

## Abstract

**Background:** Head and neck cancer patients have multiple risk factors for liver disease however little is know about the incidence of liver disease or the safety of surgery in these patients.

**Methods:** We identified patients with liver disease on routine preoperative laboratory analysis undergoing head and neck surgery using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) from 2005-2013. We selected patients with liver disease using an aspartate aminotransferase-to-platelet ratio index (APRI) >0.7 and further selecting patients with advanced liver based on a Model for End-Stage Liver Disease-Sodium (MELD-Na) score of >10. We compared the rate of postoperative complications using multivariate logistic regression.

**Results:** We identified 19,138 patients undergoing head and neck surgery in which the incidence of liver disease was twice as common in patients undergoing aerodigestive tract surgery (6.8% with any liver disease and 3.4% with advanced liver disease) compared with thyroid surgery (3.3% with any liver disease and 1.5% with advanced liver disease). On multivariate analysis, patients with advanced liver disease experienced a 6-times higher rate of 30-day mortality (OR 6.1; 95% CI 2.9-12.8). The 30-day mortality rate after major head and neck surgery with advanced, mild and no liver disease was 14.6%, 3.0% and 0.9% respectively ( $p < 0.001$ ) while for non-major surgery the mortality rate was 3.0%, 0.3% and 0.3% respectively ( $p < 0.001$ ).

**Conclusions:** Patients undergoing surgery of the upper aerodigestive tract are at increased risk of liver disease. Those with advanced liver disease are at high risk for perioperative mortality and surgery should only be offered with caution.

## Introduction

Alcohol abuse is a major risk factor for both cancer of the upper aerodigestive tract<sup>1</sup> and liver disease,<sup>2</sup> and it increases the risk for both in a dose dependent fashion.<sup>3</sup> Liver disease is important to recognize preoperatively because in patients with liver disease the risk of surgery can be grave.<sup>4</sup>

Even though there is a high prevalence of alcohol abuse in head and neck cancer patients,<sup>5</sup> little is known about the frequency of liver disease in this group or the risk for complications in patients with liver disease.

## Methods and Materials

We used the ACS-NSQIP from 2005-2013 including all adult patients that underwent head and neck surgery of the upper aerodigestive tract and thyroid/parathyroid surgery who had full laboratory information. We identified patients with liver disease based on a preoperative APRI score >0.7 and further selected patients with advanced liver disease based on a MELD-Na score of >10. We defined major head and neck surgery to include total glossectomy/composite resection, total laryngectomy and free tissue transfer.

## Results

Patients with evidence of liver disease were significantly more likely to be male, more likely to drink >2 alcoholic drinks per day, and more likely to smoke within 1 year of surgery. Patients undergoing surgery of the upper aerodigestive tract were 2.2 times more likely to have any liver disease and 2.3 times more likely to have advanced liver disease compared to patients undergoing endocrine surgery (Figure 1,  $p < 0.001$ ).

Patients undergoing major & non-major head and neck surgery had a significantly higher rate of postoperative mortality based upon the severity of liver disease (Figure 2,  $p$  values <0.001). Patients undergoing major and non-major surgery also experienced a significantly higher rate of complications based on the severity of liver disease (75.6%, 54.5% and 45.1% 30-day rate of morbidity in major surgery for advanced, mild and no liver disease respectively  $p < 0.001$  and 19.0%, 9.2% and 6.0% 30-day rate of morbidity in non-major surgery respectively  $p < 0.001$ ).

