

## HYPOXIA AMONG PATIENTS ON THE LIVER-TRANSPLANT WAITING LIST

*Hipóxia entre os pacientes na lista de espera para transplante de fígado*

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**HEADINGS** - Liver transplantation. Hypoxemia. Liver-transplant waiting list. Hepatopulmonary syndrome.

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**DESCRITORES** - Transplante de fígado. Hipoxemia. Lista de espera para transplante de fígado. Síndrome hepatopulmonar.

**ABSTRACT - Background:** Hepatopulmonary syndrome is formed by a triad of liver disease, intrapulmonary vascular dilatation and changes in blood gases. This condition is present in 4-32% of patients with cirrhosis. **Aim:** To analyze the blood gas changes data of patients in liver-transplant waiting list. **Method:** Clinical data of 279 patients in liver transplantation waiting list in May 2013 were studied. Overall patient was analyzed by the demographic aspects, laboratorial and image findings on exams that determine lung disease (hypoxemia) in these cirrhotic patients. The mean values and standard deviations were used to examine normally distributed variables. **Results:** There was a high prevalence of male patients (68%); the mean age was 51(±5,89) years, and the predominant reason for listing was hepatitis C cirrhosis. The MELD score mean was 16±5,89, without prioritization or special situation. The most common blood type was O in 129 cases (46%) and the mean of body max index was 25,94±4,58. Regarding arterial blood gas tests was observed 214 patients with PaO<sub>2</sub> <90 mmHg, 80 with PaO<sub>2</sub> <80 mmHg and 39 with PaO<sub>2</sub> <50 mmHg. In relation to O<sub>2</sub> saturation, 50 patients had <90%, 33 <80% and 10 <50%. **Conclusion:** Was observed a high rate of hypoxemia in patients on waiting list liver transplant. Due to the high severity and morbidity, is suggested better monitoring and therapeutic support to hypoxemic patients on liver transplant waiting list.

**RESUMO - Racional:** A síndrome hepatopulmonar é formada por tríade clínica com doença do fígado, dilatação vascular intrapulmonar e alterações nos gases sanguíneos. Esta condição está presente em 4-32% dos pacientes com cirrose. **Objetivo:** Analisar as alterações gasométricas nos pacientes em lista de espera de transplante de fígado. **Método:** Foram estudados dados clínicos de 279 pacientes na lista de espera para transplante hepático em maio de 2013. Foram analisados aspectos demográficos, gasometria arterial e achados de imagem que determinam a doença pulmonar (hipoxemia) nestes pacientes cirróticos. Os valores médios e desvios-padrão foram utilizados para examinar as variáveis normalmente distribuídas. **Resultados:** Houve alta prevalência de homens (68%); a idade média foi de 51 (±5,89) anos; e a razão predominante para listar para o transplante foi cirrose pelo vírus C. O MELD médio foi de 16±5,89, sem priorização ou situação especial. O tipo de sangue mais comum foi O, 129 casos (46%) e a média do índice de massa corporal foi 25,94±4,58. Com relação aos exames de gasometria arterial, observou-se 214 pacientes com PaO<sub>2</sub> <90 mmHg, 80 com PaO<sub>2</sub> <80 mmHg e 39 com PaO<sub>2</sub> <50 mmHg, e em relação à saturação de O<sub>2</sub>, 50 pacientes <90%, 33 pacientes <80% e 10 pacientes <50%. **Conclusão:** Observou-se alta taxa de hipoxemia nos pacientes em lista de transplante de fígado; devido à elevada gravidade e morbidade, sugere-se melhor seguimento e suporte terapêutico aos doentes hipoxêmicos na lista de espera para o transplante de fígado.

## INTRODUCTION

Hepatopulmonary syndrome (HPS) is defined as clinical triad of liver disease, intrapulmonary vascular dilatation and hypoxemia. It is present in 4-32% of patients with cirrhosis. Its pathogenesis is not well defined, but it is speculated that a combination of factors, such as an imbalance in the response of vascular endothelin receptors, pulmonary microvascular remodeling and genetic predisposition, leads to intrapulmonary vascular dilatation and bacterial translocation<sup>1-4</sup>

Initially the hypoxemia in these patients responds to low-flow supplemental oxygen, but, over time, the need for oxygen supplementation. Currently, no pharmacological intervention can readily improve arterial oxygenation and alter the course of HPS. Thus, liver transplantation is the only effective therapeutic option for its resolution<sup>4,5</sup>.

