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Aberrant subvesical bile ducts identified during laparoscopic cholecystectomy: A rare case report and review of the literature



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ABSTRACT

INTRODUCTION: Aberrant subvesical bile ducts are a scarce anatomical variation, consisted by a network of bile ducts located in the peri-hepatic capsule of the gallbladder fossa. These rare ducts are usually discovered intraoperatively and their presence poses the risk of bile injury and clinically significant bile leak.

PRESENTATION OF CASE: Aberrant subvesical bile ducts were unexpectedly identified in a young woman during laparoscopic cholecystectomy. These three ducts were clipped carefully for avoidance of bile duct injury and subsequent bile leak. The operation was uneventful. A meticulous review of the recent literature was conducted as well.

DISCUSSION: This unusual anatomical variation of the biliary tract is mainly discovered during the operation. Thus, surgical injury of these ducts is nearly inevitable and it provokes the severe complication of bile leak. Bile injury represents the most crucial and life-threatening postoperative complication of cholecystectomies. Surgeons in the right upper quadrant of the abdomen should be constantly aware of this rare anatomical variation.

CONCLUSION: Aberrant subvesical bile ducts are associated with a high risk of surgical bile duct injury. Nevertheless, meticulous operative technique combined with surgeons' perpetual awareness concerning this peculiar anatomical aberration leads to a safe laparoscopic cholecystectomy.

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1. Introduction

Aberrant subvesical bile ducts are a peculiar anatomical variation, defined as a network of bile ducts located in the peri-hepatic connective tissue of the gallbladder fossa [1]. These scarce bile ducts when encountered intraoperatively worth of surgeons' attention [2] since their injury is nearly inevitable and it poses the risk of bile leak [3]. This manuscript has been reported in line with the SCARE guidelines [4].

2. Case report

A 35-year-old female presented with a 2-month history of colicky abdominal pain in the right upper quadrant which progressively become worse. Her vital signs were normal. Clinical examination was unremarkable without positive Murphy's sign, tenderness, palpable masses or jaundice. No previous surgical history existed. Blood tests including ALT, AST and bilirubin were all normal. An abdominal ultrasound scan revealed multiple gallstones within the patient's gallbladder. Following this, laparoscopic cholecystectomy was scheduled. At the laparoscopy, when the surgeons attained to dissect the gallbladder off the liver, they exposed carefully the operative field and they unexpectedly identified three aberrant subvesical bile ducts originating from the right lobe of the liver and draining in the gallbladder. (Fig. 1–3) All these three aberrant bile ducts were immediately clipped meticulously so that bile leakage could be evitable and postoperative complications could be avoided. The laparoscopic cholecystectomy continued in the usual fashion. A drainage was placed beneath the liver, which was removed the 3d postoperative day. The patient was discharged the

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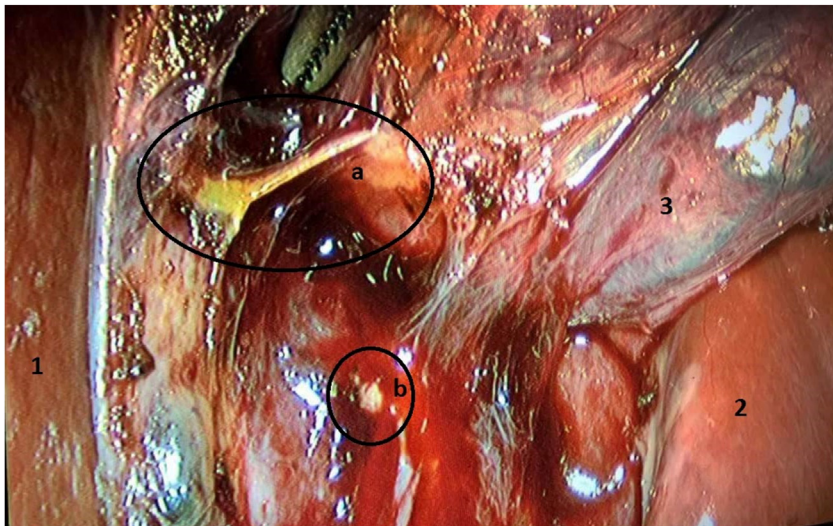


Fig. 1. a) first aberrant subvesical bile duct, b) second aberrant subvesical bile duct, 1: right lobe of the liver, 2: left lobe, 3: posterior surface of the gallbladder.

