

Hepatic Vein Injury During Laparoscopic Cholecystectomy: The Unappreciated Proximity of the Middle Hepatic Vein to the Gallbladder Bed

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Uncontrollable hemorrhage during laparoscopic cholecystectomy occurs in 0.1% to 1.9% of all cases, with 88% originating from the gallbladder bed. The anatomical proximity between major branches of the middle hepatic vein and the gallbladder bed, and hence the risk of intraoperative bleeding, is unclear. CT scans of 20 random patients were retrospectively reviewed to identify the closest distance between branches of the middle hepatic vein and the gallbladder bed. The vein diameter was also recorded. Risk factors for intraoperative bleeding during laparoscopic cholecystectomy were also retrospectively reviewed. Large branches (mean diameter = 2.1 mm) of the middle hepatic vein are directly adjacent to the gallbladder bed in 10% of patients. An additional 10% of cases also possess branches within 1 mm of the gallbladder bed. Chronically scarred and contracted gallbladder disease may increase the risk of significant bleeding, requiring conversion. Twenty percent of all cases will display a large branch of the middle hepatic vein adherent or immediately adjacent to the gallbladder fossa. These patients are at increased risk for intraoperative bleeding. Furthermore, contracted gallbladders with evidence of chronic disease may be at increased risk for significant hemorrhage. (J GASTROINTEST SURG 2006;10:1151–1155) © 2006 The Society for Surgery of the Alimentary Tract

KEY WORDS: Laparoscopic cholecystectomy, hepatic vein, hemorrhage

Uncontrollable hemorrhage during laparoscopic cholecystectomy occurs in 0.1% to 1.9% of all cases.^{1,2} In 88% of these incidents, bleeding originates from the gallbladder bed.² Although the middle hepatic vein or its branches are often implicated as the source of hemorrhage, only recently has this proposed association been evaluated objectively by using color Doppler ultrasound.^{3–6} Unfortunately, various investigating groups have come to very different conclusions regarding the precise anatomical relationship between major branches of the middle hepatic vein and the gallbladder bed. Although three groups^{3–5} identified middle hepatic veins that were completely adherent to the gallbladder bed in 10% to 15% of healthy volunteers, Kebudi and colleagues⁶ observed a vessel-to-

bed distance of 6 to 29 mm, with a mean of 17 mm. It is unclear if these dramatic differences are due to the study cohorts themselves, or to the technology used to evaluate this anatomy.

In the past 22 months, four patients at our institution have required emergent conversions from laparoscopic to open cholecystectomy because of profuse bleeding from the gallbladder bed. Each was a direct result of a lacerated superficial branch of the middle hepatic vein. As a result of these cases, as well as the ongoing dispute within the literature, our aim was (1) to identify the precise proximity of the middle hepatic vein, and/or its branches, to the gallbladder bed by using CT technology, and (2) to identify potential risk factors for significant gallbladder bed hemorrhage during laparoscopic cholecystectomy.

