preventing recurrence,[3] and thus surgical intervention has so far been the only effective treatment available.[4] This entails considerable morbidity, however, and occasionally death. Bean and Rodan have recently reported that aspiration and injection of alcohol could be the treatment of choice for symptomatic congenital cysts.[5]

In November 1985, an elderly woman aged 81 years with a large symptomatic hepatic cyst of volume 2100 ml was referred to our clinic for surgical treatment. She was considered a poor surgical risk, however, and instead ultrasound-guided percutaneous aspiration with temporary ethanol injection was performed as the definitive treatment, with excellent results. Since then we have prospectively treated all patients with symptomatic congenital nonneoplastic hepatic cysts with aspiration sclerotherapy. Eight patients with 15 symptomatic hepatic cysts treated successfully by this method form the material for the present report.

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Patients and Methods

Eight patients (seven women and one man, aged 25 to 87 years) with 15 symptomatic nonneoplastic congenital hepatic cysts were prospectively treated by ultrasound-guided percutaneous aspiration and temporary injection of alcohol into the cyst at Oulu University Central Hospital between November 1985 and June 1987. Four patients had a solitary hepatic cyst and the other four patients had polycystic liver disease. One patient also had polycystic kidneys but normal renal function. One patient with polycystic liver disease had previously undergone a decompressive unroofing procedure for a large symptomatic hepatic cyst at our clinic. All patients had epigastric pain caused by the cysts (Table 1).

A careful traveling history was taken and a thorough examination with US, CT, and laboratory examinations was used to rule out parasitic and neoplastic liver cysts. The diagnosis was made by ultrasonography (US) and confirmed by computed tomography (CT), from which

the diameters of the cysts were measured. Hematologic values (hemoglobin, hematocrit, and leucocyte count), liver and renal function tests, and clotting factors (bleeding and prothrombin time, and activated partial thromboplastin time) were normal in all patients.

The procedure was performed as described by Bean and Rodan[5] in 1985. All patients were admitted to the hospital for treatment and were given 50 mg pethidine hydrochloride and 0.5 mg atropine sulphate subcutaneously as premedication. After local analgesia of the puncture site with 1% lidocaine hydrochloride, a small incision was made.

First a 270 mm, 19G Lunderqvist PTC needle® with a sheath of 4.87 × 250 mm (Meadox Surgimed A/S, Denmark) was passed into the cyst using real-time ultrasound guidance with a 3.75-MHZ convex transducer (Toshiba 77, Toshiba Corp., Japan). Twenty milliliters of fluid was aspirated from the cyst cavity and sent to the laboratory for cytologic and bacteriologic examination. Then a 110-cm, 0.035-inch diameter Lunderqvist guide wire with a 7-cm flexible tip® (Meadox Surgimed A/S, Denmark) was introduced through the needle into the cyst cavity and the needle was withdrawn. Using the Seldinger technique, a 40-cm, 6 French Drainage catheter with loop technique® (Angiomed, West Germany) was placed in the cyst and the remaining fluid was aspirated and its volume measured. The time required for emptying the cyst cavity depended on the size of the cyst. The largest cyst, volume 8100 ml, was emptied slowly over 24 hours. A radiograph of the cyst was obtained after injection of contrast medium (Urografin 30%,® Oy Leiras Ab, Finland) to ensure that there was no communication with the biliary tree or extravasation into the peritoneal cavity. After complete aspiration of the contrast medium, 20 to 100 ml of sterile absolute alcohol (Ethanol 99%,® Oy Orion Ab, Finland) was injected into the cyst depending on its size. The alcohol was left in the cyst for 20 minutes, during which time the patient was rolled from side to side into various positions at several-minute intervals so the alcohol came into contact with all surfaces of the cyst cavity. After this treatment all alcohol was aspirated. Smaller cysts were treated two times at the same sitting, and larger cysts were treated three times. Complete emptying of the cyst cavity was verified by US. If the patient experienced severe pain during the instillation of alcohol, the procedure was aborted and completed later. Blood alcohol content was measured 20 and 80 minutes after completion of the procedure. The preoperative laboratory examinations were repeated the next day.

Routine follow-up US scans and laboratory tests were requested 1, 2, 6, 12, 18, and 24 months after the treatment or if there was a recurrence of symptoms. All patients were followed regularly until June 1988. They all are alive and doing well.

