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Case report

SURGICAL TREATMENT OF COMPLICATED DUCTUS CHOLEDOCHUS HYDATIDOSIS DURING THE COVID-19 PANDEMIC: EFFECTIVENESS AND LIMITATIONS OF RADIOLOGICAL SERVICES AND SURGERY IN EXTRAORDINARY CONDITIONS

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Abstract: **Introduction:** While uncomplicated echinococcal cysts can grow in the liver for years without symptoms, complicated hydatid cysts (CHC) present distinct clinical characteristics that necessitate urgent treatment.

Case Report: We present a case of acute biliary obstruction, cholangitis, and sepsis due to massive choledocho-hydatididosis in an 84-year-old COVID-positive patient during the COVID-19 pandemic. Imaging revealed a multicystic lesion in liver segments V and VIII that compressed surrounding liver tissue, leading to intrahepatic duct dilation. A daughter cyst in the ductus choledochus was confirmed during surgery. An attempt at endoscopic retrograde cholangiopancreatography (ERCP) was unsuccessful. We performed an open pericystectomy with total cystectomy and choledochotomy, carefully evacuating all hydatid cysts. The postoperative course was uneventful, and the patient was discharged without surgical complications.

Conclusion: Complicated hydatid cysts (CHC) leading to acute biliary obstruction require prompt diagnosis and indicate the need for rapid evacuation of the cyst and correction of complications.

Keywords: Choledocho-Hydatididosis (CH), Complicated Hydatid Cysts (CHC), Intraoperative Ultrasound (IOUS), Hydatid Disease (HD), Liver Surgery.

INTRODUCTION

Liver hydatid cysts, when complicated by rupture into the bile ducts, can lead to cholangitis and bile obstruction (1, 2, 3). Uncomplicated hydatid cysts in the liver are asymptomatic for years, with an average growth rate of 1-5 mm per year (1, 2). Multiple cysts in the liver are detected in 20-40% of cases (2).

Hydatid disease (HD) originates from the larval stage of *Echinococcus granulosus*, a parasitic zoonosis historically referred to as a "liver full of water" since ancient times (1-4). It is most prevalent in regions where livestock is raised in close proximity to humans and dogs, such as the Mediterranean, the Middle East, Africa, South America, and New Zealand (1, 2, 5). Serbia is an endemic area for this parasitic infection (5).

Acute biliary obstruction caused by parasitic cysts in the bile ducts presents specific radiological signs. Ultrasonography (US) is the first step in the diagnostic algorithm and can establish a diagnosis with high sensitivity while also allowing classification of HD (6-11). Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) provide more detailed visualization of the lesions and complications of HD (8, 12). Serological tests may yield either strongly positive or negative results depending on the stage of the parasitic cyst (13).

Management options range from minimally invasive procedures to open surgery, all aimed at rapid cyst evacuation and the treatment of complications. Treatment strategies for complicated hydatid cysts (CHC) of the liver include surgery, interventional procedures such as PAIR (Puncture, Aspiration, Injection, and

Respiration), and specific antiparasitic medications (14-17).

We present the surgical case of a massive choledocho-hydatididosis with a daughter cyst in the ductus choledochus in an 84-year-old patient, treated with a multidisciplinary approach during the COVID-19 pandemic.

CASE PRESENTATION

An 84-year-old man was admitted to Emergency Surgery during the COVID-19 pandemic. The patient presented with acute biliary obstruction, pain, jaundice, cholangitis, and septicemia. The patient's medical history included cholecystectomy, appendectomy, and inguinal hernia repair. He also had atrial fibrillation. The patient lived in a rural sheep-farming area and reported owning dogs. Physical examination revealed abdominal tenderness, predominantly in the right upper quadrant, without signs of peritoneal irritation. His body temperature was 38°C. He showed signs of respiratory deterioration, and COVID-19 pneumonia was confirmed.

Laboratory tests revealed WBC count of 13.5 × 10^9/L, RBC count of 4.09 × 10^{12}/L, hemoglobin of 125 g/L, hematocrit of 0.376 L/L, and CRP of 160.6 mg/L. The International Normalized Ratio (INR) was 0.85. Liver function tests (LFTs) showed total bilirubin at 96 µmol/L, ALT at 150 U/L, AST at 141 U/L, GGT at 410 U/L, and ALP at 487 U/L.

