

Duct of Luschka Injury - The Biloma Dilemma: A Case Report

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Abstract

Post-Operative bile leaks have been a major topic of discussion in the literature. These events lead to morbidity as well as increased mortality among patients. Injury to the ‘Duct of Luschka’ has increasingly been discussed in recent times. We present a case of post-open cholecystectomy complicated with bile leak attributed to injury to the subvesical duct, also known as the ‘Duct of Luschka’. This case report discusses the origins of the term of the duct of Luschka as well as other aspects of tackling a case of bile leak from this duct.

Keywords: Duct of Luschka, Subvesical duct, Bile leakage, Cholecystectomy

INTRODUCTION

Bile leak post cholecystectomy is one of the most feared postoperative complications. The International Study Group of Liver Surgery has defined bile leakage as “bilirubin concentration in the drain fluid at least 3 times the serum bilirubin concentration” on or after postoperative day 3, requiring radiologic or operative intervention due to biliary collection or bile peritonitis.¹

Post-operative bile leaks were observed to occur in 0.9% of patients after laparoscopic cholecystectomy, 4.2% in patients undergoing laparoscopic cholecystectomy but converted to open surgery, and 2.4% in patients undergoing open cholecystectomy. This complication significantly contributes to morbidity in 44% of the patients and boasts a mortality rate of 8.8%.²

The most common site contributing to postoperative bile leaks occurs at the cystic duct stump, followed by the duct of Luschka, and other sites.³ The duct of Luschka, also known as the subvesical duct, was first described in detail by Hubert Von Luschka in 1963. He described the subvesical duct as a slender bile duct running along the gallbladder fossa, draining into the right hepatic duct or common hepatic duct.⁴ A literature review conducted by Schnelldorfer revealed a prevalence of subvesical duct injury of only 4%.⁵ We herein report the occurrence of bile duct leakage secondary to an injury to the duct of Luschka after open cholecystectomy for gallbladder empyema.

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CASE PRESENTATION

A 74-year-old man presented with a history of right upper quadrant for 2 days. There was nausea and vomiting. He had tenderness at the right hypochondrium with positive Murphy's sign. His white cell count (WCC) was raised ($23,400/\text{mm}^3$) and had slightly elevated serum bilirubin level (2.0 mg/dL). Abdominal ultrasonography (USG) showed features of gallbladder empyema with multiple gallstones. The patient underwent an emergency open cholecystectomy. The surgery was uneventful. A drain was left in the Morison's pouch.

The patient had an uneventful postoperative course until day 4 after surgery. There was significant bile fluid flowing from the drainage tube, and the patient had a mild right upper quadrant tenderness. A repeated abdominal ultrasonography (USG) showed a fluid collection at the gallbladder fossa measuring $2.2 \text{ cm} \times 2.2 \text{ cm} \times 2.0 \text{ cm}$, while Magnetic Resonance Cholangiopancreatography (MRCP) revealed a gallbladder fossa fluid collection communicating with segment VIII/V intrahepatic duct, likely through the duct of Luschka (Figure 1). Endoscopic Retrograde Cholangiopancreatography (ERCP) was performed in view of the persistent bile drainage, and established that there was contrast leakage from the duct of Luschka, with no leakage from the cystic duct (Figure 2). A 12 cm/7Fr plastic biliary stent was deployed. Over the next few days, the bile leakage decreased markedly, and the patient was discharged home, symptom free.

