

# Assessment of morbidity and mortality after hepatic resections

## *Avaliação da morbidade e da mortalidade após ressecções hepáticas*

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### A B S T R A C T

**Objective:** To describe morbidity and mortality in patients undergoing hepatectomy. **Methods:** We evaluated hepatectomy according to type of surgery, perioperative blood transfusion, hospital stay, complications and postoperative mortality. For statistical analysis we used the Fisher's exact test, considering significant p values <0.05. **Results:** We performed 22 (31.43%) major hepatectomies, 13 (18.57%) being right hepatectomies extended to segments IVa and IVb, nine (12.86%) left hepatectomies, among these, six included the segment I. We conducted 48 (68.57%) minor hepatectomies, 36 (51.43%) segmental resections and 12 (17.14%) non-anatomical resections. The main indication for resection was colorectal adenocarcinoma metastasis in 27 (38.57%) patients. The higher incidence of primary tumor was hepatocellular carcinoma in 14 (20%) patients, followed by cholangiocarcinoma in six (8.57%). Among the 13 (18.57%) resections for benign diseases, the predominant one was intrahepatic lithiasis (n = 6). Six patients (8.57%) received perioperative blood transfusion. Hospital stay ranged from 2 to 28 days (mean four days). Eight (11.43%) patients developed postoperative complications. Overall mortality was 8.57%, mostly in patients with hepatocellular carcinoma (5.71%). **Conclusion:** Metastatic colorectal adenocarcinoma was the main indication for surgery and minor hepatectomies were the most common procedures. Despite the low overall incidence of postoperative complications, there was high morbidity and mortality in cirrhotic patients with hepatocellular carcinoma.

**Key words:** Diagnosis. Morbidity. Mortality. Hepatectomy.

### INTRODUCTION

Hepato-biliary-pancreatic surgery has been emerging as a specialty in recent decades. Some factors were important for this emergence, amongst them the elucidation of the complex anatomy of the liver, allowing increased safety in surgical interventions on the organ<sup>1-3</sup>. The advent of imaging diagnostic methods, such as ultrasound, computed tomography and magnetic resonance imaging, enabling better patient selection and appropriate surgical planning, also contributed.

Perioperative care associated with modern techniques for dissection of the hepatic parenchyma had an impact on reducing operative morbidity and mortality<sup>4-6</sup>, partly as a result of reduced blood transfusions, which are related to higher incidence of postoperative complications<sup>7-9</sup>.

As a result, there was an increase in surgical indications, especially in the treatment of liver metastases of colorectal adenocarcinoma. Resection combined with

chemotherapy is the only treatment option that offers healing and considerable five-year survival increase for those patients<sup>10-12</sup>.

In this context, this study aimed to evaluate the morbidity and postoperative mortality in patients undergoing hepatectomy.

### METHODS

From January 2007 to December 2009 70 hepatectomies were performed in patients from the National Health System admitted to the Group of Liver, Biliary Tract, Pancreas and Spleen Service of the Alfa Institute of Gastroenterology, Hospital das Clínicas, Federal University of Minas Gerais. Forty patients were female and 30 male. Their ages ranged from 19 to 75 years (mean 49).

All patients underwent preoperative evaluation for each specific disease, including clinical examination, laboratory and imaging (CT or MRI). Data concerning

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surgical indication, type of hepatectomy, perioperative blood transfusion, hospital stay, complications that interfered with the evolution and postoperative mortality (within 30 days of surgery) were prospectively collected following the protocol of the service. Hepatectomy was considered major when three or more segments were resected, and minor when an enucleation, as well as a uni or bisegmentectomy according to the classification of Couinaud<sup>3</sup>, was performed.

