

CORRELATION OF ALCOHOL INTOXICATION WITH LIFE-THREATENING ASSAULTS

Derrick J. Beech, MD, and Robert Mercadel, MD

New Orleans, Louisiana

The number of violent crimes has increased substantially over the past decade with an associated increase in injury-related mortality. The influence of alcohol intoxication on accidents involving motor vehicles has been investigated extensively, but few studies have examined the influence of alcohol and drug intoxication on life-threatening assaults. This study examined the correlation of alcohol intoxication with life-threatening victimization by penetrating torso trauma.

Retrospective evaluation of patients presenting with penetrating nonmissile anterior torso trauma to an urban Level I trauma center between January 1988 and December 1991 was performed. Serum ethanol levels and urine toxicology studies were assessed at initial presentation for all patients. Sixty-two patients with anterior abdominal stab wounds were evaluated, of which 51 (82%) were male. Ethnic distribution paralleled that of the surrounding community, with 50 (81%) African-American, 8 (13%) Latino, and 4 (6%) white patients. The mean age was 32 years. Fifty-two (84%) patients tested positive for alcohol, with 39 (63%) having serum levels of ethanol above the legal intoxication limit. Twelve (19%) patients tested positive for cocaine on urine toxicology screen. Polysubstance use was evident in 10 (16%) patients with positive test results for both alcohol and cocaine. These data demonstrate a strong correlation between alcohol use and life-threatening assaults. (*J Natl Med Assoc.* 1998;90:761-764.)

Key words: alcohol ♦ intoxication ♦ assault

The majority of fatal injuries from penetrating trauma occur in urban areas that are densely populated and account for more than 32,000 deaths annually in the United States.¹ Injuries resulting from the use of firearms account for 88% of penetrating trauma, with the remainder resulting from nonmissile mechanisms.² Unlike deaths due to gunshot wounds

in which approximately half of the cases are a result of suicides, nonmissile penetrating injuries are universally the result of assaults. The perplexing challenge in managing acutely injured patients involves the development of preventive strategies that can potentially break this disturbing trend of increased mortality and morbidity associated with assaults.

Alcohol intoxication produces a complex array of physiologic changes that can be characterized by disinhibition or a depressed level of alertness. This altered level of consciousness can potentially create increased opportunity for assailants, primarily as a result of slower motor reflexes and distorted communication skills. Victims of nonmissile penetrating anterior torso injuries may be particularly disadvan-

From the Department of Surgery, Tulane University School of Medicine, New Orleans, Louisiana. Requests for reprints should be addressed to Dr Derrick J. Beech, Dept of Surgery, Tulane University School of Medicine, 1430 Tulane Ave, New Orleans, LA 70112.

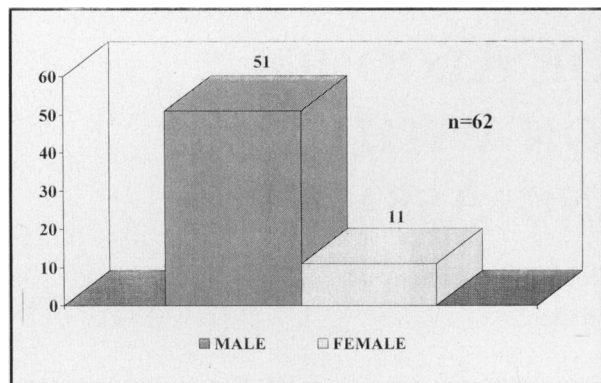


Figure 1A.
Distribution of penetrating nonmissile anterior torso injuries by gender.

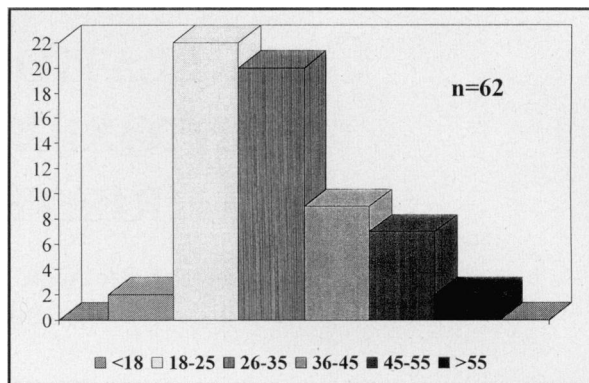


Figure 1B.
Distribution of penetrating nonmissile anterior torso injuries by age.

