CLINICAL PROFILE OF PATIENTS WITH TRAUMATIC THORACOLUMBAR SPINE FRACTURE ADMITTED AT A TERTIARY CARE HOSPITAL

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Abstract

Spinal cord fills about 50% of the canal in the thoracolumbar segments. The remainder of the canal is filled with Cerebrospinal fluid, epidural fat and meninges. The spatial relationships of grey and white matter structures remain consistent throughout the length of the cord, but the proportions change based on the level. All the patients had routine X-rays of thoracolumbarspine in both Anteroposterior and Lateral views.In all the patients MRI spine and 3D CT ofspine with 2mm thick film uploaded in navigation machine which gives 3D image of the vertebrae. After registration in navigation machine, the pedicle screw trajectory, size and length planned and placed in the center of the pedicle.In our study we had 69.23% males and 30.77% female patients in conventional method and had 84.61% males and 15.39% female patients in navigation method. The average age was 36 years and 29 year in conventional method and navigation method respectively, with male predominance in each group.

Keywords:clinical profile, traumatic, thoracolumbar spine fracture

Introduction

The human spine also known as vertebral column is made of individual units called vertebra. The name vertebral column is derived from its appearance when viewed from the front it really looks like a column. Basic knowledge of the spinal column's osseoligamentous and neurological structures is essential to understand and evaluate trauma to spine. It helps the surgeon to assess the relative stability of the injury, the risk of an associated neurological deficit, and the specific treatment needed [1].

The development of human spine starts with the onset of the trophoblastic stage of the embryo and ends in the third decade of life. The vertebral column is formed from the sclerotomes of the somites.We have seen that the paraxial mesoderm becomes segmented to form a number of somites that lie on either side of the developing neural tube. A cross-section through a somite shows that it is a triangular structure and has a cavity[2].

Pedicles are the strongest part of the vertebra and integrity of the pedicle is an important factor in the selection of the screw and its placement. Pedicles serve as the load transmitting struts between the neural arch and the vertebral body. They are the strongest part of the vertebra. Anteriorly they attach to superior portion of the lateral aspect of the posterior surface of the body. Posteriorly they are attached at the pars interarticularis. It consists of outer cortical bone and inner cancellous medulla[Spinal cord fills about 50% of the canal in the thoracolumbar segments. The remainder of the canal is filled with Cerebrospinal fluid, epidural fat and meninges. The spatial relationships of grey and white matter structures remain consistent throughout the length of the cord, but the proportions change based on the level. The vertebral level and the spinal cord level do not correspond to each other[4].

From T1 to T6 the spinal cord level lies 2 levels above the vertebral body level. T7 to T9 it is 3 levels above. Two T10 to T12 vertebral levels correspond to lumbar myomeres. The conus medullaris containing the sacral and coccygeal myomeres is dorsal to L 1 and L 1-2 disc.

Spinal cord ends at L1 L2 disc. It ends as conus medullaris. Below this cauda equina continues (motor and sensory roots of lumbosacral myomeres). Till L1 cord trauma, root injury or both may cause the neurological deficits. Below L1, it is entirely caused by root damage.

Methodology

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All the patients were initially assessed in the outpatient departmentor casualty according to their presentation and then they underwent a detailed evaluation of their hemodynamic, spine, neurological status and other injuries if associated with trauma. The patients and their attendant were interviewed, their epidemiological, historical, subjective and physical findings were noted.After initial investigations and haemodynamic stabilization, patients were assessed neurologically in detail. A neurological chart was maintained for each patient.

All the patients had routine X-rays of thoracolumbarspine in both Anteroposterior and Lateral views.In all the patients MRI spine and 3D CT ofspine with 2mm thick film uploaded in navigation machine which gives 3D image of the vertebrae. After registration in navigation machine, the pedicle screw trajectory, size and length planned and placed in the center of the pedicle.

The pre-operative neurological status was graded on the basis of ASIA grading. It was also used to assess post-operative recovery and follow-up.

The indication for the surgery was spinal instabilityfor which instrumentation was needed to restore spinal stability and to protect neurological elements.

Inclusion criteria

1. Age group >18yrs.
2. Traumatic thoracolumbar unstable fractures with neurological deficits.

Exclusion criteria

1. Age < 18 yrs.
2. Traumatic cervical spine fractures and sacral spinal fracture.
3. Spinal instability due to congenital spinal abnormality.
4. Patients not willing for surgery.
5. Medically unfit for surgery.
6. Pathological fracture.
7. Traumatic thoracolumbar unstable fractures treated with method other than pedicle screw fixation.

Preoperative work up

1. Plain radiograph
i) Anteroposterior views.
ii) Lateral view
iii) To assess extent of degeneration, instability, mechanism of injury, fracture pattern and its severity and canal compromise or deformity.

