

Hepaticojejunostomy in the Treatment of Iatrogenic Biliary Lesions following Laparoscopic Cholecystectomy. A Retrospective Study on 51 Cases

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KEY WORDS:

Laparoscopic cholecystectomy; iatrogenic biliary lesion; Hepaticojejunostomy

ABBREVIATIONS:

Laparoscopic Cholecystectomy (LC); Endoscopic Retrograde Cholangio-pancreatography (ERCP); Open Cholecystectomy (OC); Hepaticojejunostomy (HJ); Alkaline Phosphatase (PA)

ABSTRACT

Background/Aims: Laparoscopic cholecystectomy is characterized by a higher incidence of iatrogenic biliary lesions. The Authors evaluate the role of hepaticojejunostomy in the treatment of iatrogenic biliary lesions following laparoscopic cholecystectomy in 51 patients observed in the Campania region, Italy from 1991 to 2003.

Methodology: The Authors report the data of a retrospective multicentric study of 51 patients -39 women (76.47%), 12 men (13.53%)- reoperated on for major biliary lesions following laparoscopic cholecystectomy. Hepaticojejunostomy in 20 cases (39.21%) and T-Tube plasty in 20 cases (39.21%) were performed.

Results: The mean follow-up was 25.01 months. The mean hospital stay was 25.7 days. 1/51 patients

(1.9%) died from intraoperative uncontrollable hemorrhage while cumulative postoperative mortality was 9.8% (5/51 patients). Therapeutic success rate of hepaticojejunostomy was 70% with a T-Tube plasty success rate of 65%. 9/51 patients (17.64%) were reoperated while in 4/51 (7.84%) a biliary stent was positioned. In 1/51 patients (1.9%) a biliary cirrhosis and in 3/51 (5.7%) a biomoral cholestasis was observed.

Conclusions: Laparoscopic cholecystectomy causes a higher incidence of iatrogenic biliary lesions. Hepaticojejunostomy gives better long-term results and lower morbidity compared to T-Tube plasty. Management of septic complications in patients with iatrogenic biliary lesions represents the first therapeutic step.

INTRODUCTION

Iatrogenic biliary lesions following laparoscopic cholecystectomy (LC) are more common compared to those occurring after open cholecystectomy (OC) and the incidence varies from 0.24-1.3% according to data from the literature (1-4). Laparoscopic iatrogenic biliary lesions are generally "higher" and in such cases vascular damage (right hepatic artery) is associated. Treatment of these complications is characterized by high morbidity and costs; legal issues are also frequent. Hepaticojejunostomy (HJ) represents the operation of choice in most of the cases and offers good long-term results while a biliary plasty with a T-tube is reserved in selected cases.

The Authors discuss the medium- to long-term surgical results and the management in 51 patients operated for biliary iatrogenic lesions following LC, observed in the Campania region from 1991 to 2003, as reported in a previous paper (5).

METHODOLOGY

The Authors have planned a retrospective and multicentric study by a questionnaire proposed in the Campania Region, Italy, by the Lap Club-collaborative group for the study and diffusion of laparoscopic surgery founded in Naples, Italy, in 1995. Data collection started in June 2002 and stopped in December 2003, according to national legal normative. All infor-

TABLE 1 Type of Lesions

	N. patients	%
CHD complete section	21	41.17
CHD complete section + HA + PV	1	1.90
CHD partial section	17	33.30
CMD lesion	1	1.90
RHD complete section	3	5.88
RHD section + RHA	1	1.90
RHD section RHA + RPV	1	1.90
LHD partial section	1	1.90
LHD clips	1	1.90
Choledochus clips	3	5.88
Aberrant duct section	1	1.90

CHD: common hepatic duct; RHD: right hepatic duct;
LHD: left hepatic duct; RHA: right hepatic artery;
RPV: right portal vein.

information derived from the study was secreted. Twenty-six centers participated: 9 university Hospitals, 10 regional Hospitals and 7 private Hospitals.

Patient's initials, gender, age, associated pathologies, date of operation, site, type and mechanisms of lesions (thermal damage, partial or total section, clips, other), indication to LC, experience of the surgeon (more or less than 100 LC), diagnostic timing, symptomatology, preoperative instrumental work-up, complications of the treatment, hospitalization, follow-up, legal-medical issue were requested in the questionnaire.

