Successful management of locally advanced hilar cholangiocarcinoma: Surgical procedure for extended left hepatic lobectomy coupled by resection/ reconstruction of the right hepatic artery

<Case Report>

Emi Akizuki Shindo, MD, Yasutoshi Kimura, MD, PhD, Mitsuhiro Mukaiya, MD, PhD, Toshio Honnma, MD, PhD, Toru Mizuguchi, MD, PhD, Tomohisa Furuhata, MD, PhD, Kazumitsu Koito, MD, PhD*, Tadashi Katsuramaki, MD, PhD, and Koichi Hirata, MD, PhD

*First Department of Surgery, *Department of Radiology, Sapporo Medical University School of Medicine S-1, W-16, Chuo-ku, Sapporo, Hokkaido 060-8543, JAPAN*

ABSTRACT

Recently, the methods for hepatic lobectomy, which require highly qualified and experienced surgeons and include difficult post-operative management, have improved markedly, and, moreover, there are very few patient deaths resulting from hepatic artery reconstruction. Now, as an overall trend, the focus of discussion has shifted to whether there is any positive value in radical resection. A few reports have described success in such operations.

Extended left hepatectomy with right hepatic artery resection in a case of advanced hilar cholangiocarcinoma with suspected right hepatic artery invasion is reported. The surgery absolutely required reconstruction of the hepatic artery. During the postoperative course, in which the patient was at high risk for complications, temporary bleeding was observed from a pseudo aneurysm in the anastomotic site. Fortunately, no severe problems were caused by transarterial embolization in the right hepatic artery. The patient completed the planned chemotherapy regimen and was discharged.

Key words : Extended left hepatic lobectomy, Hilar cholangiocarcinoma, Hepatic artery reconstruction

INTRODUCTION

Numerous reports have described cases in which aggressive surgical approaches were used to achieve curative resection for advanced hepatic hilar cholangiocarcinoma, but the benefits of such surgical treatment are still uncertain. Such operations have been performed only rarely, and the patients' prognoses have, unfor-

Correspondence should be addressed to:
Emi Akizuki Shindo, M.D.
First Department of Surgery,
Sapporo Medical University School of Medicine
S-1, W-16, Chuo-ku,
Sapporo, Hokkaido 060-8543, JAPAN
Tel： +81-11-611-2111 (Ext. 3281), Fax： +81-11-613-1678
E-mail： akizuki@sapmed.ac.jp

tunately, not been included in reports. Herein is a case report of extended left hepatectomy with right hepatic artery resection and extra-hepatic bile duct resection in order to achieve tumor-free margins. The actual surgical procedure and the prognosis are described, and several important points are discussed.

CASE REPORT

A 59-year-old male was hospitalized with upper abdominal pain and jaundice. Preoperative magnetic resonance imaging (MRI)(Fig.1A), cholangiography via percutaneous transhepatic cholangio drainage (PTCD) catheter (Fig.1B) were performed and a diagnosis of advanced hilarcholangiocarcinoma, spreading to the common bile duct and the left hepatic duct was made. On intraductal ultrasonography (IDUS) via a PTCD catheter, subserosal invasion was suspected in some parts of the tumor, but no encasement of the right hepatic artery was detected by either angiography or IDUS. Neither was any portal vein invasion detected. Several lymph nodes surrounding the inferior bile duct were detected on computed tomography (CT). There was no evidence of liver metastasis. A diagnosis of, advanced hilar cholangiocarcinoma was made.