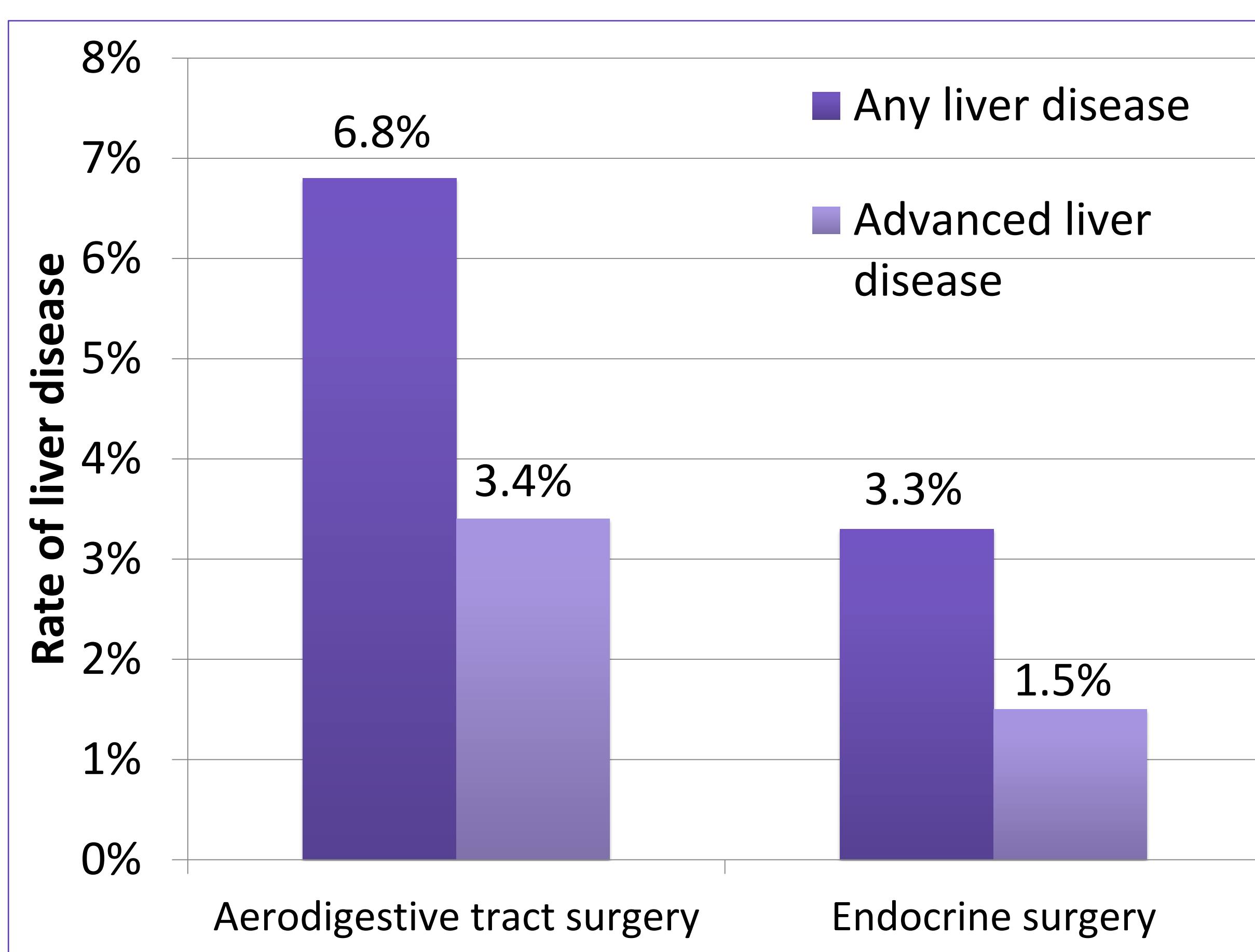


Figure 1: Rate of liver disease by type of head and neck surgery.