2. Magnetic resonance imaging (MRI) was useful in determining
i) The condition of the spinal cord following trauma
ii) Any soft tissue encroachment (intervertebral disc) of the spinal Cord.

Pre-operative preparation

Patient shifted in Operation Theater after overnight nil per oral, local part preparation, well informed consent, xylocaine sensitivity test, with bowel preparation, urinary catheter applied and adequate hydration maintainedProphylactic intravenous antibiotics were given. In supine position general anaesthesia with endotracheal intubation was administered.

Results

Table 1: Age distribution

Age (Year)	Conventional Method	Navigation Method
18-20	01	03
21-30	04	04
31-40	04	05
41-50	03	01
>51	01	00
Total	13	13

Table 2: Sex distribution

Sex	Conventional Method		Navigation Method	
	No.of Cases	Percent	No.of Cases	Percent
Male	09	69.23%	11	84.61%
Female	04	30.77%	02	15.39%
Total	13	100%	13	100%

Table 3: Type of fracture (AO Classification)

Classification offracture	Conventional Method		Navigation Method	
	No.of Cases	Percent	No.of Cases	Percent
Type A	12	92.3%	12	92.3%
Type B	00	0%	00	0%
Type C	01	7.69%	01	7.69%
Total	13	100%	13	100%

Table 4: Level of Fracture

Level of Fracture	Conventional Method		Navigation Method	
	No.of Cases	Percent	No.of Cases	Percent
D10	01	7.69%	00	0%
D11	00	0%	00	0%
D12	03	23.07%	06	46.15%
L1	08	61.83%	05	38.46%
L2	01	7.69%	02	15.39%
Total	13	100%	13	100%

Table 5: Mode of injury

Mode of Injury	Conventional Method		Navigation Method	
	No. of Cases	Percent	No. of Cases	Percent
RTA	01	7.69%	01	7.69%
Fall from Height	11	84.61%	12	92.31%
Fall of Object	01	7.69%	00	00%
Total	13	100%	13	100%

Discussion

In our study we had 69.23% males and 30.77% female patients in conventional method and had 84.61% males and 15.39% female patients in navigation method. The average age was 36 years and 29 year in conventional method and navigation method respectively, with male predominance in each group. Gregory F. Alvine*et al.* in their study found that average age was 31 years, with a male predominance. Nasser M.G, *et al.* in their study found that average age was 28.8 years with a male predominance.Rick C. Sasso*et al.*, in their study had 77% males and 23% females with a mean age of 34 years.Razak M, *et al.* in their study found that average was 30 year[5].

In our study we noted 84.61% patients in conventional method fall from a height and 92.31% patients in navigation method fall from a height. Road traffic accident was the second commonest cause with 7.69% of patients in both conventional and navigation method. Nasser M.G, *et al.* in his study noted that the main cause of injury was fall from a height and road traffic accident was the second commonest. Gregory F. Alvin *et al.* noted that in 52% of patients injuries resulted from fall from a height, in 39% patients due to road traffic accidents and 9% due to fall of heavy objective. Razak M, *et al.* in his study noted that 69% of injuries were caused from fall from height, 31% due to road traffic accident[6].

In our study we had 92.31% of patients in conventional method and100% in navigation methodfractures between T11-L2 levels.7.69% of patients in conventional method with fractures betweenT1-T10 levels. Nasser M.G. *et al.* in their study noted that the commonest vertebrae to be fractured were L1 comparable to our study. Gregory F Alvine*et al.*, noted that in 72.5% of cases the injury was at level of T11-L2. Rick C. Sasso*et al.*, noted that in 80% of cases the injuries were at T11-L2 levels. Razak M *et al.*, noted thatin 92% of cases the injuries were at the L1 and L2 vertebral levels[7].

In our study we found 92.13% of patients with AO Type-A fractures, 7.69% with AO Type-C fractures in both conventional and navigation method.Nasser M.G. *et al*. in their study noted 76% of patients with Type-A, 8% with Type-B and 16% with Type-C.Rick C.Sasso*et al*.noted that 62.5% had AO Type-B and 37.5% had AO Type-A fractures.Gregory F.Alvine*et al*. noted that Type-B fractures were seen in 57.5% of patients Type-A in 22.5% and 20% Type-C. Nasser M.G. *et al*., in their study noted 76% of patients with Type-A, 8% with Type-B and 16% with Type-C.Rick C.Sasso*et al*., noted that 62.5% had AO Type-B and 37.5% had AO Type-A fractures.Gregory F.Alvine*et al*. noted that Type-B fractures were seen in 57.5% of patients Type-A in 22.5% and 20% Type-C[8-10].

Conclusion

- Thoracic and lumbar spine fractures are more common in the 2nd and 3rd decade of life with malepredominance due to outdoor activities.
- The commonest mode of injury was fall from a height.
- Thoracolumbar region is the most common site for spinal fracture.

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