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A Laparoscopic Versus Open Approach for Hepatic Hydatid Cyst Removal

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Abstract:
For context, hydatid cysts in the liver are still mostly treated with surgery. Laparoscopy is a less intrusive alternative to traditional open surgery that yields the same or similar outcomes. Laparoscopic treatment of hepatic hydatid disease in children: a feasibility and safety evaluation were the goal of this investigation. Subjects and Procedures: This research followed participants over the course of five years in a prospective randomized fashion. The results of laparoscopic treatment for children with Gharbi Type I, II, III cysts, 3 cysts, and superficially accessible cysts were compared with those of matched controls who had open approach treatment. The trial involved fifty patients, with twenty-five individuals assigned to each of the two matched groups. The laparoscopic surgery was performed on twenty-five individuals (10 males and 15 females) who had 35 liver hydatid cysts. The average size of the cyst was 8.8 (± 2.39 cm). The conversion to open was necessary for two patients. None of the patients had a notable leakage of cyst contents. The outcomes of the laparoscopic group were superior to those of the open group in terms of length of hospital stay, time to drain removal, duration of parenteral analgesia, postoperative pain intensity, time to ambulation, and return to full orals. Both groups had comparable rates of complications.
In conclusion, laparoscopic therapy of hydatid cysts of the liver in children is a safe and practical approach with minimal complications, conversion rates, and morbidity when the patients are carefully selected.

Key words: *Children, hydatid cyst liver, laparoscopy, safety and efficacy*

Introduction

Infestations produced by the canine tapeworm Echinococcus granulosus in its larval (cyst) stage are known as hydatid illness (1). Whether it's the cystic or alveolar (multilocular) variety, the liver is the primary organ impacted in 75% of cases. There is a germinal layer within the cyst and a laminated acellular layer outside. A pericyst, a layer of fibrous tissue, forms as a host response to the parasite (2). The most typical location for a hepatic hydatid cyst is the anterior inferior section of the right lobe of the liver. The cyst may not cause any symptoms or be found by chance. Distention or a dull ache in the upper right quadrant of the body are symptoms. Infection, dissemination, or rupture, along with the potentially fatal anaphylactic response, are all

possible complications. Although jaundice is uncommon, patients may also have vomiting or an abdominal lump (3).

The three most common forms of imaging used for diagnosis are computed tomography (CT) scans, magnetic resonance imaging (MRI), and ultrasonography (4). The identification of antihydatid antibodies is the basis of the usefulness of serological testing (5).

Albendazole and mebendazole are two medications that have been helpful in treating hydatidosis in people with liver and lung (6).

Surgery, both open and laparoscopic, and percutaneous drainage, often known as PAIR (puncture and aspiration injection and reaspiration), are the primary means of managing liver hydatid disease (7). Hepatic hydatid disease therapy with a laparoscopic technique was first suggested in 1992. Less postoperative discomfort and a shorter hospital stay are two benefits of the laparoscopic method. Difficult access and an increased risk of intraoperative leakage are some of the downsides (8).

Patient and methods:

The private hospital in Iraq was the site of this prospective randomized trial. The research lasted for five years, beginning in January 2018 and ending in 2023. Up to January 2018, new instances were recruited. Cases of hepatic hydatid cysts were the only ones included. The research included patients who had cysts of Type I, II, or III, as well as those with 1–3 cysts and superficial cysts that could be seen by laparoscopy. Cysts of types IV and V, those with more than three, and those that were inaccessible were not included in the research. Tests for IgG antibodies, CECT on the belly and pelvis, and ultrasonography of the abdomen were used to confirm the diagnosis.

Surgical method

Laparoscopic technique

The supine posture was used for all operations. Antibiotics were given 30 minutes prior to the procedure. The patient, surgeon, helper, and scrub all remained in the same positions as during any previous laparoscopic liver operation. The patient was placed under general anesthesia while the open approach was used to generate pneumoperitoneum. Twelve millimeters of mercury was reached as the intraabdominal pressure. The 5 mm umbilical port is used to insert a 30-degree scope, while the subxiphoid port is used to insert a 10-mm suction cannula. Following diagnostic laparoscopy via a 5 mm umbilical port, two further 5 mm trocars were inserted into the liver at predetermined positions according to the cyst's location. The first laparoscopic assessment revealed that the cyst was suitable for laparoscopic treatment. The basic procedure consisted of the following steps: first, the pericystic sac was packed with gauze soaked in cetrimide or betadine to contain any leakage; second, the cyst was decompressed by aspiration using a wide-bore needle inserted into an antigravity position through one of the 5 mm ports; third, two 5 mm suction cannulas were placed next to the aspirating needle to control any leakage; fourth, the fluid was visually examined for signs of bile or pus that could indicate cysto-biliary communications (CBC); fifth, a 10-minute injection of hypertonic saline or cetrimide was administered to guarantee the organism's death; and lastly, aspiration was performed. Extractions were performed via the epigastric port after a cystotomy was done in the nondependent region of the pericyst using scissors or the hook electrode. The germinative membrane was then removed and placed in a plastic bag or

locally improvised specimen bags to avoid contamination. Any residual membranes or CBC were examined by focusing the microscope on the cyst cavity. If the cyst's position or shape required it, omentum was placed into the remaining cavity for care. Otherwise, unroofing, partial pericystectomy, or simple tube drainage were used. Primary suturing and omentopexy were used to control CBC, if any were present. An impartial third party was to assess the likelihood and severity of cyst contents leakage during the surgery.