Resections were performed using three methods together: monopolar electrocautery, argon beam scalpel and "kellyclasia". Perioperative ultrasonography was routinely performed in patients with malignant diseases. A subcostal incision was used bilaterally, with midline superior extension in five cases. In the major right or left hepatectomies a selective approach to the main vascular pedicles was performed. In minor hepatectomies the Pringle maneuver, when performed, was kept for a maximum of 15 minutes intermittently, interspersed with five minutes of reperfusion. In two patients we used the approach of intrahepatic pedicles, as described by Machado *et al.*<sup>13</sup>.

Statistical analysis was performed using Fisher's exact test, considering significant p values <0, 05.

## RESULTS

Table 1 shows the distribution of patients by indication for surgery, type of liver resection and mortality in each group. When the indication of hepatectomy was for resection of metastases, the ones of colorectal adenocarcinoma were predominant (38.57%), which represented 79.41% of this group. Other indications have been one metastasis from synovial sarcoma, one from endometrial cancer, two from ovarian cancers and one from carcinoid tumor. In two patients with metastases we performed preoperative percutaneous embolization of the right portal vein.

The most incident primary tumor was hepatocellular carcinoma, in 14 (20%) patients. Of these 13 were Child Pugh A cirrhotic individuals without criteria

for liver transplantation and one had no chronic liver disease. Amongst the 13 (18.57%) resections for benign disease, intrahepatic stones were predominant, in six (8.57%) patients, 46% of the indications in this group. Other indications were two cases of adenoma, one focal nodular hyperplasia, three resections of segment IVb in patients with high stenosis of the biliary tract and one liver cyst with three recurrences after laparoscopic unroofing.

We carried out 22 (31.43%) major hepatectomies, 13 (18.57%) being right, with one extending to segments IVa and IVb and one associated with resection of the segment IVb and enucleation of lesions in segments II and III; nine (12.86%) left hepatectomies, from which six included segment I. We performed 48 (68.57%) minor hepatectomies, 36 (51.43%) being segmentectomies and 12 (17.14%) non anatomical resections.

Of the 70 patients, six (8.57%) received blood transfusion in the perioperative period. Hospital stay ranged from 2 to 28 days (mean = 4). Eight (11.43%) patients had postoperative complications. In addition to the six specified in Table 1, which were causes of death, two others comprehending one biliary fistula and one sub-hepatic abscess. The fistula received a conservative approach and the abscess was treated by percutaneous drainage. Complications predominated in patients undergoing major hepatectomies (n = 6, p = 0.0009).

## DISCUSSION

Resection of metastatic colorectal adenocarcinoma was the main indication for hepatectomy in this series, which led to the predominance of minor resections to treat this condition. Economic resections preserving the maximum of disease-free parenchyma are recommended, since anatomical or functional infeasibility for subsequent interventions may occur after major hepatectomy, reserving them for specific cases<sup>10-12,14,15</sup>.

Thorough knowledge of the anatomy of the liver to identify and connect the smaller pedicles along the

**Table 1 -** Surgical Indications, type of hepatectomy and deaths in patients undergoing hepatic resections.

Indications	Hepatectomies (deaths)		Total patients n=70 (%)	Total deaths (%) n=6 (8,56%)
	The Largest <sup>†</sup> n=22	Minors n=48		
Metastasis of colorectal adenocarcinoma	7 (0)	20 (0)	27 (38.5%)	0
Metastasis of other malignant neoplasms	3 (1)*	4 (0)	7 (10%)	1 (1.43%)
Hepatocellular Carcinoma	5 (2)***	9 (2)****	14 (20%)	4 (5.71%) <sup>††</sup>
Colangiocarcinoma	6 (1)**	0	6 (8.6%)	1 (1.43%)
Fibrolamelar Carcinoma	1 (0)	0	1 (1.4%)	0
Adenocarcinoma of gallbladder	0	2	2 (2.9%)	0
Benign liver diseases	0	13 (0)	13 (18.6%)	0

<sup>†</sup>: major hepatectomy mortality (p = 0.079) <sup>††</sup>: hepatocellular carcinoma mortality (p = 0.019) and causes of deaths: \*respiratory complications; \*\*high digestive haemorrhage, \*\*\*liver failure, \*\*\*\*sepsis.

section line was important in the prevention of biliary fistula, which had an incidence of only 1% in this study. Wider vessels and bile ducts were sutured to prevent bleeding and postoperative fistulas<sup>16,17</sup>.

