

The usefulness of drainage-internal capitonnage with/without selective bile duct repair technique for liver hydatid cyst

Atilgan Tolga Akcam, Ahmet Gokhan Saritas, Kubilay Dalci, Abdullah Ulku

Department of General Surgery, Cukurova University Faculty of Medicine, Saricam, Turkey

Purpose: The aim of the present study is to describe the cavity-reducing internal capitonnage technique that we used for the surgical therapy of liver hydatid cyst, and contribute to the literature by presenting the short- and long-term outcomes of the patients who were operated on with this technique.

Methods: A drainage and internal capitonnage technique was performed on 12 cases due to liver hydatid cyst in our clinic between January 2016 and December 2019.

Results: The mean age of cases was 36.25 ± 12.5 years, with 7 females and 5 males. All cases had pain in the right upper quadrant, and a sense of fullness in 5 cases. None of the cases had ruptured cysts, jaundice, or other clinical manifestations. The preoperative laboratory findings were normal in 8 cases. Intraoperative biliary-cyst communication was demonstrated in 8 cases (66.7%). Cases were followed up for a mean duration of 38.1 months (range, 24–88 months).

Conclusion: The drainage/internal capitonnage with/without selective bile duct repair is a technique that can be performed with very low morbidity and mortality rates in experienced hands, especially for centrally located hydatid cysts.

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Key Words: Capitonnage, Echinococcosis, Liver

INTRODUCTION

Hydatid disease (hydatid cyst or human echinococcosis) is a chronic and complex disease with a worldwide prevalence. The disease is more common in Central Asia, China, Middle East, South America, and certain parts of Europe. Turkey is considered an endemic area for this disease. The disease mainly affects the liver, although it may occur anywhere in the body [1-3].

The diagnosis of the disease depends mainly on clinical findings, imaging methods, and serological tests. The treatment, on the other hand, is based on 2 main principles: the first being the surgical removal of parasitic lesions and the second being

long-term, continuous medical therapy with benzimidazole (albendazole or mebendazole). However, medical therapy often remains insufficient in achieving a radical solution and preventing relapse despite continuing for a long period. Therefore, surgical therapy is still of importance for hydatid cyst treatment [4-6]. The surgical technique, in turn, is based on 2 methods: the first is total cystectomy or forms of liver resection, in which the whole cyst is excised; and the other involves techniques for the drainage of the cyst cavity. Total excision of the cyst is usually not preferred by surgeons due to its location, surgeon's lack of experience, and the associated high mortality and morbidity [4,7-9]. Therefore, the drainage of cyst cavities and the rinsing of the cavity with a scolicedal agent are more

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Corresponding Author: Ahmet Gokhan Saritas

Department of General Surgery, Cukurova University Faculty of Medicine,
01330, Saricam/Adana, Turkey

Tel: +90-05075769191, **Fax:** +90-322-338-69-45

E-mail: drags0001@hotmail.com

ORCID: https://orcid.org/0000-0003-2715-6390

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commonly performed due to the ease of application. However, such techniques are associated with a higher possibility of relapse and more cavity-related complications such as biliary fistula and abscess than radical surgery. In addition, the presence of a cavity on liver imaging in the postoperative period raises the suspicion of relapse. Despite such cavity-reducing techniques as capitonage and use of omentum, which have been described to avoid these complications and the confusion in diagnosing a relapse, a consensus has yet to be reached [10-12].

The aim of the present study is to describe the cavity-reducing internal capitonage technique that we used for the surgical therapy of liver hydatid cyst, and contribute to the literature by presenting the short- and long-term outcomes of the patients who were operated on with this technique.

METHODS

Design and subjects

This study examined the records and the short- and long-term outcomes of cases using drainage and internal capitonage technique due to liver hydatid cyst in our clinic between January 2016 and December 2019. The study was approved by the Institutional Review Board of the Cukurova University Hospital (No. 07.08.2020/102/33). In addition, all patients provided their consent. Hydatid cyst cases were classified using ultrasonography (USG) as per the World Health Organization Informal Working Group on Echinococcosis (WHO-IWGE) classification system. The study excluded CE4 and CE5 cases, CE1 and CE2 cases that were eligible for the PAIR (puncture, aspiration, injection, reaspiration) technique, cases that had radical surgery for any of the cysts, and cases with involvement of other organs.

The evaluated parameters included age, sex, indication for operation, type of operation, symptoms, examination findings, preoperative and postoperative laboratory values (whole blood count, biochemical parameters, and serological tests), surgical intervention performed, morbidity, mortality, length of stay,

and postoperative follow-up findings. Duration of operation and need for transfusion were recorded. The cases were closely followed up in the early period for such complications as fever, biliary fistula, surgical site infections, pneumonia, life-threatening allergic reactions, elevated liver enzymes, and bilirubin. An albendazole treatment (at a dose of 10 mg/kg) was initiated 3–4 weeks before the operation which continued for 3 months following the operation. All cases were administered preoperative wide-spectrum antibiotics.

