EFFICACY OF AN INFLATABLE SPINE-BOARD PADDING DEVICE IN REDUCING PAIN DURING SIMULATED SPINAL IMMOBILIZATION

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STUDY OBJECTIVES: Rigid Spine boards, in combination with other devices, are commonly used for spinal immobilization of trauma victims by EMS services. Research indicates that victims spend an average of 60 minutes immobilized, from scene to ED clearance of the spine.[1] Prolonged immobilization has been shown to cause pain, which may prompt unnecessary x-rays.[2,3] Padding devices have been shown to decrease pain in immobilized volunteers.[4] The use of a verbal analog scale to rate pain has been validated.[5] This study investigated the efficacy of a commercially-available, disposable, inflatable spine-board padding device (IPD) in reducing pain due to spinal immobilization in normal healthy volunteers.

DESIGN: Prospective randomized crossover study.

SETTING: Nonclinical, EMS laboratory setting.

PARTICIPANTS: Twenty-five healthy adult volunteers without acute or chronic back pain and not having used analgesics in the preceding 24 hours.

METHODS/INTERVENTIONS: Two trials were performed on each subject, with and without the IPD (BackRaftTM, MedicTech Inc.), with each subject acting as his/her own control. Volunteers were immobilized using rigid cervical collars, spine boards, head immobilizers and straps. Immobilization was performed by experienced paramedics and the investigators, using standardized methods and the manufacturer's instructions for application of the IPD. The order of the two trials was randomized, and timed at least 48 hours apart. Volunteers were immobilized for 60 minutes. A verbal analog scale (VAS) was used to assess pain, with subjects asked to rate their pain on a scale of 0 to 10, with 10 being most severe. A pain assessment was obtained immediately pre-immobilization and every 15 minutes until 15 minutes after immobilization was discontinued. The difference between pain ratings with and without the IPD was calculated for each participant at each time interval. The mean difference in pain ratings for each time interval was then compared to zero using a paired two-tailed t- test. Results were considered statistically significant at $p < 0.05$. Research suggests that a difference of >1.3 units on a 0-10 unit VAS indicates clinically significant pain relief.[6] Mean differences with lower 95% confidence intervals > 1.3 were thus considered clinically significant. Subjects were examined for physical injury 15 minutes after immobilization was discontinued.

RESULTS

TIME (minutes)	MEAN REDUCTION IN PAIN SCORE WITH IPD (Lower – Upper 95% C.I.)	P (NS if p>0.05)	CLINICALLY SIGNIFICANT LOWER 95% C.I. > 1.3
Pre-immobilization	0 (-0.12 – 0.12)	NS	
0	-0.04 (-0.37 – 0.28)	NS	
15	0.72 (0.17 – 1.27)	0.0128	
30	1.68 (1.09 – 2.27)	<0.0001	
45	2.36 (1.64 – 3.08)	<0.0001	Yes
60	3.36 (2.54 – 4.18)	<0.0001	Yes
Post-immobilization	0.48 (-0.07 – 1.03)	NS	

Reductions in mean pain scores with the IPD at 15 through 60 minutes were statistically significant. Mean scores at 45 and 60 minutes met the criterion for clinical significance. None of the victims had significant physical injury.

CONCLUSIONS: Healthy volunteers reported statistically significant reduction in pain at 15 through 60 minutes when an IPD was used during spinal immobilization. Using a criterion of >1.3 units on a VAS, reduction in pain at 45 and 60 minutes was also clinically significant. The IPD was effective in decreasing discomfort during spinal immobilization in healthy volunteers. Clinical studies in immobilized trauma victims are indicated.

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