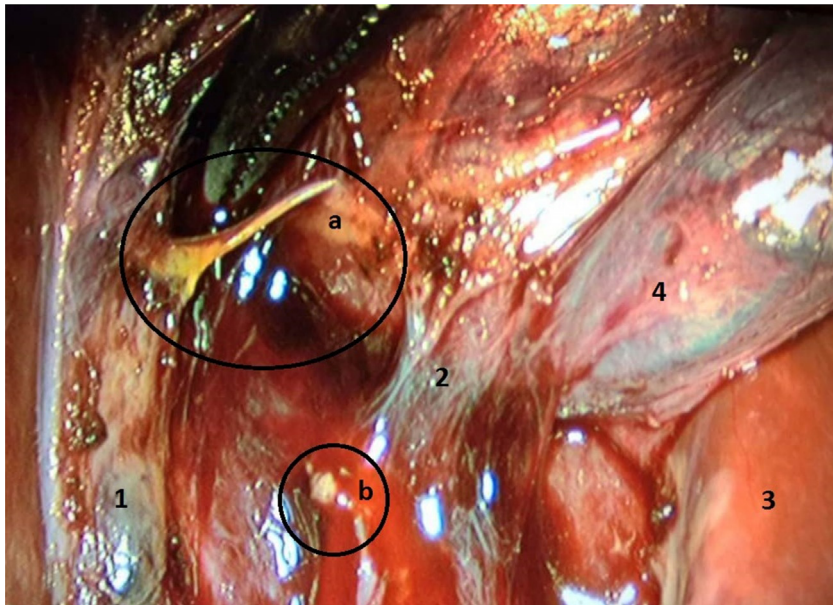


Fig. 2. a) first aberrant subvesical bile duct, b) second aberrant subvesical bile duct, 1: right lobe of the liver, 2: aberrant communication of the gallbladder and the liver, 3: left lobe of the liver, 4: gallbladder.

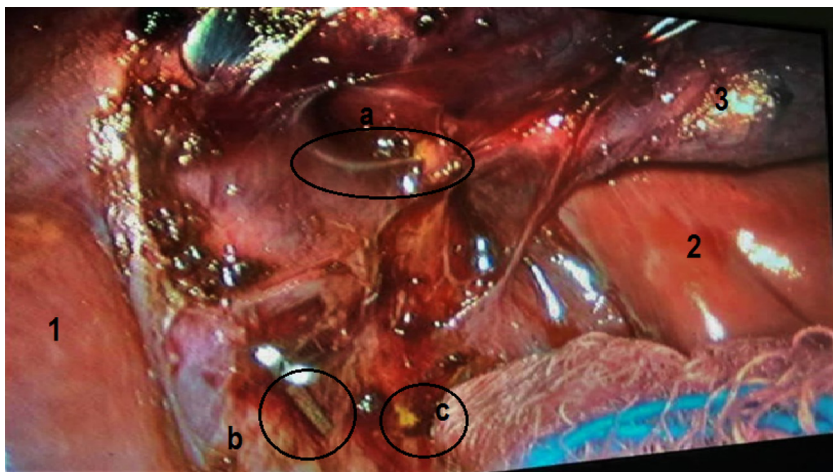


Fig. 3. Detailed exposure of the operative field. a) first aberrant subvesical bile duct, b) clipped aberrant bile duct, c) third bile duct. 1: right lobe of the liver, 2: left lobe, 3: gallbladder.

2nd postoperative day with instructions. At the follow-up, the 7th postoperative day, the patient had no any complication.

3. Discussion

Subvesical bile ducts, which are usually termed incorrectly “ducts of Luschka” are scarce anatomical variations of the biliary tract, that traverse in contact with the gallbladder fossa [1]. Regarding these unusual bile ducts, a lack of appropriate anatomical classification and elucidated, common definition was evident till the categorization of Schnelldorfer and colleagues. According to their research, subvesical bile ducts are divided in four types: 1) segmental or sectorial, 2) accessory, 3) hepaticocholecystic and 4) aberrant bile ducts [1]. “Ducts of Luschka” do not drain in the gallbladder [5] and they differ from the three aberrant bile ducts which were identified intraoperatively in the present case and which run in the gallbladder.

Aberrant subvesical bile ducts are a rare anatomical variation consisted by a network of bile ducts within the connective tissue of the gallbladder fossa [1]. These peculiar bile ducts have a typically small diameter, with an average size of 2 mm and they usually originate from the right lobe of the liver [6].

The etiology of subvesical bile ducts is a subject of considerable debate since it is thought to be a congenital anomaly or an acquired condition as well [1,7]. The first theory suggests that during the early stages of the fetus development, subvesical bile ducts are formed from the ductal plate in atypical regions [7]. On the other hand, concerning the acquired condition, there are two different theories. Principally, it is believed that subvesical bile ducts are normal peripheral bile ducts located in a region where liver parenchyma reverted due to hepatic remodeling [7]. The second theory suggests that subvesical bile ducts are caused as a result to hypertrophy of parenchymal branches due to previous local inflammation [1].

