Accessory hepatic duct injury during laparoscopic cholecystectomy: Ligation as an alternative treatment approach

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Abstract

Introduction: Extrahepatic atypical bile duct such as accessory hepatic duct, aberrant hepatic duct and Luschka duct, is a rare finding and its incidence is reported to vary from 1.4 % - 27%. In patients with such biliary tract anatomical variations injuries are related to difficulty in identifying the correct anatomical structures either laparoscopically or in open way.

Case report: A 35 years old woman was scheduled for laparoscopic cholecystectomy (LC) due to symptomatic gallbladder lithiasis. During operation, an aberrant hepatic duct was misdiagnosed as the cystic duct and, thus, it was ligated and cut. During cyst detachment, the injury was noticed and, therefore, the LC was transversed into an open cholecystectomy. The cystic duct was recognized to originate from an aberrant duct, proximally 2 mm in diameter. The aberrant duct was intubated and an intraoperative cholangiography was performed; revealing intrahepatic communication between left and right hepatic ducts and aberrant duct. Ligation of the accessory duct was, therefore, accomplished. The patients’ recovery was uneventful and she was discharged in the 5th post operative day. No biochemical alterations of the hepatic enzymes were recorded and the patient had no signs of hepatic pathology during follow up.

Conclusion: In spite of excellent laparoscopic visualization, extrahepatic accessory bile duct injuries during LC are unavoidable due to rarity and unexpectedly. In our case, although the duct’s diameter was 2 mm, we proceeded in the final ligation after taking into account that both right and left hepatic lobes had good intercommunication with the aberrant duct and the common hepatic duct. We recommend the use of intraoperative cholangiography in cases that anatomical variations are suspected. The safe performance of these operative procedures requires good knowledge of the anatomy, definite identification of the relevant structures and high degree of clinical suspicion.

Key words: aberrant hepatic duct, laparoscopic cholecystectomy injury, intraoperative cholangiography

Introduction

Laparoscopic cholecystectomy (LC) is considered to be the gold standard for gallbladder pathology. However, LC is accompanied by high incidence of injuries even in most experienced centers [1]. During cholecystectomy, the abnormal bile duct route is considered, among others, to be one of the most crucial anatomical factors leading to increased injury incidence [2]. Extrahepatic atypical bile duct confluence, known also as Luschka duct, accessory hepatic duct or aberrant hepatic duct, is a rare finding and its incident is reported to vary from 1.4 % - 27% [1,2,3,4]. In patients with such abnormalities, the bile duct injuries occur 3.2 to 8.4 times more frequently than those with normal bile duct route, regardless open or laparoscopic cholecystectomy is performed [1,2,4].

Improvement in imaging methods, such as three-dimensional computed tomography (CT) and drip infusion cholangiography (DIC) are reported to be useful for verification of the biliary tract anatomy and to facilitate the preoperative diagnosis of the abnormalities, concerning the presence of accessory hepatic ducts, and the cystic duct confluence [5,6]. Nevertheless, injuries to the biliary tract during LC continue to be reported [7]. We report an aberrant hepatic duct injury during LC, which was managed successfully.

Case Report

A 35 years old female was scheduled for LC due to symptomatic cholecystolithiasis diagnosed by ultrasound. In the CT examination of the upper abdomen a hemangioma in the IV hepatic segment was observed (Fig.1). Routine blood analyses were in normal range. Patient’s past medical and surgical history was free and no use of any medication was mentioned.

Figure 1. CT scan of the abdomen revealed the presence of hemangioma in the IV hepatic segment.
During LC, an aberrant hepatic duct was misdiagnosed as the cystic duct and, thus, it was clipped and cut. During cyst detachment, the injury was noticed and, therefore, LC was transversed into an open cholecystectomy. The cystic duct was recognized to originate from an aberrant duct, proximally 2 mm in diameter (type IV, according to Uchiyama K, et al) [2] (Fig.2). The aberrant duct was intubated and an intraoperative cholangiography was performed (Fig. 3, 4). The last showed intrahepatic communication between left and right hepatic ducts and the aberrant duct, and a normal rest extrahepatic biliary anatomy (Fig. 5). Ligation of the accessory duct was, therefore, accomplished.

Figure 2. The cystic duct was recognized to originate from an aberrant duct (arrows), proximally 2 mm in diameter (type IV, according to Uchiyama K, et al.) [2].

Figures 3, 4. Intraoperative cholangiography through a catheter inserted into the injured aberrant hepatic duct

Figure 5. Cholangiography shows communication of aberrant hepatic duct to the right and left hepatic duct, and a normal extrahepatic biliary anatomy

Postoperatively, no biochemical alterations of the hepatic enzymes were recorded and the patient had no signs of hepatic pathology in clinical examination. The patient’s recovery was uneventful and she was discharged in the 5th post operative day. During follow up 3 months later, no pathological sign was recorded.