TABLE 1. *Presenting Symptoms*

Symptom	Number of Patients
Epigastric pain	8
Epigastric mass	4
Vomiting	1
Dyspnea	1
Edema of the legs	1

Results

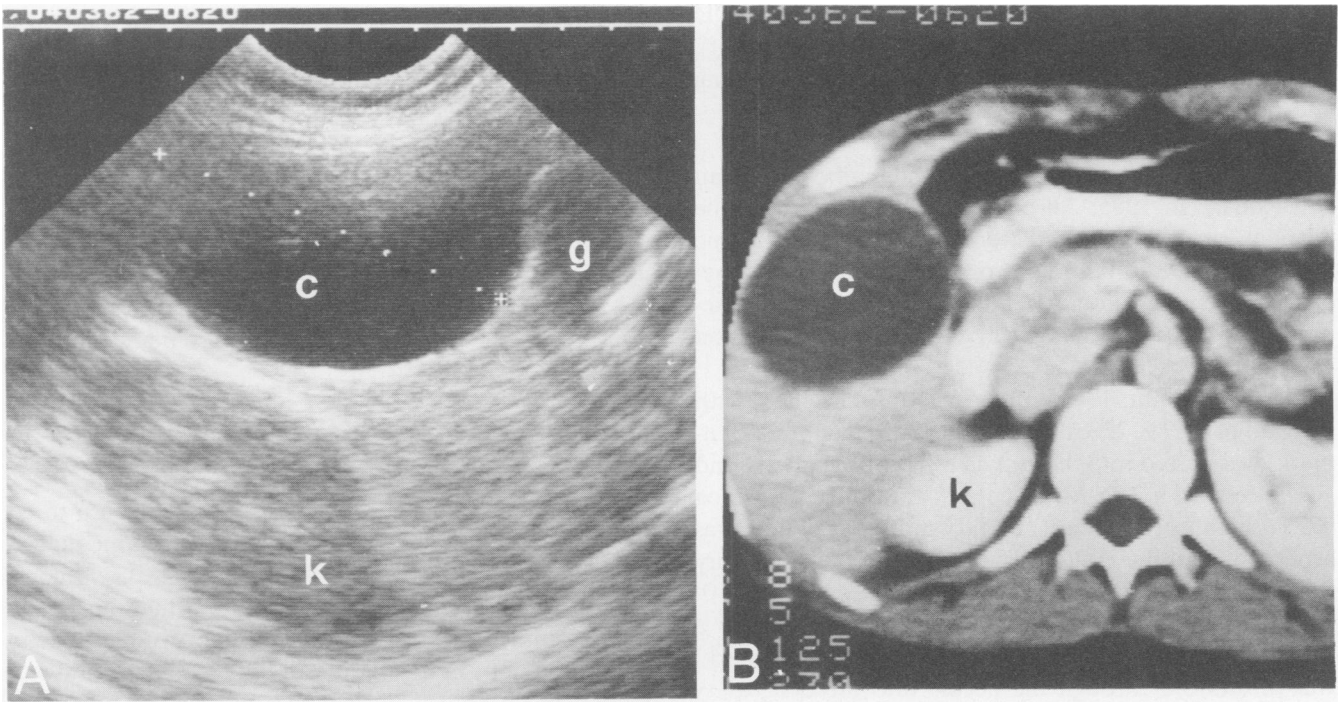
The initial diameter of the cysts ranged from 6 to 25 cm (mean 10 ± 5 cm) and their aspirated volume ranged from 95 to 8100 ml (mean 950 ± 2000 ml). No communication between the cyst cavity and the biliary tree or no significant extravasation into the peritoneal cavity was detected by cystography. All fluid cytologies and cultures were negative. No changes were observed in hemoglobin and hematocrit values, leucocyte count, liver and renal function tests or clotting factors after the procedure.

Blood alcohol content was elevated in all patients immediately after the procedure; the mean value 20 minutes after alcohol sclerotherapy was 0.43 ± 0.38 per milliliter, but it decreased to 0.38 ± 0.32 per milliliter within one hour. The highest value measured in the first sample was 1.02 per milliliter, which had decreased to 0.92 per milliliter after one hour. The total volume of alcohol used correlated significantly with the increase in blood alcohol content per kilogram of body weight ($p < 0.025$, linear regression).

