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A novel chain-based sponge dressing for management of junctional hemorrhage

Dear Editor

Bleeding is the leading cause of death on the battlefield. With the widespread use of extremity tourniquet, junctional hemorrhage becomes the most common cause to lead death [1]. Currently, there is no perfect hemostatic product available for junctional hemorrhage [2]. We have made a new type of hemostatic device based on chain structure that can be used in the junctional hemorrhage.

The Chain Sponge Dressing (CSD) is made of polyvinyl alcohol expansion sponge (Network Medical Products Ltd.). Each one contains 20 triangles which are strung together with surgical suture (VICRYL, Johnson & Johnson). Every triangle is 1 * 1.5 * 0.45 cm and packed in a 20 ml syringe. Each device can expand 10–12 times in 20s.

Using 5 female Bama miniature pigs, accepted the femoral artery injury model (6-mm arteriotomy) [3]. Exposure and isolation of at least 6 cm of the femoral artery was performed. A 0.6 cm wound on the femoral artery with a drill. After 30 s of free bleeding, blood loss was collected by gauze, the device was applied into the wound. Hemostasis was judged by if there was no oozing with visual observation. Pressure was not allowed after packing. After observation for 180 min, the dressings were removed. Resuscitation was continued for the entire observation period. In the end, all 5 completed hemostasis within 45 s and the survival rate reached 100%. The average time to remove the device was 38.8 s (Table 1) (Fig. 1).

This study was demonstrated that the device has the potential to stop bleeding without additional compression. It could permit quick application with syringe applicator. The chain structure reduced the time of removing dressings. The hemostasis unit adopted triangular structure which increases the contact area with the blood and increases the expansion speed.

This study was a first step to introduce and demonstrate this device was effective in junctional hemorrhage. In the follow-up study, we will continue to improve this device such as adding radiopaque. To compare the effect of the device with standard gauze would be important.

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Competing interests

There are no conflicts of interest.

Disclosure

The product is still investigational.

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Table 1
Hemodynamic parameters, blood loss.

Dressing type	Number of animals	Number of dressings used ^a	Pretreatment blood loss (mL) ^b	Post-treatment blood loss (mL) ^c	Blood loss total (mL)	Time to hemostasis (s)
CSD	5	5.2	238.36	81.62	319.98	45

CSD Chain Sponge Dressing. Data expressed as mean ± SD.

^a Sample testing was stopped after no oozing.

^b Blood loss during 30-second free bleed.

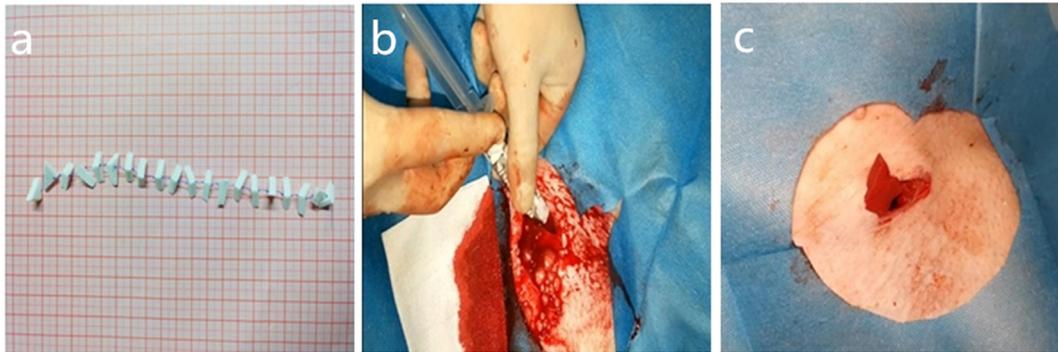


Fig. 1.

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The effects of skin pigmentation on the detection of genital injury from sexual assault

As technology and examination techniques have improved, the literature reflects a growing ability by examiners to detect genital injury following rape and sexual assault. Previous investigators have suggested



that individuals with darker skin may be at a disadvantage for injury identification with current examination strategies (direct visualization, nuclear staining, colposcopy), and color awareness may be an important component of the sexual assault forensic examination [1,2]. Women with dark skin may not have their injuries treated and will be at a disadvantage throughout the criminal justice system if injury is not detected [1]. The purpose of this study was to investigate the role of skin pigmentation in the visual identification of genital injury following sexual assault in adolescent and adult women.

This retrospective cohort analysis evaluated consecutive female patients presenting to a community-based Nurse Examiner Program (NEP) during a 10-year study period. Sexual assault victims presenting directly to four downtown emergency departments are routinely referred to the NEP for evaluation after triage and initial assessment. The clinic is associated with a university-affiliated emergency medicine residency program and is staffed by forensic nurses trained to perform medical-legal examinations using colposcopy with nuclear staining. Patient demographics, assault characteristics, and injury patterns were recorded using a standardized classification form. For the purposes of this study, injury was defined as any tissue trauma visible on inspection which was then subsequently classified using the TEARS classification system: tears, ecchymosis, abrasions, redness, or swelling in the topology proposed by Slaughter and Brown [3]. Because the registry data does not provide specific information on skin pigmentation, race/ethnicity was used as a proxy for skin pigmentation [1]. We included only those women who self-reported as non-Hispanic white or non-Hispanic black. The primary outcome of interest was the documentation of anogenital injuries from sexual assault in whites versus blacks living in the same urban community. Chi-square and ANOVA tests were used to compare anogenital findings in victims examined. To reduce the inflated risk of a type I error that occurs when a large number of statistical analyses are conducted, we choose a p-value <0.01 for statistical significance.

Case files of 2234 patients were reviewed; 83.3% were white and 16.7% were black. The two cohorts were comparable in terms of age, marital status, type of sexual assault, alcohol and drug use, known assailant, and time to physical exam (Table 1). Whites had a 14%

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