Journal of Surgical Oncology 2005;90:43–45

HOW I DO IT

Bi-segmentectomy V-VIII as Alternative to Right Hepatectomy: An Intrahepatic Approach

MARCEL AUTRAN C. MACHADO, MD,[1,2]* PAULO HERMAN, MD,[1] ROBERTO F. MEIRELLES JR, MD[2]
TELESFORO BACCHELLA, MD,[2] AND MARCEL C.C. MACHADO, MD, FACS[1,2]
[1]Department of Abdominal Surgery, Cancer Hospital, São Paulo, Brazil
[2]Department of Surgery, University of São Paulo, São Paulo, Brazil

KEY WORDS: liver; anatomy; resection; bi-segmentectomy V-VIII

INTRODUCTION

The knowledge of segmental liver anatomy has provided the fundamental basis for segmental liver resections. Formerly described by Couinaud [1] as right paramedian sectorectomy, right anterior liver resection or bi-segmentectomy V-VIII is defined as the removal of segments V and VIII of the liver. Among several types of liver resection, bi-segmentectomy V-VIII is one of the most difficult to perform. Makuuchi et al. [2] were the first authors to present detailed operative technique and clinical data regarding this procedure. The main drawback of this technique is a complex hilar plate dissection including individual identification of arterial, portal, and bile duct branches of right anterior liver segments (V and VIII). We have recently described a modification of the intrahepatic posterior technique with a standardized way to identify and isolate the right glissonian sheaths [3]. The intrahepatic approach to glissonian pedicles is a useful step to make easier and safer this formerly complex procedure and permits the complete anatomical delineation of all liver segments [3–6]. This technique allows the removal of individual hepatic segments sparing functioning parenchyma.

The authors describe the intrahepatic technique for bi-segmentectomy V-VIII and their experience in eight patients with a small left liver, steathotic liver, or bilateral lesions that otherwise would result in hazardous or extensive liver resection.

MATERIALS AND METHODS

Eight consecutive patients that underwent bi-segmentectomy V-VIII using standardized intrahepatic pedicle approach technique were prospectively evaluated from September 2001 to June 2004. There were two men and six women with a mean age of 54.5 years (range, 42–75 years). Seven patients had liver metastasis and one had hepatic adenoma. None of the patients presented liver cirrhosis. The surgical procedure, postoperative course, and outpatient follow-up were evaluated. The following data was collected prospectively: duration of surgery, perioperative transfusions, postoperative complications, and hospital stay.

Preoperative Evaluation

Preoperative investigation included liver and renal function tests, complete blood count, and coagulation profile. All patients underwent abdominal CT scan and/or MRI. Patients were selected to right anterior resection when the lesion or lesions were located in segments V and/or VIII and there was no portal vein invasion. This segmental approach was employed whenever an adequate margin of normal hepatic tissue could be obtained.

Operative Technique

A bilateral subcostal incision extended superiorly in the midline to the xyphoid was performed. Liver was mobilized by sectioning falciform, right triangular and coronary ligaments, and a self-retaining retractor was

*Correspondence to: Marcel Autran C. Machado, MD, Rua Evangelista Rodrigues 407-05463-000, São Paulo, Brazil. Fax: 55-11-3031-2899.
E-mail: dr@drmarcel.com.br

DOI 10.1002/jso.20236
Published online in Wiley InterScience (www.interscience.wiley.com).

