

Original Article

The trend in Management of Stable Burst Fracture of Thoracolumbar Spine with Intact Neurology among Members of the Association of Spine Surgeons of Nepal: A Survey

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ABSTRACT

Introduction: The management of stable burst fracture of thoracolumbar spine with intact neurology is controversial. The radiological interpretation of such fractures differs among the surgeons and hence the treatment. So, this survey aims to study discrepancies in management of such fractures among the members of the Association of Spine Surgeons of Nepal (ASSN).

Methods: Two representative cases of stable burst fracture with intact neurology (Case 1 AO type A3 and Case 2 AO type A4) were chosen by the authors. Questionnaire was formulated in Google form which also contained X-rays and CT scans of the cases. Google form was circulated among the members of ASSN. The response was recorded in excel and was analyzed.

Results: Out of 67 members of ASSN, 55 (82.08%) responded the survey. 35 responders (63.63%) used both AO classification and TLICS. Majority of responders responded correctly as AO Type A3 and A4 burst fractures after looking at X-rays and CT scans of Case 1 and Case 2 respectively. Regardless of TLICS of 0-3 or 4 in both the cases, majority (81.81% in Case 1 and 78.18% in Case 2) chose surgical intervention. The degree of kyphosis for 48 respondents (87.27%), the level of fracture for 45 respondents (81.81%), bone quality for 41 respondents (74.54%), the severity of canal compromise for 40 respondents (72.72%) were some important factors in treatment decisions.

Conclusion: The wide interobserver variability exists among members of ASSN in the management of stable burst fractures of the thoracolumbar spine with intact neurology.

KeyWords: Intact neurology, Interobserver variability, Stable burst fracture, Trend in management

Introduction

Thoracolumbar burst fracture accounts for 21%-58% of thoracolumbar spine injuries and 10%-20% of all spinal fractures.¹⁻³ The management of stable thoracolumbar burst fracture with intact neurology is controversial.³ There are a few classification systems like Thoracolumbar Injury Classification and Severity Score (TLICS) and AO Classification for thoracolumbar injuries to guide the treatment. Radiological interpretation of the fracture may differ between the surgeons and hence decisions regarding management also differ. There are several other factors, which are not included in these classifications, that surgeons take into consideration while deciding the treatment.

This survey aims to study discrepancies in the interpretation of TLICS and AO Classification of thoracolumbar fractures and their management by providing the same cases of burst fractures with intact neurology to the members

of the Association of Spine Surgeons of Nepal (ASSN).

METHODS

This is a descriptive cross-sectional study conducted among the members of the Association of Spine Surgeons of Nepal (ASSN) from 7th January 2022 to 12th February 2022 via electronic media. Two representative cases of a burst fracture of the thoracolumbar spine with intact neurology were chosen by the authors. The first case was chosen as a representative case of an AO Type A3 fracture of the L1 vertebra (Figure 1) and the second case was an AO Type A4 fracture of the L2 vertebra (Figure 2). A similar questionnaire was formulated for both cases. Google form was designed which contained four sections; the first section for the general information of the responder, the second and third section for information and questions related to the first and second representative cases respectively, and the fourth section with general questions about important factors in deciding appropriate treatment among different options, MRI in burst fracture with intact neurology and Load Sharing classification. The google form was circulated via electronic media. All the members were requested via a telephone call to respond to the google form. The responded data were trans-

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Figure 1. L1 Burst fracture AO type A3. (A) x-ray shows L1 body fracture with decreased height and retropulsion of fracture fragment, (B, C and D) CT scans shows L1 superior end plate fracture extending to posterior wall and retropulsion of fragment causing narrowing of spinal canal.



Figure 2. L2 Burst fracture, AO type A4. (A) X-ray shows L2 body fracture involving both superior and inferior endplate with decreased height and retropulsion of fragment into the canal, (B) CT scan of the same patient, better delineate the fracture morphology.

ferred to a Microsoft Excel sheet (2013) and analyzed.

