Review Article

Rouviere’s sulcus—Aspects of incorporating this valuable sign for laparoscopic cholecystectomy

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Summary Laparoscopic cholecystectomy is one of the most common procedures performed worldwide. Despite advances in technique, injury to the common bile duct and blood vessels still occurs. Rouviere’s sulcus, a naturally occurring cleft in the right lobe, anterior to Segment 1, occurs in over 80% of normal livers. It is a useful, but often ignored, anatomical landmark for beginning dissection of Calot’s triangle, and also for confirming its location. Despite this, its usefulness is not widely known or appreciated by general surgeons. This article discusses the critical aspects of incorporating this useful landmark in safe laparoscopic surgery, including pitfalls, where the landmark may not be present or misleading. The useful mnemonic of “RANGERS”—Rouviere’s At Neck of Gallbladder Eases Recognition of Structures, helps draw attention to the sulcus to facilitate safer laparoscopic cholecystectomy.

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1. Introduction

Laparoscopic cholecystectomy was first performed by Professor Erich Mühe of Germany, on September 12, 1985, and has now become one of the most common operations worldwide. It remains one of the standard operating procedures taught to and performed by surgical residents. The most feared complication of this surgery is injury to the bile ducts or hepatic arteries. It is clear that as the numbers of laparoscopic cholecystectomies increased over time, so did the rates of associated bile duct injuries, even with experienced surgeons. One study revealed that the number of bile duct repairs almost tripled over a 4-year period in the early history of this procedure.

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Bile duct injury is a serious complication, often requiring further major surgery, and usually occurs due to a failure to recognize the critical structures in Calot’s triangle.

2. Rouvière’s sulcus and safe laparoscopic surgery

Rouvière’s sulcus, also sometimes called the incisura hepatica dextra, or Gans incisura, was initially described in 1924 by Henri Rouvière, a French anatomist; however it is not widely known, and therefore, not often incorporated in laparoscopic cholecystectomy. In fact, Rouvière is better known for his description of the anatomy of the human lymphatic system, and particularly for the “node of Rouvière”, the most superior of the lateral group of the retropharyngeal lymph nodes, found at the base of the skull. Dahmane et al described Rouvière’s sulcus to be present in 82% of normal livers. It represents a cleft, anterior to the traditionally described “Segment I of the liver”, which has more recently been described by Couinaud as Segment IX. The sulcus lies oblique to the anterior, inferior, and external edge of the liver in 97% of cases, and horizontal in 3%. In 1955 Gans described the sulcus as an extension of the porta hepatitis, and thereafter, it has been noted in 80% of livers; Reynaud et al noted it in 73% of livers, and Hugh et al in 78% of livers. The most common advantage of identifying the sulcus is that the common bile duct lies below it, and the cystic duct and artery above it. The sulcus is in line with the cystic duct and artery after completing the dissection of Calot’s triangle. In fact, we have found that on retraction of the gallbladder during laparoscopic cholecystectomy, Rouvière’s sulcus usually “points” to the neck of the gallbladder (the narrow part that then tapers into the cystic duct) and can then be used as a reference point to facilitate identification and dissection in Calot’s triangle, thereby safely identifying the cystic duct and artery (Figures 1 and 2), as a prelude to achieving the critical view.

Hugh et al reported that fewer common bile duct injuries occur during laparoscopic cholecystectomy if dissection begins ventral to Rouvière’s sulcus, and also constructed a checklist for the operation incorporating the identification of Rouvière’s sulcus. Peti and Moser described a case where identification of the sulcus helped prevent a common bile duct injury.

In the presence of conditions such as cirrhosis, fatty liver or hilum, or with a chronically contracted gallbladder, misidentification of the bile ducts can occur, and the distorted anatomy may obscure Rouvière’s sulcus or cause it to be misleading. With this in mind, we stress that Strasberg and Brunt’s concept of the critical view of safety, with adequate dissection of the Calot’s triangle and exposure of the cystic duct, must remain the benchmark for the safest approach to laparoscopic cholecystectomy, with identification of Rouvière’s sulcus a useful adjunct in most cases when it is present. Shinde and Pandit recently described a novel approach to dealing with the “frozen” Calot’s triangle that can be encountered in these circumstances, by consistent identification of a series of anatomical landmarks including Rouvière’s sulcus, creation of a retro-gallbladder tunnel, and encircling of the gallbladder with gauze.

Indocyanine green-infrared cholangiography is an emerging technology and potentially has an additional role in the improvement of accuracy in the identification of the biliary tree prior to and after dissection. It may also assist with some of the technical problems with intraoperative cholangiography, for example, exposure to radiation.

We suggest the simple aide memoire “RANGERS” sign during laparoscopic cholecystectomy: Rouvière’s At Neck of Gallbladder Eases Recognition of Structures. This allows the operating surgeon to recall the presence of the sulcus, and then to start safe dissection of Calot’s triangle medial to and above the sulcus, and keeping the sulcus in view laterally at all times, thereby ensuring the common bile duct is well below the plane of dissection.
3. Conclusion

Identifiable in most healthy livers, Rouviere’s sulcus provides an easy reference point for safe laparoscopic cholecystectomy. It remains vital however, to achieve the critical steps in the procedure safely, and identifying Rouviere’s sulcus can only be a component of the surgery. It is important to remember that the sulcus may not be present in 20% of normal individuals, and difficult to identify in livers that are diseased.

References