

Research Article

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Abnormal right hepatic artery injury resulting in right hepatic atrophy: diagnosed by laparoscopic cholecystectomy

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Abstract: An intact hepatic artery is the gateway to successful hepato-biliary surgery. Introduction of laparoscopic cholecystectomy (LC) has stimulated a renewed interest in the anatomy of hepatic artery. In this case report we have highlighted importance of variations of right hepatic artery in terms of origin and course. We present a rare asymptomatic case of liver atrophy due to an intraoperative lesion of right hepatic artery. We also performed a literature review about surgical vascular lesions and tried to confirm the right concept behind “non trivial procedure” of the LC.

Keywords: liver atrophy, cholecystectomy, right hepatic artery

1 Introduction

The classic anatomical pattern of hepatic artery is found in 55-70% of cases, whereas 30% of cases found to have variant arteries [1]. The frequent anatomical variations of hepatic artery are as follows: the left hepatic artery from left gastric artery (18%), the right hepatic artery from mesenteric superior artery and the common hepatic artery origin from the mesenteric artery (4,5%) [2]. The damage of vascular structures are frequently reported with bile

duct injuries in laparoscopic cholecystectomy (LC). The most common lesion of bile duct is due to its resection and the right hepatic artery (RHA) that is situated medial to the common bile duct and is frequently involved in the damage [3,4].

RHA has been reported to have variation of origin and course and runs closely parallel to the cystic duct in 6-16% of patients [5]. The total incidence of vascular lesions in LC has been estimated to be 0.25 %, although hepatic artery lesions accounted to be only 0.06%. Liver necrosis due to right hepatic artery ligation have been reported [6]. Similarly in 1992, Bacha et al [7] reported a case of right liver necrosis and sepsis following incidental ligation of RHA in LC.

2 Case Report

Our case, a 68 years old woman referred to our Emergency Department with three months history of recurrent abdominal pain, weakness and weight loss (-10 Kg). Her past history documents chronic gastropathy for which LC was performed eight years back. Physical examination revealed no signs of associated pathology but laboratory tests revealed cytotoxicity and cholestasis altered by ten times as much and the bilirubin level was found to be within normal range. Upper abdominal ultrasound examination revealed a complete atrophy of right side of liver and a scanty abdominal collection. Liver atrophy was confirmed through CT scan with multiple minute hepatic lesions suspected of secondaries (Fig.1). Patient was admitted in surgical ward and upon further analyzing previous medical record: laboratory tests revealed progressive increase of cytotoxicity and cholestasis since LC to admission in ward (Table 1). Prior to LC's annual follow up, the ultrasounds were performed four times and showed an initial volumetric alteration of right liver without a clear evidence of atrophy. The previous

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LC reports showed an anomaly of right hepatic artery and were interrupted at the time of a profuse bleeding during Calot's triangle dissection (Fig 2,3). The description of the surgical procedure explained the cause of bleeding and the intra-operative control with unspecified numbers of clips.

Tumor markers were revealed as follows Ca19.9=635.5 Ca125=14123.92 CEA= 2.71 AFP=0.2 ng/ml. An abdominal-RM confirmed the complete interruption of the right branch of biliary duct in complete atrophy of right liver but it couldn't detect primary tumor (Fig 4,5). With guidance of PET-TC scan we were able to confirm the presence of metastatic ovary carcinoma. Therefore the patient was referred to Oncologic Department to undertake chemotherapy and further treatments.

Ethical approval: The research related to human use has been complied with all the relevant national regulations, institutional policies and in accordance the tenets of the Helsinki Declaration, and has been approved by the authors' institutional review board or equivalent committee.

Informed consent: Informed consent has been obtained from all individuals included in this study.

3 Discussion

Biliary and vascular lesions (B-VL) are the most dangerous and common complications of LC [8]. We assisted an increment of B-VL under the supervision of laparoscopy in first period and the subsequent decreasing in following years [9]. In our case we assume that the RHA was a direct conduit of mesenteric artery and has a course which is extrahepatic, tortuous and superficial; in accord with TC and RM images, the nature of lesion was a iatrogenic vascular stricture due to incorrect clipping of RHA in order to stop the intra-operative bleeding.

Even though major B-VL are identified in peri-operative period because of early complication, other lesions (stenosis and sectorial devascularization) can be diagnosed after many months.

In our case, the absolute asymptomaticity of the patient despite the importance of the injury, is truly unusual; in concurrence with the absence of jaundice in the first post-operative period and due to sluggishness of the establishment of liver atrophy, hence, we assume that the lesion was just pure vascular. Usually prolonged biliary ischemia with secondary biliary cirrhosis ends up as liver necrosis. In such complicated cases it may be necessary to carryout liver resection or even transplantation. In some literature it is defined the presence of some effective cases

of biliary reparation without vascular reconstruction in B-VL [10-11]; probably, in our case, pure vascular lesion, with similar physiological compensatory mechanism that results in reconstruction and this could explain the unusual postoperative course of our patient.

The complex pattern of hepatic artery makes peri-hilar region more dangerous and susceptible to various injuries. The possibility of biliary injury should be considered in patients who undergo difficult or prolonged dissection of the Calot's triangle, followed by the development of pain, fever and altered liver function tests [12]. Instead vascular lesion represents a diagnostic challenge and also a therapeutic dilemma.

Parmeggiani et al. [13] in 2010 defined the major risk factor for B-VL in cholecystectomy, which includes surgeon's experience based on a correct learning curve. In accord with Parmeggiani, we believe that the utilization of a standardized technique is at the base of each surgical procedure; every rule must be followed carefully with the aim of obtain the best results in terms of lowest risk rate [14-19]. Every complex procedure and an emergency situation may lead to unintended injury and be unrecognized. In such cases the conversion to open approach is always to be preferred in order to avoid additional lesions.

4 Conclusion

The pure vascular lesion of RHA can totally be asymptomatic. The management of hepatic vascular lesion seems to be more difficult both from a technical standpoint and to decision-making. The follow-up of LC must be carried out carefully with highlighting each kind of complication associated, whether early or delayed. LC is a modern noninvasive procedure and may cause serious unsuspected complication. The perfect knowledge of anatomy and of possible variation of RM is mandatory, a proper surgical technique and consciousness are the key elements of the success and low incidence of complication, which is always achievable.

Conflict of interest statement: Authors state no conflict of interest

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