## Introduction

The standard protocol of care for hemostatic bandages is to pack the dressing followed by 3 minute compression period to achieve hemostasis. This may be too long in battlefield situations. A faster treatment time has the potential to reduce risk to the medic and colleagues. A new hemostatic dressing (Celox<sup>™</sup> Rapid) has been designed for rapid wound packing and rapid compression time.

## Objective

The objective of this study is to assess the efficacy of this new rapid haemostatic gauze without applying any compression and after a short (one minute) compression time using a model of severe arterial hemorrhage.



Figure 1 – New hemostatic dressing

#### Testing a new gauze hemostat with reduced treatment time. Hoggarth A<sup>1</sup>, Hardy C<sup>1</sup>, Millner R<sup>2</sup>, Lyon A<sup>1</sup> (1: Medtrade Products Ltd, UK, 2: Blackpool Victoria Hospital, UK)

# Method

We measured hemostasis without compression and after one minute compression if needed. Test articles were Celox Rapid (CR) n=12 and Combat Gauze<sup>A</sup> (CG) n=8. The model consists of a 6 mm punch injury to the femoral artery in Yorkshire swine. The inguinal area was dissected to reveal the artery. Papaverine was applied to the wound site before creating the arterial injury. After 45 seconds of free bleeding the test article was packed into the wound, maintaining pressure on the bleed point. After packing, the wound was observed for up to two minutes for further bleeding. If bleeding continued, then compression was applied for one minute. Hemostasis success was defined as no re-bleeding after two minutes' observation after packing or after the one minute compression. If bleeding was not controlled after one minute compression, a fail result was recorded. Models were resuscitated with 500 ml Hextend after treatment. At 15 and 60 minutes after treatment, the models were assessed for re-bleeding. On removal, the CR dressings were assessed for intact removal and for evidence of damage to tissue as the CR product is designed to stick to wet tissue.

Additional tests were carried out on Celox Rapid at three minutes' compression (current TCCC guideline) to provide a baseline.



Figure 2 – packing.

## Results

All animals survived to study end. After packing (no compression), CR achieved 75 % success (9/12), CG achieved 38 % (3/8). After one minute compression results were CR 83 %, CG 50 %. Separate tests on CR at three minute compression recorded 75 % success (3/4). There was no re-bleeding at 15 or 60 minutes in either group. All CR dressings were removed intact without evidence of damage to tissue.

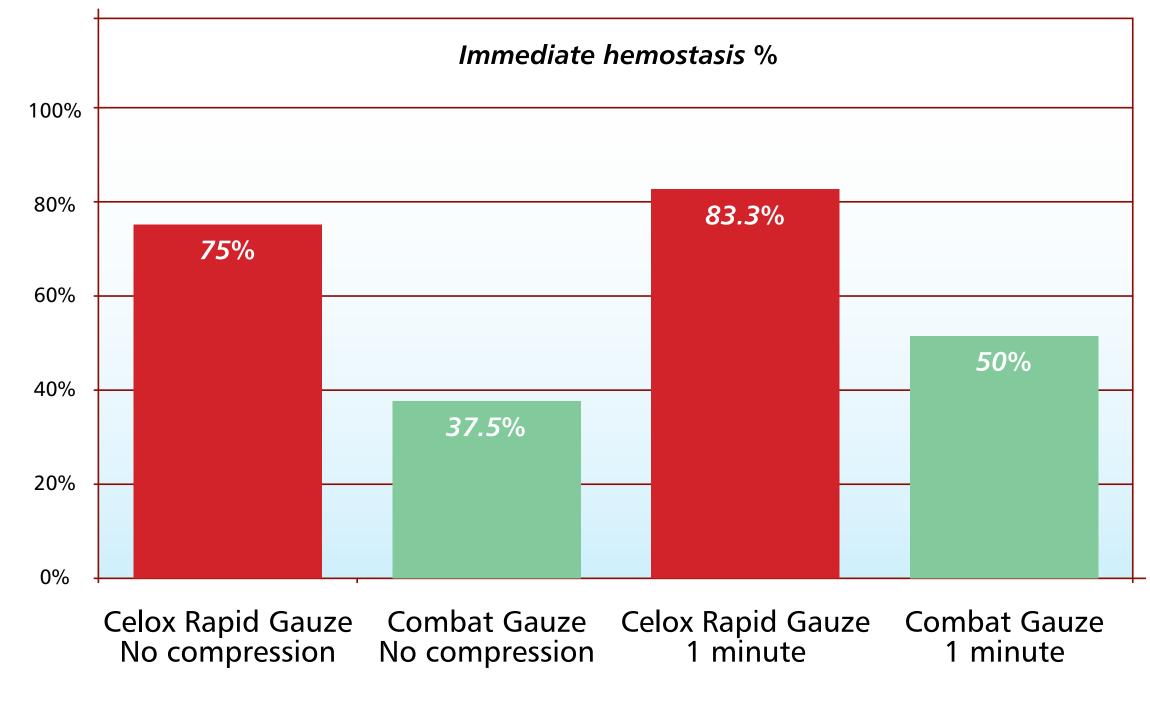


Figure 3 – successful hemostasis at no compression and one minute.

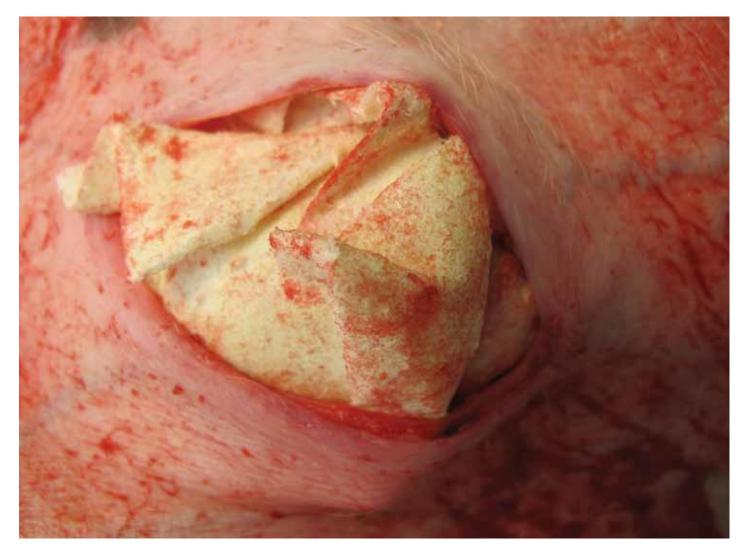


Figure 4: Product after one hour.

# Discussion

The process of packing applies pressure to the bleeding site and in this study took approximately 35-40 seconds, during which time pressure is maintained. In this study, once the hemostat packing is complete there is no additional wrap or bandaging over the hemostat. In reality, medics are taught to wrap for evacuation in a way that maintains pressure for longer. The study deliberately shortened compression times below the manufacturer's recommended compression times (one minute compression for Celox Rapid and three minutes for Combat Gauze) to test the effect of stressful situations in potential danger.

Despite the reduced treatment time, Celox Rapid without any subsequent compression stopped bleeding in 75 % of tests and in 83 % with one minute of compression. On the basis of these results, it may be viable to treat arterial bleeding without compression and go straight from wound packing to assess for hemostasis and then bandage / wrap for evacuation.

# Conclusions

Celox Rapid has the potential to be used with reduced compression or no compression in arterial injuries. If reproduced, these results could impact care protocols on the battlefield.

The product was found to handle safely in use, being removed intact and without tissue damage.