Five patients had side effects after the procedure (Table 2). Four patients experienced mild pain during alcohol injection, but the procedure was completed successfully. One patient reported severe pain during alcohol injection and the alcohol was immediately aspirated and the procedure aborted. It was successfully completed one month

TABLE 2. *Complications*

Complication	Number of Patients
Pain	
severe	1
mild	4
Fever	2
Nausea and vomiting	1
None	3



FIGS. 1A–E. A 25-year-old woman with a 2-month history of epigastric pain. (A) Sagittal sonogram of the right upper quadrant of the abdomen shows a 8-cm solitary hepatic cyst (c), right kidney (k) and gallbladder (g). (B) Computed tomography reveals a solitary cyst (c) in the right lobe of the liver and the superior pole of the right kidney (k). (C) Cystography after percutaneous aspiration. The cyst was subsequently treated with 30 ml of 99% ethanol three times at the same sitting. (D) One-month follow-up sonogram shows only a small residual cyst cavity (c) and the right kidney (k). (E) One-year follow-up sonogram confirms ablation of the treated cyst. Right kidney (k) and gallbladder (g).

later. The mean diameter of the cysts decreased from 10 ± 5 cm to 3 ± 3 cm, measured by US, immediately after the treatment. The diameter of the largest cyst decreased from 25 to 7 cm.

In our first two patients a second alcohol sclerotherapy was carried out 1 or 2 months after the initial treatment, but the remaining six patients underwent treatment only once. In three patients a small solitary cyst disappeared completely during the follow-up period of 1 year after the first treatment (Figs. 1A-E). Our third patient, who had the largest cyst in this series, 8100 ml in volume, was treated only once with excellent results (Figs. 2A–I). The size of the cyst increased during the first month after the procedure and then decreased continuously, so that 32 months after the treatment its diameter measured 7 cm. Simultaneous with the decrease in size, a dense network of adhesive septae started to develop between the cyst walls. A similar pattern was also observed in some other large cysts.

The patients were followed by ultrasound for 12 to 32 months (mean 18 ± 12 months) on an outpatient basis. None of the small residual cysts had increased in size after the 2-month check-up. All patients were symptom free at their last follow-up visit. Three patients with five cysts have been followed up for more than 2 years without any signs of recurrence (Fig. 3).

Discussion

Most congenital hepatic cysts are fully asymptomatic and their presence is detected incidentally by US or CT, but occasionally some of them become large enough to cause symptoms. Surgical procedures such as unroofing, excision, or standard hepatic resection have been the only feasible treatment for symptomatic congenital hepatic cysts until.[4] Operations nevertheless subject the patient to considerable morbidity and sometimes death, and hepatic resection is an especially formidable undertaking in a high-risk patient. A patient with polycystic liver disease in whom the whole liver may be composed of cysts of varying sizes poses a special problem if some of the cysts become symptomatic.[6] In such a case, formal hepatic resection for excision of the diseased tissue may be a major undertaking that is unwarranted by the extent of the lesion and does not definitely prevent recurrence. Success with the use of alcohol in renal cysts[7] encouraged Bean and