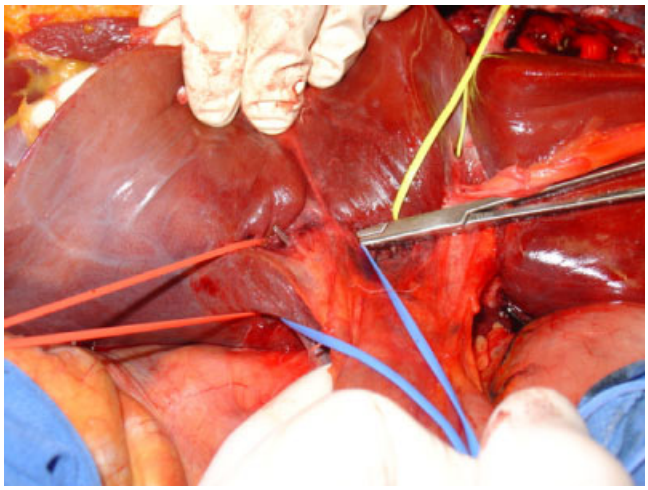

Fig. 1. Intrahepatic access for bi-segmentectomy V-VIII. A Mixter clamp is encompassing the right anterior glissonian pedicle.

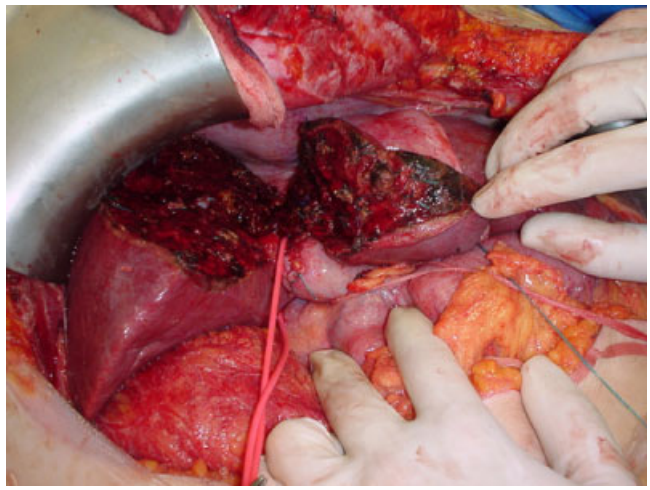

Fig. 2. Bi-segmentectomy V-VIII along with ligature of the right hepatic vein. Intraoperative view of raw surface of the liver. The venous drainage of the posterior sector (segments VI and VII) was maintained through an accessory inferior right hepatic vein.

used. Without the use of Pringle maneuver, a small anterior incision was made in front of the hilum in order to disclose the anterior surface of the right glissonian pedicle. A second incision was performed on the right edge of the gallbladder bed to permit access to the right anterior pedicle and a large clamp was inserted through the first incision with a 60° angle reaching the second incision as described elsewhere [3]. The right anterior glissonian pedicle was then encircled as shown in Figure 1. The pedicle was then tied and divided (a vascular stapler may as well be used). At this time, the limits of the right anterior sector (segments V and VIII) were clearly defined through an ischemic delineation. At this time the liver parenchyma was transected as usual.

RESULTS

Six patients underwent bi-segmentectomy V-VIII (Figs. 2 and 3), one had bi-segmentectomy V-VIII along with bi-segmentectomy II-III, and one underwent bi-segmentectomy V-VIII with resection of segment III.

Blood transfusion (mean 2 units) was required in three patients (37.5%). Mean operative time consumed to achieve complete control of the right anterior pedicle was 16.6 min (range, 10–30 min) and mean operation time was 380 min (range, 270–540 min). The median hospital stay was 7 days (range, 5–29 days). One patient developed postoperative pneumonia and subphrenic abscess that was successfully treated by open drainage and systemic antibiotic (morbidity rate of 12.5%). No patient had postoperative signs of liver failure. No postoperative mortality was observed.

The mean follow-up was 21.1 months. Fourteen months after operation one patient with colorectal metastasis developed lymph nodes recurrence at hepatic hilum. She ultimately died 5 months later. Another patient died of recurrence 11 months after liver resection. No tumor recurrence was observed in the remnant liver.