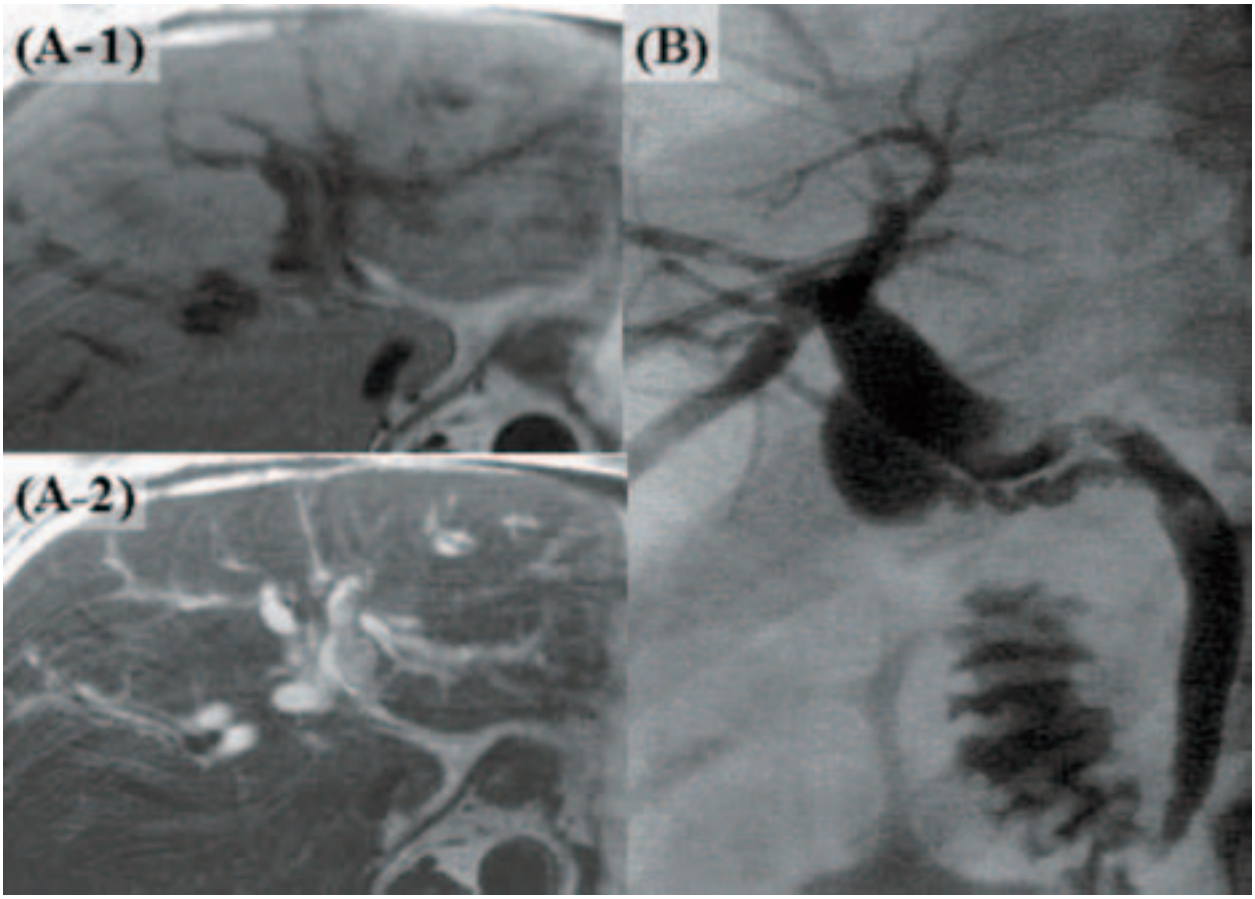

Fig.1

(A) MRI showed a T1 low, T2 high intensity mass located at the hepatic hilum. Tumor invasion reached beyond the umbilical portion and left secondary duct confluence, and there was no invasion towards the right hepatic duct.

(B) Cholangiography via percutaneous transhepatic cholangio drainage (PTCD) catheter (inserted from B5) showed complete obstruction of the left hepatic duct, and tumor invasion to the right hepatic duct was suspected, but there was no invasion towards the right segmental branch.

The patient had a fatty liver, and the 15-minute retention rate of indocyanine green clearance ($ICGR_{15}$) was 10.4%. A technetium-99 m-diethylentriaminepentaacetic acid-galactosyl human serum albumin (Tc-99m-GSA) liver scintigraphy study showed average liver function in spite of the fatty liver, and extended left hepatectomy was predicted to offer the most beneficial results in terms of the remnant liver [1].

Surgical procedure

The common bile duct was divided at the level of the inferior common bile duct, and at the right hepatic duct (proximal side of the caudate lobe bile duct branches). Examination of a frozen section of the cut end of the bile duct was negative for cancer. The tumor was located from the hepatic hilar region to the left hepatic duct, and an induration of about 1cm in length was identified where the right hepatic artery went back across the common bile duct (Fig.2A-1). Frozen-section examination of the connective tissue between the induration and the common bile duct was positive for cancer, and tumor invasion to the right hepatic artery was suspected. No cancer invasion was observed in the left hepatic artery and the portal vein, and they were ligated and divided at the bifurcation.