Cases were invited for follow-up visits at 3-month intervals for the first year and 6-month intervals for the subsequent years. Routine blood tests were performed at each follow-up visit, and serological tests and USG or CT scans were performed after 1 year to establish the long-term outcomes.

Surgical technique

Firstly, 30–50 mL of cyst fluid was aspirated for CE1 and CE2 cases. It was determined if the fluid had a color of rock water or bile staining. Then, 50% diluted povidone-iodine and hypertonic saline (3% NaCl) were injected into the cavity in a quantity equal to the amount of drained fluid. After waiting for 10–15 minutes, the surrounding of the cyst was covered with pads soaked with povidone-iodine, the front surface of the cyst was excised, and the cyst content was completely evacuated. As CE3 cases are multiloculated, they are directly evacuated by covering the surrounding with povidone iodine-soaked pads. Once the cavity was fully cleared, it was rinsed again with povidone-iodine and hypertonic saline. White gauze soaked with normal saline was placed into the cavity. The choledochus and liver were patted proximally. If the exposed bile duct was visible when there was bile staining on the gauze, it was repaired with 5/0 propylene. If the biliary fistula was not visible but still suspected, then cholecystectomy was performed and a catheter was placed through the cystic duct. The distal choledochal flow was stopped by performing a Pringle maneuver manually or using a vascular clamp. Bile leak was detected by applying normal saline or methylene blue through the catheter. Then,

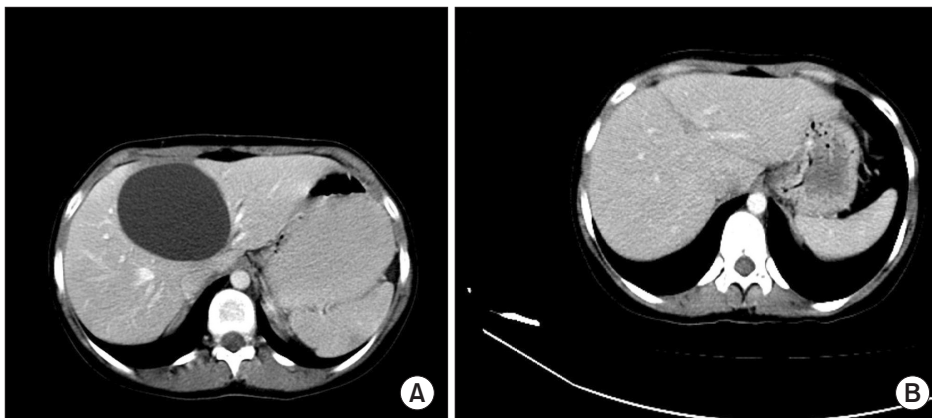


Fig. 1. Preoperative and postoperative comparison of CT scans. (A) Preoperative CT imaging shows type 1 hydatid cyst in segment 4, sized 86 × 34 mm. (B) Postoperative CT imaging after internal capitonage shows regression of hydatid cyst in segment 4, with no signs of relapse.

the bile duct was repaired with 5/0 propylene. The internal capitonage technique was performed on all patients to reduce the cavity. In this technique, 2/0 or 3/0 propylene was used in at least 3 lines, 1.0–1.5 cm apart, to close the cyst cavity. The sutures were placed in a horizontal, continuous, and non-deep (maximum 3 mm without exceeding the fibrous capsule) manner in order to not damage or ligature the vascular and bile ducts (Figs. 1, 2). The same technique was performed on other cysts when there was more than 1 cyst. The operation was terminated upon placing 2 drains; 1 on the lateral aspect of the liver and 1 in the Winslow cavity. The short video of surgical technique was demonstrated on Supplementary Video 1.

Statistical analysis

Statistical analysis of data was made using SPSS ver. 17.0 (SPSS Inc., Chicago, IL, USA). Categorical data were expressed in numbers and percentages, while continuous data were

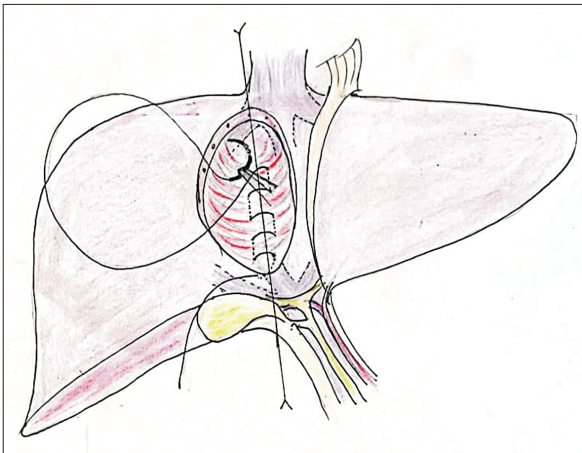


Fig. 2. Internal capitonage technique.

expressed in mean and standard deviation (median and range, where required).