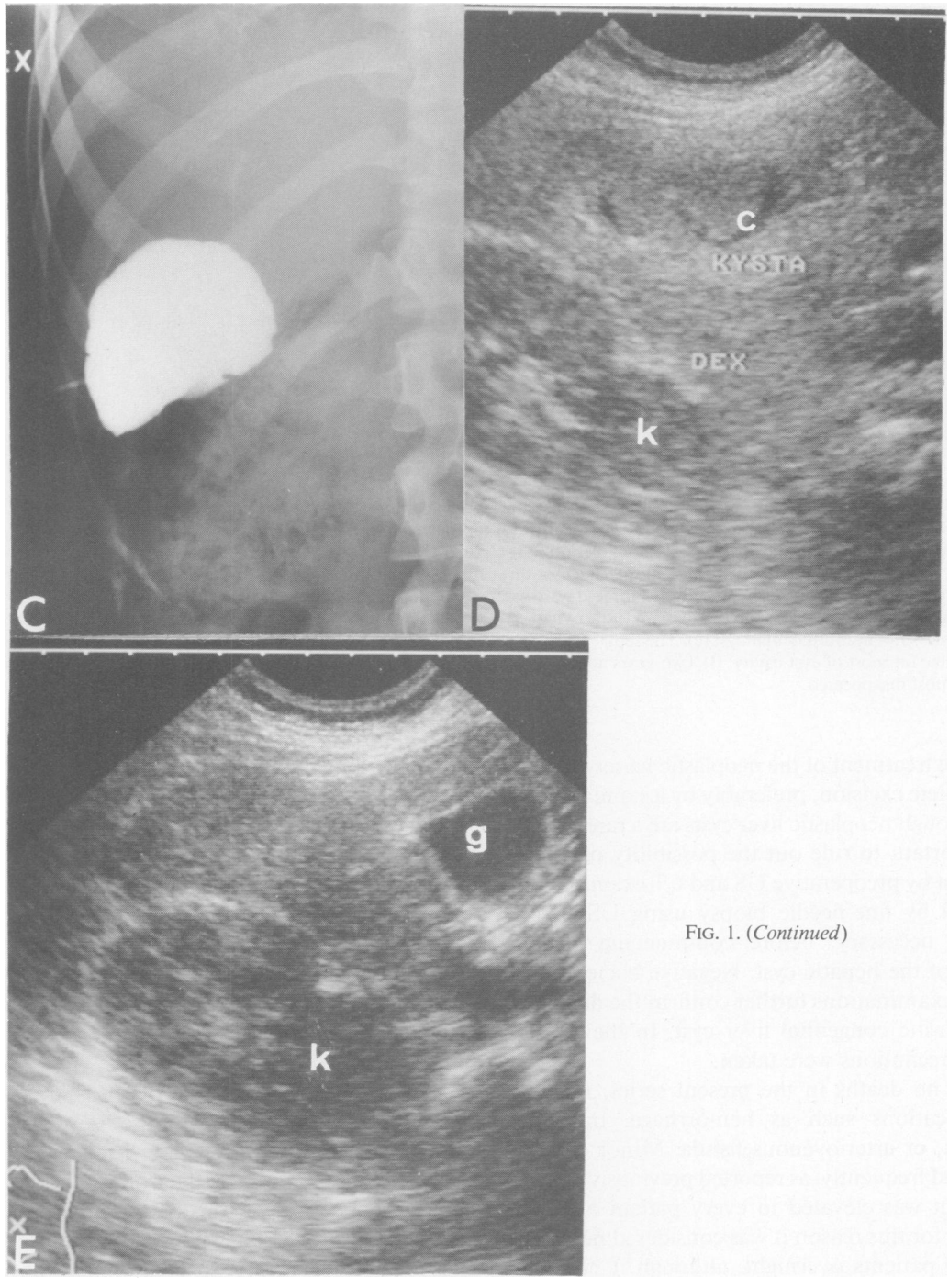
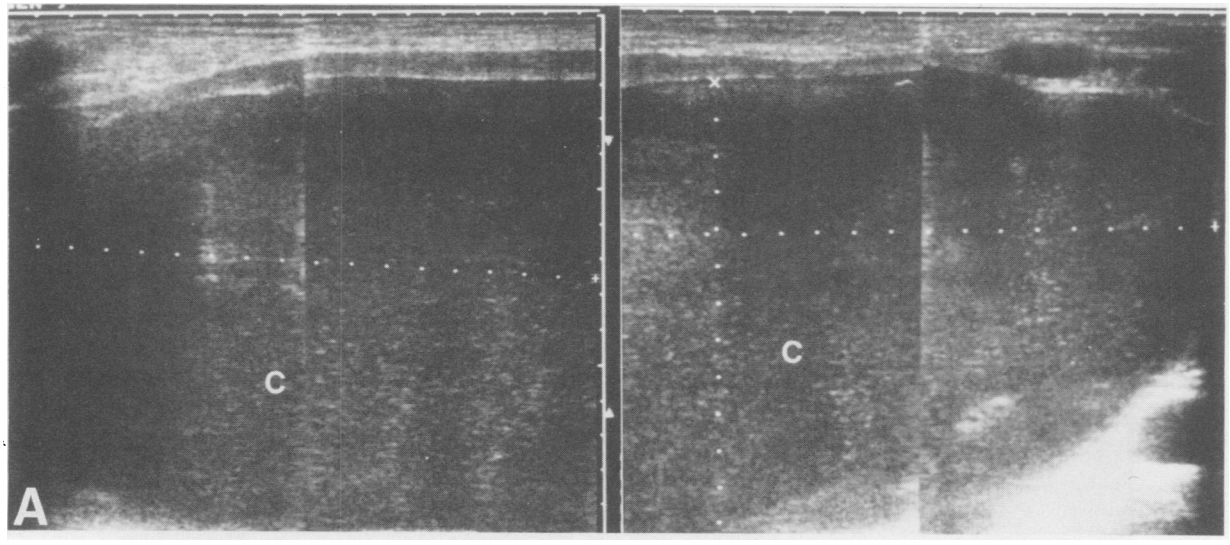


