

Summary Report of the Study Titled:
In Vitro Evaluation of Real-Time Viscoelastic and Coagulation Properties of Various Classes of Topical Hemostatic Agents Using a Novel Contactless Nondestructive Technology

Study Overview

The study evaluated the real-time viscoelastic and coagulation properties of several topical hemostatic agents (HAs) using a novel, contactless, nondestructive technology. Testing was performed in three environments:

- Recalcified blood (normal coagulation)
- Citrated blood (clotting cascade inhibited)
- Phosphate Buffered Saline (PBS) (non-blood fluid)

Agents tested: WoundClot[®], Celox[®], Hemospray[®], Surgicel[®], FloSeal[®], QuikClot[®], Helistat[®], and Surgifoam[®].

Key Validated Findings

WoundClot[®] was the only gauze that consistently performed across all environments (effective in recalcified blood, citrated blood, and PBS) while QuikClot[®] and Surgicel[®] did not [46:4 L22-L24].

WoundClot[®] and Celox[®] were the only agents cascade-independent, providing reliable action in coagulopathic or anticoagulated conditions [46:4 L22-L24].

WoundClot[®] significantly increased clot stiffness at higher doses in both recalcified and citrated blood, while QuikClot[®] required intact coagulation [46:1 L8-L13].

Volume change: WoundClot[®] swelled (expansion aiding tamponade), whereas QuikClot[®] shrank [46:1 L48-L54].

Over 5 days, WoundClot[®] softened (gradual degradation), making removal easier and improving biocompatibility, while QuikClot[®] and Surgicel[®] stiffened (poor biodegradability) [46:0 L19-L25].

Conclusion

This study highlights WoundClot[®] as the superior hemostatic gauze, demonstrating unmatched performance across impaired and normal coagulation conditions, high absorption, robust clot stability, and favorable long-term biocompatibility. In contrast, traditional agents like QuikClot[®] and Surgicel[®] were limited to normal cascade conditions and produced clots that stiffened over time, while sponge-based products (Helistat[®], Surgifoam[®]) showed minimal effect.

Comparative Scoring Table (1–5 Scale)

Product	Base Technology	Cascade Independence	Speed	Stability	Volume	5-Day Biodegradation	Citations
WoundClot®	NONRCS	5	5	5	5	5	CB & PBS [46:4]; CIT↓ [46:4]; Stiffness↑ [46:1]; Swells [46:1]; Softens [46:0]
Celox®	Chitosan	5	5	5	3	3	CB & PBS [46:4]; Stiffness weaker CB [46:1]
Hemospray®	Bentonite Clay	1	5	1	1	1	Fast CIT [46:4]; No CB/PBS [46:4]; Unstable [46:4]
Surgicel®	ORC	3	3	3	3	1	CB only [46:4]; Stiffness↑ [46:1]; Swells [46:1]; Stiffens [46:0]
FloSeal®		3	3	1	3	1	CB only [46:4]; Low CR [46:0]; Stiffens [46:0]
QuikClot®	Kaolin	1	3	3	1	1	Cascade dep. [46:0]; Shrinks [46:1]; Stiffens [46:0]
Helistat®	Collagen	1	1	1	3	1	No CB/PBS [46:4]; Weak effect [46:4]
Surgifoam®	Gelatin	1	1	1	3	1	No CB/PBS [46:4]; Weak effect [46:4]

Bibliography

ACS Applied Materials & Interfaces. In Vitro Evaluation of Real-Time Viscoelastic and Coagulation Properties of Various Classes of Topical Hemostatic Agents Using a Novel Contactless Nondestructive Technology. <https://doi.org/10.1021/acsami.2c01741>