



## Original article

Hepatic Resection: A Safe and Effective Surgery<sup>☆</sup>

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## A B S T R A C T

**Introduction:** We analyze major liver resections performed in 10 years, with the objective of evaluating perioperative results. As secondary objectives, factors related to major complications and comparative analyses of 2 5-year periods are evaluated.

**Methods:** Retrospective analysis of patients undergoing major hepatic resection (3 or more segments) from January 2005 to December 2014, from pre, intra and postoperative data. The Clavien classification is used for postoperative morbidity.

**Results:** A total of 416 major hepatectomies were performed. Transfusions were performed in 38 patients (9.1%). A Pringle maneuver was used in 47.7% of the cases. Half of the patients had no complications, and only 96 patients (23%) had a major complication. Bile leakage was the most frequent complication (n=72, 17.3% of patients), especially due to malignant disease and biliary reconstruction, high risk ASA (III-IV) and prolonged surgical time. Thirteen patients met criteria for liver failure, of which 7 died (5 associated a bacterial infection). The mean hospital stay was 12.5 days, with an 11.8% readmission rate. When comparing 2 5-year periods, at present more complex patients are operated on, with a lower incidence of transfusions and complications (ns).

**Conclusions:** Liver surgery has increased significantly in recent years. Surgical management of the liver now allows safe and effective surgery, with a very low complication rate. The limit of resectability depends on the residual hepatic volume.

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## Resección hepática mayor: una cirugía segura y eficaz

## R E S U M E N

**Introducción:** Se analizan las resecciones hepáticas mayores realizadas en 10 años, con el objetivo principal de evaluar los resultados perioperatorios. Como objetivos secundarios, se evalúan los factores relacionados con las complicaciones mayores y el análisis comparativo de 2 periodos de 5 años.

**Métodos:** Análisis retrospectivo de pacientes intervenidos mediante una resección hepática mayor (3 o más segmentos) desde enero de 2005 hasta diciembre de 2014, de los datos

## Palabras clave:

Hepatectomía mayor

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pre-, intra- y postoperatorios. Se utiliza la clasificación de Clavien para el análisis de la morbilidad postoperatoria.

**Resultados:** Se realizaron 416 hepatectomías mayores, con necesidad de transfusión en 38 pacientes (9,1%) y maniobra de Pringle en el 47,7% de los casos. La mitad de los pacientes no presentaron ninguna complicación y únicamente 96 pacientes (23%) presentaron una complicación mayor. La fuga biliar fue la complicación más frecuente (n=72; 17,3% de los pacientes), sobre todo, por enfermedad maligna y derivación biliar, con ASA elevado (III-IV) y tiempo quirúrgico prolongado. Trece pacientes cumplían criterios de insuficiencia hepática, de los cuales 7 murieron (5 asociaban sobreinfección bacteriana). La estancia hospitalaria media fue de 12,5 días, con una tasa de reingreso del 11,8%. Al comparar 2 periodos de 5 años, se operan pacientes más complejos, con menor incidencia de transfusiones y de complicaciones (ns).

**Conclusiones:** La cirugía hepática ha aumentado de forma significativa en los últimos años. El manejo quirúrgico del hígado permite en la actualidad ofrecer una cirugía segura y eficaz, con un índice de complicaciones muy bajo. El límite de la reseabilidad viene marcado por el volumen hepático residual.

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## Introduction

Liver resection surgery has shown the ability to substantially modify the prognosis of patients who were previously considered non-candidates for treatment with curative intent, such as patients with liver metastases<sup>1</sup> or primary hepatic tumors,<sup>2</sup> and the technique has progressed remarkably since its introduction. The positive results and universal dissemination have led to an increase in its indications, which in turn has resulted in more highly complex procedures being performed. Consequently, more and more patients with greater volumes of liver disease are being evaluated for resection, and they are ultimately treated with more extensive liver resections.<sup>3,4</sup>

Generally speaking, the larger the quantity of liver parenchyma resected, more specific postoperative hepatic complications may appear. The morbidity and mortality associated with these complications define the limits of liver resection surgery.<sup>5,6</sup> Unlike minor liver surgery, which can be performed in most hospitals with minimal infrastructure, major liver surgery (resection of 3 or more segments) leads to more intraoperative and postoperative complications (hemorrhage, postoperative liver failure, bile leak, etc.) and requires different postoperative management, with a dedicated intensive care unit, and specific additional maneuvers. The result is that these surgeries are normally performed at hospitals with extensive experience in this type of surgical procedures. The experience obtained after these resections has become a key factor to achieve better results in terms of complications and survival in patients operated on at reference hospitals. This has resulted in patients being sent for treatment at tertiary hospitals with high patient volumes and regional policies for the referral of patients requiring complex liver surgery.<sup>7</sup>

In this present article, we present a descriptive study of consecutive major liver resections performed at our hospital over the last 10 years. Our main objective was to evaluate the

results in the immediate intra- and postoperative periods in terms of morbidity and mortality. As secondary objectives, we analyzed the learning curve factor for the technique according to the evolution of the results over time and, finally, we evaluated the factors that could determine the appearance of major complications in the postoperative period.

## Methods

This is a retrospective study of prospectively collected data. Included in the study were patients with major liver resections in a 10-year period from January 1, 2005 to December 31, 2014. In this timeframe, a total of 827 liver resections were performed at our hospital, 416 of which were major hepatectomies, representing 50.3% of the total.

Patient demographic data are shown in [Table 1](#). Most of the patients were male, with a male:female ratio of 61.5%:38.5%, and a mean age of 58±14.6 years (range 17–91). Regarding the assessment of anesthetic risk, the majority of patients (66.2%) presented an anesthetic risk assessment (ASA) score of II.

## Etiology

Out of the 416 procedures, 323 (77.3%) were performed due to malignant diseases and 95 (22.7%) benign diseases. The causes for major hepatectomy are shown in [Table 1](#): the majority (189; 45.4%) was for colorectal liver metastases (CLM). The second most frequent etiology was cholangiocarcinoma, with 74 cases (17.8%), and the third most frequent was split-liver donation for living donor liver transplantation, with 52 cases (12.5%).

## Preoperative Data

Almost one-quarter of all patients (24.5%) received chemotherapy before the liver resection procedure, which in all cases was for CLM or metastases of another origin.

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