Spinal Immobilization
Adverse Effects vs. Benefits
in the Trauma Patient

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Scenario
You are an EMT-P arriving on the scene of a rollover that occurred less than 10 minutes ago. No witnesses are present. It appears that the vehicle was going in excess of 45 mph around a turn, then rolled. You notice skid markings leading up to the vehicle. No other vehicles were involved. An 18 y/o female is found unconscious restrained in the drivers seat with air bags deployed. A patient state was noted on scene, and the fire department is still another 20 minutes away. The nearest hospital is roughly a 20 minute drive.

On first look you see the patient is not pinned within the vehicle. She is not responding to verbal cues but is responsive to noxious stimuli. She is incoherent. She is pale, diaphoretic, tachypneic, and her stomach is distended and rigid. Only minor bleeding is noted on the patient’s face and should be examined closely.

Three options:
1. Await Fire for extrication and assistance.
2. Attempt the extraction with your partner and two on standing policemen with short spine board and c-collar. Then transition to long board once out of the vehicle. Include the patient head first to the hospital.
3. Attempt the extraction with your partner and two on standing policemen as fast as possible. Start IVs and obtain vitals on the way.

Scenario with additional info
1. Journal of Neurotrauma conducted a study in 2014 on Prehospital Use of Cervical Collars in Trauma Patients that concluded: “The existing evidence for using collars is weak, and our practice is mainly a result of the historical influence of poor evidence. More significant and concerning, there is a well of less-appreciated documentation of harmful effects from collars.”

2. Recent Report from the National Academy of Sciences, Engineering, and Medicine concluded that 20 percent of people who die from traumatic injuries could have been saved if they got treatment at a trauma center quicker.
Background

The origin of spinal immobilization for severe spinal trauma is unclear, but the first patent for such a device was shortly after the Vietnam war by inventor Glen Hare, the founder of Dyna-Med in 1974. The initial use of spinal immobilization devices was based on anecdotal evidence that their use reduced the likeliness of further neurological injury post trauma. Since then, the use of spinal immobilization devices has become a standard practice in the Western world.

The use of spinal immobilization devices is not benign and can cause adverse complications for the patient to include:

- Restricted breathing
- Airway obstructions
- Increased transport time to medical treatment facility from scene of injury
- Increased medical cost
- Abnormal Separations of the Vertebrae

This review assesses the current evidence of adverse effects from spinal immobilization in trauma patients.

Methods

An exhaustive search of available literature was conducted using the MEDLINE-Ovid, Web of Science, CINAHL, and Google Scholar using the keywords: spinal immobilization, adverse, and trauma. Articles cited in the included articles were examined for additional relevant sources. Articles that assessed the effects of spinal immobilization on trauma patients were included. The quality of relevant articles was evaluated using (GRADE) Working Group guidelines.

Characteristics of Reviewed Studies, GRADE Profile

Authors | Study Design | Limitations | Indirectness | Inconsistency | Imprecision | Publication bias | Quality
--- | --- | --- | --- | --- | --- | --- | ---
Leonard et al | Prospective Cohort study | Not Serious | Not Serious | Not Serious | Not Serious | Unlikely | Moderate
Hauswald et al | Retrospective Cohort study | Not Serious | Not Serious | Serious | Not Serious | Unlikely | Very Low
Mobb et al | Prospective Cohort study | Serious | Serious | Not Serious | Not Serious | Unlikely | Very Low

a Upgraded due to a large treatment effect
b Large uncontrollable differences in sample populations (Malaysian vs. U.S.)
c Lacked a control group
d Single person for application and data collection
e Limited sample n=10

Three studies met eligibility criteria and were included in this systematic review. The studies consisted of a retrospective study and two prospective cohort studies. One study of 329 children found a statistically significant increase in pain score, rate of admission, and rate of radiological examination.

The second study of 454 trauma patients found little to no neurological effect of spinal immobilization on patients with spinal injuries. The third study of 10 consecutive head-injured patients found a rise in ICP following the application of a rigid cervical collar. All studies had a very low to moderate quality of evidence based on GRADE guidelines.

Effect of Spinal Immobilization

<table>
<thead>
<tr>
<th>Odds Ratio (95% CI)</th>
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<tbody>
<tr>
<td>Pain Score</td>
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<tr>
<td>Rate of admission to ICU or OR</td>
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<tr>
<td>Rate of radiological exam</td>
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Discussion

- Multitude of cohorts since the early 1990s have come to a similar conclusion.
- No randomized controlled trials to substantiate continuing the practice of spinal immobilization in out-of-hospital trauma victims.
- The results of the studies reviewed were consistent across different populations and different regions of the world.
- Direct comparative complications: different populations, measuring different adverse effects.
- Consistent low level quality of evidence.
- The variability among studies is due to inadequate reporting of study protocols and investigational methods.
- The overall low quality of evidence makes it difficult to recommend practice.
- The results are that spinal immobilization has no benefit, and may possibly incur adverse side effects to the patient.
- Enough data to substantiate temporary change in practice to a level through direct comparison such as a randomized control trial.

Conclusion

The studies evaluated and prior data clearly illustrate the increased risk of adverse effects when utilizing spinal immobilization with trauma patients that include:

- Increased pain
- Increased likelihood of radiographic imaging
- Increased likelihood of admission
- Increased ICP

The use of spinal immobilization devices appears to have little to no beneficial effect. Providers need to assess the legitimacy of this practice with the potential adverse side effects demonstrated in these studies. Further research must be performed to ensure the safety of patients.

Questions

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REFERENCES