Discussion

The role of LC in the treatment of gallbladder pathology is undisputed, in terms of morbidity, mortality and quality of life [8]. Nevertheless, it has been suggested that up to 0.5% of LCs are associated with biliary injury in contrast to the historic 0.1-0.2% rate reported after open cholecystectomy [9,10]. This was originally attributed to a ‘learning curve’ phenomenon, but according to more recent studies, the incidence of injuries remained constant, even past the learning curve period [11,12]. Larobina et al. [13] verify the above mentioned conclusion and confounded their results by 3 variables: a lower threshold to perform LC, more difficult cases are being done by laparoscopy and fewer injuries are being recognized intraoperatively.

The presence of abnormal anatomy of the biliary tree is considered to account for a small number of biliary injuries. That is, mostly, due to the rarity of such variations, but when present, leads to a significant number of postoperative bile leakage or bile duct obstructions [14]. In cadaveric specimens, the aberration rate of the bile duct tree was reported to range between 14-28% although the reported rate of intraoperative discovery of such anatomic variations (either laparoscopically or open way) was 10%
[15]. Aberrations are commonly seen at the area near the confluence of the hepatic duct and the entry of the cystic duct into the common bile duct (CBD). The majority of aberrant ducts arises from the right lobe of the liver and not exceeds 1 to 2 mm in diameter; they usually drain within 30mm of the hepatocystic angle [3]. The term accessory ducts should be avoided, as the term aberrant is considered to be more accurate since, in most cases, these ducts consist the only route of drainage for one or several hepatic segments [1].

Transaction, thermal injury or ligation of the aberrant duct may result in exclusion of that duct from the main biliary tree. Lack of intercommunication among segmental ducts makes the postoperative detection of such injury difficult even impossible, since the injured aberrant bile duct fails to opacify during endoscopic or percutaneous injection of contrast material into the main biliary tree. That is not true in all cases as in some patients’ bile ducts from different segments or lobes do intercommunicate by means of interhepatic ducts [1] and that was also true in our case.

Preoperative diagnosis of such hepatic tree abnormalities is often difficult and usually accidental, during imaging studies for other biliary pathology (choledocholithiasis). Although injury of the biliary tract is prevented by intra-operative cholangiography, the last is not established as routine procedure and is not seem to help in case of accessory hepatic ducts. Thus intra-operatively, such abnormality can be identified during dissection near the hepatocystic confluence; it is recommended to avoid overzealous dissection close to the CBD. Instead, it is proposed a blunt dissection closer to the neck of the gallbladder and the ‘critical view’ approach as well [14].

In case of bile duct injury that has been identified intra-operatively, the surgeon faces the question of either converting into an open approach or continue on the further dissection by laparoscopy, depending on experience and the availability of devices and instruments. Intra-operative cholangiography is useful to provide information about the continuity of the biliary tract and detect the location, type and severity of the injury. After recognition of the injury, the treatment recommendations vary from an end to end Anastomosis; if the ducts diameter is more than 2 mm, to hepatico-enterostomies (hepaticocoduodenostomy, hepaticojejunostomy, Roux-en Y reconstruction) [1,2]. Nevertheless, Li et al. [14] support that aberrant ducts drain only a small portion of the liver, therefore, if injured them, these can be ligated without severe influence to liver function. The atrophy of the segments drained by this duct is usually one of the progresses of such injury [1]. Our case concerned an aberrant hepatic duct that, cholangiographically revealed, it was intercommunicated with the rest of the biliary tract, thus saving us from the dilemma and permitting us to, safely, ligate it.

If the injury is discovered postoperatively; usually due to a biloma, the presence of an injured aberrant duct is difficult to be suspected. Suhocki et al. [1] propose that, a torn aberrant bile duct should be expected when bile leakage and any of the four following circumstances are encountered: cholangiography is interpreted as normal, the surgeon reported ligating an injured aberrant bile duct during cholecystectomy; an endoscopic stent had been previously placed for a ‘cystic duct leakage’; or the patient had already undergone a Roux-en-Y choledochoenterostomy without undergoing imaging of the entire biliary tree before surgery [1].

Standard imaging modalities usually have poor results in detecting the injury, post-operatively, due to the lack of intercommunication with the rest biliary tract, as it was mentioned before. It has been proposed that, the injection of contrast material through a, surgically or percutaneously placed, drainage into the biloma may be sometimes opacify the torned aberrant duct through retrograde flow of the contrast material and the success rate is independent of the size of the biloma [1]. Once an injured aberrant duct is detected, placement of a percutaneous drain into the aberrant system facilitates operative treatment of the duct injury. In such case if the torn is partial then the drain could be advance past the injury into the bowel, obviating surgical repair [1].

Conclusion
The presence of aberrant bile duct is rare and one of the major unexpected events leading to its injury even in the most skilled and experienced surgeon; the intraoperative recognition of such injury is even rarer. Blunt dissection near the neck of the gallbladder should be preferred always in order to avoid injury of the CBD or any anatomical variations. Once an injury has been identified, we believe that intraoperative cholangiography should be performed. In case of aberrant bile duct injury, the duct could be ligated or anastomosed, depending on the liver volume that it drains. We believe that, the best treatment is prevention, thus profound knowledge of the anatomy and careful dissection are required.

References

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