Abdominal ultrasonography detected a 5 × 5 cm multilocular cystic lesion in the right hepatic segments, with posterior acoustic enhancement and no liver tissue infiltration. Multiple smaller (daughter) cysts completely filled the largest one, a feature often described as a "spoked wheel pattern." During patient movement, a "snowstorm pattern" was observed, caused by the dispersal of hydatid sand inside the cyst, seen as small hyperechoic foci. The cyst communicated on its medio-caudal side with the right posterior sectoral duct (RPSD), adjacent to its confluence with the right anterior sectoral duct (RASD). Our ultrasound findings corresponded to stage 3 by the Gharib ultrasound classification and to CE3b by the WHO-IWGE classification. The biliary tree was dilated, and hydatid material was detected in the right hepatic duct, common hepatic duct, and common bile duct (CBD), which measured 12 mm in diameter. No gallbladder was observed, consistent with the patient's history of cholecystectomy. No free fluid was seen in the abdomen. Other organs appeared normal on ultrasound.

An abdominopelvic multidetector computed tomography (MDCT) scan was performed after the administration of 100 ml of contrast agent. Both arterial and portal venous phases were acquired using the "bolus tracking" technique, followed by multiplanar

Figure 1. *Intraoperative ultrasound confirmed intrahepatic anatomical relationships of hydatid cyst*

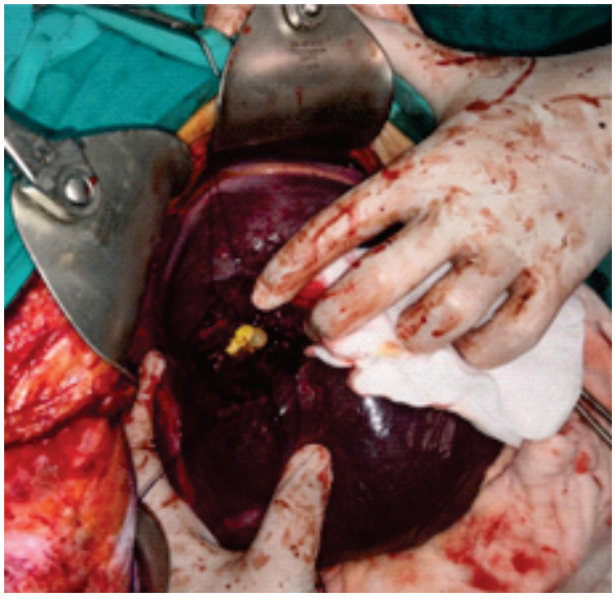

Figure 2. *The hepatic hydatid cyst was unroofed, the germinative membrane and daughter cysts are evacuated and cysto-biliary communication was sutured*

reformation and reconstruction (MPR). The liver exhibited normal CT density. A multicystic lesion measuring 55 × 45 × 57 mm was detected in liver segments V and VIII. The cyst abutted the bile duct branches for the right lobe and compressed surrounding liver tissue, causing intrahepatic ductal dilation, an indirect sign of communication with the cystic lumen. The cystic duct measured 8 mm, and the CBD was 12 mm in diameter, both almost entirely filled with inhomogeneous, low-attenuation structures.

Endoscopic procedures were unavailable, so the patient underwent open surgical treatment. A liver hydatid cyst was confirmed intraoperatively by intraoperative ultrasound (IOUS) (Figure 1), which revealed the cyst's anatomical relationship with surrounding structures. The hydatid cyst and the operating field were cov-

