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Isolated biliary tract injury: necessity to heighten vigilance following blunt abdominal trauma in children

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Abstract

Background: Bile duct injury after blunt abdominal trauma is a rare entity in the pediatric population. Its occurrence has been highly linked to the primary injuries of the liver or duodenum as explained by their anatomical affiliation.

Case presentation: Here we present a case of a 4-year-old female brought in with a history of generalized abdominal pain that was associated with distension and absolute constipation. This was preceded by a blunt abdominal traumatic incident four days prior. On examination, she was ill-looking, tachypneic, and had a grossly distended abdomen with a positive Blumberg's sign. After the baseline laboratory and radiographic investigations, she was taken for exploration where Bile peritonitis was found secondarily to a perforated common bile duct (CBD). All other visceral structures and organs were fine; a meticulous primary closure of the 2 by 1 cm defect was done as superimposed by an omental patch. She fared well post-operatively and was discharged on the seventh day.

Conclusion: Though rare, biliary tract injury should always be considered among the differential diagnoses in blunt abdominal trauma, as its early diagnosis precipitates early intervention which will in turn positively affect the patient's outcome.

Keywords: Biliary Tract, Abdominal Trauma, Children, Biliary Leak, Bile Peritonitis, Blumberg's Sign, Tanzania

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Background

Most of the bile duct injuries present as associated with penetrating abdominal trauma with either an isolated ductal perforation or as an accompanying lesion of potential visceral injuries including the liver and the duodenum. It is however rare in blunt abdominal trauma and its occurrence almost always suggests the presence of primary high-grade hepatic injuries as manifested by an intrahepatic biliary leak [1]. The general non-specific clinical presentations render difficulties in making a symptomatic diagnosis. Extended-focused assessment with sonography in trauma (eFAST) is commonly utilized as per the increased availability of ultrasound machines and its usefulness cannot be underrated, it is however less sensitive and less specific to biliary leak thereby attracting the use of more advanced sophisticated diagnostic investigations like hepatobiliary iminodiacetic acid (HIDA Scan) and magnetic resonance cholangiopancreatography (MRCP) [2]. Modality of treatment is not limited to expectant/ non-operative management (NOM) as used in low output biliary leak but also extends to minimally approach procedures like laparoscopy, percutaneous drainage, and endoscopic retrograde cholangiopancreatography (ERCP) which can serve in both diagnostic and therapeutic purposes. On multiple occasions, patients end up with open abdominal surgeries as most of the biliary injuries are incidentally diagnosed during explorative laparotomies [3,4]. We here then present a case of a 4-year-old girl brought into our facility with a 4-day history of generalized abdominal pain along with other features following a blunt abdominal injury which was later found to be a potential leaking-isolated common bile duct perforation.

Case presentation

A 4-year-old girl was brought into our facility as a referral from one of the primary nearby health centers as she presented with a history of abdominal pain for over 4 days that was associated with absolute constipation and abdominal distension. It was preceded by a traumatic incident as she was bluntly hit by her 11-year-old brother after they got into a sibling fight. The brother informed the parents that he did give her multiple abdominal fist blows but he stopped only after she fell complaining of pain. However, there was no history of loss of consciousness, neither convulsion nor bleeding per nose or ears. The pain was symptomatically managed at home by the use of paracetamol

tablets. Still, two days later with no avail, she was taken to the nearby primary health center as the condition was systematically progressing presenting with fever, and denial of feeding whilst the abdomen was gradually distending. She was admitted and managed for 2 days with no recess, and hence the decision to refer her to the higher health facility was made. On arrival, she was ill-looking however alert, neither pale nor jaundiced. She was dyspneic saturating at 88% on room air (95 – 97 % on 5 liters of oxygen with a face mask), she was also tachycardic at 143 beats/minute. The abdomen was grossly distended (Figure 1), hyper-tympanic, tender on palpation with a positive Blumberg's sign, and hard stool was felt on digital rectal examination. With the diagnosis of peritonitis complicating with sepsis (as per SIRS criteria), the following immediate investigations were ordered; Abdominal ultrasound which showed a significant intraperitoneal fluid accumulation with features pointing to peritonitis.

Figure 1: A grossly distended abdomen of a 4-year-old on day four post blunt abdominal trauma

Plane abdominal pelvic x-ray showed multiple air-fluid levels, homogenous opacification with a positive colorectal mottled sign (Figure 2), and an erect chest x-ray was clear with no signs of viscus perforation (Figure 3).

Figure 2: Plane Abdominal-pelvic X-ray having multiple air-fluid levels, homogenous opacification with a positive mottled sign

Along with other investigations, complete blood count (CBC) results showed significant leukocytosis of 17 x 109/L with marked neutrophilia of 11 X 109/L. After being optimized, the patient was taken to theatre for explorative laparotomy with the diagnosis of Sepsis secondary to peritonitis querying a possible unspecified visceral injury.