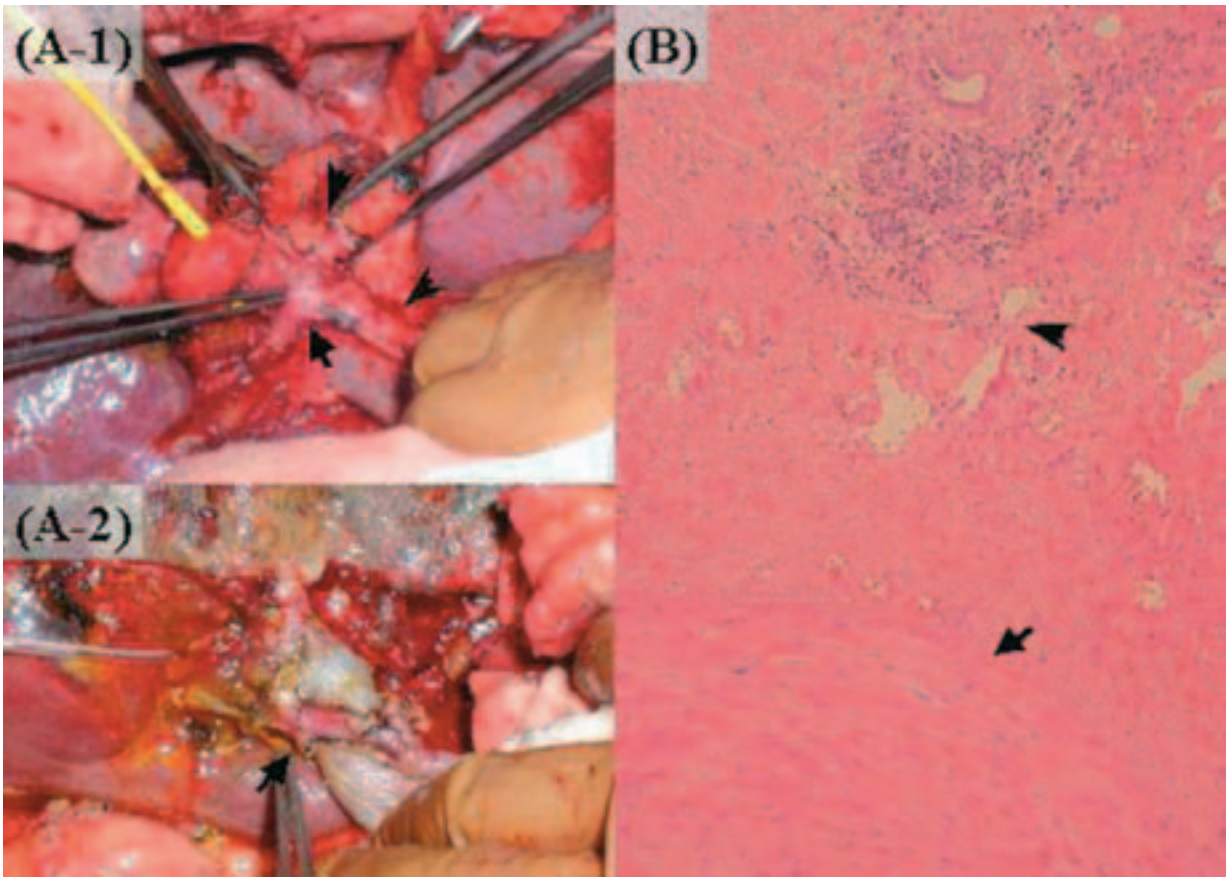

Fig.2

During the operation, an induration (➝) was identified on the upper common hepatic duct and along the right hepatic artery (➔) nearby (A-1). The right hepatic artery was resected about 2 cm along the induration and was reconstructed by end-to-end anastomosis (➔) (A-2). On microscopic findings of the specimen, right hepatic artery (outer membrane) (➔) in the left lower and atypical duct (➝) in the middle upper, the distance between each was about 700um (B).

Left hepatectomy with half removal of the caudal lobe, and lymph node dissection (para-aortic, celiac, and hepatoduodenal ligaments) were carried out as a standard procedure. There was no apparent lymph node metastasis. With the prospect of R0 resection, right hepatic artery resection was performed. The right hepatic artery was resected about 2 cm along the induration, and arterial reconstruction was performed by direct end-to-end anastomosis (Fig.2A-2). Biliary reconstruction was performed by right-hepaticojejunostomy with a Roux-en-Y loop.

Histological findings

Histological findings of the tumor in the excised specimen revealed poorly to moderately differentiated tubular carcinoma. Tumor invasion was dominant in the left hepatic duct (extending to the umbilical portion), extending to the right hepatic duct, and to the caudal side. Cancer cells were observed 5 mm inside the dissected surface, but the actual surgical margin was negative for cancer. The connective tissue around the right hepatic artery that seemed clinically to be invaded by cancer was proven to be positive for cancer. The wall of the artery was not invaded directly (Fig.2B). Perineural invasion was obvious.

