

Rouviere's Sulcus: Anatomy and its Surgical Implications in Laparoscopic Cholecystectomy

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ABSTRACT

Background: Now a day laparoscopic cholecystectomy is routinely performed surgical procedure in general surgery practice all across world. Rouviere's sulcus is an important anatomical landmark in safe dissection of Calot's triangle in laparoscopic cholecystectomy.

Aim: To determine the frequency and types of Rouviere's sulcus in cadaveric dissection at Sheikh Zayed Medical College, Rahim Yar Khan.

Methodology: A prospective descriptive study was conducted at Sheikh Zayed Medical College Rahim Yar Khan at its Anatomy dissection hall. A human cadaver was dissected for teaching purpose in which twenty five macroscopically healthy and undamaged livers of both sexes were included. A cadaver livers with cirrhosis of liver, liver tumor, operated livers and death due to liver trauma were excluded. Frequency and type of Rouviere's sulcus were documented.

Results: Rouviere's sulcus was present in 20 livers (80%) and 5 livers (20%) had no sulcus.

Out of 20 livers with Rouviere's sulcus, type I was most common (12 liver-48%) type-II was 5 liver (20%) and type-III was 3 liver (12%).

Conclusion: Regarding surgeon's anatomical armamentarium, Rouviere's sulcus is an important fixed extrabiliary landmark in laparoscopic cholecystectomy and serves as a valuable adjunct in the prevention of biliary & vascular injuries.

Key words: Rouviere's sulcus, Laparoscopic cholecystectomy, Liver anatomy

INTRODUCTION

The role of surgical Anatomy in the accomplishment of safe surgical procedures cannot be denied. It is of utmost importance in reducing the postoperative complications. Laparoscopic cholecystectomy is considered a gold standard general surgical operation performed worldwide and is acknowledged as the established procedure for cholelithiasis. Professor Erich Mùhe performed first laparoscopic cholecystectomy in 1985¹. After that it was continuously performed by surgical trainee and is considered to be the one of the standard procedure in general surgery². Laparoscopic cholecystectomy is affiliated with more biliary, vascular and visceral complications when compared with its open variant.³ Most of the studies have revealed that overtime there is significant increase in the number of bile duct injuries with laparoscopic cholecystectomies even with experienced hands.⁴⁻⁹ Bile duct injury is a serious and most feared complication leading to significant morbidity and mortality. Strategies to reduce complications in laparoscopic cholecystectomy have been focused in recent times^{10,11}.

A French anatomist Henry Rouviere, in 1924, described a sulcus present on the right of porta hepatis and anterior to caudate lobe. It was named after his name. On the other hand it is not extensively identified and studied,

so it usually not encountered in laparoscopic cholecystectomy. It accurately identifies the plane of common bile duct¹². The cystic duct and artery lies over while common bile duct lies under the Rouviere's sulcus that is quite identifiable and valuable landmark during laparoscopic cholecystectomy.

Four types of different Rouviere's sulcus are identified

1. Type-I: Open type where sulcus was open throughout its length.
2. Type-II: Partially fused with sulcus open at its lateral end.
3. Type-III: Partially fused with sulcus open at its medial end.
4. Type-IV: Fused type with absent sulcus.

The present study was designed to find out the frequency and type of Rouviere's sulcus on liver.

METHODOLOGY

This prospective descriptive study was conducted in the Department of Anatomy, Sheikh Zayed Medical College (SZMC), Rahim Yar Khan from July 2015 to June 2018. Livers from cadavers dissected at anatomy department, Sheikh Zayed Medical College for teaching purpose. Twenty five livers from cadavers dissected at Anatomy department, SZMC, Rahim Yar Khan for teaching purpose.

Inclusion criteria: Macroscopic healthy and undamaged liver from cadavers of both sexes.

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Exclusion criteria: Following livers from cadavers were excluded from study.

1. Cirrhosis of liver.
2. Liver tumors.
3. Operated livers.
4. Death by liver trauma.

Frequency and type of Rouviere's sulcus were documented.

RESULTS

Frequency of Rouviere's sulcus: 25 livers from dissected cadavers were studied in the dissection hall of Anatomy. Rouviere's sulcus was present in 20 livers (80%) and five livers (20%) had no sulcus.

Type of Rouviere's sulcus: Out of 20 livers where Rouviere's sulcus was present, type-I was most common (12 livers, 48%) and type-II and III were respectively 5 livers (20%) and 3 livers (12%). Five livers (20%) showed no Rouviere's sulcus.

