

Spinal immobilization for the junior doctor

Introduction

The early recognition and correct management of spinal injuries is vital to avoid serious, irreversible long-term consequences. In the 1970s the American College of Surgeons (ACS) devised the Advanced Trauma Life Support course. This was designed to give any doctor the basic knowledge to stabilize any trauma patient in a systematic fashion. These guidelines are still widely accepted as the gold standard for the assessment and initial management of trauma patients throughout the world.

One of the many issues addressed by the ACS was that of spinal immobilization. Following blunt trauma, vertebral column injury is common. It should therefore be assumed that spinal cord injury has occurred until proven otherwise. Without correct immobilization of the spine, an unstable vertebral column can cause or exacerbate a spinal cord injury. Excessive manipulation of the spine during transfer, assessment and management of a trauma patient means that medical intervention can lead to iatrogenic injury.

Spinal injury

In most cases trauma patients will arrive in the accident and emergency department already immobilized by the paramedic team. However, the patient still needs to be transferred from the ambulance to the hospital examining table safely.

Once the spine is immobilized appropriately, examination and imaging of the spine can be deferred while other, more immediately life-threatening problems can be treated. The patient should remain immobilized until spinal injury is excluded.

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A sound knowledge of the natural anatomical position and neuroanatomy of the spine is vital when applying immobilization. Failure to immobilize the spine correctly can lead to further injury.

Immobilization

Spinal immobilization should be applied in such a way as to keep the patient in completely neutral alignment. There should be no rotation, forward or lateral flexion, or extension of any part of the spine. This is most important in the cervical region, where the majority of spinal column injuries occur.

The use of a cervical collar, long spinal board and bolstering devices can limit neck movements by up to 95%. The widely used semi-rigid cervical collar can be placed, after correct sizing, around the neck with minimal manipulation of the patient. They are designed to limit cervical motion to 11° in all planes. They do not provide sufficient immobilization on their own, however.

The long spinal board provides an effective spinal splint. The spinal board is also used to transfer the patient between trolleys and surfaces.

Lastly a variety of bolstering devices and straps keep the patient in neutral alignment on the board or table. The patient's head and neck can be bolstered with specifically designed head blocks placed either side of the head above the shoulders. Makeshift bolsters can be fashioned from saline bags or sandbags. Straps are then used to secure the patient to the spinal board at the forehead, neck, chest, pelvis and ankles.

The log roll

The most difficult and potentially dangerous element of immobilization is the log roll. This technique is used to transfer the patient between surfaces without compromising the integrity of the spine. The initial log roll will be to move the patient from the scene to the ambulance spinal board, and then from the ambulance long board to the hospital table. It is important that the patient is removed from the long spinal board to a firm, padded hospital examination table quickly. Also during

this final transfer, it is a good opportunity to expose and examine the back, thereby omitting another unnecessary movement.

An effective, safe log roll requires at least four trained members of the trauma team. The first person stands at the head of the table immobilizing and maintaining neutral alignment of the cervical spine. This is done by placing one hand on each shoulder and then using their forearms to bolster the patient's head between them. This minimizes cervical motion as much as possible.

The second person's responsibility is to control the torso and arms, thereby stabilizing the thoracolumbar spine. The arms are straightened and placed by the patient's side, palms in, and the clinician holds the shoulder furthest away and stabilizes the wrist against the body.

The third member of the team stabilizes the pelvis and the legs, by holding the hip furthest away, and the ankles which are tied together. The team members controlling the body and legs will stand on the side of the table that the patient is to be rolled towards.

The last person is there to direct the procedure, and also to position or remove the spinal board. They are also in a good position to inspect and palpate the patient's back during the log roll.

At the command of the person controlling the head and neck, the team in unison then rolls the patient towards the clinicians supporting the torso, pelvis and legs. The smallest degree of movement possible should be used to position or remove the spinal board and to inspect the back. The patient is then slowly and steadily lowered back down.

Complications

Spinal immobilization is not without its risks and complications. The purpose of a spinal board is to provide a safe transferring mechanism. They are not designed for the patient to spend any lengthy amount of time on.

As soon as possible the patient should be transferred on to a firm, padded surface, to prevent the formation of ulcers which can develop quickly. This may be compounded if there is a neurological deficit causing areas of anaesthesia.

For this reason it is recommended that the patient is removed from the spinal board in under 2 hours, and should also be regularly log-rolled once off the spinal board. Ulcers tend to form at the areas of most pressure, e.g. sacrum, scapulae, heels and the occiput.

Other risks of spinal immobilization include: difficult airway management; venous obstruction; difficult central venous access and care; decreased enteral feeding and increased risk of pulmonary aspiration.

Conclusions

At present in the UK, there are no specific mandatory guidelines for managing the trauma patient. However the ACS's Advanced Trauma Life Support guidelines are widely used and endorsed by the British Orthopaedic Association and the Royal College of Surgeons.

There is a need for a nationally accepted protocol that should be constructed for accident and emergency, surgical and medical trainees early in their career. **BJHM**

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Further reading

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KEY POINTS

- Spinal cord injury in the trauma patient should be assumed to have occurred until proven otherwise.
- Effective spinal immobilization is paramount to preventing or exacerbating cord injury.
- The log roll should be performed safely and steadily during transfer of patients and evaluation of the spine.
- Spinal immobilization allows the clinician to manage other life-threatening problems, while maintaining the integrity of the spine.
- Spinal boards are recommended for transfer only, and patients should not be left on them for more than 2 hours.

RSM STUDENT MEMBERS' GROUP RESEARCH PRESENTATION

Patterns of apoptosis in malignant cell lines

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Abstract

Introduction

The growth and recurrence of solid tumours appears to be associated with cancer stem cells (CSCs) and tumour recurrence may result from therapeutic failure to destroy the CSC subpopulation. Many therapies act by induction of apoptosis but how they affect CSCs is unclear. Stem cell patterns persisting in cell lines permit comparison of the apoptotic sensitivities of CSCs and their amplifying progeny.

Method

Apoptosis was induced by ultraviolet B irradiation of cell lines derived from oral, breast and prostate carcinomas. Apoptotic rates were assessed by phase contrast microscopy, by staining for cleaved Caspase 3, and by fluorescent activated cell sorting using CD44 as a CSC marker. All lines showed increased apoptotic rates 6–24 hours following ultraviolet B exposure.

Amplifying cells, identified as colonies of large, loosely scattered cells (Locke et al, 2005), showed more apoptosis than CSCs, which were identified as colonies of small, closely packed cells. Apoptosis could be induced in CD44+ cells but fluorescent activated cell sorting analysis indicated a many-fold higher resistance. It was also observed that colonies with CSC characteristics emerged with time

after exposure to high levels of ultraviolet B radiation.

Conclusions

These results support the possibility that tumour recurrence may result from therapeutic failure to kill apoptotic-resistant CSCs. **BJHM**

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