RESULTS

Out of 67 members of the Association of Spine Surgeons of Nepal (ASSN), 55 (82.08%) responded to the survey. 42 responders (76.36%) were fellowship-trained spine surgeons. 13 responders each were from medical colleges, private hospitals in Kathmandu, and private hospitals outside Kathmandu, 10 responders were from a government hospital in Kathmandu, and 6 were from a government hospital outside Kathmandu. 35 responders (63.63%) used both AO classification and Thoracolumbar Injury Classification and Severity Score (TLICS), 13 responders (23.63%) used TLICS classification only, 4 responders (7.27%) used AO classification only and 3 responders (5.45%) used neither of these classifications to assess burst fracture. All the responders except one had access to a CT scan and 44 responders (80%) had access to MRI.

As per Table 1, with the X-ray of the first case, 21 responders (38.18%) categorized it as AO type A3, 14 responders (25.45%) as AO type A1 and 11 responders (20%) as AO Type B2 fracture. For the same case, with a CT scan, 26 responders (47.27%) categorized as AO type A3, and 14 responders (25.45%) categorized as AO type B2. The number of responders who categorized the case as AO Type A1 with -X-ray decreased to 2 responders (3.63%) with CT scan. With X-ray, 30 responders (54.54%) gave a TLICS score of 0-3 which decreased to 23 responses (41.81%) with a CT scan. 45 responders (81.81%) preferred surgical intervention over 9 responders (16.36%) who preferred non-operative management of various modalities. 38 responders (69.09%) preferred short segment posterior stabilization with intermediate screws.

Table 1. Categorization of X-ray and CT scan of Case 1 by responders

Classification	With X-Ray	With CT scan
A1	14	2
A2	3	3
A3	21	26
A4	2	7
B1	4	3
B2	11	14
Total	55	55

As per Table 2, with an X-ray of the second case, 32 responders (58.18%) categorized the case as AO Type A4 fracture and 12 responders (21.81%) as AO Type A3 fracture. For the same case, with a CT scan, the number of responders who categorized the case as AO type A4 increased to 38 (69.09%), and as AO type A3 decreased to 9 (16.36%). 30 responders (54.54%), with X-ray, scored TLICS of 0-3 followed by 19 responders (34.54%) with a score of 4. With a CT scan, the number of responders with a TLIC score of 0-3 decreased to 27 (49.09%) and a TLIC score of >4 increased to 10 (18.18%). 43 responders

Table 2 Categorization of X-ray and CT scan of Case 2 by responders

Classification	With X-ray	With CT scan
A1	2	0
A2	4	2
A3	12	9
A4	32	38
B1	2	3
B2	3	3
Total	55	55

(78.18%) preferred surgical intervention and 11 responders (20%) preferred non-operative management of various modalities. 32 responders (58.18%) chose to perform short-segment posterior stabilization and among them, 26 responders (47.27%) chose open procedure with intermediate screws.

Besides from the AO Classification and TLICS components, the degree of kyphosis for 48 respondents (87.27%), the level of fracture for 45 respondents (81.81%), bone quality for 41 respondents (74.54%), the severity of canal compromise for 40 respondents (72.72%), the degree of vertebral comminution for 38 respondents (69.09%), and the amount of decrease in vertebral body height for 36 respondents (65.45%) were important factors in treatment decisions. The load-sharing classification for burst fracture is used by 33 respondents (60%) in select cases, 8 respondents (14.54%) in all cases and 14 respondents (25.45%) do not find it useful. 29 respondent (52.72%) would order MRI while 26 respondent (47.27%) would not order MRI in burst fracture with intact neurology.

DISCUSSION

The wide interobserver variability exists among members of association of spine surgeons of Nepal in the classification and management of stable burst fractures of the thoracolumbar spine with intact neurology.