FIG. 1. (*Continued*)

Rodan[5] and Trinkl et al.[8] to try it with symptomatic congenital hepatic cysts, with excellent results. A bleeding tendency, parasitic and neoplastic cysts, communication from the cyst to the biliary tree, or extravasation into the peritoneal cavity are considered contraindications for alcohol sclerotherapy.[4,5,8]

Both benign and malignant neoplasms have been reported by Jones et al.[4] in congenital liver cysts. In the Lahey Clinic series of 18 patients with nonparasitic cysts of the liver, they found two cases of neoplastic liver cysts (11%). One was a benign papillary cystadenoma and the other was a malignant cystadenocarcinoma. They em-



FIGS. 2A–I. An 87-year-old man with a 1-year history of epigastric pain, upper abdominal mass, and edema of the legs. (A) Sonogram shows a giant hepatic cyst (c). (B) Computed tomography reveals a 25-cm hepatic cyst (c) replacing the whole right lobe of the liver and compressing the inferior vena cava. 8100 ml of fluid was aspirated over a 24-hour period. (C) Cystography shows a partially collapsed cyst cavity. After aspiration of the contrast medium, 100 ml of 99% ethanol was injected into the cyst three times at the same sitting. (D) One-day follow-up sonogram shows a small residual cyst cavity (c). (E) Follow-up sonogram after three days confirms recollection of fluid in cyst (c). (F) Two-month follow-up sonography shows a 15-cm multilocular cyst (c). A dense network of intracavitary septae (s) has begun to develop between the cyst walls. (G) Four-month follow-up sonogram reveals a 13-cm multilocular cyst (c). The septae (s) have become thicker. (H) One-year follow-up sonogram shows an 8-cm multilocular cyst (c). Thick septae fill most of cyst cavity. (I) Two years after aspiration sclerotherapy the diameter of cyst (c) had further decreased to 7 cm. The cyst cavity had almost disappeared.

phasize that the treatment of the neoplastic variety of liver cysts is a complete excision, preferably by a standard liver resection. Although neoplastic liver cysts are a rare entity,[4] it is very important to rule out the possibility of a neoplastic liver cyst by preoperative US and CT examinations complemented by fine-needle biopsy using US or CT guide and, if necessary, before commencing alcohol sclerotherapy of the hepatic cyst. Negative bacteriologic and cytologic examinations further confirm the diagnosis of a nonneoplastic congenital liver cyst. In the present study all the precautions were taken.

There were no deaths in the present series, nor any major complications such as hemorrhage, infection, pneumothorax, or arteriovenous fistula. Minor complications occurred frequently, as reported previously.[5] Blood alcohol content was elevated in every patient after the procedure and for this reason it was considered necessary to observe the patients overnight, although it has been suggested that the procedure can be performed on an outpatient basis.[5]

According to Bean and Rodan,[5] larger cysts require more than one alcohol injection at the same sitting. In this series the smaller cysts were treated two times with alcohol instillation at the same sitting and the larger cysts were treated three times. At first we thought that larger cysts would need to be treated twice at 1- or 2-month intervals, but this proved to be unnecessary. We treated our largest cyst, volume 8100, only once, with excellent results. The larger cysts decreased in size progressively after an initial temporary recollection of fluid during the first 2 months after sclerotherapy. At the same time a dense network of adhesions began to develop between the cyst walls in some large cysts. During the follow-up period the adhesions became thicker and the cyst cavity continued to decrease in size for at least 2 years. In three cases smaller solitary cysts disappeared completely during the first year.