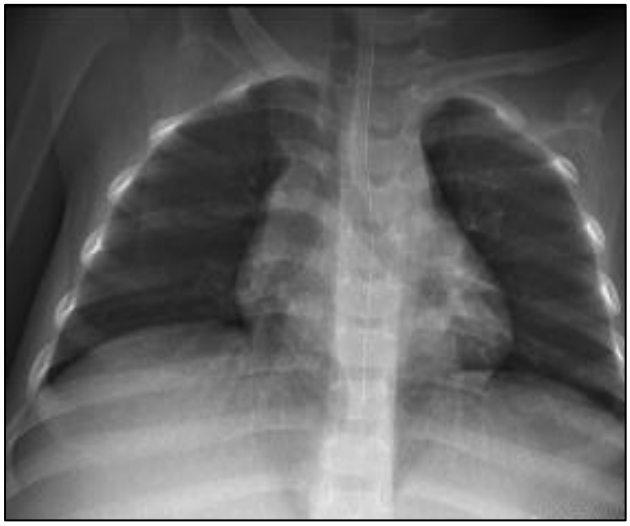

Figure 3: An erect chest x-ray with no signs of Gastrointestinal Viscus perforation

On opening up of the abdominal wall, no air gush was observed but rather a significant bilious peritoneal fluid of about 600 mls which was suctioned out. A whole of the peritoneum with its viscera was all bile stained. Thorough exploration was done only to find a 2 by 1 cm hole in the common bile duct (Figure 4). With refreshment of the margins, the hole was primarily interruptedly closed, superimposing an omental patch above the repair. Thorough peritoneal lavage was done with warm saline and after placement of intraperitoneal drainage, the abdominal wall was closed in layers. The patient was sent to a high dependency unit (HDU) for immediate post-operative care, she was then transferred to the general ward 24 hours later as her progress was promising. The drainage was removed on day 3 and she was successfully discharged on day 7 after the surgery. Follow-up was made for 2 consecutive months with no presentation or complications related to the primary pathology or intervention done.

Figure 4: Intraoperatively, a 2 by 1 cm Common Bile Duct perforation (which was successfully primarily repaired)

Discussion

The bile ducts are major structures that facilitate the flow of bile from the liver where it is produced down to the duodenum for its desired physiological functions. Anatomically, the ducts are categorized to be either intrahepatic or extrahepatic as per their location in relation to the liver. The extra hepatic component is

