incidence of bile duct injury associated with laparoscopic cholecystectomy should equal the incidence associated with an open procedure. It is every surgeon's responsibility to achieve this goal. Hepaticojejunostomy is the procedure of choice for most reconstructions. Technical expertise in hepatobiliary surgery appears to optimize results of repair.

Résumé

Bien que plusieurs études semblent démontrer que l'incidence des plaies de la voie biliaire est relativement basse durant la cholécystectomie coelioscopique, on peut s'inquiéter du nombre croissant de ces plaies vues dans les centres pratiquant la reconstruction biliaire secondaire. Vingt et un cas de plaies de la voie biliaire principale après cholécystectomie coelioscopique ont été observés en seconde main. La lésion a été reconnue pendant l'intervention coelioscopique chez 6 patients seulement (29%). Dix neuf de ces patients ont eu une anastomose hépatico-jéjunale et une cure d'une fistule cholédochoduodénale et un patient a eu une cure d'une fistule biliocolique. Une anastomose hépatico-jéjunale au-dessus du confluent supérieur a été nécessaire chez 10 (50%) patients, au niveau du confluent chez 3, et en-dessous du confluent chez 7. Neuf des 11 patients ayant eu une réparation initiale dans un autre établissement ont eu une sténose secondaire (médiane d'apparition = 7 mois). La cause principale de ces plaies au cours de la cholécystectomie coelioscopique est l'absence d'identification du triangle de Calot. Des conseils spécifiques à chaque moment de la cholécystectomie sont décrits pour éviter de telles plaies. Une expérience dans la chirurgie hépato-biliaire est nécessaire pour obtenir les meilleurs résultats de la chirurgie réparatrice.

Resumen

Aunque varios estudios han demostrado una baja incidencia de lesión de la vía biliar durante la colecistectomía laparoscópica, existe preocupación por un sostenido incremento en el número de pacientes que son referidos para reconstrucción biliar después de este procedimiento. Veintiún pacientes han sido referidos a nuestra institución debido a lesiones mayores luego de colecistectomía laparoscópica. La lesión fue reconocida en el curso del procedimiento laparoscópico en sólo 6 pacientes (29%); en diecinueve se realizó hepaticoyeyunostomía y reparación por lo menos una vez, 1 requirió hepaticoyeyunostomía y reparación de una fístula coledocoduodenal y 1 reparación de una fístula biliocolónica. Fue necesario practicar la hepaticoyeyunostomía en 10 casos (50%), al nivel de la confluencia en 3 y por debajo en 7. Nueve de 11 pacientes en quienes la reparación inicial fue realizada en el hospital local desarrollaron estrechez temprana (media, 7 meses). El común denominador de la lesión de la vía biliar en el curso de la colecistectomía laparoscópica es la falla en identificar las estructuras del triángulo de Calot. Se describen las maniobras específicas para evitar lesiones de la vía biliar en el curso de la colecistectomía laparoscópica. La experiencia y la destreza técnica optimizan los resultdos de la reconstrucción.

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Invited Commentary

John G. Hunter, M.D.

Emory University School of Medicine, Atlanta, Georgia, U.S.A.

This article chronicles the downside of the revolution in laparoscopic surgery: Laparoscopic biliary injury was a nationwide epidemic, and the patients who were affected will serve as a reminder for the next forty years of the errors in education that were allowed during the introduction of laparoscopic cholecystectomy. Though this epidemic was predicted in early 1990 [1], the brakes could not be applied. And because cholecystectomy represented substantial income, the desire to be the first to perform laparoscopic cholecystectomy became more important than the desire to be the best at performing the procedure.

How could we have avoided "learning curve" laparoscopic

biliary injuries? It has been frequently demonstrated that patients do not suffer while a young surgeon develops mastery of a new operation *if* a skilled teacher is in attendance. This is how our residents learn, and there is little doubt that residents coming out of such training will not repeat the learning curve errors. If practicing surgeons had been able to learn in a similar fashion by observing, assisting, and eventually being assisted by the pioneers of laparoscopic surgery, much of this misery would have been avoidable. Drs. Asbun et al. have characterized laparoscopic biliary injury from a group of patients referred to the Lahey Clinic for biliary repair. The error common to all cases was a misinterpretation of the anatomy in and around Calot's triangle. While the error was attributed to acute or chronic inflammation in most cases, it is unlikely that the same surgeon operating on the same patient through a Kocher's incision would have injured the common bile duct. In my review of many laparoscopic biliary injury cases, the most common mistake was extreme cephalic traction on the gallbladder infundibulum which pulled the common bile duct up from behind the duodenum and closed the angle between the cystic and common hepatic ducts. Even with such dangerous retraction, dissection starting on the gallbladder infundibulum would have revealed the problem in most cases. If a cholangiogram was performed and correctly interpreted, the error of mistaken identity could be immediately rectified. If cholangiography was not performed, the common bile duct was clipped three times and transected. The dissection then proceeded up the left side of the common hepatic duct to the hepatic plate, frequently coming across the right hepatic artery. Then, as the surgeon turned right on the under surface of the liver, the common hepatic duct was cleanly divided at its bifurcation. It is unclear how the rush of bile that must have occurred upon transecting the common hepatic duct would not be immediately identified, but the truth is, intraoperative detection of biliary injury without cholangiography occurred infrequently.

Rather than reiterate the steps necessary to avoid biliary injury, I would recommend that you go back now and reread the discussion of this paper. I strongly believe that implementation of the principles of dissection as described there will reduce the frequency of laparoscopic bile duct injuries to the acceptable frequency achieved with open cholecystectomy (1 to 2 in 1000). The goal of the dissection in Calot's triangle is not to identify the cystic duct/common duct junction, but to develop a circumferential dissection of the gallbladder infundibulum such that the gallbladder appears as a polyp on a stalk. If the dissection is complete, the first clip can be easily placed on the gallbladder itself, just where the cystic duct is beginning to widen to become the infundibulum. Cholangiography below this point will confirm the appropriate recognition of anatomy and allow the surgeon to know the amount of cystic duct available for the safe application of clips between the cystic ductotomy and the common bile duct. When the cystic duct is extremely short, cholangiography is performed through the gallbladder infundibulum leaving the entire cystic duct intact for a bile-tight closure.

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