Bean and Rodan[5] suggest that it is ideal to treat cysts with 25% replacement volume of 95% alcohol, whereas Trinkl et al.[8] used only 5 to 10 ml of 95% alcohol for sclerotherapy. Although the volume of alcohol used in the present series was related to the size of the cyst, we never used more than 100 ml of absolute 99% ethanol per injection. It was for this reason that the alcohol treatment of the large cysts was repeated three times at the same sitting. It is very important to roll the patient from side to side into various positions at intervals of a few minutes so that the alcohol comes into contact with all surfaces of the cyst cavity. We aspirated alcohol 20 minutes later, as suggested by Bean and Rodan.[5]

Trinkl and coworkers[8] instilled 5 ml of 95% alcohol into the cyst in their case and recovered it ten minutes

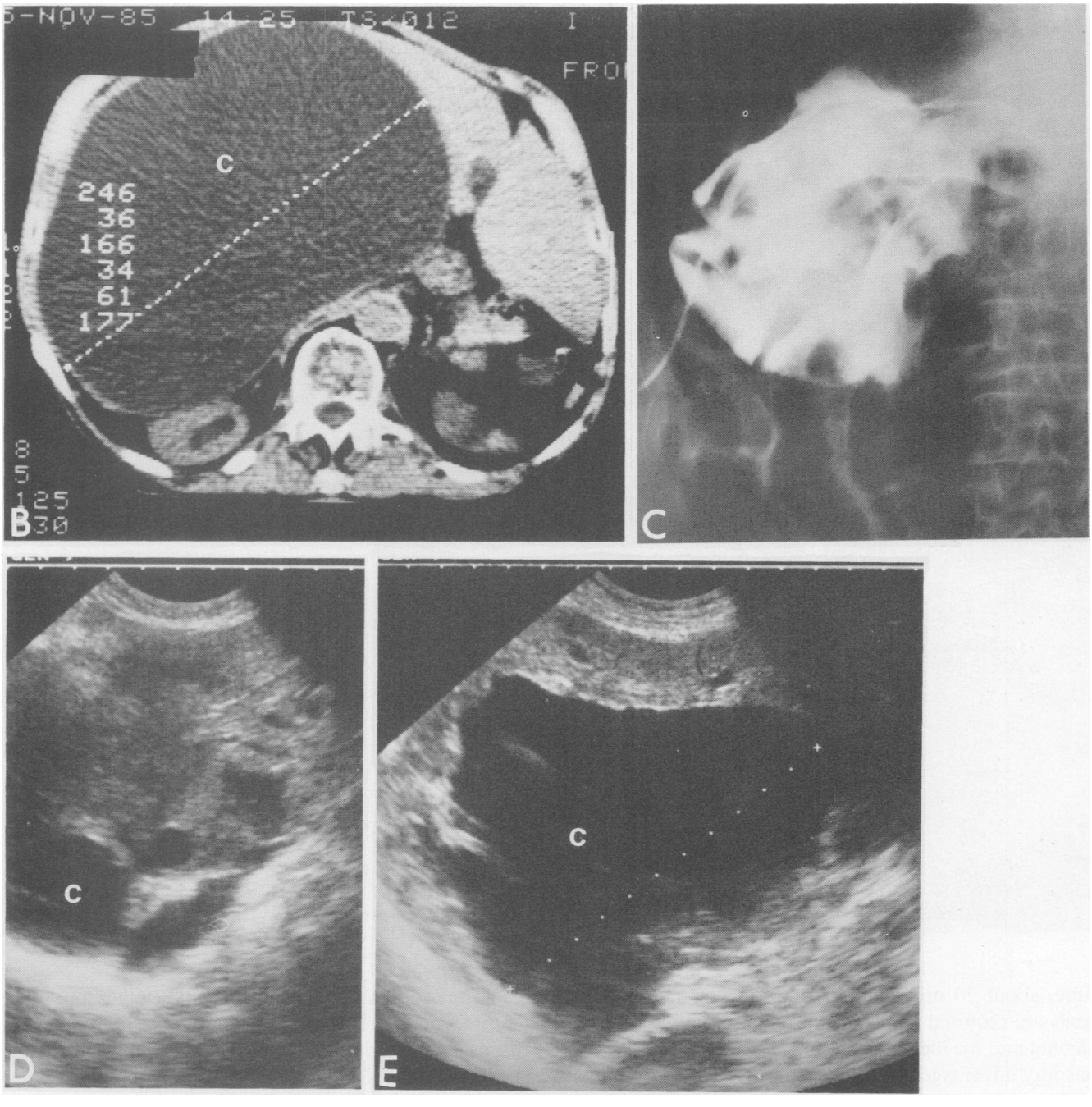


FIG. 2. (*Continued*)

later. Recurrence of the cyst 5 months later indicated an inadequate sclerosing effect due to either insufficient alcohol or insufficient contact time of alcohol with the cyst epithelium or a combination of both factors. The cyst recurrence was successfully treated with instillation of 10 ml of 95% alcohol for ten minutes. The authors conclude that 10 ml of 95% alcohol and a contact time of 10 minutes may be sufficient.[8] They further recommend aspirating the cyst fluid at once instead of slowly draining large cysts over a 24-hour period, as was done in the present study and in that of Bean and Rodan.[5] According to our own experience and that of Bean and Rodan,[5] we recommend a larger amount of alcohol for instillation (20 to 100 ml, depending on the size of the cyst) and a longer contact

