

Cadaveric study of Rouviere's sulcus: An important surgical landmark in Laparoscopic Cholecystectomy

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Abstract

Objective: Identification of the Rouviere's sulcus as an extra biliary landmark during laparoscopic cholecystectomy helps to reduce the iatrogenic injuries of common bile duct (CBD). Therefore, this study was carried out to assess its frequency, morphology, and its relation with the CBD in cadaveric liver specimens.

Methods: An observational study was carried out in the department of Anatomy, during a period of 2021 -2023. Fifty liver specimens without any previously recorded liver or extra hepatic biliary pathology were dissected and observed. During dissections, Rouviere's sulcus was identified, and its morphology of open type, closed, or scar-like shapes was noted, and the CBD and its relation with the Rouviere's sulcus was observed.

Results: Rouviere's sulcus was identified in 35/50 (70%), whereas 15/50 (30%) it could not be seen. Among the 35/50 livers with Rouviere's sulcus, 20 /35 (57%) were of open type, 10/35 (28%) were close type, and scar like seen in 5/35 (15%). Among these 35 liver specimens, in 28/35 (80%) the Rouviere's sulcus was above the level of CBD line. In 5/35 (14%) the sulcus was at the same level. in 2/35 (6%) the sulcus was below the line of CBD.

Conclusion: Identification of Rouviere's sulcus can be helpful as an additional landmark as its close relation to CBD

Keywords: Rouviere's sulcus, Common Bile Duct, Liver, Cholecystectomy, Injury

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Introduction

Many surgical techniques have been practiced to minimize the bile duct injuries during laparoscopic cholecystectomy (1-4). The critical view of safety is a widely adopted method to reduce bile duct injury in laparoscopy (5). However, in instances with severe inflammation and dense adhesions, it may be impossible to achieve clear critical view of safety. In such situations, an anatomical landmark such as Rouviere's sulcus, which may guide to identify the common bile duct (CBD) during laparoscopic cholecystectomy. Rouviere's sulcus is a 2–5 cm fissure on the liver between the right lobe and caudate process (6-8). Identification of the Rouviere's sulcus during laparoscopic cholecystectomy denotes that the cystic duct and artery are anterosuperior to the sulcus, and the CBD is below the level of the sulcus. Even though laparoscopic studies on Rouviere's sulcus are available, cadaveric studies are less (9, 10). Therefore, this study was carried out to assess its frequency, morphology, and its relation with the CBD in cadaveric liver specimens.

Methods

An observational study was carried out in the department of Anatomy, during a period of 2021 -2023. Fifty liver specimens without any previously recorded liver or extra hepatic biliary pathology were dissected and observed. During dissections, Rouviere's sulcus was identified, and its morphology of open type, closed, or scar-like shapes was noted, and the CBD and its relation with the Rouviere's sulcus

was observed. Open type of sulcus was defined as a cleft in which the medial end was opened toward the right hepatic pedicle. In close-type, the medial end was closed toward the right pedicle, whilst its lateral end remained open. In scar type, it appeared like a linear scar (1-6). Further dissection in the Calot's triangle was done to expose the cystic duct, cystic duct and common hepatic duct junction and the cystic artery. (Figure: 1) The ethical clearance was obtained. No conflict of interests.

Statistical analysis

The data was presented in terms of number and percentage (%), and as mean $\pm$ standard deviation (SD) and median. The analysis was done using the Statistical Package for the Social Sciences (SPSS) (Version-16, IBM, Chicago, IL, USA).

Results

Among all the dissected livers, 60% (30/50) were females and 40% (20/50) were males. Rouviere's sulcus was identified in 35/50 (70%), (Figure:1) whereas 15/50 (30%) it could not be seen. Among the 35/50 livers with Rouviere's sulcus, 20 /35 (57%) were of open type, 10/35 (28%) were close type, and scar like seen in 5/35 (15%). Among these 35 liver specimens, in 28/35 (80%) the Rouviere's sulcus was above the level of CBD line. In 5/35 (14%) the sulcus was at the same level in 2/35 (6%) the sulcus was below the line of CBD. Both were male cadavers.



Figure1: Rouviere's sulcus

Red Arrow - Rouviere's sulcus, GB – Gall Bladder, CHD – Common Hepatic Duct, CD – Cystic Duct, CBD – Common Bile Duct. Roman numerals denote the Couinaud's segments.

Discussion

It is well accepted that critical view of safety minimizes the iatrogenic CBD injury during laparoscopic cholecystectomy. However, Rouviere's sulcus as an extra biliary anatomical landmark may further help to locate the CBD. When the gallbladder fundus is retracted during laparoscopy, the Rouviere's sulcus can be visualized, and its relation to the nearby structure can also be appreciated very well. Rouviere's sulcus represents the level of portal-hepatis where the right pedicle enters the liver. Therefore, it has been suggested that all the dissections are to be kept above the level of this sulcus to avoid injury to CBD (6). Furthermore, being an extra biliary landmark, its presence can still be noted even in the inflammatory conditions of the calot triangle.

In addition, the cystic artery and cystic duct lay invariably anterosuperior to the sulcus (2-8).

According to the literature, based on laparoscopic cholecystectomy, Rouviere's sulcus was present in 79.3% cases. Furthermore, the data shows that 54.9% cases, it was of open type, and 24.4% cases had scar type. Another operative study of 160 patients showed that Rouviere's sulcus was present in 68.13% patients during laparoscopic cholecystectomy. Open type of Rouviere's sulcus was observed in 48 patients, whereas 61 had fused type of sulcus (9-14). In our study, Rouviere's sulcus was identified in 35/50 (70%). Among the 35/50 livers with Rouviere's sulcus, 20 /35 (57%) were of open type, 10/35 (28%) were close type, and scar like seen in 5/35 (15%). (Figure:1) Among these 35 liver specimens, in 28/35 (80%) the

Rouviere's sulcus was above the level of CBD line. In 5/35 (14%) the sulcus was at the same level. In 2/35 (6%) the sulcus was below the line of CBD. According to literature there is a correlation to gender as there is a slight female predominance in presence of Rouviere's sulcus (15). Furthermore, combined attention of Rouviere's sulcus with other anatomical landmarks such as bile duct and base of segment 4, hepatic artery, umbilical fissure, and enteric viscera, e.g., duodenum, pylorus significantly reduces bile duct injury in laparoscopic cholecystectomy (16). Our major limitation was the small number of samples. Since this been a pilot study, we would suggest carrying out further studies combining both cadaveric and operative data, which will help to achieve norms for the Sri Lankan population.

Conclusion

Identification of Rouviere's sulcus can be helpful as an additional landmark as its close relation to CBD. To establish the regional incidence of the level of CBD in line with the sulcus needs further studies.

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