Post-operative course

The blood flow of the reconstructed artery was timed with the use of Doppler US and enhanced CT. On the eighth postoperative day, a minor bile discharge from the cut end of the liver was suspected. On the twentieth day, slight but apparent bleeding through the abdominal drain was temporarily observed. Emergent angiography showed a pseudo-aneurysm formation on the right hepatic artery. Transarterial embolization (TAE) was performed on the right hepatic artery. Hepatic ischemia in the remnant liver occurred, and it took one month for the hepatic transaminases to return to the normal range. Adjuvant chemotherapy was carried out for one month, and the patient was discharged. Liver metastasis, but not local recurrence, was, unfortunately, detected 9months after the operation. The patient died from sudden renal failure 11months after the operation.

DISCUSSION

Although diagnostic techniques for hepatobiliary diseases have recently improved, hilar cholangiocarcinoma is still encountered at an advanced stage. Surgical approaches to hilar cholangiocarcinoma using hepatobiliary resection have been applied with varying degrees of success. Jarnagin et al. reported that in their study, five-year survivors all had concomitant hepatic resection and none had tumor-involved margins[2]. Most recent studies on the surgical treatment of cholangiocarcinoma indicate that tumor-free margins represent the most important prognostic parameter [3]. However, there is a controversy regarding the long-term survival benefits and the surgical risks of these approaches. A study by Nakagohri et al. showed no evidence of a survival benefit of vascular resection for patients with hilar invasive intrahepatic cholangiocarcinoma [4] Extended liver resection with vascular reconstruction was found by Gerhards et al. to be one of the significant predictors of increased mortality during surgical treatment for hilar cholangiocarcinoma [5].

Furthermore, reconstruction of the hepatic artery is more difficult than that of the portal vein because of the small diameter and the high probability of postoperative occlusion of anastomosis. Lately in hepatic artery reconstruction, the introduction of microscopic surgery can make the procedure safer. When it is hard to perform end-to-end anastomosis, anastomosis to the gastroduodenal artery or the middle colic artery can also be considered [6]. Portal arterialization (portal vein-gastroduodenal artery anastomosis) can also be considered to cope with insufficient backflow from the hepatic artery.

In the herein reported case, addition of the right hepatic artery resection, resulted in improved curability grade from R2 to R1. Adequate preoperative assessment and complete resection are necessary in treatments of hilar cho-

langiocarcinoma, and aggressive surgical approaches may contribute more to increased local control of cancer.

REFERENCES

1. Katsuramaki T, Fujimori K, Furuhata T, Kimura Y, Meguro M, Nagayama M, Honma T, Mukaiya M, Hareyama M, Hirata K. Preoperative estimation of risk in hepatectomy using technetium-99m-galactosyl human serum albumin receptor amount by nonlinear 3-compartment model. Hepato-Gastroenterology 2003;50:174-177.
2. Jarnagin WR, Fong Y, Dematteo RP, Gonen M, Burke EC, Bodniewicz J, Youssef M, Klimstra D, Blumgart LH. Staging, resectability, and outcome in 225 patients with hilar cholangiocarcinoma. Ann Surg 2001; 234:507-519.
3. Neuhaus P, Jonas S, Settmacher U, Thelen A, Benckert C, Lopez-Hanninen E, Hintze RE. Surgical management of proximal bile duct cancer: extended right lobe resection increases respectability and radicality. Langenbecks Arch Surg 2003;388:194-200.
4. Nakagohri T, Asano T, Kinoshita H, Kenmochi T, Urashima T, Miura F, Ochiai T. Aggressive surgical resection for hilar-invasive and peripheral intrahepatic cholangiocarcinoma. World J Surg 2003;27:289-293.
5. Gerhards MF, van Gulik TM, de Wit LT, Obertop H, Gouma DJ. Evaluation of morbidity and mortality after resection for hilar cholangiocarcinoma -a single center experience. Surgery 2000;127:395-404.
6. Shimada H, Endo I, Sugita M, Masunari H, Fujii Y, Tanaka K, Misuta K, Sekido H, Togo S. Hepatic resection combined with portal vein or hepatic artery reconstruction for advanced carcinoma of the hilar bile duct and gallbladder. World J Surg 2003;27: 1137-1142.

(Accepted for publication, July 4, 2006)