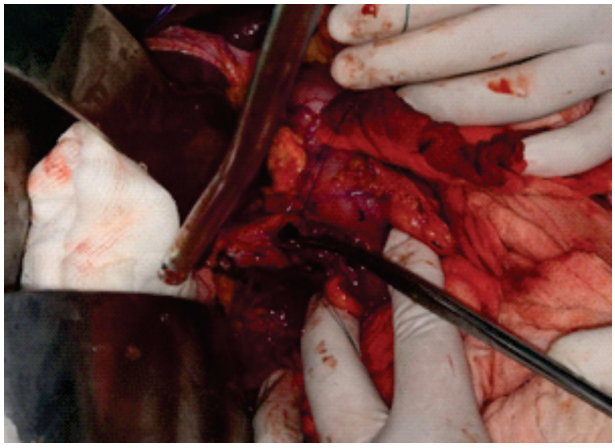

Figure 3. *After choledochotomy hydatid cysts were found inside ductus choledochus*

ered with pads soaked in hypertonic saline to prevent the spillage of parasites into the abdomen. The cyst was first punctured and aspirated, then unroofed, and the germinative membrane and daughter cysts were evacuated. The cyst cavity was explored, and a cysto-biliary communication was identified and sutured. An open pericystectomy with total cystectomy was performed, followed by a choledochotomy (Figure 2). Hydatid cysts were found in the ductus choledochus and were carefully evacuated (Figure 3). The ductus choledochus was washed, and a catheter was passed through the papilla into the duodenum. Intraoperative cholangiography was normal, and a T-tube drain was placed.

The postoperative course was uneventful, and the patient was started on early enteral nutrition. Postoperatively, he received antiparasitic drugs and antibiotic therapy. Control postoperative cholangiography was normal, showing a properly arborized biliary tree with no bile fistula. The patient was discharged on the third postoperative day without surgical complications and was transferred to the respiratory care unit for further COVID-19 treatment. After two years of follow-up, he remained free of complications.

DISCUSSION

Hydatid liver disease is most commonly detected in the right liver segments during ultrasonographic examinations (12, 14). Computed Tomography (CT) and Nuclear Magnetic Resonance (NMR) provide a more detailed view of the lesion's anatomy, including its morphological characteristics, its relationship with vascular structures, and the presence of complicated cysts or communication with the bile ducts (3, 8, 12). We presented the case of a patient treated at the emergency surgery clinic during the COVID-19 pandemic. Due to pandemic-related restrictions, we had limited access to imaging records, as no MSCT recordings were preserved. The treatment was constrained by the availability of open surgery and the exclusion of most minimally invasive and endoscopic procedures during the pandemic.

There are specific ultrasonographic signs indicative of hydatid cysts in the liver (8, 12). Ultrasonography is highly specific for diagnosing echinococcal liver disease both at initial presentation and for post-treatment follow-up (8, 12). The disease classification was first proposed by Hassan Gharbi from Tunisia in 1982 and later refined by the World Health Organization - Informal Working Group on Echinococcosis (WHO-IWGE) in 2003, with an update in 2006 (7, 10). For liver hydatid cysts in stages 3 and 4 of the Gharbi classification, there is a high likelihood of cystobiliary communication (11). In this case, the patient experienced biliary obstruction caused by daughter cysts in the ductus choledochus, which migrated through the biliary communication from a larger cyst in the right liver. Communication may also occur at the level of the common hepatic duct (2, 3, 6).

Several authors have found a positive correlation between the size of the cyst and the likelihood of biliary communication, particularly in cysts larger than 10 cm (3, 11). Hydatid cysts can compress surrounding structures, causing necrosis of the bile duct wall and the formation of biliary fistulas, allowing hydatid membranes and daughter cysts to enter the biliary tree (1, 3). This can lead to bile flow obstruction and infection. In our case, even though the cyst was smaller than 10 cm, biliary communication was confirmed.

Accurate diagnosis of the hydatid cyst stage is critical for determining treatment outcomes and avoiding postoperative complications (3, 15-20). Obstructive bile duct disease, as seen in our patient, requires precise radiological confirmation. However, preoperative detection of biliary communication is not always possible, and it is often necessary to explore the liver cavity during surgery (1, 6). Intraoperative ultrasound (IOUS) is essential for confirming the location, size, and relationships of the cyst during surgery (18). In our case, we located and punctured the cyst under IOUS control after laparotomy, ensuring both accuracy and patient safety.

