

Hemorrhaging Of The Tongue Due To The Use Of A Mechanical Chest Compression Device.

S Furukawa, A Takaya, T Nakagawa, I Sakaguchi, K Nishi

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Abstract

Following a cardiac arrest, high-quality cardiopulmonary resuscitation may improve cardiac and brain resuscitation. The desire to provide optimal chest compressions led to the development of automated mechanical chest compression devices. A 79-year-old man had an out-of-hospital cardiac arrest in a traffic accident. On the patient's arrival to the hospital, the medical staff used a mechanical chest compression device on him. At autopsy, no petechial hemorrhages were present in his conjunctivae, but hemorrhagic infarctions of the tongue were observed. His death was attributed to skull base fractures. Hemorrhages of the tongue had been observed after chest compressions by automated mechanical devices.

INTRODUCTION

Successful resuscitation depends on a coordinated set of actions, including early cardiopulmonary resuscitation (CPR). High-quality CPR may be important for cardiac and brain resuscitation (1,2,3). Observations of rescue personnel indicate that maintaining consistent compressions is a difficult task (4). In a laboratory setting, trained paramedics unknowingly provide shallower and slower compressions over time (5,6). Chest compressions often do not achieve the guideline recommendations with regard to depth, rate, and hands-off time (7,8). The load-distributing band (LDB) device may be a useful addition to current cardiac arrest treatment options, especially when used early in patients with cardiac arrest who do not respond immediately to a brief period of manual CPR, defibrillation, or both. The AutoPulse Resuscitation System is an LDB circumferential chest compression device with an electrically actuated constricting band on a short backboard. It has been approved by the US Food and Drug Administration to attempt resuscitation of a cardiac arrest. This LDB-CPR device produces greater blood flow to the heart and brain than either manual CPR by trained individuals or an automated mechanical piston CPR device (9,10).

died as a result of skull base fractures. Petechial hemorrhages were not present in his conjunctivae.

At autopsy, hemorrhages of the tongue were present and had penetrated into the tongue's muscle tissue (Figure 2).

CASE REPORT

A 79-year-old man had an out-of-hospital cardiac arrest in a traffic accident. A car ran over him. He weighed 58.3 kg. The hospital used an LDB-CPR device (Figure 1), but he

Figure 1

Figure 1a.1b. Mechanical chest compression devices. The load-distributing band (LDB) device.



Figure 2

Figure 2a.2b. A view of the hemorrhages on the tongue.



DISCUSSION

Only 1% to 8% of individuals with an out-of-hospital cardiac arrest survive to hospital Discharge (11,12,13,14). Several studies suggest that a brief period of CPR performed before defibrillation can increase the intracellular adenosine triphosphate levels and improve survival (15,16,17). Attaining a coronary perfusion pressure greater than 15 mmHg is one of the best predictors of the return of spontaneous circulation in humans (18,19). Manual chest compressions provide approximately one-third of the normal blood supply to the brain and 10% to 20% of the normal blood flow to the heart (20). The use of an LDB device for chest compressions achieves greater intrathoracic pressures than that which can safely be achieved during manual chest compressions. In a small number of terminally ill patients, the device has been shown to improve coronary and systemic perfusion pressure and flow, compared with manual CPR (21). When used by paramedic fire captains in a large, urban emergency medical services system, the LDB device showed a greater improvement in spontaneous circulation, compared with manual chest compressions (22).

Multiple petechial hemorrhages occur with extensive congestion of the head and the neck above the level of strangulation. Hemorrhages of the tongue are believed to be

associated with congestion. Hemorrhages in the margins of the tongue (with or without bite marks) may result from compression by the teeth, and hemorrhages in the central part of the tongue may result from the pressure of the hyoid bone or from cranial congestion (23,24,25).

In this patient, no petechial hemorrhages were present in the conjunctivae. However, hemorrhagic infarctions of the tongue were observed. These findings support the observation that the LDB device causes hemorrhages of the tongue, and suggest that the LDB device has the same effect as a fatal pressure on the neck.

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Author Information

Satoshi Furukawa

Department of Legal Medicine, Shiga University of Medical Science

Akari Takaya

Department of Legal Medicine, Shiga University of Medical Science

Tokiko Nakagawa

Department of Legal Medicine, Shiga University of Medical Science

Ikuo Sakaguchi

Department of Legal Medicine, Shiga University of Medical Science

Katsuji Nishi

Department of Legal Medicine, Shiga University of Medical Science