Fig. 1: Frequency of Rouviere's sulcus

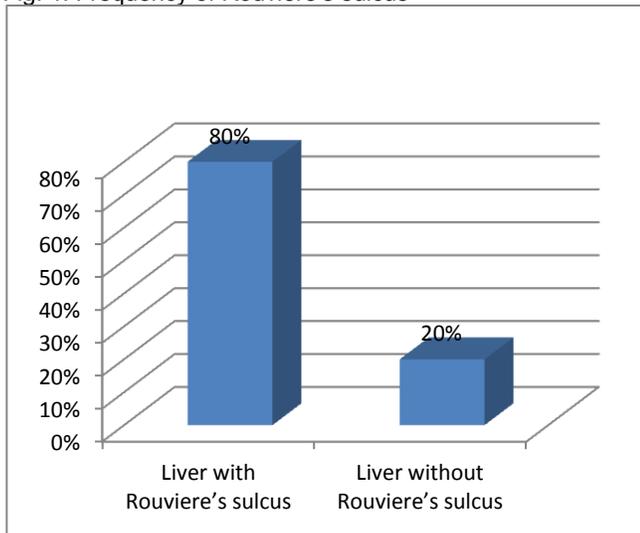
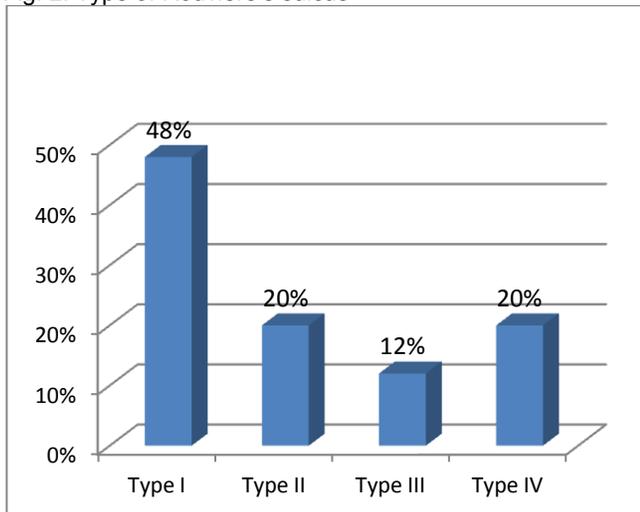


Fig. 2: Type of Rouviere's sulcus



DISCUSSION

In 1924, a French Anatomist named Henri Rouviere described the Rouviere's sulcus. It is also called incisura hepatica dextra which is 2-5cm in length and adjacent to the hilum of the liver. Rouviere's sulcus is anterior to the caudate process (segment-I) and it encloses the right portal triad as well as its tributaries. Rouviere's sulcus indicates the plane of common bile duct precisely.

In our study, Rouviere's sulcus was present in 80% of the livers and absent in 20%. Rouviere's sulcus was described as an extension of porta hepatis by Gans in 1955¹³ and he found it in 80% of livers. Dahmane et al¹⁴ found Rouviere's sulcus in 82% of normal livers and no sulcus in 18%. Open type Rouviere's sulcus was in 70% and fused type in 12%. In comparison to this, a study conducted on Pakistani population by Muhammad Z et al¹⁵ found fused type more common (55.96%) than open type (44.04%). Reyneud et al¹⁶ noted Rouviere's sulcus in 73% and Hugh et al¹⁷ in 78% of livers. Singh et al¹⁸ showed a frequency of Rouviere's sulcus as 84.5%. Couinaud¹⁹ described it as a very inconstant structure. Data on Rouviere's sulcus is mostly not included in classic anatomical literature^{20,21}. Important surgical implication of identifying Rouviere's sulcus is its relations with extra hepatic biliary structures²². Cystic duct and artery lies above while common bile duct lies under the Rouviere's sulcus level. This fact may be used as a fixed extrabiliary landmark for Calot's triangle dissection at the time of laparoscopic cholecystectomy. Hugh²³ had shown minimal biliary injuries at the time of laparoscopic cholecystectomy by initiating the dissection interior to the Rouviere's sulcus.

Acute or chronic cholecystitis is obscuring the boundaries and important landmark of Calot's triangle due to the inflammatory process. This will increase the chance of biliary injuries during laparoscopic cholecystectomy. However in comparison with Calot's triangle, Rouviere's sulcus is usually not effected by acute and chronic inflammatory process.²⁴ So Rouviere's sulcus can be and may be used as a confirmatory tool for identification and a safety check before ligation of any structure.

CONCLUSION

Regarding surgeon's anatomical armamentarium, Rouviere's sulcus is an important fixed extrabiliary landmark in laparoscopic cholecystectomy and serve as a valuable adjunct in the prevention of biliary & vascular damage.

Conflict of interest: There are no known conflicts of interest, financial or otherwise.

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