

## Summary of Hemostatic Agent Studies revised.doc

James Wilson, MD  
 EVMS Journal Club  
 February 25, 2008

P: In patients with hemorrhagic wounds  
 I: Does the use of chemical thrombotic agents  
 C: Compared to direct pressure alone  
 O: Add benefit without causing significant harm

Search, Cochrane, Pub-Med, Trip, Google Scholar

<u>Author</u>	<u>Design</u>	<u>Results</u>	<u>Comments</u>
Alam, et. al. <i>Journal of Trauma</i> 6/2003	Pig lethal groin injury (femoral artery & vein transected), bleeding for 3 minutes before dressing applied, blood suctioned at wound site	QC: Mortality 83%→0 RDH: Mortality 83%→67% TDEX: Mortality 83%→33%	Venous bleeding at time dressing applied. Dry field temperature rise to 44°C
Wright, et. al. <i>Journal of Trauma</i> 1/2004	Case Report: Quick-Clot used in hypotensive coagulopathic trauma pt	Successful control of severe thoraco-abdominal bleeding that was otherwise uncontrolled	No thermal injury noted
Alam, et. al. <i>Journal of Trauma</i> 5/2004	Pig lethal groin injury, bleeding for 3 minutes before dressing applied, blood suctioned at wound site	QC: Mortality 100%→0 HemeCon: 100%→29% Quick Relief: 100%→75% Fast Act: 100%→83% TraumaDex: 100%→43%	Packaging QC in pouches increased convenience but effectiveness. Histologic examination of tissues showed thermal injury. HemeCon showed large variation in
Wright, et. al. <i>Journal of Trauma</i> 8/2004	Pig nonlethal groin, muscle, hepatic, & splenic injury, dressing applied immediately, blood not suctioned, temperature & histologic examination	QC: good hemostasis from low-pressure hepatic, muscle, & splenic wounds; poor results from high-pressure femoral arterial wound.	Severe full-thickness burns noted on gross and histologic examination; multiple groin abscesses noted at 7 and 14 days. Fast Act caused no burns or abscesses.
Pusateri et. al. <i>Journal of Trauma</i> 9/2004	Pig Grade 5 liver laceration, dressing applied at 30 seconds, blood not suctioned	QC: Mortality 88%→12%	Severe burns noted to liver where QC applied; surgeons wore padded gloves to prevent burns to hands
Wedmore, et. al. <i>Journal of Trauma</i> 3/2006	Questionnaire from medics regarding HemeCon	97% hemostasis in wounds that had failed Kerlix pressure dressings	Difficult to apply due to brittleness, but worthwhile for wounds.
Ahuja, et. al. <i>Journal of Trauma</i> 12/2006	Pig lethal groin injury, bleeding for 3 minutes before dressing applied, blood suctioned at wound site	NaQC: Mortality 100%→43% BaQC: 100%→25% AgQC: 100%→25% Bagged QC: 100%→10% HemeCon: 100%→25%	Substituting Ca with other cations reduced exothermic heat. Putting QC in bags eliminated thermal injury while maintaining effectiveness.

Summary: When used as directed, these agents work very well. HemeCon is superior to Quick Clot because it avoids thermal injury, but for life-threatening bleeding, the benefits of Quick Clot outweigh the risks. We will start seeing these in civilian EMS soon.

## Summary of Hemostatic Agent Studies revised.doc

Ward, et. al. <i>Journal of Trauma</i> 8/2007	Pig lethal groin injury (anterior wall of femoral artery excised in elliptical shape, soaked in lidocaine to prevent vasospasm, bleeding for 45 seconds, blood not suctioned, fluids given to maintain MAP>65 mmHg)	WoundStat: Mortality 100%→0% HemeCon: 100%→80% QC: No survival Army Field Dressing: No survival QC Sponge: No survival	WoundStat seems superior, but injury model is susp
Arnaud, et. al. <i>Journal of Trauma</i> 10/2007	Pig lethal groin injury, bleeding for 3 minutes before dressing applied, blood suctioned from wound site	Granular QC: Mortality 100%→25% QC Sponge (ACS): 100%→25%	Sponge form of QC equally effective in achieving h no difference in thermal effects
Kozen, et. al. <i>Academic Emergency Medicine</i> 1/2008	Pig lethal groin injury, bleeding for 3 minutes before dressing applied, blood not suctioned	Standard dressing: Mortality 100%→50% QC: 100%→10% HemeCon: 100%→33% CELOX: 100%→0%	CELOX superior to QC and HemeCon, and avoids c of each.

**Clinical Bottom Line:** Current experience appears to demonstrate efficacy in pre-hospital field conditions most notably during Iraq and Afghanistan military operations. These agents appear to be particularly effective in proximal extremity, axillary and groin wounds that are difficult to maintain compression or use of tourniquet. When used as directed, these agents work very well. HemeCon (Chiostan), may be superior to Quick Clot (1% Zeolite) because it avoids thermal injury. For life-threatening bleeding, Quick Clot appears to have substantially longer use in the military theatre and may be the more appropriate choice depending upon the circumstances. There is insufficient evidence to base its use on in an ED setting and may be a more appropriate adjunct in the pre-hospital environment. Control of bleeding by direct pressure and use of tourniquet remains the primary means of hemorrhage control until definitive surgical care is available.

Summary: When used as directed, these agents work very well. HemeCon is superior to Quick Clot because it avoids thermal injury, but for life-threatening bleeding, the benefits of Quick Clot outweigh the risks. We will start seeing these in civilian EMS soon.