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Brief Report

Advanced spine life support: Is it time to start?

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ABSTRACT

Acute spine cases such as traumatic injuries and cord compression are unique. They need special attention, early recognition, and proper intervention. Treating such conditions needs extended practice, more experience, and comprehensive knowledge about spine acute pathologies. Different centers and regions have different approaches to treating these injuries with different outcomes. This report emphasizes the importance of establishing courses and manuals for advanced spine life support, similar to advanced trauma life support, basic life support, and advanced cardiac life support, to unify the treatment approaches, make them systematic, and lower morbidity and mortality rates.

Keywords: Life support, Medical education, Spinal cord injury, Systematic approach, Trauma

INTRODUCTION

Spine conditions can vary from myospasms to life-threatening injuries. They require particular consideration, prompt identification, and appropriate actions. Different modalities are used for treating these injuries, with varying results.

The burden of acute spine conditions and their impacts have been discussed and raised for a long period. Serious pathologies and outcomes can result from these injuries, which may cause a devastating quality of life or even life-threatening. These cases can vary from an apparent injury to a hidden insult, leading to severe consequences if missed or not immediately identified.[1] The reported data are mostly published by regional or national databases, which led to difficulty in having accurate globalized incidence and prevalence of spinal cord injuries. The life expectancy for spinal cord injured patients is dramatically lower than that of the general population.[2]

Traumatic spinal cord injuries are estimated at 40 per million of the population or about 12,400 cases annually in the US. Most of these cases (48%) are due to motor vehicle accidents, followed by falls, violence, sports related, and other causes. In addition, many spinal cord injured patients have associated injuries such as brain, chest, and extremities.[3] Furthermore, many blunt thoracoabdominal traumas are associated with other injuries, and approximately 20% of thoracolumbar injured patients were found to have neurological deficits.[4] Even with the major improvement in management, the morbidity and mortality rates are still considerably high, and life expectancy is lowered significantly.[5]

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For the initial hospitalization, the mortality rate was estimated to be 4–17%. Moreover, it was reported as 3.8% in the 1st year after discharge, 1.6% in the 2nd year, and 1.2% annually after that. The literature also reported that tetraplegia accounts for 31% of the injured patients; 25% had complete paraplegia, 20% had incomplete tetraplegia, and 19% had incomplete paraplegia. The risk of mortality increases by many factors, such as the patient's age, level of injury, associated injuries, and neurological insult.[6]

This brief report highlights the importance of developing advanced spine support courses and manuals to standardize the treatment approaches, make them more methodical, and reduce the variabilities in treating spine injuries to decrease morbidity and mortality rates.

DIFFERENT SPINE PATHOLOGIES WITH DIFFERENT MORBIDITIES AND MORTALITIES

Degenerative changes in the vertebrae, such as degenerative cervical myelopathy, are the most common cause of spinal cord insult. They are progressive by static and dynamic factors that lead to cord ischemia, inflammation, and apoptosis.[6] It has an annual rate of 1.6/100,000 of the population.[7]

On the other hand, spine infection keeps rising in Western countries and reaches 6.5/per 100,000 annually. This increase in cases is attributed to comorbidities and drug abuse.[8] The definite diagnosis may also be delayed because infected cases are challenging and easily missed, leading to permanent spinal cord damage in 2–4 months.[9] The mortality rate of pyogenic osteomyelitis is 6%, while the relapse rate is 32%, and the neurological deficit rate is 32%.[10] In addition, the incidence of epidural abscesses was estimated at 5.1/10,000 admitted patients in a large academic hospital in the US from 2004 to 2014, which shows an increase in the number of cases compared with the prior 10 years.[11] Infected patients have a reported rate of paraplegia of 4–22% and a mortality rate of 5–7%.[12]

The mortality rate in oncological spine cases varies from one case to another depending on the time of diagnosis, type of tumor, histological appearance, stage of the tumor, and its size. However, in neoplastic epidural spinal cord compression, the median survival rate was about six months in the past.[13]

Likewise, the prognosis for spinal deformity is highly variable based on many factors, such as age, the level and nature of the deformity, and associated conditions. These patients may have rapidly progressive curves, neurological insults, core pulmonale, or even death.[14]

Respiratory failure and the need for mechanical ventilation are known to be the most common cause of death in spinal cord injured patients.[15] Other causes with different rates are cardiovascular events, infections, and suicidal attempts due to psychological issues.[16]

Closed reduction of the cervical facet dislocation is a unique procedure that mandates an expert spine surgeon. Its effectiveness in surgical management and improving neurological insults have been reported and approved.[17]

