



A Comparison of Pelvic Fracture Binding Methods on a Cadaver Model: Reliability and Perceptions among Prehospital Professionals

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Introduction

- Pelvic fractures can cause life-threatening hemorrhage.
- Pelvic binding via circumferential compression devices may close the pelvic ring slowing hemorrhage and limiting further damage.
- There’s limited research on the use and success of a sheet-wrap or commercial compression devices during prehospital care.
- Data demonstrating pelvic fracture reduction via prehospital pelvic binding is scarce.

Objective

- To determine the effectiveness of sheet-wrap binding compared to a commercial compression device

Methods

- This This IRB approved prospective observational study was conducted using a softly embalmed cadaver with a surgically created open book pelvic fracture.
- Volunteer study participants were provided standardized education on two pelvic binding methods: a sheet-wrap and the T-POD™ Pelvic Stabilization Device.
- Participants placed both devices and were randomized to apply either device first. Device application time, positioning, and securing methods were recorded.
- X-ray was used to determine if the fracture was reduced completely, partially, or not at all. A post-application survey determined provider preferences between both devices and their ease of use.
- The primary outcome was fracture reduction. Chi-square & Wilcoxon Sign Ranked tests for matched samples were performed in R version 1.0.2.

Table 1: Participant Demographics

Gender(n)	
Male	39.6% (44)
Female	60.4% (67)
Age (years)	35.6±11.4
Ethnicity (n)	
Caucasian	95.5% (106)
African American	1.8% (2)
Native American	0.9% (1)
Hispanic/Latino	1.8% (2)
Education	
High School Diploma	9.9% (11)
Some College	23.4% (26)
Associates Degree	26.1% (29)
Bachelor’s Degree	39.6% (44)
Masters or Doctorate	0.9% (1)
EMS Credential Level	
EMT	17.1% (19)
AEMT	3.6% (4)
Paramedic	46.8% (52)
Nurse	30.6% (34)
Physician/extender	1.8% (2)