Fifty-one cases of major biliary lesions treated by reoperations were recorded: 39 female (76.47%) and 12 male patients (23.53%) with a mean age of 42.5 years (13-78) operated on from 1991 to 2003.

Indications for LC were as follows: in 36 cases (70.5%) symptomatic cholelithiasis (in 3 cases a misdiagnosed carcinoma was present), in 6 (11.76%) acute cholecystitis, in 2 (3.92%) a gallbladder empyema, in 2 (3.92%) a Mirizzi-like syndrome, in 2 (3.92%) a sclerotropic cholecystitis, in 3 (5.99%) a chronic cholecystitis in 1 case associated to paravaterian diverticula.

An "aberrant biliary duct", from VI segment to gallbladder, was reported in 1 case.

Surgical experience of participating surgeons consisted of more than 100 LC in 25 cases (49.01%) and less in 26 cases (50.98%). In Table 1 the types of biliary lesions are reported. The diagnosis was intraoperative in 20 cases (39.21%) and was followed by an immediate repair; it was postoperative in remaining 31 cases (60.78%) where biliary fistula, biliary peritonitis, jaundice, sepsis, alone or associated were present.

Among the 31 reoperated patients, respectively 5 within a week and 26 after 7 days, a cholangio-MRI was performed in 9 and an endoscopic retrograde cholangiopancreatography (ERCP) in 28 cases.

Only 15 patients (29.49%) were referred to a highly specialized hepato-biliary surgical center. Type of surgical treatment is depicted in Table 2.

In 13 cases (25.49%) surgical treatment was followed by reoperation (9 cases, 17.6%) or stenting (4 cases, 7.8%) for biliary tract or anastomotic stenosis and/or for complications.

Reoperations after a primary repair consisted of: 5 HJ after T-tube plasty, 1 revision of T-tube plasty; 1 duodenal bleeding ulcer suture after HJ; 1 relaparotomy for biliary fistula after right hepatectomy; 1 right hepatectomy after suture of right hepatic duct (third operation).

In 3 of the 20 patients treated by HJ a transhepatic stent was needed; 1 endoscopic stenting was performed for biliary stenoses after a T-tube plasty.

RESULTS

The mean hospital stay was 25.7 days (8-90 days).

Surgical results were evaluated measuring gamma GT, alkaline phosphatase (PA) and by ultrasound examinations with a mean follow-up of 25.01 months (4 months to 7 years).

The HJ therapeutic success rate (absence of elevation of gamma GT, PA or cholangitis) was 70% (14/20 patients). In 3/20 cases a transhepatic biliary stent was positioned for anastomotic stenoses and in 3 patients a biochemical cholestasis was reported.

A 13-year-old child, just submitted to HJ, was reoperated for hemorrhagic duodenal ulcer by a direct suture.

The T-tube plasty therapeutic success rate was 65% (13/20 patients). 5/20 patients were reoperated (third operation) by a HJ for biliary stenoses and in 1/20 an endoscopic stent was positioned. In 1/20 patient a biliary cirrhosis secondary to recurrent cholangitis was observed.

In the remaining 11/51 patients submitted to different kinds of surgical repair a biochemical cholestasis or cholangitis were not observed.

Intraoperative mortality for uncontrollable arterial hemorrhage was 1.9% (1/51 patients).

Postoperative cumulative mortality was 9.8% (5/51 patients).

Two patients died from multiple organ failure related to biliary fistula, one after HJ and another after right hepatectomy. One patient died from fulminant hepatitis after complex biliary lesion.

A myocardial infarction and a cardiorespiratory

TABLE 2 Surgical Treatment

	No. patients	%
HJ	20	39.21
CJ	1	1.90
Kehr	20	39.21
Duct-jejunostomy	1	1.90
TCD + suture	2	3.80
BIHJ	3	5.70
Quadriduct-Jejunostomy	1	1.90
Right Hepatectomy	2	3.80

HJ: hepatico-jejunostomy; CJ: choledocho-jejunostomy;
BIHJ: bihepatico-jejunostomy; TCD: trans-cystic drainage.

insufficiency were recorded in the remaining 2 patients.

In 9/51 cases (17.64%) a medical legal issue was recorded but the final outcomes were not reported in the questionnaire (Table 3).