Open technique

The majority of patients had a right subcostal approach. Using packs soaked in cetrimide or betadine, the operational field was meticulously shielded against the potential spilling of hydatid fluid. Using a large-bore angiocath needle to decompress the cyst and a syringe to aspirate hydatid fluid followed by the injection of cetrimide solution into the cavity and a 10-minute waiting period. After opening the pericyst, the laminated membrane and hydatid fluid were removed together with the cyst contents. Using gauze saturated with a cetrimide solution, the cavity was cleansed. After the surgery was finished, the cavity was checked for any signs of bile duct leaking and, if detected, vicryl suture was used to seal it. In the end, one of the two methods was sufficient for managing the remaining cavity.

1. Using an external tube for drainage
2. The omentopexy.

Time spent from skin incision to closure during operation was documented. Every patient's blood loss was meticulously documented. All patients were given parenteral antibiotics and intravenous fluids after surgery. Once the bowel noises returned, oral feeding may be resumed. It was recorded how much and what kind of postoperative drainage was present, as well as when the drain was removed. We closely watched all the patients after surgery to make sure they didn't have any problems like deep vein thrombosis, thromboembolism, suppuration, wound infection, hemorrhage, biliary leakage, pleural effusion, or prolonged ileus. We documented the amount of time each patient spent in the hospital.

RESULTS

The research included fifty patients, with twenty-five undergoing laparoscopic procedures and twenty-five undergoing open procedures. When comparing the two groups, we find that they are similar with respect to age, gender, cyst size, cyst type, cyst location, nature, and number of cysts (Table 1). With ages ranging from 6 to 14 years, our research found that the open group had a mean age of 10.9 years and the laparoscopic group a mean age of 10.82 years. For hydatid disease of the liver, thirty patients (10 males and 15 females) underwent LS, with a total of thirty-one cysts. Eighteen patients had cysts situated in the right lobe, four in the left lobe, and one in the caudate lobe of the liver. The cyst sizes ranged from four centimeters to thirteen centimeters, with an average of 8 ± 2.39 cm.

Twenty five (17:8) from the open group had a grand total of 32 cysts surgically removed. Cyst sizes ranged from 5 to 20 cm, with an average of 8.97 ± 3.32 cm. Twenty cysts were found in the right lobe, 3 in the left lobe, and two in both lobes. Omentopexy, tube drainage, capitonnage, and deroofing were used to treat the residual cavity in 63 cysts, including 31 cysts in the laparoscopic group and 32 cysts in the open group (Table 2). Two individuals in the laparoscopic group and one in the open group tested positive for CBC.

Laparoscopic suturing with vicryl 2.0 was used to address one case. The diameter of the cyst in this patient was 12 cm. One more became accessible.

The different parameters measured during and after the operation are shown in Table 3 for the two groups. Both groups did not have any significant complications.

Table 1. Distribution of cases in the two groups

Parameter	Laparoscopic group (*n*=25)	Open group (*n*=25)	*P*
Age (years)			
□10	12	14	0.612
>10	13	11	
Gender			
Males	10	17	0.037
Females	15	8	
Size of cyst (cm)			
□10	14	17	0.606
Cyst type			
Gharbi type I	23	23	0.93
Gharbi type II	6	7	
Gharbi type III	2	2	
Mean haemoglobin (g/dl)	13.02±0.79	13.21±0.90	0.28
Mean size of cysts (cm)	8.79±2.32	8.951±1.25	0.81
Location of cyst			
Right lobe	18	20	0.67
Left Lobe	4	3	
Bilateralcaudate lobe		21	20
Nature of cyst	29	30	1.00

Multilocular	2	2	
Number of cysts			
Double Unicellular	5	6	
CBC			
Absent	23	24	1.00
Present	2	1	

Table 2: Handling of the cavity between the two groups

Method	Laparoscopic group (*n*=25), *n* (%)	Open group (*n*=25), *n* (%)
Tube drainage	11 (44)	13 (52)
Omentopexy	14 (56)	9 (36)
Capitonnage	0	2 (8)
De roofing	0	1 (4)

Table 3: Intraoperative and postoperative parameters in the two groups

Parameter	Lap group	Open group	*P*
Operative time (min)	103±22.3	117.4±22.5	0.06
Hospital stay (days)	4.60±1.29	7.12±1.90	□0.0002
Duration of analgesia (days)	2.49±0.91	3.57±0.79	□0.0001
Postsurgery pain on VAS Day 1	6.35±0.64	7.17±0.52	□0.0001
Day 2	4.92±1.09	5.45±0.49	0.01
Day 3	1.37±1.13	4.27±1.72	□0.0001
Ambulation	2.20±1.08	3.34±0.52	□0.0001
Tolerate orals	2.79±0.83	3.19±0.59	□0.040
Bowl movement	2.25±0.70	2.82±0.69	0.003
Removal of subhepatic drain	2.75±0.71	3.66±1.03	□0.0001

DISCUSSION

In humans, Echinococcosus is a parasite infection caused by E. granulosus. Consumption of unwashed or inadequately cleaned contaminated fresh fruits and vegetables is the most frequent way to catch the illness, but youngsters, in particular, may get it via direct contact with sick dogs [11].