DISCUSSION

With the greater knowledge of morphological and functional liver anatomy, surgeons became able to devise anatomic resections of the right and left lobes through bloodless planes. The evolution of liver surgery stimulated a further refinement in anatomic liver resection applying modern surgical techniques to remove individual liver segments [3–6]. Hepatic lesions that involve all or part of segments V and VIII are amenable to a

Fig. 3. Bi-segmentectomy V-VIII along with ligature of the right hepatic vein. Postoperative CT scan (10 days)—the accessory inferior right hepatic vein can be seen (arrow).

segment-based right anterior hepatic resection. The reason for performing bi-segmentectomy V-VIII rather then right hepatectomy in these patients was the presence of a small left liver, steatotic liver, or bilateral lesions.

Jarnagin and colleagues, in the largest series of liver resections already reported, showed that the number of hepatic segments resected is the main predictor of perioperative morbidity and mortality [7]. The main goal of our technique is to preserve the maximum amount of functional liver parenchyma in patients that otherwise would require major liver resections. Scudamore et al. [8] compared clinical parameters in patients undergoing liver lobectomy or extended lobectomy to those treated by central hepatic resection thus sparing liver parenchyma. They reported that operative and inflow occlusion times were comparable in both techniques but the volume of resected liver and late complication rate were significantly lower in patients submitted to central resection.

Our data demonstrated that this technique did not result in considerable blood transfusion. Three of our patients required blood transfusion. In the Makuuchi series of 17 patients, there was an average blood loss of 1482 ml and 10 patients (59%) required blood transfusion [2].

Immediate complications are directly related to the extension of liver resection as previously reported [7,8]. We observed neither clinical nor biochemical signs of liver failure in any patient. In the present series, there were no deaths and the morbidity rate of 12.5% compares favorably with those of the literature for more extensive resections.

Bi-segmentectomy is technically more demanding when the classical approach with hilar dissection is employed. It requires an extensive dissection of vascular pedicles, expertise in intraoperative ultrasound, and larger transection surfaces [9]. With our technique it is possible to preclude the vascular pedicle identification by intraoperative ultrasound. The intrahepatic access avoid the difficult and/or tedious hilar dissection without the need of Pringle or digital maneuvers. However, care must be taken to avoid injury branches of both right and middle hepatic veins as they run on the line of liver transection. Intraoperative ultrasound should be used to identify those branches. This procedure may decrease the intraoperative blood loss as occurred in our most recent patients.

Bi-segmentectomy V-VIII with the standardized technique, proposed by our group, is a safe alternative to right hepatectomy in selected patients, avoiding unnecessary sacrifice of functional parenchyma with minimal bleeding and morbidity. This type of resection may increase resectability rate in patients with bilateral tumors. It may also enhance the opportunity to perform repeated resections in cases of disease recurrence.

REFERENCES

1. Couinaud C: Le Foie: Études Anatomiques et Chirurgicales. New York: Masson Publishers, 1957.
2. Makuuchi M, Hashikura Y, Kawasaki S, et al.: Personal experience of right anterior sectionectomy (segments V and VIII) for hepatic malignancies. Surgery 1993;114:52–58.
3. Machado MA, Herman P, Machado MC: A standardized technique for right segmental liver resections. Arch Surg 2003;138: 918–920.
4. Galperin EI, Karagiulian SR: A new simplified method of selective exposure of hepatic pedicles for controlled hepatectomies. HPB Surg 1989;1:19–30.
5. Launois B, Jamieson GG: The posterior intrahepatic approach for hepatectomy or removal of segments of the liver. Surg Gynecol Obstet 1992;174:155–158.
6. Machado MA, Herman P, Machado MC: Anatomical resection of left liver segments. Arch Surg 2004;139:1346–1349.
7. Jarnagin WR, Gonen M, Fong Y, et al.: Improvement in perioperative outcome after hepatic resection: analysis of 1,803 consecutive cases over the past decade. Ann Surg 2002;236:397–406.
8. Scudamore CH, Buczkowski AK, Shayan H, et al.: Mesohepatectomy. Am J Surg 2000;179:356–360.
9. Chouillard E, Cherqui D, Tayar C, et al.: Anatomical bi- and trisegmentectomies as alternatives to extensive liver resections. Ann Surg 2003;238:29–34.