RESULTS

Drainage and internal capitonage technique was performed on 12 cases due to liver hydatid cyst at the General Surgery Clinic of Cukurova University Faculty of Medicine between January 2016 and December 2019. The mean age of cases was 36.25 ± 12.5 years, with 7 females and 5 males.

All cases had pain in the right upper quadrant, and a sense of fullness in 5 cases. None of the cases had ruptured cysts, jaundice, or other clinical manifestations. The preoperative laboratory findings were normal in 8 cases. Indirect hemagglutination assay (IHA) was positive (+) in 7, while western blot test was positive (+) in 9 of the cases.

All hydatid cyst cases were classified using USG as per the WHO-IWGE classification system. Of the cases, 1 was CE1, 9 were CE2, and 2 were CE3. The CT was performed on all cases. The segments where the lesions were located and their diameters measured were established. Of 12 cases, 7 had 1 cyst and 5 had multiple cysts. Of the cysts, 7 were in segment 4, 5 in segment 7, and 4 in segment 8. Table 1 shows the presentation of cases.

Intraoperative biliary-cyst communication was demonstrated in 8 cases (66.7%). In 7 of these cases, cystic duct catheterization was required after cholecystectomy for bile duct repair. Internal capitonage technique was performed on all of the cases after drainage. The mean duration of operation was 93.58 minutes (80–160 minutes). Only in 4 cases, we required 1 unit erythrocyte suspension (350 mL) for transfusion.

Four cases had postoperative fever. Two cases had atelectasis; 1 case had pneumonia, and 1 case had wound infection. Of all

Table 1. Presentation of patients with hepatic echinococcosis

Cases No	Age (yr)	Sex	No. of cysts	Location of cysts (segment)	Dimension of cysts (cm)	Classification according to WHO-IWGE
1	24	Male	1	5, 8	10.0 × 5.5	CE1
2	32	Female	1	4	6.0 × 5.0	CE2
3	48	Female	3	3, 4, 5, 7	10.0 × 12.0, 4.0 × 5.0, 3.0 × 5.0	CE3
4	29	Female	1	4, 5	6.5 × 5.5	CE2
5	34	Male	1	4	4.0 × 6.0	CE2
6	27	Female	2	6, 7	6.2 × 3.8, 3.5 × 8.0	CE2
7	25	Male	1	8	5.5 × 6.5	CE2
8	19	Female	3	4, 5, 8	6.5 × 3.7, 8.6 × 6.4, 3.5 × 3.8	CE2
9	42	Female	1	4, 5	10.0 × 4.0	CE2
10	52	Male	2	4, 5, 6, 7	8.0 × 6.0, 10.0 × 8.0	CE2
11	53	Female	3	4, 5, 6, 7	43.0 × 41.0, 3.7 × 4.2, 6.0 × 5.5	CE2
12	50	Male	1	7, 8	11.0 × 8.0	CE3

WHO-IWGE, World Health Organization Informal Working Group on Echinococcosis.

these cases, 1 had biliary fistula (8.3%) managed spontaneously within 3 postoperative days. None of these cases had cavitory complications. The mean length of stay was 10.1 days (6–18 days). There was no mortality among the cases. At discharge, 4, 2, and 2 cases had elevated liver enzymes, elevated ALP, and γ -GT levels, respectively.

Cases were followed up for a mean duration of 38.1 months (24–88 months). In the long term, all whole blood count and biochemical parameters of cases were normal. The postoperative western blot test and IHA values were the same as preoperative values. One case had an incisional hernia in the long term. The cases did not have a relapse at follow-up. No cavitory lesion was observed with imaging methods that raised the suspicion of relapse. Fig. 1 demonstrates the preoperative and postoperative CT images of 1 case that received internal capitonage with selective bile duct repair.

DISCUSSION

Hydatid cyst is a globally common disease, for which Turkey is an endemic area. Medical therapy is still controversial and known to remain insufficient in many cases. Therefore, surgical therapy is still of importance for hydatid cyst treatment. Nevertheless, there has not been any consensus on an optimal technique, although several surgical techniques have been described [4,9,11,13]. The present study aims to describe the cavity-reducing internal capitonage technique that we used for the surgical therapy of liver hydatid cysts by presenting the short- and long-term outcomes of the patients.