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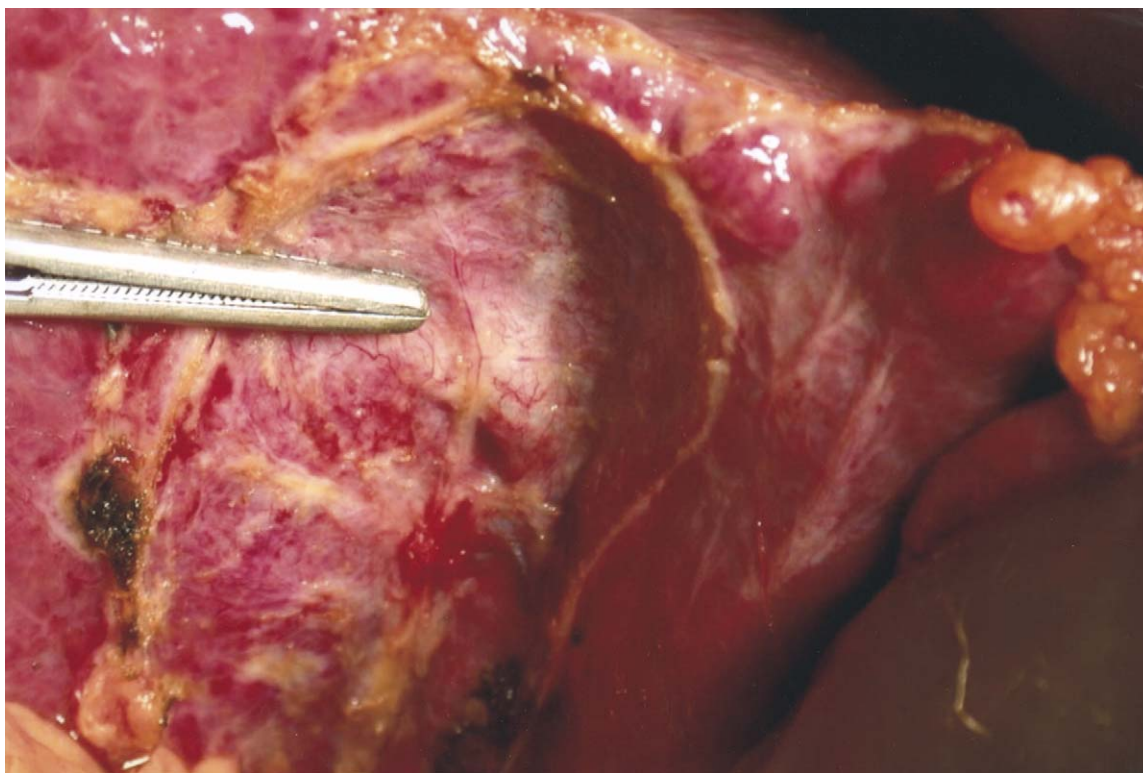


Fig. 1. Intraoperative picture of a superficial middle hepatic vein after removal of gallbladder from the gallbladder bed.

MATERIAL AND METHODS

The anatomical proximity between major branches of the middle hepatic vein and the gallbladder bed was retrospectively obtained by randomly selecting 20 patients, with varying diagnoses, from a busy hepatobiliary practice. Each patient had undergone a CT scan for diagnostic purposes unrelated to this study. This practice is based in an academic, tertiary care hospital with a catchment population of approximately 1.5 million people. Institutional review board ethics approval was obtained prior to commencement. CT scans for each of patient were reviewed concurrently by two experienced hepatobiliary surgeons to identify the closest distance between the vessel and the gallbladder bed. The diameter of the vein at the site of closest proximity to the gallbladder bed was also recorded.

All scans were contrast-enhanced, multiphase examinations designed to evaluate the abdomen and pelvis. Contrast administration consisted of 100 to 150 ml (titrated to weight of the patient) of ioversol (Optiray 350; Mallinckrodt Medical, St Louis, MO) injected intravenously at a rate of 2 ml/sec with a power injector (OP 100; Medrad, Pittsburgh, Pa).

Each exam was viewed on a picture archiving and communication system workstation (Impax; AGFA

Technical Imaging Systems, Richfield Park, NJ). On-screen computerized measuring calipers were used for all measurements.

A retrospective chart review of four patients with major intraoperative hemorrhages during laparoscopic cholecystectomy was also completed to identify any similarities between cases. Patient, imaging, operative technique, and anatomical factors were compared.

RESULTS

CT scan confirmed that the majority of patients displayed a well-developed separation of the major branches of the middle hepatic vein and the gallbladder bed. The median separating distance was 6.1 mm. The range, however, was 0 to 47 mm.

Two of 20 (10%) patients possessed middle hepatic vein branches immediately adjacent to the gallbladder bed. An additional two (10%) patients displayed major branches within 1 mm of the gallbladder bed (Figs. 1 and 2). The mean diameter of these veins was 2.1 mm, with a range of 0.9 to 3.2 mm.

Among the four laparoscopic cholecystectomy cases that required emergent conversion for major hemorrhage, the mean patient age was 59 years

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