In locations where the disease is not prevalent, people of all ages seem to be equally impacted, although the average age of onset is higher (11, 12). As a result of the sluggish development of cysts, the patient often experiences stomach pain, discomfort, and swelling (11, 13, and 14).

Several surgical techniques have been documented to address the cyst in cases with hydatid disease liver, the primary method of therapy. (15 to 19), When it comes to treating youngsters with hepatic hydatid cysts, LS has shown outcomes that are on par with open surgery. Reports of fulfilling outcomes with little problems employing laparoscopic procedures have allayed initial concerns about leakage and the ability to control the cyst wall (16, 19, 20).

PERIOPERATIVE PARAMETERS

No head-to-head comparisons of open and LS operating times for pediatric hepatic hydatid cysts have been conducted. The operating time reported by Minaev et al. [21] was 90.1 ± 7.8 minutes, whereas the average time reported by Mazoum et al. [22] using laparoscopy was 90 minutes. We found no statistically significant difference between the laparoscopic and open groups with regard to the mean operating time. Possible explanations for the shorter operation time in the laparoscopic group include less abdominal dissection and manipulation, a virgin anatomy, the absence of open closure of the laparotomy, fewer complicated cases, and omentopexy for any remaining cavities. When compared to open surgery, minimum access surgery results in reduced pain throughout the post-operative period. Our research confirmed the same thing. This is because laparoscopy is less intrusive, requires less suturing, and handles tissues less. No research has been conducted yet in a pediatric population to support the conclusions mentioned above. Because minimum access surgeries put the body under very little strain, the recovery time thereafter is quite brief. This means that you will be able to walk, eat, and drink again sooner, and you will be able to leave the hospital sooner as a result.

Similar outcomes were found in the research of laparoscopic treatment of hydatid cyst liver by Baskaran et al. [23]. The laparoscopic group showed early ambulation (2 days) and return to full orals (2.8 days) compared to the open group.

Because LS allows for quicker ambulation, drain removal, stool passing, minimum post-operative discomfort, and a very small abdominal incision, the length of time a patient spends in the hospital after the procedure is reduced.

The average duration of hospital stay reported in the research by Maazoun et al. [22], which examined the safety and effectiveness of laparoscopy in treating liver cysts in children, was 5 days. The early drain removal in minimum access surgery is a result of the reduced tissue stress and little tissue dissection compared to open surgery. In the open surgery group, drain removal took an average of 3.7 days, whereas in the laparoscopic group, it took 2.7 days. We compared these results to what Mazoumi et al. found. [22]

When dealing with hydatid cysts laparoscopically, intraoperative leakage is a major problem. Additional measures to avoid intraoperative spillage include sterilisation of cysts with chemotherapy before surgery,

aspiration of daughter cysts and laminated membrane using high-pressure suction, initial decompression with a needle followed by equal volume of scolicidal agents, and the use of scolicide-soaked gauze pieces around the perihepatic area.both [16,19] To minimize spillage, our research used pericystic packing, made the first puncture in a non-dependent antigravity posture, and utilized two suction cannulae next to the puncture site. During the procedure, an impartial observer kept an eye on both groups to make sure no spills occurred. Intraoperative leakage was negligible in both groups. Strict adherence to the several safety measures used during open surgery for hydatid liver disease to avoid spillage and scolex reimplantation may be achieved during LS.[16,19,20].

Hydatid disease is associated with CBC, which may occur anywhere from 3.5%[24] to 19%.[25] The Important clues include cholestasis in the blood, bile duct dilatation on radiographs, and jaundice or cholangitis in the patient's medical history. Two patients (6% of the total) in the laparoscopic group had CBC; both were sutured during laparoscopy for management. A risk factor for colorectal cancer that is unrelated to cyst size is CBC. According to Kilic et al., individuals experiencing biliary leakage had cysts with an average size of 10.2 cm, whereas patients without biliary leakage had cysts with an average size of 6.2 cm.[26]

Reported benefits of laparoscopic liver hydatid surgery include reduced pain, improved cosmetic outcomes, a shorter hospital stay, early return to full orals, early ambulation, and less postoperative adhesion; however, no randomised clinical trial has compared laparoscopic and open hydatid surgery.

Laparoscopic hydatid surgery and open surgical procedures did not result in any recorded cases of operation-related deaths.

CONCLUSION

With careful patient selection, laparoscopy may safely treat hydatid disease in children while minimizing conversion rates, surgical complications, and improving cosmetic outcomes.

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