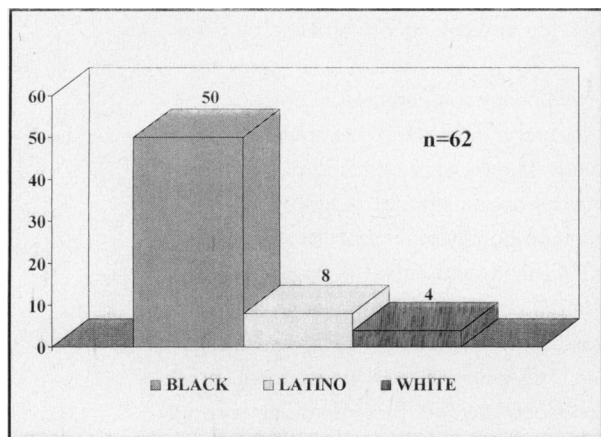


Figure 1C.
Distribution of penetrating nonmissile anterior torso injuries by ethnicity.

taged since there is typically a face-to-face confrontation prior to the assault with an opportunity to escape.

This study examined the association of alcohol use, intoxication, and illicit drug use in life-threatening assaults. The study population was comprised of patients involved in penetrating injuries with a theoretical possibility of a brief period of communication between the victim and assailant prior to attack that would allow escape from injury. The emphasis will be on the association of alcohol and drug use potentially altering the psychological state of the victim.

MATERIALS AND METHODS

A retrospective evaluation of patients presenting

at an urban Level I trauma center between the dates of January 1988 and December 1991 was performed. The study population included patients with penetrating nonmissile anterior torso trauma. These patients were identified by the emergency department triage staff as sustaining a life threatening injury. All patients treated for anterior abdominal stab wound during this 4-year period were included. Resuscitation was coordinated by a faculty trauma surgeon according to Advanced Trauma Life Support (ATLS) protocol. Patients with penetrating torso trauma were included except those with injuries outside the anterior abdomen or injuries resulting from firearms. The anterior abdomen is defined as the region below the costal margins, above the pubis, and medial to the anterior axillary lines. Thoracoabdominal injuries were excluded.

Demographic data included patient's age, gender, and ethnicity. The location of the injury along with the weapon used also was recorded. Initial vital signs, trauma score, Glasgow score, and associated injuries were noted. Serum ethanol levels and urine toxicology screens were performed on all patients along with initial laboratory analysis. The need for operative intervention and length of hospital stay also were evaluated.

RESULTS

Sixty-two patients with anterior abdominal wounds were evaluated. Fifty-one (82%) were male and 11 (18%) were female (Figure 1A). Ethnic distribution paralleled that of the surrounding community, with 50 (81%) African-American, 8 (13%) Latino,

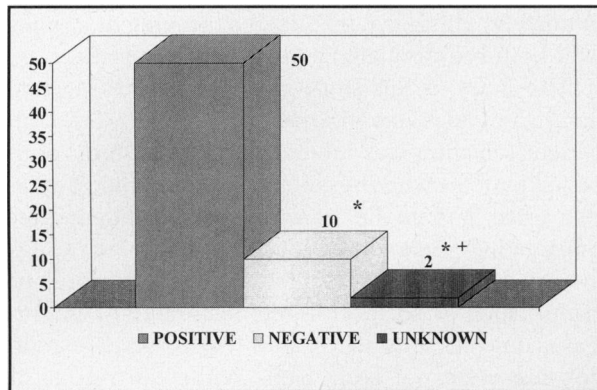


Figure 2. Blood alcohol results among patients suffering penetrating nonmissile anterior torso injuries (* $P < .00001$ versus positive and † $P < .03$ versus negative).

and 4 (6%) white patients (Figure 1B). The mean age was 32 years (range: 16-69 years) (Figure 1C).