DISCUSSION

LC is the operation of choice for symptomatic cholelithiasis but it is characterized by a major incidence of iatrogenic biliary lesions. In the published series this complication varies from 0.2 to 1.3% and in Italy in 2002 it has been estimated, within a national survey by G. Nuzzo *et al.*, to be 0.31%, being three-fold the incidence in "open" series, while 0.1% was the incidence of "minor" biliary lesion (biliary fistula) (6). In our country about 90,000 LC are performed every year and therefore the social and economic impact of this issue is easily identifiable. Iatrogenic lesions of the biliary tree carries also a more high morbidity and mortality (7), many difficulties in the clinical management and the occurrence of legal controversies (8,9). Moreover, sometimes, an extreme complexity in the treatment of specific cases is noted, with the need of major hepatic resections or liver transplant (10). Thus a highly specific competence with a multidisciplinary approach involving surgeons, endoscopists and interventional radiologists is requested. The repair of these lesions should be performed in referral centers for hepatobiliary surgery that play a central role and are able to offer the best long-term results (11-14).

Compared to those occurring in the "open" traditional approach, these lesions are generally higher (according to Bismuth classification, sometimes involving the biliary confluence), more complex and associated to a vascular damage, usually the right hepatic artery. The incidence of vascular lesions has been reported to be 61% in the series by Koffron (15) and 47% in the series by Belghiti (11). It is still controversial the possible influence of the associated vascular lesion on the outcome of the surgical biliary diversion.

The mechanisms of lesions as well as the risk factors and the principles of a correct laparoscopic surgical technique are well known (16-20). An inadequate recognition of the biliary anatomy, sometimes influenced by the severe chronic or acute inflammation or by the difficulties encountered in obtaining a correct hemostasis, is often the cause of the iatrogenic lesions. It can also be caused by an inadequate laparoscopic training or by the excess of confidence and possible lower attention by experienced surgeons. The surgeon's experience, considering a cut-off of 100 LC, does not seem to be an independent variable, as reported in the literature and confirmed in our series: in fact almost 50% of the surgeons had performed 100 LC at last the time of the reported lesion.

The major complications of the iatrogenic lesions are mostly related to an inadequate drainage of biliary fistulas that determines clinical situations at a high risk of sepsis and mortality. A correct approach to the fistula by percutaneous-endoscopic treatments or

TABLE 3 Legal Medical Issue (9 patients = 17.64%)

Surgical treatment	Outcome
HJ	Prosthesis
HJ	No cholestasis
HJ	No cholestasis
External biliary drainage → HJ	No cholestasis
Kehr	HJ
Kehr	Biliary cirrhosis
Right hepatectomy	Exitus
Quadriduct-jejunostomy	No cholestasis
Right hepatectomy	No cholestatic

HJ: hepatico-jejunostomy.

reoperation is a real emergency that always must be considered in any case before any attempt to repair the biliary damage (13). It is known, in fact, that a bilio-digestive diversion has not to be proposed in case of concomitant biliary peritonitis when the biliary fistula is not well drained. On the contrary, an intraoperative recognition of the lesion and its immediate repair offers the best long-term results with a low morbidity, reduced hospital stay and costs (21). Therefore an intraoperative cholangiogram is always advisable in case of any doubt about the biliary anatomy.

Looking at the surgical repair, the hepatico-jejunostomy (HJ) is the operation of choice in case of complete section of the common bile duct. It is controversial if an anastomotic tutor is really effective and it remains at the surgeon's discretion according to their personal and surgical school experience. Generally an end-to-end biliary anastomosis on a T-tube must be avoided since it is followed by a biliary stenosis in almost 50% of the cases (12,22,23). Similarly a biliary diversion should be preferred if vascular damage can be reasonably expected, even if the section of the bile duct is not complete. A T-tube has therefore only a decompressive function and does not act as a tutor for a bilio-biliary risky anastomosis; it can then be used only in selected cases such as partial section or lesion with a proper vascularization.