The rate of blood transfusion (8.57%) was lower than in some reported series<sup>7-9</sup>. Surgical procedures without significant blood loss contributed to the good performance and low postoperative hospital stay, with patients discharged most often on the 4th day after surgery. However, among those who had postoperative complications ( $n = 8$ ), six died, determining overall mortality rate of 8.57%. This was greater than the mortality of 2.5% reported in a multicenter analysis of 2313 hepatectomies<sup>18</sup>. In this series we performed analysis of mortality by group of diseases, and deaths occurred mainly in patients with hepatocellular carcinoma ( $n = 4$ ,  $p = 0.019$ ), with zero mortality in those undergoing resection for metastatic colorectal cancer and benign disease.

The high mortality in cirrhotic patients with hepatocellular carcinoma in advanced stages who did not

have complications during surgery showed that the indication of hepatectomy in these patients should be careful and protocols aiming at best selection should be followed. Indications for surgery in these patients may have been beyond that found in the literature<sup>19-22</sup>, but less invasive alternatives such as transarterial chemoembolization and percutaneous ablation are not yet available for the public health system in the hospital where this study was conducted. This fact confirmed the need to improve screening of cirrhotic patients, as well as the search for alternative therapies and less invasive methods for more accurate preoperative assessment for these patients.

In conclusion, hepatectomy was safely performed, with metastatic colorectal adenocarcinoma as the major surgical indications, which, associated with resections for benign diseases, mainly intrahepatic stones, caused minor hepatectomies to be the most performed procedures. Despite the low overall incidence of postoperative complications, there was high morbidity and mortality in patients with hepatocellular carcinoma.

## R E S U M O

**Objetivo:** Descrever a, morbidade e a mortalidade em pacientes submetidos à hepatectomia. **Métodos:** Avaliou-se o tipo de hepatectomia, necessidade de transfusão sanguínea peroperatória, permanência hospitalar, complicações e a mortalidade pós-operatórias. Para análise estatística utilizou-se o teste exato de Fisher, considerando-se significativos valores de  $p < 0,05$ . **Resultados:** Foram realizadas 22 (31,43%) hepatectomias maiores, 13 (18,57%) hepatectomias direitas com uma alargada aos segmentos IVa e IVb; nove (12,86%) hepatectomias esquerdas, dentre estas, seis incluíram o segmento I. Foram feitas 48 (68,57%) hepatectomias menores, sendo 36 (51,43%) ressecções segmentares e 12 (17,14%) ressecções não anatômicas. A principal indicação para ressecção de metástases foi o adenocarcinoma colorretal em 27 (38,57%) pacientes. O tumor primário de maior incidência foi o carcinoma hepatocelular em 14 (20%) pacientes, seguido pelo colangiocarcinoma em seis (8,57%) pacientes. Entre as 13 (18,57%) ressecções para doenças benignas predominou a litíase intra-hepática ( $n=6$ ). Seis pacientes (8,57%) foram hemotransfundidos no peroperatório. A permanência hospitalar variou de 2 a 28 dias (média = quatro dias). Oito (11,43%) pacientes desenvolveram complicações pós-operatórias. A mortalidade geral foi 8,57%, concentrando-se nos pacientes com carcinoma hepatocelular (5,71%). **Conclusão:** As metástases de adenocarcinoma colorretal foram as principais indicações cirúrgicas e as hepatectomias menores foram os procedimentos mais realizados. Apesar da baixa incidência geral de complicações pós-operatórias, evidenciou-se alta morbimortalidade em pacientes cirróticos com carcinoma hepatocelular.

**Descritores:** Diagnóstico. Morbidade. Mortalidade. Hepatectomia.

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