

What Factors Influence Surgeons in Decision-Making in Thoracolumbar Burst Fractures? A Survey-Based Investigation of a Panel of Spine Surgery Experts

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Abstract

Study Design: Cross-sectional survey study.

Objective: To investigate factors affecting decision-making in thoracolumbar burst-fractures without neurologic deficit.

Methods: A 40-question survey addressing expert-related, economic, and radiological factors was distributed to 30 international trauma experts. Descriptive statistics were used to assess the impact of these factors on operative or non-operative management preferences.

Results: Out of 30 experts, 27 completed the survey. The majority of respondents worked at level I trauma centers (81.5%) within university settings (77.8%). They were primarily orthopedic surgeons (66.7%) and had over 10 years of experience (70.4%). About 81% found distinguishing between A3 and A4 fractures relevant for decision-making. Most experts (59%) treated A3 fractures non-surgically, while only 30% treated A4 fractures conservatively. Compensation systems did not influence treatment recommendations, and hospital measures promoting surgeries did not significantly affect distribution. Radiological factors, such as local kyphosis (25/27), fracture comminution (23/27), overall sagittal balance (21/27), and spinal canal narrowing (20/27), influenced decisions.

Conclusion: Incomplete burst fractures (A3) are predominantly treated non-surgically, while complete burst fractures (A4) are primarily treated surgically. Compensation, third-party incentives, and outpatient care did not significantly impact decision-making. Radiological factors beyond the AO Spine thoracolumbar classification system seem to be essential and warrant further evaluation.

Keywords

spinal injuries, spinal fractures, back injuries, burst fractures, decision-making, therapy, A3/A4, compensation, equipoise, radiographic factors

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Introduction

Thoracolumbar burst fractures without neurologic deficit are frequent and their treatment still poses a controversy.¹⁻⁶ The AO Spine thoracolumbar injury classification differentiates between incomplete (A3) and complete (A4) burst type fractures and their possible treatment options.^{7,8} However, global clinical consensus remains elusive and treatment pathways diverse. This state of equipoise accentuates a critical clinical conundrum that necessitates a nuanced understanding of the multifarious factors influencing therapeutic decisions. Uniquely combining an equipoise study with an expert survey, our research addresses this gap, providing unparalleled insight into the intricate variables steering surgeons' choices. This blend of expert opinions and empirical data allows a thorough exploration of prevailing uncertainties in treating such fractures, facilitating a closer alignment of clinical practice with evidence-based guidance. The objective of this study was to explore a broad spectrum of factors—encompassing not only radiological considerations but also extending to personal factors such as background, professional training, experience, remuneration, OR availability, hospital setting etc.—that influence decision-making in managing neurologically intact thoracolumbar burst fractures.

Methodology

Employing a meticulously crafted questionnaire, we engaged an international cadre of spine surgery experts (the Equipoise Group who crafted and produced this special issue), dissecting the manifold influences inherent in decision-making processes related to A3/A4 thoracolumbar fractures. The questionnaire was drafted and defined through a discussion process within the AO Spine Knowledge Forum Trauma. This integrative tool was pivotal in unraveling the intertwined elements influencing clinical decisions, offering a panoramic view of the factors steering treatment paths. The survey along with additional insights will be provided as [supplemental material](#) to this editorial.

Findings

Expert Group Demographics and Background

A thorough analysis garnered insights from international 27 experts, predominantly stationed at Level 1 trauma centers and immersed in university settings. Most experts exhibit profound experience, with two-thirds being orthopedic surgeons. A significant 80% of these experts have engaged in AO Spine trauma courses. The professional background of the expert group is illustrated in the tables within the [supplemental material](#).

A3 Fractures: Expert Preferences and Influences

A conservative approach is predominantly endorsed for A3 fractures, regardless of the workplace's nature, with

Table 1. Crosstabulation of Therapy Recommendation for A3 Fractures With Annually Treated Fractures.

Years	Surgery	Conservative	Both Equal	Count
<10 years	0	5	3	8
>10 years	3	11	5	19
Total	3	16	8	27

68.2% of experts from Level I hospitals advocating for it. Interestingly, no considerable divergence was noted in preferences between experts with differing professional training or experience levels. Surgeons with more years of experience were more inclined to surgical therapy, whereas younger colleagues tended to prefer conservative therapy ([Table 1](#)).