represented by the distal right and left hepatic ducts that converge at the hilar hence forming the common hepatic duct which joins with the cystic duct to form a common bile duct. Having a diameter of 1.8 to 5.9 mm, this 6 to 8 cm long duct is joined with the pancreatic duct to form the ampulla of Vater which empties to the second part of the duodenum [5]. In blunt abdominal trauma, the intrahepatic duct injury is always associated with a fracture injury to the liver parenchyma whereas the injury to the extrahepatic ducts can present without an associated liver injury [1]. Though the frequency of biliary injury after blunt abdominal trauma in children is not well reported, the pediatric population is said to be at risk due to anatomical reasoning including the large size of solid organs, more exposed surface area, low fatty contents with more elastic attachments of the viscera as compared to adults. Its incidence is reported to be between 0.5 to 20% within the general population. Common mechanisms of injury are pronounced to include Road traffic accidents or Runovers, falls from height, being hit by hard objects and fist blows, as is the case in our patient [1,4,6]. There are no pathognomonic symptoms that depict bile duct injuries in blunt abdominal traumas, most of the patients in the study done by Steven et al. [7] presented with persistent abdominal pain, low-grade fever, and prolonged ileus. In circumstances where the diagnostic formulation is delayed, the patient can present with jaundice, bilirubinuria, features of peritonitis, and sometimes systemic sepsis [8]. Our patient presented with features of intestinal obstruction as characterized by abdominal pain, distension, and absolute constipation with other features pointing to peritonitis in keeping with observation from the latter studies. The nonspecific clinical presentation in blunt trauma attracts the use of diagnostic investigations whenever an injury is suspected so as to determine a proper and timely management modality. Different laboratory investigations such as liver function tests though nonspecific can give some clues, especially in an associated parenchyma liver injury. The use of ultrasound and the Computed tomography (CT) scan cannot be underrated as they help in making the diagnosis of an associated visceral injury (essentially the liver) and any sequala of bile leak including Biloma [1,9]. Highly sensitive and specific investigations include Hepatobiliary scintigraphy/HIDA scan, MRCP, ERCP and PTC (Percutaneous Transhepatic Cholangiography) are immaculately useful in diagnosis or serve both diagnostic and therapeutic purposes. HIDA Scan is more of a physiological diagnostic investigation as compared to the others like Ultrasound and CT-Scan which only play an anatomical role. It can be used in diagnosing arrays of conditions from simple inflammation, obstructions, and many other hepatobiliary pathologies [10]. It involves an intravenous injection of a radioactive tracer with sequential images taken by a gamma camera as the tracer moves through the hepatobiliary system. The radiotracer used tends to follow the bilirubin metabolic pathway unto its excretion to the bile ducts [11], it is in this way it can also be utilized for the diagnosis of biliary leak in trauma with a sensitivity and specificity of up to 100% as observed in patients post laparoscopic cholecystectomy and liver transplant [2]. Wendy et al [12] stressed the utility of the HIDA Scan in blunt abdominal trauma as it facilitates early biliary leak diagnosis henceforth significantly reducing the hospital length of stay in most of the patients. ERCP is among the essential endoscopic procedures that are used to delineate the pancreaticobiliary anatomy with the use of fluoroscopy as abetted by the contrast agents. It was developed in the 1960s just for diagnostic purposes, in 1974 it took its debut as a therapeutic technique by facilitating a successful biliary sphincterotomy in Kyoto-Japan [13]. Despite its degree of invasiveness, it is still one of the potential interventional modalities in the treatment of a variety of conditions such as choledocholithiasis, bile duct leak, and even in palliative management for malignancies that cause obstructive jaundice [14]. As suggested in different studies, the effectiveness of ERCP can well be achieved by making sure of the following: understanding the role and application of contrast materials, successful cannulation, proper utilization of fluoroscope, body position effect on duct filling, and injection tips, balloon sweeping with proper ducts visualization and finally deciding interventions if required as per a discerned pathology [15]. In the study of Aduna et al, MRCP was found to be a good alternative to ERCP being 95% sensitive and 100% specific in diagnosing biliary leaks even in blunt abdominal trauma [16]. Another useful diagnostic and interventional procedure is percutaneous transhepatic cholangiography (PTC) which became popular in 1937. It involves the insertion of a needle to the liver parenchyma via skin so as to gain access to the bile ducts where contrast is injected commonly under fluoroscopy or ultrasound guide hence allowing for the evaluation of pathologies including biliary leak. Though not always absolute, the contraindications to perform PTC include; Coagulopathies/bleeding disorders, non-dilated ductal system, unstable hemodynamics, uncontrolled hepatobiliary infections, allergy to contrast materials, anatomical limitations especially with anatomical variations, and early pregnancy as it involves exposure to some radiations [3,17]. Complications that may arise from this procedure include; infection, secondary bile leakage, catheter blockage, hemobilia, acute pancreatitis, and catheter-stent fractures. Wanda et al addressed the importance of diagnostic and interventional radiologists to be aware of the complications and procedures so as to mitigate the risks [18]. Patients may be managed by non-operative management (NOM), minimal endoscopic approaches including ERCP and PTC with or without stenting, and even laparotomies with primary repair or hepaticojejunostomy (Reux-en-y). The choice as to which modality to use should be guided by the patient's presentation, radiological findings, and failure of conservative management [19,20].

Conclusion

Being a rare entity in the pediatric population, Isolated common bile duct injury in blunt abdominal trauma should be considered as one among the differential diagnoses with a high level of suspicious index, because; its gross presentation always tends to clinically masquerade peritonitis of any other acute abdomen. The authors hence strain on the importance of early diagnosis and intervention as the foundational journey towards better management outcomes.

Abbreviation

CBD: Common Bile Duct; ERCP: Endoscopic Retrograde Cholangiopancreatography; HIDA: Hepatobiliary Iminodiacetic Acid; PTC: Percutaneous Trans-Hepatic Cholangiography; MRCP: Magnetic Resonance Cholangiopancreatography

Declaration

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Availability of data and materials

Data will be available by emailing jothamambele@gmail.com

Authors' contributions

AM and SJ prepared the first draft. AM, SJ, LM and FS participated in the review of the manuscript. AM and SJ contributed equally in the preparation of this work, all authors have approved for the final article and its final submission.

Ethics approval and consent to participate

We conducted the research following the declaration of Helsinki. An assent was sought properly from the patient's guardians, and the publication of the obtained information with its accompanied images was approved by the relevant Joint Research and Ethical Committee of the hospital and the University.

Consent for publication

Not applicable

Competing interest

The authors declare that they have no competing interests.