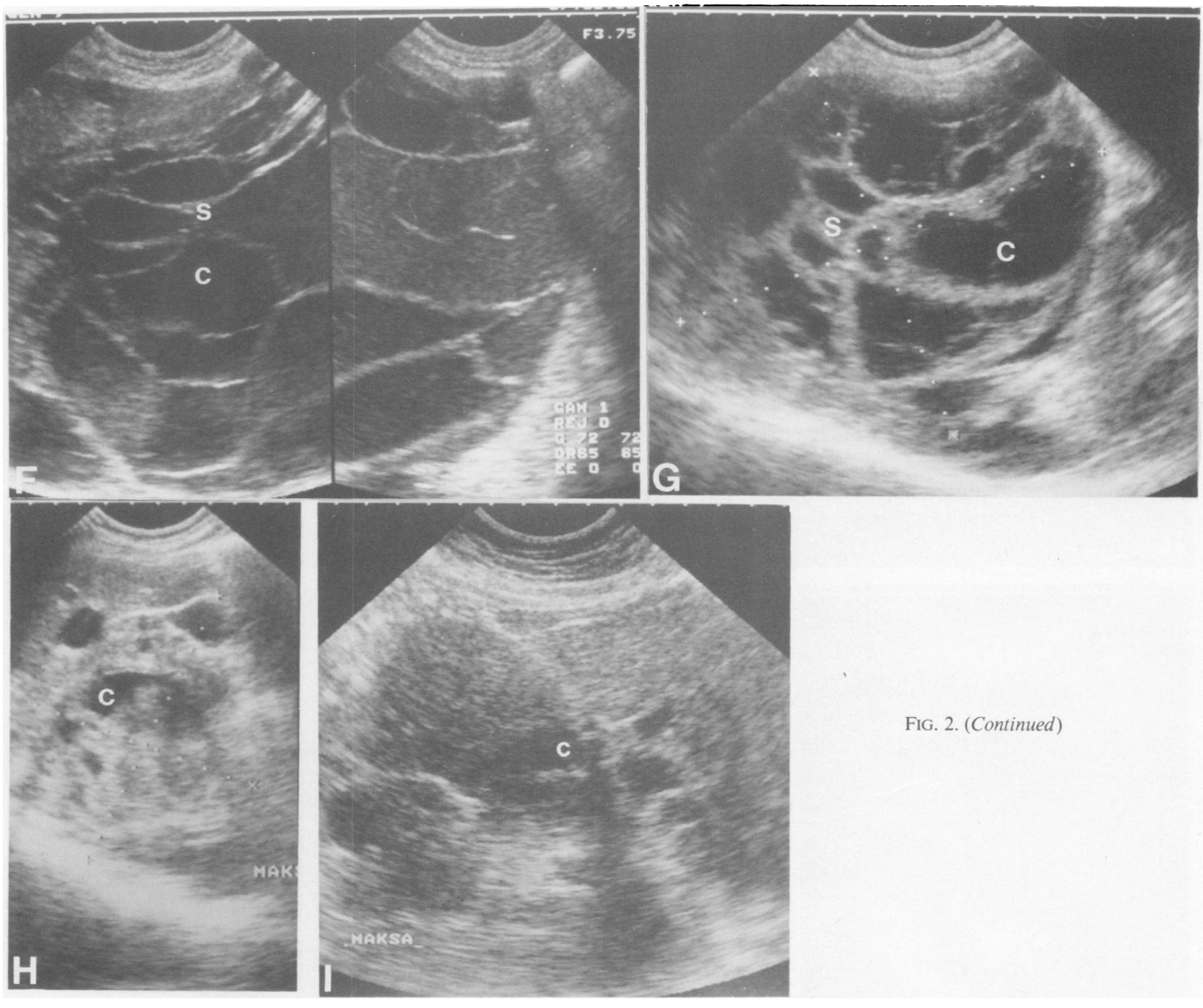


FIG. 2. (*Continued*)

time, about 20 minutes. However, further randomized trials are required to determine the optimal amount of alcohol and the ideal contact time. Whether 99% alcohol has any advantage over 95% alcohol used by the other authors remains to be seen.[5,8] Absolute alcohol possesses a more powerful sclerosing effect on the cyst epithelium but it is also more toxic. In the present study, liver function tests after the procedure, however, were normal. A 24-hour drainage time for emptying large cysts may not be necessary but we feel that a certain caution is warranted aspirating them.

