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SCIENTIFIC ARTICLE

Influence of preoperative propranolol on cardiac index during the anhepatic phase of liver transplantation

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KEYWORDS
Liver transplant;
Cardiac output;
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Abstract
Introduction: Liver transplantation is the best therapeutic option for end-stage liver disease. Non-selective beta-blocker medications such as propranolol act directly on the cardiovascular system and are often used in the prevention of gastrointestinal bleeding resulting from HP. The effects of propranolol on cardiovascular system of cirrhotic patients during liver transplantation are not known.
Objective: Evaluate the influence of propranolol used preoperatively on cardiac index during the anhepatic phase of liver transplantation.
Method: 101 adult patients (73 male [72.2%]) who underwent cadaveric donor orthotopic liver transplantation by piggyback technique with preservation of the retrohepatic inferior vena cava performed at Hospital das Clinicas, Federal University of Minas Gerais were evaluated. There was no difference in severity between groups by the MELD system, $p = 0.70$. The preoperative use of propranolol and the cardiac index outcome were compared during the anhepatic phase of liver transplantation in 5 groups (I: increased cardiac index, II: cardiac index reduction lower than 16%, III: cardiac index reduction equal to or greater than 16% and less than 31%, IV: cardiac index reduction equal to or greater than 31% and less than 46%, V: cardiac index reduction equal to or greater than 46%).
Results: Patients in group I (46.4%) who received propranolol preoperatively were statistically similar to groups II (60%), III (72.7%), IV (50%) and V (30.8%), $p = 0.57$.
Conclusion: The use of propranolol before transplantation as prophylaxis for gastrointestinal bleeding may be considered safe, as it was not associated with worsening of cardiac index in anhepatic phase of liver transplantation.

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PALAVRAS-CHAVE
Transplante de fígado;
Débito cardíaco;
Antagonista adrenérgico beta;
Propranolol

Influência do propranolol pré-operatório no índice cardíaco durante a fase anepática do transplante hepático

Resumo
Introdução: O transplante hepático (TH) é a melhor opção terapêutica para doença hepática em estágio terminal (DHET). As medicações betabloqueadoras não seletivas, como o propranolol, atuam diretamente no sistema cardiovascular (SCV) e são frequentemente usadas na prevenção de hemorragia digestiva decorrente da HP. Os efeitos do propranolol no SCV de cirróticos durante o TH não são conhecidos.
Objetivo: Avaliar a influência do uso pré-operatório do propranolol no índice cardíaco (IC) durante a fase anepática do TH.
Método: Avaliaram-se 101 pacientes adultos (73 homens, 72,2%) submetidos a transplante ortotópico de fígado doador cadáver, pela técnica de *piggyback* com preservação da veia cava inferior retro-hepática, feito no Hospital das Clínicas da Universidade Federal de Minas Gerais. Não houve diferença de gravidade pelo sistema MELD entre os grupos, p = 0,70. Foram comparados o uso pré-operatório de propranolol com o desfecho do IC durante a fase anepática do TH em cinco grupos (I: aumento do IC; II: redução do IC inferior a 16%; III: redução do IC igual a ou maior do que 16% e menor do que 31%; IV: redução do IC igual a ou maior do que 31% e menor do que 46%; V: redução do IC igual a ou maior do que 46%).
Resultados: Pacientes que fizeram uso pré-operatório de propranolol no grupo I (46,4%) foram estatisticamente semelhantes aos dos grupos II (60%), III (72,7%), IV (50%) e V (30,8%), p = 0,57.
Conclusão: O propranolol no pré-transplante, como profilaxia para hemorragia digestiva, pode ser considerado seguro, pois não se associou à pioria do IC na fase anepática do TH.

Introduction

Since the first liver transplantation (LT) performed in humans by Starzl in Denver, USA, in 1963, major advances such as better preservation of organs, improvement of surgical techniques, better knowledge of anesthesiology, and immunosuppressive therapy evolution have made liver transplantation the best treatment option for end-stage liver disease (ESLD).[1] Currently, post-LT survival is approximately 90%, 85% and 80% at 1, 3 and 5 years, respectively.[2]

Cirrhosis is the most common cause of portal hypertension (PH) and causes increase in both intrahepatic vascular resistance and portal flow. PH is associated with serious complications, such as ascites, hepatic encephalopathy, and bleeding from esophagogastric varices.[3] The hepatic venous pressure gradient (HVPG) reduction below 12 mmHg is essential to minimize the risk of upper gastrointestinal bleeding in patients with PH. Non-selective beta-blockers drugs, such as propranolol and pindolol, reduce PH by decreasing the cardiac output (CO) and splanchnic vasoconstriction and, thus, the portal blood flow.[3–5] The pharmacological effects of beta-blockers interfere with the cardiovascular system (CVS) during the perioperative period of LT and affect the transplanted liver functionality.[6]

LT intraoperative period is classically divided into three phases: pre-anhepatic, anhepatic, and neohepatic. During the anhepatic phase, severe hemodynamic changes may occur and it is important that the anesthesiologist be prepared to optimize this patient during graft reperfusion, a critical time with a high incidence of CVS instability.[7]

Thus, it is important to know the effects of preoperative propranolol during LT.

Objectives

Evaluate the effect of preoperative use of propranolol and CI clinical and surgical variables during the anhepatic phase of orthotopic transplantation of cadaver donor orthotopic liver transplantation.

Method

Prospective study was performed at the Gastroenterology Alfa Institute of the Hospital das Clinicas, Federal University of Minas Gerais (HC-UFMG). This research was approved by the Research Ethics Committee of UFMG, CAAE 0244.0.203.000-08 and CAAE 0406.0.203.000-11 projects.

During the study period, from August 29, 2008 to January 5, 2012, 218 liver transplants were performed, wherein 13 of them are of retransplantation. A total of 114 patients, who agreed with and signed the informed consent after the invitation to participate, met the inclusion criteria. Thirteen patients were excluded because of hemodynamic data collection failure.

Inclusion criteria were age $\geq$18 years, transplantation with cadaver donor by piggyback technique, and signing the informed consent. Exclusion criteria were previous LT and hepatectomy, preoperative hemodynamic instability