If we look at our data, we have first to consider that the survey is multiinstitutional and involves excellence centers and hospitals with less experience in videosurgery. The number of LC performed (>100) is not an independent variable, whereas the hepatobiliary experience of referral centers for the subsequent repair plays a key role because of the high rate of success in almost all treated cases. Patients' characteristics show a prevalence of young (median age 42.5 yrs) females (76.47%) without specific risk factors and operated on for symptomatic cholelithiasis (complicated pathology in 12/51 cases, 23.5%). In about 74% of the cases the iatrogenic lesion was a complete or partial section of the common bile duct, confirming the damage to be "high" toward the confluence in which a more complex bilio-digestive reconstruction was indicated. In 3/51 cases a vascular lesion (hepatic artery + portal vein) was present with one intraoperative death. Anyway, the exact incidence of associated vas-

cular lesions could not be identified since in most cases a preoperative angiography had not been performed. In our study also two rare cases of left biliary duct lesions (partial section and clips) are reported.

Intraoperative diagnosis was made in 39.21% of cases (20 pt).

In the 31/51 (60.71%) patients in which the diagnosis was postoperative, treated by a differed operation it a greater morbidity and a prolonged hospitalization was noted. Preoperative work-up in differed operations is characterized by a greater number of ERCP (23 cases) rather than colangio-MRI (9 cases), may be for a reduced availability of the latter procedure or the presumed therapeutic value of the endoscopic approach.

The need for the surgical endoscopic-percutaneous re-treatment in a high percentage of cases (13/51, 25.49%) confirms the extreme complexity of the approach to iatrogenic lesions.

In 9/51 (17.6%) patients a new surgical operation was indicated: 5 HJ and one revision after T-tube repair, one suture of bleeding ulcer after HJ, one revision for biliary fistula after a right hepatectomy, one HJ after external drainage of the common bile duct. In 4/51 (7.8%) cases a transhepatic or endoscopic stent was positioned: in 3 patients after a HJ (transhepatic) and in one case after a T-tube plasty (endoscopic stent). The HJ has lead to a greater success rate compared to T-Tube plasty - 70% vs. 65% - with a lower morbidity. Despite this, in 3 cases cholestasis occurred long term and 3 patients needed a transhepatic stent for stenosis. In patients who underwent a T-tube plasty (20/51), the preferred operation in case of immediate repair but never performed in the referral centers, a HJ was needed in 5 cases and an endoscopic stent in one case, with an unsuccessful rate of 35%. One biliary cirrhosis was also reported. Maybe these bad results can be determined by an inappropriate indication, with a biliary reconstruction performed also in cases with an inadequate vascularization of anastomotic stumps or in the presence of traction.

In our series also 2/51 right hepatectomies are reported which testifies for the great potential mor-

bidity of biliary lesions. Lesion-related mortality occurred in 4 cases (8%), all females with an age of 45-65 yrs, operated on for symptomatic cholelithiasis without any co-morbidity. The reported lesion was a complete section of the common bile duct or of the right biliary duct along with the right hepatic artery in one case, repaired by a T-tube plasty in 2 cases and by a right hepatectomy in another case. In the fourth case the death occurred intraoperatively and it was due to an untreatable hemorrhage by a complex bilio-artery-portal lesion. In 2 cases the death occurred from septic complications (multiorgan failure) respectively for a biliary peritonitis after a T-tube plasty and a biliary fistula and pneumonia after a right hepatectomy. An acute hepatitis after a complex lesion was also reported. Surgeon's experience was lower than 100 LC in 3 cases, and greater than 100 LC in one case (not significant).

Our data confirm that septic complications represent a frequent cause of mortality in cases of iatrogenic lesions of the biliary duct.

Legal controversies were activated for 9/51 events, also in cases of good results after repair. In 5/9 the reoperation was resolutive of symptoms without medium- to long-term complications. The death of patient, an evolution in biliary cirrhosis, a third operation or a biliary stenting determined a legal issue in the remaining 4/9 cases.

CONCLUSIONS

Laparoscopic cholecystectomy causes a higher incidence of major and minor biliary lesions, often in the absence of specific risk factors. Morbidity and mortality related to such complications may be high. Immediate treatment offers the best results as well as prompt referral to highly specialized centers.

HJ represents the operation of choice and gives better long-term results and lower morbidity compared to T-tube plasty that has to be reserved only for selected cases. An adequate management of the biliary fistula or related septic complications is the first step in patients with iatrogenic biliary lesions following LC.

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