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References

1. Zakaria HM, Oteem A, Gaballa NK, Hegazy O, Nada A, Zakareya T, et al. Risk factors and management of different types of biliary injuries in blunt abdominal trauma: single-center retrospective cohort study. Ann Med Surg (Lond). 2020 Apr;52:36-43. doi:10.1016/j.amsu.2020.02.016.
2. Matesan M, Bermo M, Cruite I, Shih CH, Elojeimy S, Behnia F, et al. Biliary leak in the postsurgical abdomen: a primer to HIDA scan interpretation. Semin Nucl Med. 2017 Nov;47(6):618-629. doi:10.1053/j.semnuclmed.2017.07.003.
3. Young M, Mehta D. Percutaneous Transhepatic Cholangiogram. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jul 25. Available from: https://www.ncbi.nlm.nih.gov/books/NBK537010/
4. Aljahdali AH, Murphy JJ. Bile duct injury in children: is there a role for early endoscopic retrograde cholangiopancreatography? Surg J (N Y). 2018 Jul;4(3):e119-e122. doi:10.1055/s-0038-1660844.
5. Strazzabosco M, Fabris L. Functional anatomy of normal bile ducts. Anat Rec (Hoboken). 2008 Jun;291(6):653-660. doi:10.1002/ar.20685.
6. Croce MA, Fabian TC, Menke PG, Waddle-Smith L, Minard G, Kudsk KA, et al. Nonoperative management of blunt hepatic trauma is the treatment of choice for hemodynamically stable patients: results of a prospective trial. Ann Surg. 1995 Jun;221(6):744-53. doi:10.1097/00000658-199506000-00015.
7. Moulton SL, Downey EC, Anderson DS, Lynch FP. Blunt bile duct injuries in children. J Pediatr Surg. 1993 Jun;28(6):795-7. doi:10.1016/s0022-3468(05)80146-8.
8. Le MT, Herrmann J, Groth M, Reinshagen K, Boettcher M. Traumatic gallbladder perforation in children–case report and review. Rofo. 2021 Aug;193(8):889-97. doi:10.1055/a-1285-8031.
9. Temiz A, Ezer SS, Gedikoğlu M, Serin E, İnce E, Gezer HÖ, et al. Management of traumatic bile duct injuries in children. Pediatr Surg Int. 2018 Aug;34(8):829-36. doi:10.1007/s00383-018-4298-8.
10. Hopfer K, Ziessman H. Nuclear medicine hepatobiliary imaging (cholescintigraphy). Gastrointest Endosc. 2011 Aug;74(2):375-7. doi:10.1016/j.gie.2011.01.037.
11. Lambie H, Cook AM, Scarsbrook AF, Lodge JP, Robinson PJ, Chowdhury FU. Tc99m-hepatobiliary iminodiacetic acid (HIDA) scintigraphy in clinical practice. Clin Radiol. 2011 Nov;66(11):1094-105. doi:10.1016/j.crad.2011.07.002.
12. Wahl WL, Brandt MM, Hemmila MR, Arbabi S. Diagnosis and management of bile leaks after blunt liver injury. Surgery. 2005 Oct;138(4):742-8. doi:10.1016/j.surg.2005.07.027.
13. Kröner PT, Bilal M, Samuel R, Umar S, Abougergi MS, Lukens FJ, et al. Use of ERCP in the United States over the past decade. Endosc Int Open. 2020 Jun;8(6):E761-9. doi:10.1055/a-1156-3870.
14. Solomon S, Baillie J. Indications for and contraindications to ERCP. In: ERCP. Elsevier; 2019. p. 54-8. ISBN: 9780323642760.
15. Lewey S, Adler DG. Fundamentals of ERCP image interpretation. Pract Gastroenterol. 2023 Aug;47(8):21.
16. Aduna M, Larena JA, Martin D, Martínez-Guereñu B, Aguirre I, Astigarraga E. Bile duct leaks after laparoscopic cholecystectomy: value of contrast-enhanced MRCP. Abdom Imaging. 2005 Aug;30:480–7. doi:10.1007/s00261-004-0210-6.
17. Chandel K, Patel RK, Tripathy T, Mukund A, Chauhan NS, Kumar C, et al. Transhepatic cholangiography and biliary drainage: basic concepts and technique. Dig Dis Interv. 2024 Oct 16. (Early Online). doi:10.1055/s-0044-1782347.
18. Venkatanarasimha N, Damodharan K, Gogna A, Leong S, Too CW, Patel A, et al. Diagnosis and management of complications from percutaneous biliary tract interventions. Radiographics. 2017 Mar;37(2):665-80. doi:10.1148/rg.2017160141.
19. LeBedis CA, Bates DD, Soto JA. Iatrogenic, blunt, and penetrating trauma to the biliary tract. Abdom Radiol (NY). 2017 Jan;42(1):28-45. doi:10.1007/s00261-016-0885-0.
20. Schreuder AM, Busch OR, Besselink MG, Ignatavicius P, Gulbinas A, Barauskas G, et al. Long-term impact of iatrogenic bile duct injury. Dig Surg. 2020;37(1):10-21. doi:10.1159/000501092.