

Hepatectomy Using Alternative Energies

RENATO RODRIGUES FERACIM; PHILIP YIN VIEIRA BORGES;
JOSÉ JÚLIO DO RÊGO MONTEIRO FILHO; RICARDO ZORRÓN

*Fundação Educacional Serra dos Órgãos, General Surgery Department of Hospital das Clínicas Constantino
Ottaviano (HCTCO), Teresópolis-RJ, Brasil.*

ABSTRACT

Objective: To analyze the influence of hepatectomy using alternative energies, specially Ultracision, related to the need of blood transfusion and its consequent morbid-mortality. **Methods:** During 2005, four patients submitted to hepatectomy were analyzed, 3 by videolaparoscopy and 1 by conventional surgery, using Ultracision technology. **Results:** From the 4 patients analyzed, 1 needed blood transfusion after surgery and another needed a new surgical intervention. There was no need of conversion to conventional surgery in the cases submitted to videolaparoscopy. **Conclusion:** The use of alternative energies in hepatectomies proved to be useful, for it can reduce the operative time, the need of blood transfusion and the time of postoperative hospital stay, culminating with the reduction of the morbid-mortality.

Key words: hepatectomy, Ultracision, blood transfusion, alternative energies.

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INTRODUCTION

The history of this surgery is of an arduous fight against bleeding, specially massive hemorrhage which is considered a great risk of hepatectomy, the operative prognostic is essentially dependent of the amount of blood loss¹. The risk of operative hemorrhage is still a major problem for this procedure².

Perioperative blood transfusion may increase mortality and morbidity because it causes immunosuppression. As it affects the survival period after hepatocarcinomas and hepatic metastasis of colorectal tumor resection this has been adversely demonstrated. Blood transfusion also carries the risk of viral transmission and may be associated to tumor recurrence².

Despite the use of well-known hemostasis approaches during hepatectomies such as Pringle's manœuvre, selective vascular occlusion among others, currently the use of new technologies such as Ultracision, Ligasure and alternative energies (argon, CUSA, laser) have promoted reduced operative time and blood loss during surgery.

This study was performed to evaluate the use of these techniques in hepatectomies, especially the use of Ultracision in which its possible benefits and advantages for the surgeon and patient were analyzed, it was considered as main criteria operative time,

necessity of blood transfusion and postoperative length of hospital stay.

Ultracision (Ethicon Endo-Surgery, Cincinnati-Ohio EUA) is an ultrasonic system device which transforms electric into mechanical energy whose blade movement causes collagen molecules vibration inside the tissues, then a coagulum was formed preventing the bleeding. This instrument is very useful in surgery of parenchymatous organs such as the liver and the spleen, where the tissue is friable and bleeds easily.

METHODS

Four patients submitted to hepatectomy were analyzed. Three were submitted to laparoscopy and one to open surgery, Ultracision technology was used in all patients.

Patient 1, 19-year-old, female, with cramping pain in the epigastric region and no alteration was observed on physical examination. Ultrasound and computed tomography scan disclosed a 5 cm tumor in the II and III segments of the liver which suggested a diagnosis of Focal Nodular Hyperplasia. The patient underwent laparoscopic resection of the II segment and a portion of the III segment with Ultracision technology without necessity of blood transfusion. The mean operative time was 150min, and on the 3rd postoperative day the patient was discharged from hospital.

Patient 2, 43-year-old, male, Chinese, who has been living in Brazil for 15 years, he came to our service complaining enlargement of the right hemiabdomen. Physical examination revealed a 6cm movable and painless mass in the right subcostal region. Computed tomography and Nuclear Magnetic Resonance confirmed a 7 cm exofitic hepatic tumor in the V segment suggestive of hepatocarcinoma. Viral markers depicted active hepatitis B with high viral load. Laparoscopic resection of the tumor with border of the segment V in addition to cholecystectomy was performed using Ultracision without the necessity of blood transfusion. The mean operative time was 150min, and the patient was discharged from hospital on the 4th postoperative day.

Patient 3, 35-year-old, female, she has been diagnosed with rheumatoid arthritis since she was 15 years old, the patient is using prednisone, chloroquine and methotrexate, and routine laboratory tests depicted increased gama-gt and alkaline phosphatase. Computed tomography revealed a 4cm lesion with limits not well-defined on the segment IV, visible only in the arterial phase, with hypothesis of adenoma and focal nodular hyperplasia. Laparoscopic resection of segment IV with the use of Ultracision was performed without necessity of blood transfusion. The mean operative time was 120min. The drain output on the first postoperative day was 50ml and 20ml on the second postoperative day when it was removed. After the 3rd postoperative day the patient complained of abdominal pain which was progressively worsening, so the patient was submitted to open surgery on the 7th postoperative day for choleperitoneum with 800ml drainage from the abdominal cavity. Seven days after the second surgery the patient was discharged from hospital without any complications.

Patient 4, 52-year-old, asymptomatic, the physical examination revealed a palpable mass in right hypochondrium. Computed tomography and abdominal ultrasound revealed a solid expansive process in the right lobe of the liver, in segments V and VI. Right hepatectomy of segments V and VI and conventional cholecystectomy were performed with the use of Ultracision technology. The mean operative time was 180 min. Blood transfusion was necessary on the first and second postoperative days (two bags of packed red blood cells + plasma). The patient was discharged from hospital on the 5th postoperative day.