The true prevalence of aberrant subvesical bile ducts is ambiguous occurring to an absence of literature regarding the fetal anatomy of the bile tract and the prevalence of subvesical bile ducts in fetuses [8] in addition to bounded sensitivity of identifying small subvesical bile ducts during the operation [1].

Indeed, because of their size, these unusual bile ducts might go unnoticed and they may get injured [9,10]. Thus, subvesical bile ducts have a great clinical significance for surgeons in the right upper abdominal quadrant since they are barely detected preoperatively [5] and they might be injured during hepatobiliary and gallbladder operations [1]. MRCP has sensitivity 66% to identify subvesical bile ducts and DIC-CT has sensitivity up to 100% [11]. These results imply that preoperative detection is feasible and it can lead to prevention of subvesical bile duct injury during the operation. Unfortunately though, such imaging methods will certainly increase overall cost [6] and they are not essential when approaching a patient requiring laparoscopic cholecystectomy, as in the presented case.

More specifically, injury of a subvesical bile duct is quietly inevitable [1] and it is one of the most common etiologies of bile leakage in cholecystectomies [3,12,13]. In fact, approximately 27% of clinically significant bile leaks are occurred by injury to a subvesical bile duct [1]. In particular, bile injury represents the most crucial and life-threatening postoperative complication of cholecystectomies [14] and bile leak remains a potential cause of morbidity (0.2–2%) for patients undergoing laparoscopic cholecystectomy [6], which can even lead to biliary peritonitis to the patient [15].

The majority of injuries to subvesical bile ducts commonly occur during the dissection of the gallbladder off the liver [16]. The risk of such an injury is increased from vast inflammation, surgeons' lack of experience and tactless use of the cautery [6].

Bile leaks due to subvesical bile duct injury are usually detected during the first postoperative week, presenting with symptoms such as abdominal pain and signs such as tenderness and fever [13]. Mild augmentation of ALP and bilirubin may also be detected. Moreover, biliary peritonitis with subsequent sepsis may occur [6]. Nevertheless, there are reported cases in which bile leaks present several weeks after the operation [17] and cases in which patients had no symptoms at all [6]. In fact, bile leaks from subvesical bile ducts usually have milder clinical signs and symptoms comparing to a major undetected bile leak that might provoke peritonitis, biliomas and septic shock to the patient [16]. All previously mentioned clinical manifestations, should be immediately investigated. Postoperatively, a subvesical bile leak may be detected via fistulography [6].

Almost all subvesical bile duct leaks can be treated successfully by ERCP and endobiliary stent placement [16,18]. Conversely, reoperation of the patient can be performed [6].

Therefore, aberrant subvesical bile ducts worth of surgeons' attention and their vigilance during the operation is pivotal. If detected intraoperatively, the treatment of choice is a simple closure of these aberrant bile ducts in order to avoid bile leak and its complications, as performed in the reported case.

4. Conclusion

Aberrant subvesical bile ducts are extremely rare and they might be unnoticed during hepato-biliary operations [9]. Unfortunately, their injury is barely inevitable and it provokes bile leakage, which is a life-threatening complication of laparoscopic cholecystectomy [6]. Hence, a meticulous operative technique and detailed exposure of the operative field is the cornerstone of a safe laparoscopic cholecystectomy in addition to surgeons' perpetual awareness concerning this scarce anatomical aberration of the biliary tract.

Conflict of interest

None.

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Ethical approval

This is a Case Report for which the patient provided written informed consent.

Consent

Written consent was provided from the patient for the publication of this case report and accompanying images.

Author contribution

Mariolis-Sapsakos and Zoulamoglou conceived of the study. Kaklamanos was senior consultant at this case report and participated in its coordination. Papapanagiotou and Piperos contributed to the acquisition of clinical data, its analysis and interpretation and to the preparation of images. Zarokosta and Sgantzios carried out the literature review. Mariolis-Sapsakos, Zarokosta and Birbas contributed to the preparation of the manuscript. Mariolis-Sapsakos, Zarokosta and Zoulamoglou contributed to the refinement of the case report. All authors have approved the final article.

Guarantor

The Guarantor who is responsible for the present case report is Ioannis Kaklamanos. He coordinated the preparation of the case report and revised it critically for important intellectual content.