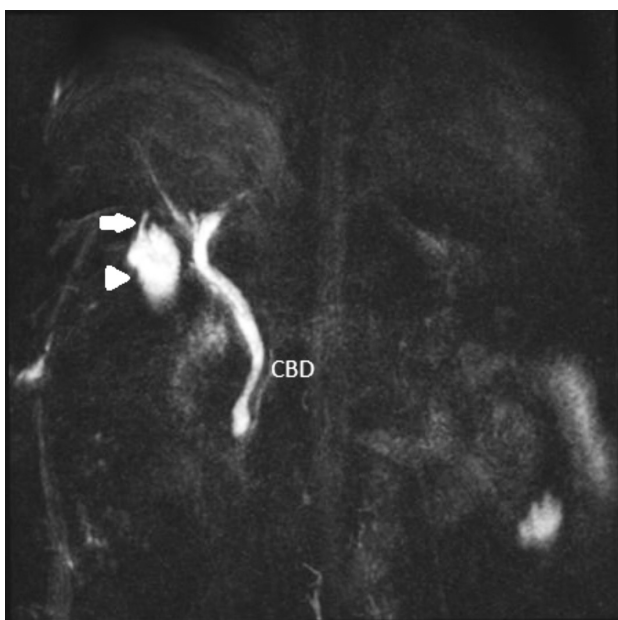


Figure 1 MRCP image showing contrast flow from subvesical duct (arrow) and contrast extravasation (arrow head)



Figure 2 ERCP image demonstrating contrast leak from subvesical duct

DISCUSSION

The duct of Luschka is a well-known anatomic variant that has been mentioned and discussed frequently in recent papers. Knowledge of the anatomy of this biliary tree variation is important from a clinical perspective, as it is at risk of injury during gallbladder and hepatic operations.

The name "duct of Luschka" originates from Hervert Von Luschka, who, in his anatomy book, describes the duct as an intra-mural gland draining into the gallbladder lumen or a network of microscopic ducts within the soft tissue surrounding the gallbladder.⁴ The duct of Luschka have since been cited and referenced frequently without a clear definition. A literature review by Schnelldorfer in 2011, identified 13 articles, comprising 3996 patients, in an attempt to properly define the anatomy of the duct of Luschka. He concluded that this anatomic variant should be better termed the subvesical duct. In his review, the subvesical duct prevalence was 4%. He also revealed that the duct commonly had a mean diameter of 2 mm (range, 1 to 18 mm) and a mean length of 35 mm (range, 8 to 82 mm). These subvesical ducts originated mainly from the right lobe (69%). Drainage into the right lobe occurred in 40% of subvesical ducts, while majority drained into the gallbladder.⁵ Being aware of the anatomical variants may go a long way in preventing biliary complications.

As expected, bile leaks carry some degree of morbidity and mortality. An analysis of 3,551 patients with bile leaks revealed that 2.4% of patients died within 1 year, which is 2-fold higher than that of patients with no bile leaks.⁶ This mortality was observed despite adjusting for sepsis and cholangitis suggesting even in the absence of overt infection, bile leakage still had a detrimental effect on survival. Hence, clinical awareness remains crucial in detecting bile leakage. A retrospective study of patients who were referred for suspected bile leakage, revealed that the majority of patients with bile leakage was symptomatic (72%). A large proportion presented with abdominal pain (62%), as well as fever (37%) and jaundice (7%).³

Bile leakage from the duct of Luschka is a rare complication, reported in only 0.15% to 2% of patients undergoing cholecystectomy.⁸ The duct of Luschka can be screened for its presence or injury in three phases, namely pre-operative, intra-operative and post-operative. Pre-operative detection uses drip-infusion cholangiography with computed tomography (DIC-CT). A study conducted by Kitami et al revealed that among 277 patients with cholelithiasis, the duct of Luschka was identified in 28 patients.⁷ Intra-operative cholangiography to detect duct of Luschka injury during surgery could be technically challenging, and hence does not always detect such injury.⁹ The most common period where an injury to the duct of Luschka is diagnosed is therefore post-operative. Radiologic imaging is an important modality in detecting postoperative bile leakage. There are many options available, such as fistulography, ERCP, or MRCP.⁷ MRCP with contrast agents primarily excreted by the biliary tract in T1-weighted sequences results in 86% sensitivity and 83% specificity for the detection of bile leakage. It also offers the possibility to detect leaks not communicating with the central biliary tree and to differentiate bile from free fluid of different origin.⁸ An example of contrast agent being used is Teslascan (intravenous mangafodipir trisodium) which is primarily excreted via the biliary tract.⁷