Figure 1: Open Pelvis Fracture Before & After Pelvic Binding

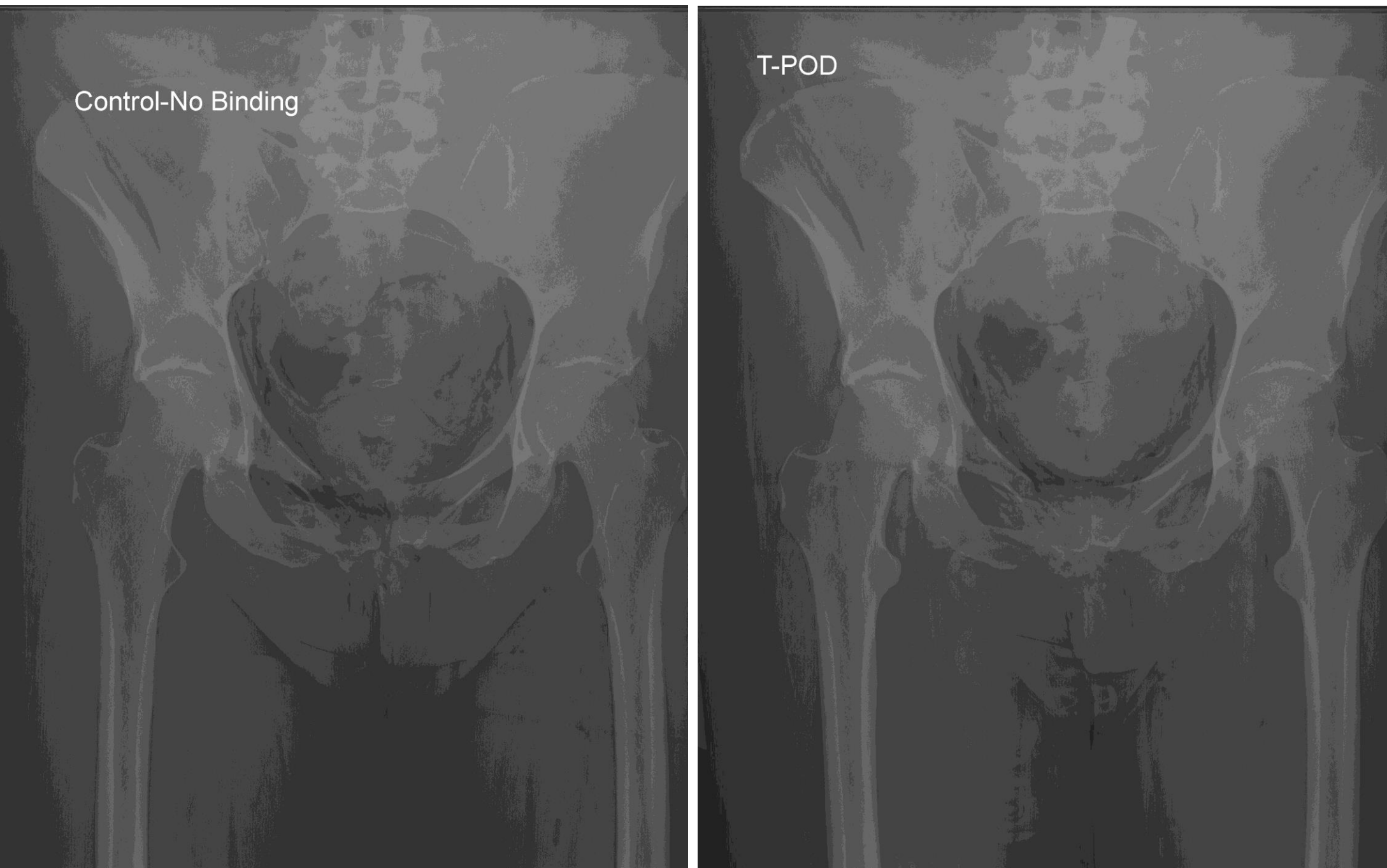


Figure 2: Participants placing Sheet Wrap on Cadaver



Table 2: Comparison of Pelvic Binder Placement

	Sheet Wrap n=111	T-Pod n=111	Significance
Time (sec) [median, IQR]	73.00 [60.00, 96.00]	68.00 [55.00, 88.5]	p=0.279
Placement (%)			
Correct	44 (39.6)	67 (60.4)	p<0.001
High	0 (0.0)	6 (5.4)	
Low	67 (60.4)	38 (34.2)	
Results			
No Reduction	6 (5.4)	4 (3.6)	p<0.001
Partial Reduction	70 (63.1)	42 (37.8)	
Full Reduction	35 (31.5)	65 (58.6)	
Ease of Use			
Extremely easy	36 (32.4)	64 (58.2)	p<0.001
Somewhat easy	38 (34.2)	36 (32.7)	
Neither	15 (13.5)	3 (2.7)	
Somewhat difficult	22 (19.8)	7 (6.4)	

Table 3: Provider Experience Impact on Device Placement

	Never placed before n=29	Prior Placement Experience N=82	Significance
Sheet wrap placement (%)			
Correct	12 (41.4)	32 (39.0)	p=.998
Low	17 (58.6)	50 (61.0)	
Sheet Wrap Result			
Full reduction	3 (10.3)	32 (39.0)	p=0.017
Partial reduction	24 (82.8)	46 (56.1)	
No reduction	2 (6.9)	4 (4.9)	
T-Pod Placement			
Correct	16 (55.2)	51 (62.2)	p=0.378
High	3 (10.3)	3 (3.7)	
Low	10 (34.5)	28 (34.1)	
T-Pod Xray Result			
Full Reduction	15 (51.7)	50 (61.0)	p=0.444
Partial Reduction	12 (41.4)	30 (36.6)	
No reduction	2 (6.9)	2 (2.4)	

Results

- A total of 111 providers participated who were primarily female (n=67, 60.4%), Caucasian (n=106, 95.5%), paramedics (n=52, 46.8%), and had a bachelor’s degree (n=44, 39.6%).
- Providers had an average of 12±10.09years experience.
- There was no difference in application time (in seconds) between the T-POD™ and sheet-wrap (68±28v.73±31;p=0.279).
- The T-POD™ was more frequently placed correctly (60.4%vs39.6%;p<0.001) and resulted in full fracture reduction more often (58.6%v.31.5%;p<0.001).
- When comparing providers with pelvic binding experience to those without, the sheet-wrap resulted in a lower proportion of fracture reduction (39.0%v.10.3%;p=0.017), while T-POD™ success was the same (61.0%v51.7%;p=0.444).
- Most participants (72.1%) preferred the T-POD™, and a higher proportion of participants reported it was easy to use (90.9%vs66.6%;p<0.001).
- Sheet-wrap success was not influenced by sociodemographic factors; however, a higher proportion of successful T-POD™ placement was reported when participants had a college degree (p<0.001).

Conclusions

- Providers placed the T-POD™ pelvic binder with more consistency, which resulted in more frequent pelvic fracture reduction.
- Providers perceived the T-POD™ to be easier to apply than a sheet-wrap.

Limitations & Next Steps

- This study evaluated one commercial device on a single cadaver.
- Participants were recruited from a small geographic region.
- Additional research is needed to determine any potential impact on patient outcomes



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