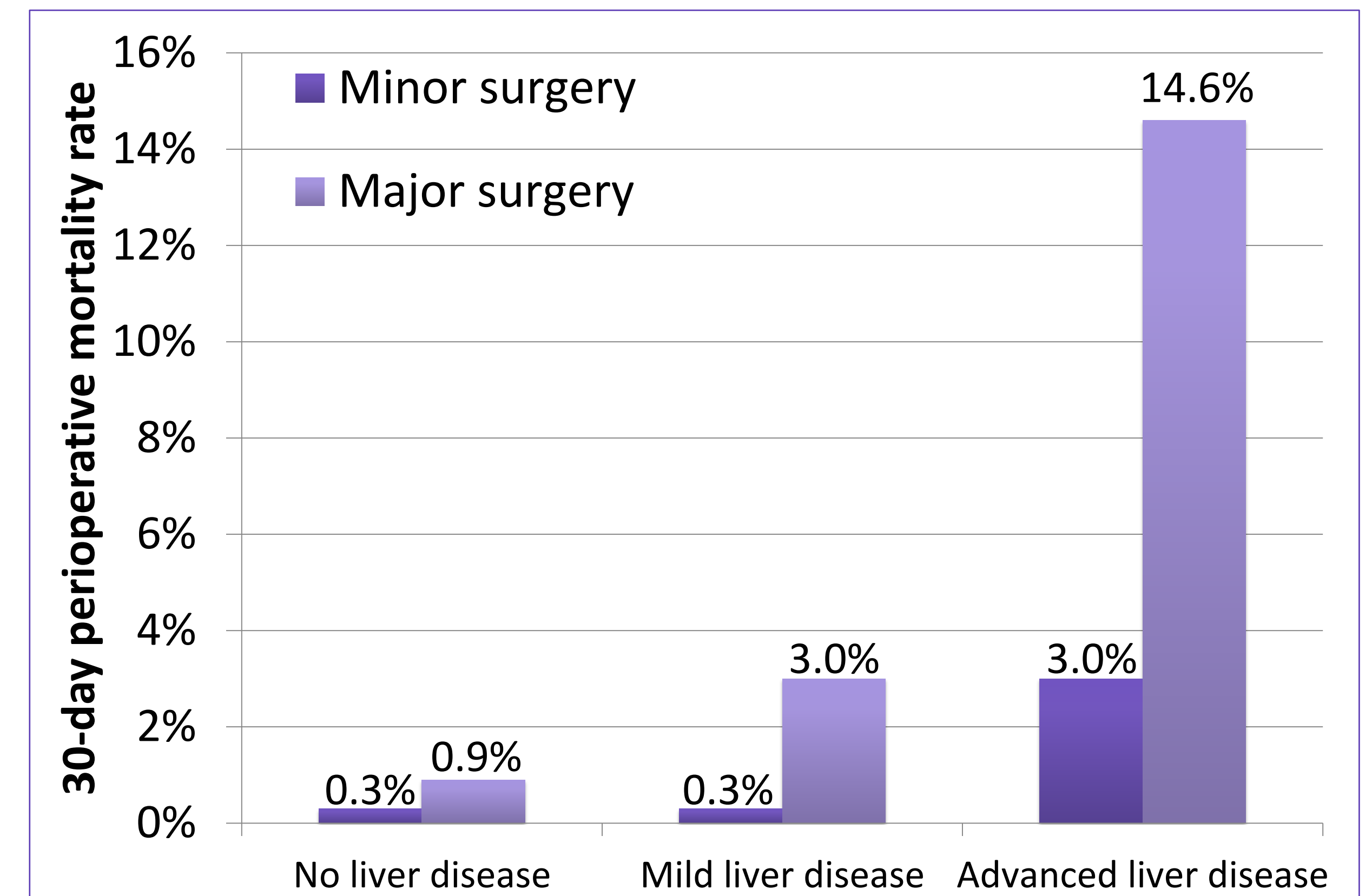


Figure 2: Rate of mortality by severity of liver disease

## Discussion

Despite widespread recognition that alcohol abuse is a major risk factor for both head and neck cancer and liver disease little has been published on the rate of liver disease or the risk of postoperative complications.

We show that a significant percentage of head and neck cancer patients have evidence of liver disease and further that this population has an increased risk postoperative mortality. Our findings emphasize the importance of accurate risk-stratification using a validated scoring system such as the MELD-Na or MELD score to allow patients and surgeons to make a more informed decision. Given the 15% 30-day perioperative mortality rate we observed, surgeons contemplating offering major head and neck surgery in patients with advanced liver disease should exercise caution and consider less intensive surgical options or non-surgical options.

When interpreting our study, one should consider several limitations including errors in coding, patient selection using laboratory data and lack of specific information on head and neck specific complications.

## Conclusions

Although head and neck cancer and liver disease are not frequently discussed together, we challenge clinicians to consider the potential for liver disease in these patients as it may significantly impact outcomes. Our findings suggest that liver disease is twice as common in patients undergoing surgery of the upper aerodigestive tract as compared to a reference of endocrine surgery. Patients with advanced liver disease are at high risk of mortality in the perioperative period emphasizing the need for surgeons to use caution.

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