Preoperative abdominal CT scans can confirm the presence of hydatid cysts in the biliary tree, as well as detect infected cysts or liver abscesses (3, 15). Secondary signs of biliary communication with a hydatid cyst include irregular cyst walls, distorted cyst shape, and air-fluid levels (8, 15). In our case, the cystic lesion compressed the surrounding liver tissue, resulting in intrahepatic duct dilation—an indirect sign of biliary communication.

Magnetic Resonance Cholangiopancreatography (MRCP) is the superior method for detecting hydatid material in the biliary tree (8). According to the American College of Gastroenterology Guidelines,

laparoscopic or open surgery is indicated for complicated echinococcal liver cysts, especially when multiple daughter cysts, fistulas, ruptures, bleeding, or secondary infections are present (16). Laparoscopic surgery is now considered safe for even large and complicated lesions (17). Radical surgical procedures, such as liver resection, offer low recurrence rates but carry higher intraoperative risks and morbidity (17). More conservative procedures, including cyst sterilization, evacuation, and partial cyst removal, are safer and simpler but may have higher recurrence rates (17, 19). Non-surgical treatments, such as percutaneous drainage, should also be considered for well-selected patients (20). Endoscopic retrograde cholangiopancreatography (ERCP) can be employed as a therapeutic option in certain cases (3).

In our case, considering the patient's general condition, we opted for an emergency open surgical approach to rapidly evacuate the cysts and relieve the biliary obstruction. The surgery proceeded without complications, and the patient recovered postoperatively without any surgical issues.

CONCLUSION

Communication between a hydatid cyst and the biliary tree is a complication of hydatid disease (HD) that necessitates timely diagnosis and appropriate therapy to reduce morbidity, mortality, and recurrence rates. Simple abdominal ultrasound and radiological imaging can confirm complications of HD, even in asymptomatic patients. Despite the extraordinary limitations on procedures during the pandemic, surgery remains the primary treatment option for patients with complicated HD.

Abbreviations

CH - Choledocho-Hydatididosis
CHC - Complicated Hydatid Cysts
IOUS - Intraoperative Ultrasound
HD - Hydatid Disease
CT - Computed Tomography
MRI - Magnetic Resonance Imaging
ERCP - Endoscopic retrograde cholangiopancreatography

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Note: Artificial intelligence was not utilized as a tool in this study.

Sažetak

HIRURŠKO LEČENJE KOMPLIKOVANE HIDATIDOZE DUCTUS CHOLEDOCHUS-a TOKOM PANDEMIJE COVID-19: EFIKASNOST I OGRANIČENJA RADIOLOŠKE SLUŽBE I HIRURGIJE U VANREDNIM USLOVIMA

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Uvod: Dok nekomplikovane ciste ehinokoka mogu godinama da rastu u jetri potpuno asimptomatski, komplikovane hidatidne ciste (KHC) imaju svoje kliničke karakteristike i zahtevaju hitno lečenje.

Prikaz slučaja: Prikazali smo hirurški slučaj akutne bilijarne opstrukcije i holangitisa zbog masivne holedoho-hidatididoze kod 84-godišnjeg COVID pozitivnog pacijenta. Multicistične lezije otkrivene radiološki u segmentima jetre V i VIII komprimovale su okolno tkivo jetre sa dilatacijom intrahepatičnih puteva i tokom operacije potvrđeno je postojanje ćerki cista u duktus holedohusu. Pokušaj ERCP nije uspeo. Urađena je otvorena pericistektomija sa totalnom cistektomijom i holedohotomijom. Sve hidatidne ciste su pažljivo evakuisane. Postoperativni tok je protekao uredno. Pacijent je otpušten sa hirurgije bez hirurških komplikacija.

Zaključak: Komplikovane hidatidne ciste (KHC) sa akutnom bilijarnom opstrukcijom zahtevaju brzo postavljanje dijagnose i brzu evakuaciju parazitske ciste i saniranje njenih komplikacija.

Ključne reči: Choledocho-Hidatidoza (CH), komplikovane hidatidne ciste (KHC), Intraoperativni ultrazvuk (IOUS), hidatidna bolest (HB), hirurgija jetre.

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