RESULTS

From the 4 patients submitted to hepatectomy with the use of Ultracision, 3 did not need blood transfusion, and only one needed postoperative blood transfusion. Only one patient needed reoperation because of postoperative complications, after the 3rd postoperative day the patient complained of abdominal pain which was progressively worsening, so the patient was submitted to open surgery on the 7th postoperative day for choleperitoneum with 800ml drainage from the abdominal cavity. Seven days after the second surgery the patient was discharged from hospital without any complications, the other patients did not have any complications.

Conversion from laparoscopic surgery to open surgery was not necessary.

DISCUSSION

The risk of operative hemorrhage during hepatectomy is a major problem for this procedure, because it increases the need of peri and postoperative blood transfusion, therefore immunosuppression, viral transmission and tumor recurrence are risks inherent in this procedure.

Ultracision (Ethicon Endo-Surgery, Cincinnati-Ohio-EUA) Ultracision is a device that contains an ultrasonic system connected to a generator that transforms electric energy into mechanical movements, producing in this way longitudinal vibrations of the blades at approx. 55 kHz per second. The movement of the blades causes collagen molecules to vibrate inside the tissues, thus forming a coagulum upon their denaturation. This method is especially useful in parenchymatous organs, where dissection can be performed cleanly and with little or no bleeding.

Ligasure (Valleylab, Boulder-Colorado-EUA) is an hemostatic device to be used in abdominal surgery to create vessel sealing. It is a bipolar device that uses high current and low voltage, a combination of pressure and energy creating the seal by melting the collagen and elastin in the vessel walls and transforming it into a plastic-like seal, without depending on primary hemostasis.

Poon and collaborators, in a prospective study of 1222 patients who were submitted to hepatectomy for benign and malignant hepatobiliary neoplasia from July 1989 to June 2003³, conclude that surgical technique development lead to reduced perioperative blood loss which contributed to improved outcomes.

This is due to several changes in the surgical technique over the study period, including the use of ultrasonic dissection instead of the finger-fracture technique. The adoption of a low central venous pressure during hepatic transaction and the use of a vascular stapler for control of hepatic veins, together with the increased experience of the surgeons, have all contributed to the reduction in operative blood loss.

Rui and collaborators performed a comparative study of 51 patients submitted to major hepatectomy without blood transfusion and 60 patients submitted to major hepatectomy with blood transfusion from August 1997 to December 2000⁴. In the first group tumor margins could be defined by intraoperative ultrasonography and liver parenchyma was removed by an ultrasound dissector (CUSA System 200) which is efficient to reduce blood loss. In the second group the techniques used were not described. The authors reported that the first group has advantages such as reduced surgical complication and better prognosis.

Fan and collaborators in the Department of Surgery of the University of Hong Kong compared the results of hepatectomy for hepatocellular carcinoma (HCC) using an ultrasonic dissector with those of a combination of kelly-clasia and finger fracture techniques⁵. The kelly-clasia and finger fracture method was used from 1989 to 1992 in 96 patients and the ultrasonic dissector from 1993 to 1994 in 69 patients.

Use of the ultrasonic dissector resulted in lower blood loss and less patients requiring blood transfusion. Postoperative complications occurred in 45 patients (47 %) of group 1 and 19 (28 %) of those in group 2. There were no deaths in group 2 whereas the hospital mortality rate in group 1 was 16 of 96 (17 %). A wider tumor-free resection margin and lower serum bilirubin level throughout the postoperative period were also observed in group 2. The authors described that the ultrasonic dissector is better than the kelly-clasia in association to the finger fracture technique in hepatectomy for hepatocarcinoma.

Yamamoto and collaborators in a study of 252 patients submitted to hepatic resections for hepatomas from 1984 to 1989⁶ in the Surgical Department of Tokyo and Matsumoto in Japan, elucidated the effect of perioperative blood transfusion on the recurrence of carcinoma. They described that carcinoma recurred in 55 (74.3%) of the 74 patients who received a transfusion,

but in only 89 (50%) of the 178 patients who did not receive a transfusion. This result was significant even when only a small amount of blood was transfused. Based on multivariate analysis, perioperative blood transfusion was a significant predictor for accelerated recurrence, as were tumor invasiveness and background liver cirrhosis. The recurrence of tumors was markedly significant either in patients with noninvasive tumor or in patients with cirrhotic liver that were submitted to blood transfusion. The authors of this study report that these results strongly suggest that perioperative blood transfusion substantially promotes the recurrence of carcinoma after hepatectomy. They advocate that this result must be considered and added to the risks of perioperative blood transfusion before formulating a surgical strategy for carcinoma of the liver.

To conclude, this study have demonstrated that the use of surgical techniques using alternative energy, mainly the Ultracision, may reduce the operative time, the need of blood transfusion and the length of postoperative hospital stay, in spite of other advantages, which results in possible significant improvement of patients' prognostic.

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Correspondence Address:

DR. RICARDO ZORRÓN
Av. Ataulfo de Paiva, 135 / sl. 606
Leblon - Rio de Janeiro - Brazil
CEP: 22775-002
Email: rzorron@terra.com.br