DISCUSSION

Spine cases that need emergent approaches are unique and need special attention and careful care. For instance, it is crucial to know that applying the cervical collar is part of airway (A) security. Mastering the National Emergency X-Radiography Utilization Group criteria and the Canadian C-spine rules is substantial. Both have a high sensitivity rate for assessing the need for keeping the cervical collar and if the patient needs further imaging. Keeping the cervical collar for a long time may increase the risk of aspiration, pressure ulcers, and diminishing respiratory function.[18]

Furthermore, intubating all patients with above C5 complete spinal cord injury is recommended. Furthermore, vital capacity <10 mL/kg or decreasing vital capacity, clinical respiratory distress, or pCO_2 >20 mmHg above baseline are approved indications for intubation. Conversely, incomplete spinal cord injury and the lower levels vary from one case to another.[19] Besides, the intubation itself should have special considerations in the traumatic cervical spine. The patient should be intubated electively by an expert with the awake fiber-optic approach to restrict neck movement.[20] On the other hand, rapid sequence intubation for urgent scenarios with minimizing cervical spine mobility is the recommended option if a cervical spinal cord injury is suspected.[21] In addition, adequacy of oxygenation and ventilation should be considered in those patients due to the loss of diaphragm innervation, and neurogenic shock should be ruled out.[22]

Another example of the uniqueness of the spine approach is considering that all blunt traumatic patients have a spinal injury until proven otherwise. For that reason, all those patients should be provided with spinal immobilization. They should be immobilized with a cervical collar and kept with log-roll precaution or in the High Arm in Endangered Spine position until the spinal injury is excluded. This precaution will prevent the worsening of the insult if it is there, and it may halt further soft-tissue injury. The backboard aims to transfer the patients only. It should be removed immediately once the patient arrives at the hospital to avoid pressure ulcers, which cause higher morbidity and mortality rates, cost, and longer hospital stays.[23]

In addition, the uniqueness of spine cases is that serious pathologies are not only found in the emergency rooms but can also be seen in the clinic or admitted patients for entirely different reasons. The obstacles to reaching the

right treatment are difficulty identifying the condition, ordering the incorrect diagnostic modalities, and applying inappropriate management plans. Red flag findings and emergent cases can be easily and frequently missed in patients with low back pain.[24] This dilemma may have been attributed to knowledge gaps, overlooked clinical manifestations, and cognitive errors. Furthermore, most back pain cases are benign and self-limiting.[25]

Approaching these conditions requires comprehensive knowledge of spine care to make the appropriate decisions. Several guidelines and protocols are reported for acute non-traumatic cases, mainly tumor cases, acute disc herniation or hemorrhagic lesions, and infected cases. They emphasize the timing of spine magnetic resonance imaging, decompression, and the use of empirical antibiotics in infected cases, which are debatable due to many factors, such as the diversity of the references and inter- and intra-observer variations in assessing the diagnostic tools.[26]

Therefore, this report encourages establishing systematic and unified approaches with international courses to improve all front-line healthcare providers' knowledge of these spine injuries and to keep them updated. These courses should cover all traumatic spine cases and other acute cases that cause cord compression or affect the spine's stability due to severe degenerative, infectious, deformity, or oncological conditions. All these conditions should be covered thoroughly by starting with their basic science and biomechanics, followed by approaching these cases radiologically, clinically, and surgically.

One of the best examples in this regard is the Advanced Trauma Life Support (ATLS) approach. Thanks to the ATLS manual and courses, there has been a significant decrease in morbidity and mortality in trauma patients in several countries in different areas of the world since it was established by James Styner (orthopedic surgeon) in 1976 after a tragic plane crash. Training physicians who are not frequently dealing with traumatic cases is one of the most important contributions of this course, which led to a systematic approach and unified language between all providers. The ATLS course is highly recommended to be taught to all physicians who are involved in managing traumatic patients.[27] Basic Life Support (BLS), Advanced Cardiovascular Life Support, and Pediatric Advanced Life Support are other good examples of courses that unify the language and make the approach systematic between all care providers. Many institutions require these courses from certain healthcare providers to make sure that the providers can deal with these life-threatening cases.[28]

CONCLUSION

Spinal conditions need special attention from more experienced physicians with comprehensive knowledge about spine conditions. Therefore, establishing courses and manuals for advanced spine life support, similar to ATLS, BLS, and Advanced Cardiac Life Support, will improve outcomes and decrease morbidity and mortality.

ETHICAL APPROVAL

The Institutional Review Board approval is not required.

DECLARATION OF PATIENT CONSENT

Patient's consent not required as there are no patients in this study.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY FOR MANUSCRIPT PREPARATION

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

CONFLICTS OF INTEREST

There are no conflicting relationships or activities.

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