To date, the surgical treatment techniques used for liver hydatid cyst have been based on 2 main principles: the first being a total cystectomy or a form of liver resection, in which the whole cyst is excised; and the other being partial cystectomy and cavity draining techniques, in which the cyst is partially excised. Total excision of the cyst is usually not preferred by surgeons due to the location of the cyst, the surgeon's lack of experience, and the associated high mortality and morbidity [14–16]. In our clinical practice, we perform total or near-total cystectomy for peripherally located cysts in segments 2, 3, 5, and 6. We may prefer resection techniques for the cysts covering the entire right or left lobe. However, in the cases in the present study, for cysts that are mostly 5–10 cm in diameter on average and relatively centrally located in segments 4, 7, and 8, we perform drainage and apply an internal capitonage technique.

The drainage of cyst cavities and the rinsing of the cavity with a scolicial agent maintain its position as the most commonly preferred method by surgeons due to the ease of application. However, it has been emphasized in the literature that such techniques are associated with more cavity-related complications such as abscess than from radical surgery.

Therefore, cavity-reducing capitonage and omentoplasty techniques have become important. Several studies point out that omentoplasty is associated with good outcomes [7,10,11]. However, as we all know, the omentum has several roles in the abdomen. It is also obvious that the site of omentoplasty would complicate a secondary operation when reoperation is required in drainage techniques, which are associated with a slightly higher likelihood of relapse than from radical surgery. We believe that, thanks to the internal capitonage technique suggested in the present study, we have prevented cavitory problems while also allowing the omentum to perform its prominent tasks.

The morbidity and mortality outcomes of all cases that were operated on with this technique are much lower when compared to those undergoing resection and drainage techniques mentioned in the literature [15,16]. The development of biliary leak is one of the most frightening complications whether with radical surgical techniques or drainage techniques [12,17]. Recently, Deo et al. [16] reported 7.4% biliary leak rates for resection procedures and 27% for conservative procedures. One biliary leak (8.3%) was developed in a case of our series having 3 cysts and 5 biliary fistulas in cyst cavities. However, biliary leakage stopped spontaneously within 3 postoperative days. As is known, there is normal pressure due to the presence of ampullary sphincter in the choledochus (15–16 mmHg). Since the pressure at the proximal side after cyst drainage suddenly drops, the bile turns toward this side and a biliary fistula occurs. We believe that normal or negative pressured drains that are put into the cavity facilitate this event. Almost half of these cases are treated with endoscopic retrograde cholangiopancreatography (ERCP) sphincterotomy by decreasing the pressure at the distal choledochus. However, ERCP is not a technique with low mortality and morbidity. The absence of biliary fistula among our cases is most likely due to the selective repair of the duct, and less likely due to the increased pressure we created at the proximal side. Further studies are required to establish the reason. On the other hand, 33.3% of our cases had mildly elevated liver enzymes at discharge. However, all biochemical parameters were observed to return back to normal at the postoperative close follow-ups.

The presence of the cavity on liver imaging in the late postoperative period, and thereby raising the suspicion of relapse is the most important handicap of hydatid cyst follow-up. Cavity-reducing techniques, such as the use of the omentum, have been described to avoid confusion in diagnosing relapse [9,11]. To demonstrate the advantage of the internal capitonage technique, USG and/or CT were performed on each case, in addition to the laboratory and serological tests at least after 1 year. No cavitory lesion that raised the suspicion of relapse was detected in any of our cases. We argue that this advantage of our technique will provide an insight into the

literature.

Even though our study will provide an insight into the literature in this regard, it involved a few limitations. The first one is the low number of cases; however, we thought that we should not wait for the number of cases to increase, since our purpose was to define the technique. Given the lack of standardization in the number of cases and the operation techniques, no comparison was made with other applied techniques.

In conclusion, the drainage-internal capitonage with/without selective bile duct repair is a technique that can be performed with very low morbidity and mortality rates in experienced hands, especially for centrally located hydatid cysts. Nevertheless, there is a need for broad literature support to draw an accurate conclusion.

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

ORCID iD

Atilgan Tolga Akcam: <https://orcid.org/0000-0001-7525-3107>
 Ahmet Gokhan Saritas: <https://orcid.org/0000-0003-2715-6390>
 Kubilay Dalcı: <https://orcid.org/0000-0002-3156-4269>
 Abdullah Ulku: <https://orcid.org/0000-0001-5180-1543>

Author Contribution

Conceptualization, Project Administration: All authors
 Formal Analysis: ATA
 Investigation: ATA, AU
 Methodology: ATA, AGS
 Writing – Original Draft: ATA, AGS
 Writing – Review & Editing: All authors

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