Disaster Medicine and Public Health Preparedness

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Development and Prospects of the Non-compressive Hemostatic Devices Being used in Disaster Fields

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Letter to the Editor

Cite this article: Zhao X and Qu B (2022) Development and prospects of the non-compressive hemostatic devices being used in disaster fields. *Disaster Med Public Health Prep* **16**: 2215. doi: https://doi.org/10.1017/dmp.2021.293.

First published online: 15 October 2021

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The purpose of this letter is to draw researchers' attention to the non-compressive devices used in disaster fields. Most casualties at disaster sites are caused by fatal hemorrhage. As the Damage Control Resuscitation (DCR) strategy of intensive hemorrhage illustrated, the earlier reasonable treatment measures are taken, the lower the rate of secondary injury, and death will be.[1] Large vessels pass junctional regions, and the skin there is superficial and fragile, hence cannot be pressurized.[2] Conditions at the disaster rescue site are austere, while traditional tourniquets cannot be deployed at junctional areas. Hence, the basic approach for junctional hemostasis is to apply pressure to the wound to slow the bleeding. When the effect of this method is unremarkable, further urgency calls for more advanced prehospital rescue devices.[3]

In August 2013, 4 symbolic junctional hemorrhage control methods were explored: the Abdominal Aortic and Junctional Tourniquet (AAJT); the Combat Ready Clamp (CRoC); the Junctional Emergency Treatment Tool (JETT); and the SAM Junctional Tourniquet (SJT), wherein 3 of them (CRoC, JETT, SJT) were approved for introduction into TCCC guidelines. TCCC indicates that they serve as immediate medical protection for prehospital medical staff. A total of 3 years later, all of them have been approved for sale as an option for non-compressive hemostasis, and they are also certificated by the Food and Drug Administration (FDA). Additionally, iT-Clamp can be applied as a substitution when a junctional tourniquet is helpless,[4] as it can also achieve direct pressure hemorrhage control when utilized with hemostatic gauze. However, these traditional devices are weak in individual-based treatment which means that according to the different characteristics and vital signs of the wounded, such as gender and body temperature, they cannot self-adjust and apply different hemostatic methods to bring better hemostasis effect.

With the rapid progression of material science and internet technology, non-compressive hemostatic devices will continue their crucial role in fighting against the trauma triad of death in disaster prehospital rescue, and as the main force of disaster rescue equipment, non-compressive hemostatic devices are bound to take on pivotal life support tasks. More attention should therefore be paid to effectively collecting and using the valuable data of each rescue along with the hemostatic devices. These real data are of great significance in simulation, and are of great help to future rescue research. The latest fifth generation wireless systems (5G) is bringing remarkable changes to mobile communication and other related industries by virtue of its advantages of low latency; with 5G, the hemostatic devices can serve as the terminal to collect the data of the wounded, and analyze them with machine learning or deep learning techniques in a dedicated server. Also, as the rescue database continues to grow, the AI algorithm can better distinguish the characteristics of patients and the individual-based treatment of the wounded will become more precise. It can therefore be seen, that the application of highly resistant materials, artificial intelligence, and telemedicine-based wireless communication technology, will effectively enrich the abilities of hemostatic devices in future.

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