The pain experienced by five of the eight patients during the alcohol injection was probably caused by extravasation of a small amount of alcohol into the peritoneal cavity.[5] In only one patient was the pain severe enough to require cessation of alcohol injection, while in the other four cases the procedure could be completed without any complication in spite of mild discomfort. Therefore mild pain is not considered to be an indication for aborting the treatment.

All patients were followed up for at least 1 year without any signs of recurrence, and all of them were asymptomatic during their last follow-up visit. Cysts have been shown to recur within 2 years in all cases after percutaneous aspiration alone.[3]

Our results indicate that percutaneous aspiration and temporary instillation of alcohol is a feasible alternative to surgical intervention in patients with symptomatic nonneoplastic congenital hepatic cysts. Alcohol sclerotherapy provides a definitive cure. High surgical risk is

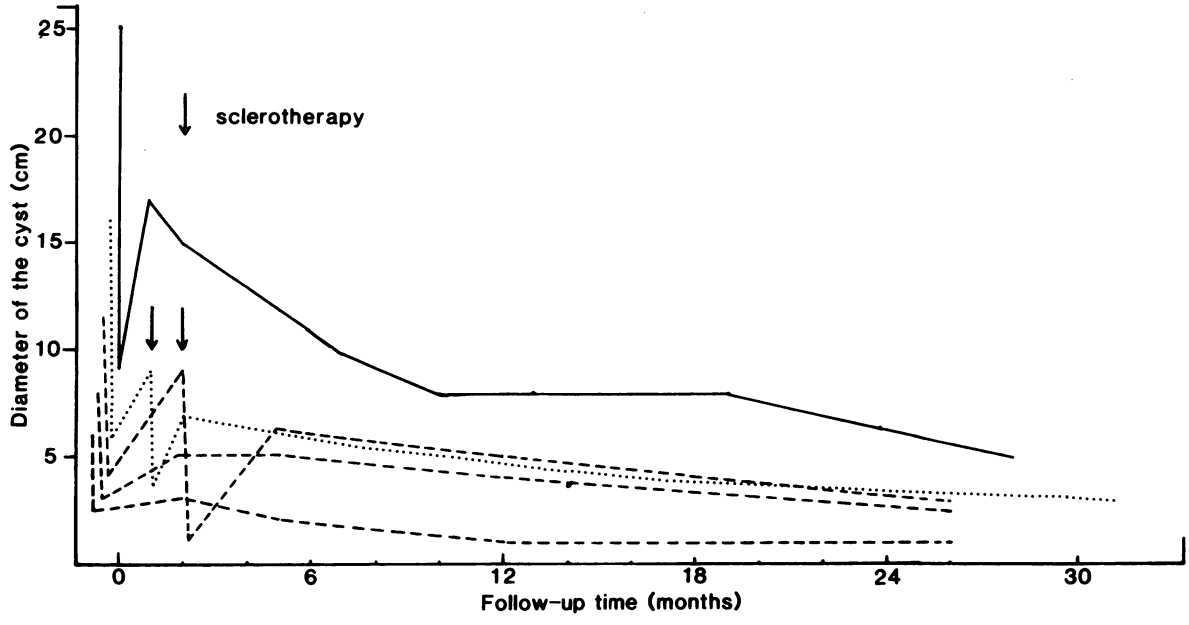


FIG. 3. Long-term results in three patients followed for more than 2 years. Two patients were treated twice, one (.....) at 1-month intervals and the other (——) at 2-month intervals. ‡ denotes the second sclerotherapy. The latter patient underwent simultaneous percutaneous aspiration and alcohol sclerotherapy for three hepatic cysts.

not a contraindication for the procedure. On the contrary, we recommend alcohol sclerotherapy as the treatment of choice for patients with a high surgical risk or polycystic liver disease.

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