Treatment of thoracolumbar burst fracture with intact neurology is controversial. AO and TLICS classification guide the management of thoracolumbar fractures.^{4,5} Total 35 responders (63.63%) use both AO and TLICS classification. These are based on fracture morphology, the integrity of PLC, and the neurological status of the patient. Fracture morphology is better assessed with a CT scan.^{6,7} 54 (98.18%) responders in our study had access to a CT scan facility. Correctly identifying the fracture morphology on plain radiographs can be challenging. In our study, 26 (47.27%) spine surgeons in case 1 and 38(69.09%) spine surgeons in case 2 correctly identified fracture morphology after assessing the CT image. 14 spine surgeons diagnosed case 1 as AO type A1 based on plain -X-ray, however, after assessing the CT scan 8(57.14%) of them correctly diagnosed it as AO type A3. Similarly, in case 2, five out of 12 (41.67%) surgeons changed their diagnosis from A3 to A4 type after assessing the CT scan.

The integrity of PLC plays an important role in deciding treatment modality. Disrupted PLC warrants a surgical intervention in the burst fracture. Identifying PLC injury on plain radiographs and CT scan is difficult due to poor interobserver variability.⁸ MRI although helps in detecting PLC injuries, may over-diagnose these injuries and hence is not recommended to be used alone to determine treatment.⁹ 44 responders (80%) have access to MRI, however 29 surgeons (52.72%) decided not to have MRI done for burst fractures with intact neurology. MRI in burst fracture with intact neurology is not indicated. However, these modalities help detect occult fractures which may change management plans.¹⁰

TLICS classification guides treatment in thoracolumbar fractures and is widely used. The number of surgeons who initially classified the injury as a score less than three, decreased to 23 from 30 in case 1, to 27 from 30 in case 2 after assessing the CT scan. This could be because, surgeons assumed the patient to have PLC injury based on fracture morphology, comminution, retropulsion, and degree of kyphosis, which are better appreciated on CT scans.¹¹

The majority of surgeons opted for surgical management. Even though 23 and 27 surgeons in case 1 and case 2 respectively calculated TLICS as less than three, 38(69.09%) surgeons in case 1 and 43(78.18%) surgeons in case 2 wanted a surgical intervention disputing with the guideline. Other factors play a major role in deciding treatment. Mattie et al demonstrated progressive late kyphotic deformity in comminuted burst fracture in patients with intact PLC.¹² In this study, the degree of kyphosis and the level of fracture are thought to be an important factors for deciding treatment by 48 responders (87.27%) and 45 responders (81.81%) respectively.

Load-sharing classification is mainly used to assess the likelihood of failure of short segment fixation without anterior support.¹³ 33 responders (60%) use load-sharing classification in selective cases and 14 responders (25.45%) do not find it useful. The majority of surgeons opted for open short posterior fixation with the intermediate screw. This could be because of the preference and experience of most surgeons with open technique as compared to percutaneous technique. Many reports suggest intermediate screw in fractured vertebrae results in rigid construct, better fusion rate, and better restoration of the alignment.¹⁴⁻¹⁶

In case 1, three out of 16(18.75%) surgeons working in government hospitals chose conservative management over operative treatment as opposed to 6 out of 39 (15.38%) surgeons working in private setups. Similarly, in case 2 these figures were four out of 16 (25%) and 7 out of 39(17.94%) among government and private hospitals, respectively. There was no significant difference. The study suggests that management decisions do not differ with the different setups of the hospital.

CONCLUSION

The thoracolumbar burst fracture with intact neurology is common. No classification system exists at present which takes into account all variables influencing deci-

sion-making. Hence wide interobserver variability exists among members of Association of Spine Surgeons of Nepal in the management of stable burst fractures of the thoracolumbar spine with intact neurology. The degree of kyphosis, level of fracture, and severity of canal compromise are some important factors that are taken into consideration in cases of intact PLC and intact neurology.

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