We looked at how different economic factors like the hospital setup, how doctors are paid, and the risks of legal issues might affect treatment decisions for A3 fractures. However, these factors did not change the treatment recommendations. The findings show a steady preference for non-surgical treatments for A3 fractures, regardless of these economic factors.

A4 Fractures: Inclination Towards Surgical Therapy

In contrast, A4 fractures witness a predominant recommendation for surgical therapy, with 55.6% of experts leaning towards it. The diversity in professional training and levels of experience did not significantly alter this inclination. Despite the availability of surgical capacities or varying health care systems and insured statuses, the recommendations steadfastly remained surgical, unveiling a cohesive preference irrespective of external variables ([Tables 2-4](#)).

Radiological Influences: Consensus and Divergences

The differentiation between A3 and A4 fractures was deemed crucial by the overwhelming majority of experts in determining treatment plans. In decisions related to A3 fractures, 81% of experts incorporated considerations for potential long-term complications such as post-traumatic kyphosis and implant failure, though this did not significantly sway the overall distribution of treatment recommendations.

Regarding A4 fractures, 81% of experts expressed that long-term complications like kyphosis or material failure do play a pivotal role in influencing treatment decisions.

Apart from the AO Spine classification, experts displayed uniform opinions on various radiological factors for both A3 and A4 fractures ([Table 5](#)). There existed a robust consensus among experts regarding the influence of several elements on decision-making: local kyphosis, fracture comminution, overall sagittal balance, and spinal canal narrowing as

Table 2. Crosstabulation of Operation Room Availability and Treatment Recommendation for A4 Fractures.

			What is the most common treatment you recommend for A4 fractures?		
			Surgery	Conservative	Both equal
In your hospital, how would you rate the availability of an operating room for fracture treatment?	Moderate or inconsistent availability	Count	4	1	0
	Excellent	Count	11	7	4
Total		Count	15	8	4

Table 3. Crosstabulation of Level of Insurance and Treatment Recommendation for A4 Fractures.

			What is the most common treatment you recommend for A4 fractures?		
			Surgery	Conservative	Both equal
What is the level of insurance of the majority of your patients	Obligatory basic health care insurance for the whole population	Count	5	1	1
	Obligatory basic health care insurance for the whole population + optional extra insurance	Count	8	2	1
	No obligatory basic health care insurance, but most patients are insured	Count	0	4	1
	No obligatory basic health care insurance, most patients are not insured	Count	2	1	1

Table 4. Crosstabulation of Perceived Reimbursement and Treatment Recommendation for A4 Fractures.

			What is the Most Common Treatment You Recommend for A4 Fractures?		
			Surgery	Conservative	Both Equal
Is surgery for A3/A4 adequately reimbursed from the surgeon's perspective?	No	Count	7	1	3
	Yes	Count	8	7	1
Total		Count	15	8	4

Table 5. Radiological Factors Influencing the Therapy Recommendation for A3 and A4 Fractures.

Factor	Important	Not Important
Local kyphosis	25	2
Fracture comminution	23	4
Overall sagittal balance	21	6
Spinal canal narrowing	20	7
Disc injury	13	14
Vertical lamina fracture	11	16

impacting treatment decisions. However, the expert group remained divided on the significance of disc injury and additional lamina fracture in shaping their treatment decisions, acknowledging their impact.

Conclusion

This study aimed to understand how factors related to clinician expertise, economic interests, and radiological features influence therapy recommendation for AO Spine A3/A4 thoracolumbar fractures without neurological deficit. The majority of experts (81%) found distinguishing between A3 and A4 in neurologically intact patients to be relevant for decision-making. Accordingly, most of the experts (59%) treat A3 fractures without surgery, while only 30% treat A4 fractures conservatively. Most experts are concerned about long-term complications such as implant failure or future kyphosis. Radiological factors, such as local kyphosis, fracture comminution, overall sagittal balance, and spinal canal narrowing strongly influence the treatment decision by the experts, while remuneration pattern does not.

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Supplemental Material

Supplemental material for this article is available online

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