ABSTRACT

Objectives: To determine survival rates in adult trauma patients requiring cardiopulmonary resuscitation (CPR).

Methods: We used 1992–2002 trauma registry data to identify all adult trauma patients over the age of 16 who required CPR in the pre-hospital setting or within 24 hours of arriving at the hospital. Demographic information, mechanism of injury, injury severity score (ISS), vital signs at the scene and in the hospital, and mortality were obtained from patient charts. Patients were stratified into 2 groups: those with absent vital signs in the field who required prehospital CPR, and those who lost vital signs within 24 hours of arriving at the trauma suite.

Results: Of 50 eligible patients, 28 (58%) were male and 46 (92%) sustained blunt trauma. Mean age was 44.8 ± 20 years and mean ISS was 38 ± 18. Overall mortality was 96% (48/50), and all patients who required prehospital CPR died. The only 2 survivors were patients who arrived with vital signs and developed pulseless electrical activity while in the trauma suite.

Conclusion: In this consecutive series of trauma victims with cardiopulmonary arrest there were no survivors among those who lost vital signs and required CPR prior to arriving at the hospital.

Key words: cardiopulmonary resuscitation; trauma outcomes; mortality; survival; cardiac arrest
Introduction

In patients suffering cardiac arrest not caused by trauma, cardiopulmonary resuscitation (CPR) leads to survival rates of 14% to 17%;1,2 however, for trauma patients with cardiac arrest, survival rates are only 0% to 5%.3–7 This has led some authors to conclude that CPR efforts in trauma victims may be futile and consume valuable resources.3,8 Our goal was to determine survival in trauma patients requiring on-scene or in-hospital CPR who presented to a Canadian Level 1 trauma centre.

Methods

This study was performed at a Canadian Level 1 trauma centre that receives approximately 450 adult trauma patients (>16 yr) annually with injury severity scores (ISS) >12. We used prospectively gathered trauma registry data (1992–2002) to identify all patients with an ISS >12 who sustained a cardiopulmonary arrest prior to hospital arrival or within 24 hours of arriving at the hospital. Patients were excluded if CPR was deemed futile and discontinued after arrival to hospital.

Three investigators reviewed hospital charts to abstract demographic data, ISS, mechanism of injury, time of injury, time to ambulance arrival, time to hospital arrival, duration of CPR, type of cardiac arrest, and autopsy-determined cause of death. The primary outcome was in-hospital mortality.

Results

Of 4688 patients screened, 50 (1.1%) met inclusion criteria. Table 1 shows that the study population included 29 men and 21 women from 17 to 88 years of age (mean = 44.8; standard deviation [SD] = 20). Forty-six patients (92%) sustained blunt trauma, and 4 had penetrating injuries: 3 with stab wounds to the heart and 1 with a gunshot wound to the head. Fifteen patients (30%) arrived at the hospital with absent vital signs. Eight of these patients briefly regained vital signs, but none survived.

Overall, 48 of 50 patients (96%) died. Five suffered thoracic aortic transection (2 with associated cardiac injuries), 2 patients had complete C1–C2 spinal cord disruptions, and 2 blunt trauma victims sustained concomitant inhalation injuries with carbon monoxide (CO) poisoning (CO >55%). All 9 of these patients lost vital signs prior to hospital arrival. In this group, resuscitative thoracotomies were performed for all 9 patients, but there were no survivors.

Two patients were ultimately discharged. Both had vital signs on ED arrival but subsequently experienced cardiac arrest. Both had sustained falls and both suffered pulseless electrical activity (PEA) arrest, lasting 5 minutes and 15 minutes respectively. The first patient had a full functional
recovery, whereas the second patient is functionally disabled and requires assistance with self care.

Discussion

Improvements in pre-hospital care have led to more rapid stabilization and transport of critically injured patients to definitive care. Despite this, cardiac arrest caused by trauma carries mortality rates of 81%–100%, even if managed early and aggressively.4–7,9–11 Increasingly, it has been recognized that continued CPR efforts on a trauma victim in the ED after failed pre-hospital resuscitation are futile and expensive. Our study found that patients requiring CPR did not survive if they lost vital signs prior to hospital arrival.

Rommurgy and colleagues reported 100% mortality in patients who received CPR at the scene or enroute to the hospital, and suggested that such cases should be considered hopeless and undergo no further resuscitation.5 In a study of 245 cases of cardiac arrest caused by trauma, Fulton and coworkers found that no patient presenting to hospital with vital signs absent survived.10 These authors noted that CPR for >10 minutes and resuscitative efforts for multiple episodes of arrest were futile. Durham and associates also found that trauma patients who arrive at the hospital with CPR in progress did not survive.12 All of these studies support Mattox and colleagues’ statement that trauma patients requiring >5 minutes of pre-hospital CPR should be considered dead.11 In addition, Copass and coworkers reported that survivors had significantly shorter CPR times than non-survivors (12 min v. 28 min, \(p < 0.01\)).11

Previous researchers have suggested that resuscitative thoracotomy for blunt trauma victims who arrive at the hospital in cardiac arrest is a low yield, high-cost, time-consuming procedure that should be abandoned.7,14,15 and in our study, no trauma patients survived thoracotomy for cardiac arrest. This is in contrast to cardiac arrest following penetrating trauma, where survival of 35% has been reported with use of resuscitative thoracotomy.13,16

Limitations

Given our limited sample size, we cannot identify characteristics associated with survival following CPR.

Conclusion

In this consecutive series of trauma victims who suffered cardiac arrest, overall survival was only 4%, and there were no survivors among patients who lost vital signs and required CPR prior to arrival at the hospital.

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References


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