References

- [1] T. Schnelldorfer, M.G. Sarr, D.B. Adams, What is the duct of Luschka? A systematic review, *J. Gastrointest. Surg.* 16 (2012) 656–662.
- [2] M. Balija, M. Huis, F. Szeda, J. Bubnjar, M. Stullhofer, Laparoscopic cholecystectomy-accessory bile ducts, *Acta Med. Croatica* 57 (2) (2003) 105–109.
- [3] H.H. Lien, C.S. Huang, M.Y. Shi, D.F. Chen, N.Y. Wang, F.C. Tai, S.H. Chen, C.Y. Lai, Management of bile leakage after laparoscopic cholecystectomy based on etiological classification, *Surg. Today* 34 (2004) 326–330.
- [4] R.A. Agha, A.J. Fowler, A. Saetta, I. Barai, S. Rajmohan, D.P. Orgill, for the SCARE Group, The SCARE statement: consensus-based surgical case report guidelines, *Int. J. Surg.* 34 (October) (2016) 180–186.
- [5] S.E. Lee, K.W. Park, Y.S. Choi, E.S. Lee, Rare bile duct anomaly: b3 duct draining to gallbladder, *J. Pediatr. Surg. Case Rep.* (2016) 8–9.
- [6] C.P. Spanos, T. Syrakos, Bile leaks from the duct of Luschka (subvesical duct): a review, *Langenbecks Arch. Surg.* 391 (September (5)) (2006) 441–447.
- [7] M. Kitami, G. Murakami, D. Suzuki, K. Takase, M. Tsuboi, H. Saito, S. Takahashi, Heterogeneity of subvesical ducts or the ducts of Luschka: a study using drip-infusion cholangiography-computed tomography in patients and cadaver specimens, *World J. Surg.* 29 (2005) 217–223.
- [8] N. Kocabiyik, B. Yalcin, Z. Kilbas, S.R. Karadeniz, B. Kurt, A. Comert, H. Ozan, Anatomical assessment of bile ducts of Luschka in human fetuses, *Surg. Radiol. Anat.* 31 (2009) 517–521.
- [9] B. Doumenc, M. Boutros, R. Degremont, A.F. Bouras, Biliary leakage from gallbladder bed after cholecystectomy: Luschka duct or hepaticocholecystic duct? *Morphologie* 100 (March (328)) (2016) 36–40.
- [10] Y. Kurumi, T. Tani, K. Hanasawa, M. Kodama, The prevention of bile duct injury during laparoscopic cholecystectomy from the view of anatomic variation, *Surg. Laparosc. Endosc. Percutan. Tech.* 10 (2000) 192–199.
- [11] K. Hirao, A. Miyazaki, T. Fujimoto, I. Isomoto, K. Hayashi, Evaluation of aberrant bile ducts before laparoscopic cholecystectomy: helical CT cholangiography versus MR cholangiography, *Am. J. Roentgenol.* 175 (2000) 713–720.
- [12] M. Misra, J. Schiff, G. Rendon, J. Rothschild, S. Schwaitzberg, Laparoscopic cholecystectomy after the learning curve: what should we expect, *Surg. Endosc.* 19 (2005) 1266–1271.
- [13] J.C. Hwang, J.H. Kim, B.M. Yoo, S.G. Lim, J.H. Kim, W.H. Kim, M.W. Kim, Temporary placement of a newly designed, fully covered, self-expandable metal stent for refractory bile leaks, *Gut Liver* 5 (1) (2011) 96–99.
- [14] D. Parmeggiani, G. Cimmino, D. Cerbone, N. Avenia, R. Ruggero, A. Gubitosi, G. Docimo, S. Mordente, C. Misso, U. Parmeggiani, Biliary tract injuries during laparoscopic cholecystectomy: three case reports and literature review, *Casistica Clin.* 31 (2010) 16–19.
- [15] K. Sharif, J. de Goyet, Bile duct of Luschka leading to bile leak after cholecystectomy-revisiting the biliary anatomy, *J. Pediatr. Surg.* 38 (November) (2003) 21–23.
- [16] S. Majumder, H. Habibi, C.M. Garcia, Subvesical bile duct injury: an often missed cause of postcholecystectomy bile leak, *Surg. Laparosc. Endosc. Percutan. Tech.* 23 (August (4)) (2013) 168–169.
- [17] S.H. Albishri, S. Issa, N.M. Kneteman, A.M.J. Shapiro, Bile leak from duct of Luschka after liver transplantation, *Transplantation* 72 (2001) 338–340.
- [18] G.S. Sandha, M.J. Bourke, G.B. Haber, P.P. Kortan, Endoscopic therapy for bile leak based on a new classification: results in 207 patients, *Gastrointest. Endosc.* 60 (2004) 567–574.

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