Case Report

CAN DENIS CLASSIFICATION IN VERTEBRAL TRAUMA OF THE CHILDHOOD BE A VALID THERAPEUTIC CHOICE? A CASE REPORT AND A LITERATURE REVIEW.

Antonio Medici (2), Gabriele Fazarano (2), Giacomo Errico (3), Vincenzo Lucio Roberto (5), Raffaele Franzese (4), Alessandro Martino (6), Carmine Petrucci (6), Francesco Boscaino (6), Sara Cioffi (3), Raffaele Cioffi (3), Maria Liberata Meccariello (3), Arianna Falzarano (7), Luigi Meccariello (1)

1. Department of Medical and Surgical Sciences, and Neuroscience, Section of Orthopedics and Traumatology, University of Siena, University Hospital “Santa Maria alle Scotte”, Siena, Italy.

2. U.O.C. Orthopedics and Traumatology, Azienda Ospedaliera “Gaetano Rummo”, Chief: Gabriele Falzarano, Benevento, Italy.

3. IIInd University of Study of Napoli, Napoli, Italy.

4. Orthopaedic Clinic, IIInd University of Study of Napoli, Napoli, Italy.

5. Freelance Orthopaedic and Traumatology

6. Freelance Medical Doctor

7. Medical School, Vasile Goldiș Western University of Arad, Arad, Romania.

Corresponding Author:
Luigi Meccariello, MD
Department of Medical and Surgical Sciences, and Neuroscience, Section of Orthopedics and Traumatology, University of Siena, University Hospital “Santa Maria alle Scotte”, Viale Bracci 1, 53100 Siena, Italy.
E-mail: drlordmec@gmail.com; Cell: +39 329 9419574.

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ABSTRACT

Introduction: Denis Classification is commonly used in vertebral fractures, but does it have limitations in childhood?
Case presentation: A 3 years old and 5 months girl with politrauma from car accident. She reports: fractures of the vertebral somes from T1 to T7 and compression of the spinal canal as evidenced by MRI and CT scan associated with a compound fracture of the right clavicle.

Discussion and Conclusions: The classification of Denis, although intuitive and validated for spinal trauma in adults, cannot give a clear therapeutic approach in a traumatized spine in growth.

Key Words: Child Politrauma, Child Spine Trauma, Spine Bust, Danis Classification, Thoraco-lumbar fractures, MRI in Child Spine Fractures.

INTRODUCTION

The vertebral trauma in childhood are less common of the adult spinal trauma, although less frequent are still burdened with higher mortality due to the interest of the cervical spine[1]. This is mainly due to anatomical variances in the pediatric spine. The first traumatic cause of mortality spinal trauma in childhood remains the car accident[2]. In association with the difficulties of communication with a pediatric patient, a wide range of clinical and radiographic variants makes it difficult to correct diagnosis and treatment. Most clinicians use to frame the vertebral pediatric trauma classification of three columns of Denis[2]. This case report aims to show the predictive limits Denis classification in the outcome of spinal trauma at multiple levels in a child of 4 years.

PRESENTATION OF THE CASE

A three years and five months girl leads to the Emergency Department of the AORN Gaetano Rummo, Benevento, Italy, with the diagnosis of Politrauma by car accident with high energy impact. The patient, at the time of the car accident was properly positioned in child seat according to the rules of the road. It was performed a MRI (Fig.1) a CT scan (Figure 2) a XR of the clavicle. MRI and CT scan showed the fracture of somes T1 to T7 with compression of the medullary canal, of the back wall of somes of T5 T7, integrity of the posterior longitudinal ligament, not suffering in medullary layer. The total body XR shows the compound fracture of the right clavicle which is treated with a bandage to 8 and it is then healed in the canonical 30 days. In the absence of neurological injury but with compression and edema of the channel therapeutic choice was instead very complex. Both with the classification of Denis with TLISS we had not made the right decision. It was decided, to 7 days seeing the evolution of the neurological picture, to opt for conservative treatment in 3 points bust. After 3 months of it has come to healing (Figure 3) of the fractures and a modest framework of kyphosis of the spine that is going to correct with Physiokinesitherapy.

DISCUSSION AND CONCLUSIONS

The development of the thoracolumbar spine in children is simpler than that of the cervical spine. We must take account of an increase in the ratio of cartilage to bone, the presence of the ring apophyses and finally hyperelasticity of vertebral body. In the infant and early childhood, the vertebræ are largely cartilaginous radiographically intervertebral spaces appear widened compared to the vertebral bodies.

Leventhal et al.[3] have shown that in the infant and in the young child cervical vertebral bodies work as a series of elastic cartilage that can be extended up to 5 cm without damage, whereas cervical spinal cord, less elastic, tolerates only 6 mm in traction. This differential elasticity is probably the ideal proportion for expressing the frequency of spinal cord injury without spinal bone lesions in children, both in the cervical and thoraco-lumbar spine[4].

MRI confirms the medullary damages in the absence of bone lesions. Within 8-10 years, the thoracolumbar spine has acquired the biomechanical properties similar to those of adults, with the exception of a late progressive development of spinal deformities. Paralytic scoliosis occurs in almost all children who receive a complete spinal cord injury before the start of puberty[5]. The possible causes are precisely the injury to the vertebral cartilaginous body growth as well as muscle imbalance, spasticity and influence of gravity [6]. As in the neck, the thoracic laminectomy increases the probability of a progressive kyphosis of 36% [7]. The reduction in the diameter of the disc and the spontaneous interbody fusion after injury is rare in children [6]. Considering these elements can be said there is a great chance for the initial conservative treatment of the spine in children than adults. According to what is written above and to the treated case, the classification of Denis does not lead to a suitable choice of therapy for the treatment of thoracic vertebral trauma in the infant. In the literature we have the description of many pediatric clinical cases associated with lesion of seat belt[1].
Baaj et al.[8] indicate a case of spinal surgery on the fracture type Chance of L2 in a child of 6 years. They indicate that the nonoperative treatment is desirable, in most cases of type fractures type Chance, but surgery is sometimes justified to reduce the progression to kyphosis and the neurological deterioration. Internal fixation with pedicle screws has been widely used in the surgical repair of this injury. The authors report a 6 year old girl who suffered of a trauma of L2. At 18 weeks of follow-up, the girl continued to be free of any neurological deficit the structure of the spine remained stable at XR dynamics. The authors then described a feasible therapeutic option in the treatment of fractures of the cervical spine. Unfortunately we have to consider in our case a surgical stabilization even minimum, was not possible, even if Denis classification of fractures leads us to surgery, seeing the different levels involved. If you make a parallel with the treatment of scoliosis can also be understood that early surgery at long stabilization, can carry to a total deficit accretion of the cervical spine.

Compression fractures heal rapidly with low tendency to further progression in kyphosis. So, for a severe trauma from asymptomatic neurological point of view it is sufficient the treatment with a period of bed rest or immobilization in a cast or a bust[9]. Many children can be treated at home or need of a short period of monitoring in the hospital. Occasionally attends bedsores within busts[10]. Finally, we can say that the classification of Denis in thoracic spine trauma in childhood is not predictive of the outcome and that only in extreme cases it can come to the surgery.

Images:

Fig1. : MRI in ST2 and STIR shows fracture and compression of T5 and T7 vertebral somes with compression of the medullary canal and integrity of the posterior longitudinal ligament.

Fig.2: CT SCAN performed in emergency: it shows T5 and T7 fractured vertebral somes.
Fig. 3: MRI in ST1 and ST2 showing healing of fractures of T5 and T7 vertebral somes with modest kyphosis.

References