Fifty-two (84%) patients had positive studies (Figure 2) for blood alcohol, with 39 (63%) having serum levels of ethanol above the legal level of intoxication (Figure 3). Twelve (19%) patients tested positive for cocaine on urine toxicology screens, and polysubstance use was evident in 10 (16%) patients who tested positive for both alcohol and cocaine.

There were no deaths in the study population. The average length of hospitalization, Glasgow Coma Score, and trauma score were similar in patients with and without alcohol or drug use.

DISCUSSION

Alcohol appears to play a role in trauma through several important mechanisms. The most prevalent effect of acute alcohol intoxication is an altered level of sensorium. Ethanol use and alcohol intoxication has been associated with central nervous system depression ranging from a minimal decrease in mental activity to coma. These neurologic changes can manifest themselves by belligerence, incoherence, and restlessness. A sense of euphoria and diminished pain perception or sensory deficit also may occur.

Several pathophysiological effects of alcohol can produce added risk to the patient during the resuscitative therapeutic period. These systemic pathologic effects include myocardial depression, altered ability to clear pulmonary secretions and diminish cough reflex, inhibition of ADH release resulting in dialysis along with associated metabolic changes,

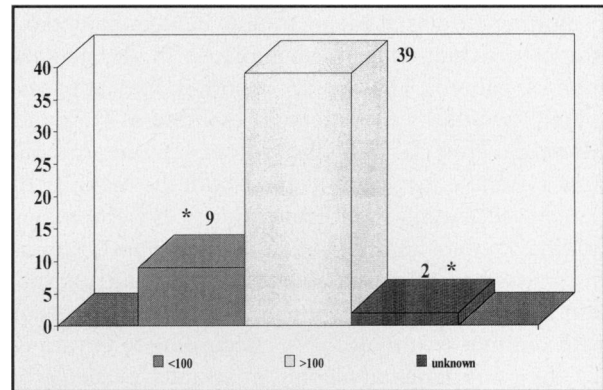


Figure 3. Serum alcohol levels of patients with penetrating nonmissile anterior torso injuries (* $P < .00001$ versus >100).

altered platelet function, and immunosuppression. Also, extreme levels of chronic intoxication and abuse can result in comorbid presentations such as Wernicke's and Korsakoff's disease.

The many neurophysiological effects of alcohol result in decreasing the ability of an intoxicated person to appropriately defend him- or herself during an assault. With acute intoxication, the effects of alcohol include loss of inhibitions, increased and perhaps overexaggerated self-confidence, slurred speech, and euphoria. At higher concentrations, alcohol intoxication results in impaired intellectual and motor performances.³

Although several studies have been performed to assess the influence of alcohol intoxication on accidents involving motor vehicles, few studies have examined the use of alcohol and drugs on life-threatening assaults. Welte and Abel⁴ reported the association of alcohol consumption in homicide in 800 fatalities, with approximately half of the patients in their study having detectable levels of alcohol. Berkelman et al⁵ also reported direct correlation between alcohol consumption and fatal injuries from assault. They analyzed 271 victims of homicide and noted that 71% tested positive for blood alcohol with more than half demonstrating serum concentrations above the intoxication limit of 100 mg/dL. In this study, the subset of patients dying from non-missile penetrating injuries had higher levels of blood alcohol than those dying from gunshot wounds. These authors have demonstrated close association between alcohol intoxication and fatal violent crimes.

Further studies at major trauma centers have documented a high rate of alcohol use in the acutely injured patient. Thal et al² reported that approximately two-thirds of patients presenting at Parkland Memorial Hospital in Dallas with penetrating trauma tested positive for serum alcohol, with the majority of patients sustaining nonmissile injuries. Several major trauma centers in the United States report similar findings where a substantial number of patients sustaining life-threatening penetrating trauma present with positive serum alcohols.⁶ According to Rivara et al,⁷ the importance of alcohol in assaults, particularly assaults involving knives, was evident in that 56.9% of such patients were intoxicated on admission.