Treatment of bile leakage from the duct of Luschka depends on several factors, mainly taking into account the clinical condition of the patient. In most cases, patients who are asymptomatic with low output bile leakage should only require a simple percutaneous drain insertion. Spontaneous resolution of bile leakage is possible if the duct of Luschka does not drain bile from a

significant portion of the liver parenchyma.⁷ If there is clinical deterioration, or the bile leakage becomes high output, ERCP with sphincterotomy and biliary duct stenting would benefit the patient.

CONCLUSION

Bile leakage is a serious complication after cholecystectomy. Leaks from the duct of Luschka are an infrequent event, but should remain a possible complication after cholecystectomy in the surgeon's mind. Even in the hands of the most experienced surgeon, this complication may occur. ERCP and stenting is still the gold standard treatment for this injury. The name 'duct of Luschka' should be referred to as the subvesical bile duct.

DECLARATIONS

Consent for publication

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

Authors' contributions

Hemanathan Praemanathan: Conceptualization, Data curation, Resources, Validation, Visualization, Writing-original draft, Writing-review & Editing

Ivan Ho Khor Ee: Conceptualization, Data curation, Resources, Validation, Visualization, Writing-original draft, Writing-review & Editing

Yeoh Aik Guan: Conceptualization, Resources Validation, Visualization, Writing-Review

Muhamad Izwan Ismail: Conceptualization, Resources Validation, Visualization, Writing-Review, Supervision

REFERENCES

1. Koch M, Garden OJ, Padbury R, et al. Bile leakage after hepatobiliary and pancreatic surgery: a definition and grading of severity by the International Study Group of Liver Surgery. *Surgery* 2011;149:680-8. doi: 10.1016/j.surg.2010.12.002.
2. Buanes T, Waage A, Mjåland O, et al. Bile leak after cholecystectomy significance and treatment: results from the National Norwegian Cholecystectomy Registry. *Int Surg* 1996;8:276-9.
3. Kaffes AJ, Hourigan L, De Luca N, et al. Impact of endoscopic intervention in 100 patients with suspected postcholecystectomy bile leak. *Gastrointest Endosc* 2005;61:269-75. doi: 10.1016/s0016-5107(04)02468-x.

4. Luschka H. Die Anatomie des Menschen in Rücksicht auf die Bedürfnisse der praktischen Heilkunde bearbeitet. Die Anatomie des menschlichen Bauches. Tübingen: Laupp; 1863;2:235-263.
5. Schnelldorfer T, Sarr MG, Adams DB. What is the duct of Luschka? A systematic review. *J Gastrointest Surg* 2012;16:656-62. doi: 10.1007/s11605-011-1802-5.
6. Fong ZV, Pitt HA, Strasberg SM, et al; California Cholecystectomy Group. Diminished survival in patients with bile leak and ductal injury: management strategy and outcomes. *J Am Coll Surg* 2018;226:568-576. doi: 10.1016/j.jamcollsurg.2017.12.023.
7. Spanos CP, Syrakos T. Bile leaks from the duct of Luschka (sub-vesical duct): a review. *Langenbeck's Arch Surg* 2006;39:441-447. DOI: 10.1007/s00423-006-0078-9.
8. Paramythiotis D, Moysidis M, Rafailidis V, et al. Ducts of Luschka as a rare cause of postoperative biloma. MRCP findings. *Radiol Case Rep* 2019;14:1237-1240. doi: 10.1016/j.radcr.2019.07.008.
9. Polat FR, Abci I, Coskun I, et al. The importance of intraoperative cholangiography during laparoscopic cholecystectomy. *JSLs* 2000;4:103-7.