ALCOHOL INTOXICATION AND THE TRAUMA PATIENT:

I drink therefore I am…Hypotensive

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INTRODUCTION

Alcohol intoxication is frequently associated with traumatic injury. Animal studies have shown that acute alcohol intoxication impairs the hemodynamic and metabolic compensatory mechanisms after acute hemorrhage including the inhibition of epinephrine, norepinephrine, and vasopressin.[1,2] Alcohol has also been shown to depress cardiac contractility after hemorrhagic shock.3 These physiologic alterations have been associated with increased hypotension following hemorrhage in animal models. There is a paucity of literature documenting this association in humans.

HYPOTHESIS

Acutely intoxicated patients with blunt liver injuries will be more likely to present with hypotension secondary to the decrease in catecholamine release and dysfunction of cardiac muscle contractility. This will result in an increase in the volume of fluid resuscitation, the amount of blood transfused and the number of exploratory laparotomies.

DESIGN

Retrospective review of the trauma registry, blood bank and medical records data.

METHODS

Data was collected for patients admitted to the level I trauma centers at the University Medical Center and Community Regional Medical Center from September 2002 to May 2008. There were a total of 11,901 trauma admissions during this time, of which 9,807 were blunt. Of these, 569 patients had both confirmed liver injuries and blood alcohol level (BAL) drawn upon admission.

Patients were divided into alcohol intoxicated and non-intoxicated (BAL ≥ 0.08 mg/dl and < 0.08 mg/dl, respectively). Age, mean liver injury scale grade, ISS, admission hematocrit, base deficit, and BUN/Cr ratio were compared between the two groups. Comparison was also made regarding percentage of patients transfused with blood products, volume of products, liters of IV crystalloid, mortality, and length of hospital stay.

Blunt liver injury was used as the primary inclusion criterion for the following reasons:

1. The liver is the most commonly affected organ in blunt trauma.[4,5]
2. Liver injuries can be graded according to an accepted and reproducible scale, i.e. AAST solid organ injury scale.[6]
3. Patients with documented liver injuries have objective evidence of hemorrhage. This allowed a more direct comparison of physiologic compensatory mechanisms.

Data are presented as mean ± standard error. Chi-square and two-tailed t-test was used for statistical analysis, and a p value of < 0.05 denoted significance. The project was approved by the Institutional Review Board of Community Regional Medical Centers and the University of California, San Francisco.

RESULTS

Patient Characteristics

	Sober BAL <0.08 mg/dl (n=420)	Intoxicated BAL ≥0.08 mg/dl (n=149)	p value
Age (yrs)*	33.3 ± 1.2	33.3 ± 1.6	NS
Mean Liver Injury Grade	2.5	2.3	0.02
ISS	24 ± 0.7	24 ± 1.2	NS
Admission hematocrit (%)	36.8 ± 0.3	38.3 ± 0.5	0.02
% Hypotensive (SBP≤ 90)	15	25	0.01
BUN/Cr Ratio *	19 ± 0.7	12 ± 1.1	<0.01
% with positive FAST	28	24	NS

Data reported + standard error where applicable
* 2.5 years collected data
NS: Not Significant

Resuscitation Findings

	Sober BAL <0.08 mg/dl (n=420)	Intoxicated BAL ≥0.08 mg/dl (n=149)	
Base Deficit	-3 ± 0.3	-6 ± 0.5	<0.01
% Transfused	30%	32%	NS
Average # units blood-products transfused$^{\Sigma}$	9.6 ± 1.2	15.1 ± 2.7	0.03
24 hour IV crystalloid (Liters) *	6.5 ± 0.5	12.2 ± 1.7	<0.01
% Exploratory Laparotomy	28%	36%	NS
% requiring OR liver intervention	11%	13%	NS
Length of stay (days)	12.2 ± 0.6	14.1 ± 1.2	NS
% Mortality	7	13	0.03

Data reported + standard error where applicable
* 2.5 years collected data
NS: Not Significant
Σ in patients who received products

CONCLUSIONS

Alcohol intoxication impairs the ability of patients with blunt liver injuries to compensate for acute blood loss.

Alcohol-intoxicated, blunt trauma patients with liver injuries:

- Are more likely to be hypotensive on admission.
- Have greater base deficit.[7]
- Have increased resuscitative requirement of both IV fluid and blood products (despite no increase in the severity of injury).
- Have significantly increased mortality.

Despite these physiologic derangements, there was no significant increase in requirement for laparotomy (or hepatic intraoperative intervention), percentage of positive FAST exams, or length of hospital stay in acutely intoxicated patients when compared to those not intoxicated. Mortality, however, was significantly increased in the intoxicated group.

RECOMMENDATIONS

All trauma patients should have blood alcohol levels drawn upon admission. The resuscitation in patients with elevated blood alcohol levels should be performed with an understanding of the physiologic alterations caused by acute alcohol intoxication.

References

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