Other authors have reported similar high rates of acute intoxication in victims of assaults and stabbing. The rate of acute intoxication also was reported to be higher in victims of stabbings than shootings.^{8,9-11} These authors have demonstrated close association between alcohol intoxication and violent crimes. The results of our retrospective study on penetrating anterior torso nonmissile trauma concurred with the aforementioned studies. Of the 62 patients included in this study, 52 (84%) patients had positive studies for blood alcohol, and 39 (63%) of these patients had serum levels of ethanol above the legal level of intoxication (Figure 3). Our data demonstrated a correlation between alcohol use and being a victim of a life-threatening assault.

These results suggest that alcohol or drug intoxication places an individual at increased risk for assaults. Hence, intoxication might increase the vulnerability and may have a direct impact on the injury itself. Victims of anterior abdominal nonmissile penetrating injuries were evaluated because of their theoretical opportunity to potentially communicate with the assailant prior to sustaining a life-threatening injury.

A 5-year follow-up of trauma patients in a study performed by Sims et al¹² revealed a recurrence rate of injury of 44% and a mortality rate of 20%. This finding implies that intervention directed at lowering the levels of alcohol consumption, particularly in those previously identified as having sustained an alcohol-related injury, could have a substantial impact on recurrent trauma victims. Programs directed at lowering alcohol and drug use may provide primary preventive strategies in the trauma patient. Alcohol use and drug consumption potentially represent areas that will allow preventive strategies to

ultimately minimize the degree of violent crimes with both health-related and economic benefits.

The flaws of this study include its retrospective nature and its relatively small sample size. Although patient selection was limited during the study period, all patients who presented with penetrating anterior torso nonmissile trauma were included, thus minimizing selection bias. Several variables involved in interpersonal relations and violent crimes such as socioeconomic factors, demographics, crime circumstances, and victim/suspect relationship were not addressed. While the results of this study indicate that there is a definitive correlation between alcohol intoxication and life-threatening assaults, it should be noted that a substantial number of victims of violence do not present with any evidence of substance abuse.

Acknowledgments

The authors thank Mrs Patricia Duboue for her assistance in preparing the manuscript.

Literature Cited

1. Institute of Medicine, Committee on Trauma Research. *Injury in America*. Washington, DC: National Academy Press; 1985.
2. Thal ER, Bost Ro, Anderson RJ. Effects of alcohol and other drugs on traumatized patients. *Arch Surg*. 1985;120:708-712.
3. Bennett RM, Buss AH, Carpenter JA. Alcohol and human physical aggression. *Quarterly Journal on Study of Alcohol*. 1969;30:870-876.
4. Welte JW, Abel EL. Homicide drinking by the victims. *J Stud Alcohol*. 1989;50:197-201.
5. Berkelman RL, Herndon JL, Callaway JL, et al. Fatal injuries in alcohol. *Am J Prev Med*. 1985;1:21-28.
6. Jurkovich GJ, Rivara FP, Gurney JC, Seguin D, Fligner CL, Copass M. Effects of alcohol intoxication on the initial assess of trauma patients. *Ann Emerg Med*. 1992;21:704-708.
7. Rivara FP, Mueller BA, Fligner CL, et al. Drug use in trauma victims. *J Trauma*. 1989;29:462-470.
8. Soderstrom CA, Trifillis AL, Shankar BS, Clark WE, Cowley RA. Marijuana and alcohol use among 1023 trauma patients: a prospective study. *Arch Surg*. 1988;123:733-737.
9. Meyers HB, Zepeda SG, Murdock MA. Alcohol and trauma: an endemic syndrome. *West J Med*. 1990;153:149-153.
10. Goodman RA, Mercy JA, Loya F, et al. Alcohol use and interpersonal violence: alcohol detected in homicide victims. *Am J Public Health*. 1986;76:144-149.
11. Rivara FP, Jurkovich GJ, Gurney JG, et al. The magnitude of acute and chronic alcohol abuse in trauma patients. *Arch Surg*. 1993;128:907-911.
12. Sims DW, Bivens BA, Obeid FN, Horst HM, Sorensen VJ, Fath JJ. Urban trauma: a chronic recurrent disease. *J Trauma*. 1989;29:940-946.