The aim of this study was to analyze the blood gas changes data of patients in liver-transplant waiting list.

## METHODS

The study was approved by the Institutional Review Board fulfilling all requirements to retrospective studies in humans.

Clinical data of 279 patients in liver-transplant waiting list in May 2013 were studied. They were analyzed by demographic and laboratorial aspects, and the image findings that determine lung disease (hypoxemia) in these cirrhotic patients.

The statistical analysis was performed using GraphPad Prism Software<sup>®</sup>. Differences were considered significant at  $p < 0.05$ . Data were presented as the mean  $\pm$  standard deviation (SD) for continuous variables.

## RESULTS

There was a high prevalence of men (68%); the mean age was  $51(\pm 5,89)$  years and the predominant reason for listing was hepatitis C cirrhosis. The MELD mean score was  $16 \pm 5,89$ , without prioritization or special situation. The most common blood type was O in 129 cases (46%) and the mean of body mass index was  $25,94 \pm 4,58$ .

### Arterial blood gas analysis

Regarding arterial blood gas tests were observed 214 patients with  $\text{PaO}_2 < 90$  mmHg, 80 with  $< 80$  mmHg and 39 with  $< 50$  mmHg. The oxygen saturations ( $\text{O}_2$  saturation) were in 50 patients  $< 90\%$ , in 33  $< 80\%$  and in 10  $< 50\%$  (Figure 1).

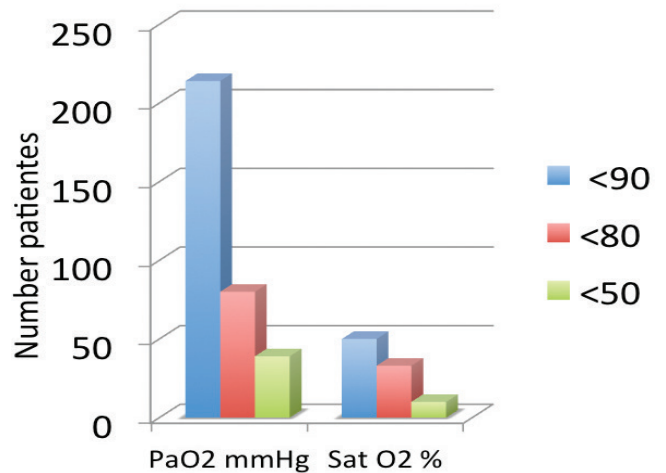


FIGURE 1 - Arterial blood gas analysis in overall patients (n=214) on liver-transplant waiting list

## DISCUSSION

Were observed high values of desaturation in this population. Moreover, differential diagnosis must to be done to excluded pulmonary and clinical findings that simulate disease of the lung in end-stage of liver disease.

HPS can normally be diagnosed with non-invasive tests. An elevated alveolar-arterial gradient and decrease in arterial blood gas occurs due to the dilatation of pulmonary vasculature leading to shunt with ventilation-perfusion mismatch<sup>4-8</sup>.

The majority of patients are either asymptomatic, particularly if diagnosed during evaluation for liver transplantation. Some cases develop the insidious onset of dyspnea<sup>7,9</sup>. In addition, respiratory symptoms are common in end-stage of liver disease owing to poor physical condition, smoking, ascites or other lung disease<sup>4,9</sup>. Chest radiography, chest CT and pulmonary function tests are often performed to evaluate dyspnea in cirrhosis and during evaluations for liver transplantation<sup>10</sup>. Commonly, chest radiographic findings are normal in HPS, even when hypoxemia is severe.

No effective medical therapy for HPS is available although a number of related substances have been studied in experimental and human disease<sup>4</sup>. Several reports using TIPS to treat HPS were done and others are in progress, but no effective benefit has been presented<sup>11</sup>. Supplement oxygen is effective to improve dyspnea.

Finally, liver transplantation is the only effective treatment for patients with HPS and complete resolution of gas exchange abnormalities is reported in  $> 80\%$  on them<sup>7,8</sup>. However, an early prospective study found that those with severe HPS ( $\text{PaO}_2$  of  $< 50$  mmHg) had a marked increase in postoperative mortality<sup>4,10</sup>.

## CONCLUSION

Was observed a high rate of hypoxemia in patients on waiting list liver transplant. Due to the high severity and morbidity, is suggested a better monitoring and therapeutic support to hypoxemic patients on liver transplant waiting list.

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