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JISAR NEWS
8th issue!

JISAR Welcomes...

SPINE SURGEON

Dr. Vijay S, MS Orthopaedics,
Fellow of Spine surgery (CMC Vellore)

We are glad to inform you that **Dr. Vijay S** (MS ortho, Fellow of Spine surgery (CMC Vellore) has joined our team of spine surgeons at JISAR, adding to our efforts to give the best possible care for patients undergoing treatment for spinal disorders at our institute.

PAIN MANAGEMENT SPECIALIST

Dr Shivanna Venkataramana,
MBBS, MD (PGIMER),FRCA(UK), FIPP,
Consultant Anaesthesia and Chronic Pain

We at JISAR believe that common spinal disorders like low back pain, neck pain and radicular pains without deficit can be treated non-operatively. In this regard we are happy to bring to your notice that **Dr Shivanna Venkataramana,** (MBBS, MD (PGIMER),FRCA(UK), FIPP, Consultant Anaesthesia and Chronic Pain) has joined JISAR as the Interventional pain management specialist and would be catering to all patients at JISAR requiring relief from pain. This takes us a further step towards our efforts to make JISAR an institute catering to all needs of patients with spinal disorders.

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2. Pang D, Dias MS, Ahab-Barmada M. Split cord malformation: Part I: A unified theory of embryogenesis for double spinal cord malformations. Neurosurgery. 1992 Sep;31(3):451-80.

JISAR
Jain Institute of Spine-care And Research
(A unit of Bhagwan Mahaveer Jain Hospital)
BHAGWAN MAHAVEER JAIN HOSPITAL BANGALORE SERVICE TO THE PEOPLE

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QUARTERLY NEWSLETTER AND SPINE-CARE UPDATE

ADDRESSING CHALLENGES IN DEFORMITY CORRECTION

Congenital Spinal deformities are commonly associated with anomalies of spinal cord

Can the spinal cord anomaly and the deformity be addressed in a single stage surgery?

Dr. Mahesh
M.S. (Ortho) AIIMS,
New Delhi
Spine Surgeon

Dr. Upendra B.N
M.S. (Ortho) AIIMS,
New Delhi
Spine Surgeon

Dr. Anand Jayaraman
MRC Psych (UK)
Consultant Psychiatrist

Dr. Dr. Vijay. S
MS (Ortho): Spine
Fellowship (CMC Vellore)
Spine Registrar

Dr. Shivanna Venkataramana
MBBS, MD (PGIMER), FRCA(UK), FIPP
Consultant Anaesthesia and Chronic pain

Dr. Rajkumar Mahan
Resident, JISAR

Mrs. Leena
Secretary
& Co-ordinator

For Circulation Among Medical Professionals Only
Appointments: 9900020262 | T: +91 80 4087 5555 , 4093 0444 | Email : jisarspine@gmail.com | www.spinebangalore.com

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ADDRESSING CHALLENGES IN DEFORMITY CORRECTION

One of the most challenging surgeries in the field of spine is the correction of spinal deformities. The following facts make a surgeon think twice before venturing into a scoliosis or kyphosis correction surgery.

1. Patients with spinal deformity are relatively younger with most of them in their adolescence. Their ability to lead a productive life ahead depends on the outcome of the deformity correction surgery.

2. As a surgeon, Deformity correction surgery is highly demanding, involving extensive and long exposure of the spine and technically challenging instrumentation in the bent spine. Severe deformities further require spinal osteotomy and/or decompression of the spinal cord. Single surgeon performing severe deformity correction surgery, faces the uphill task of maintaining his concentration, despite exhaustion for the crucial part of the surgery involving correction of deformity over a free hanging spinal cord after the osteotomy (Fig 1).

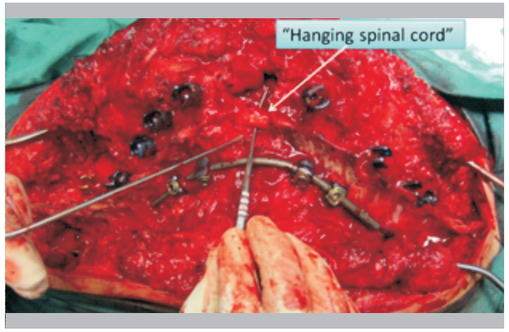

Fig 1: Vertebral column resection (VCR) osteotomy completed and two segments of the spine held by temporary rod with the spinal cord hanging freely in-between. The crucial step involves correction of the deformity with minimal manipulation of the cord.

3. Many spine surgeons, though capable, usually find themselves in an inadequate setup with inexperienced staff and anaesthesia team for performing severe deformity correction surgeries.

We at JISAR have been fortunate to develop a team of well trained spine surgeons along with a team of anaesthesiologists familiar with spine surgery including severe deformity correction surgeries which involve longer operative time and significant blood loss. In addition, severe deformity surgeries require intraoperative real time monitoring of spinal cord functioning to guide the surgeon on magnitude of deformity correction that can be safely attempted. ***Today, intraoperative neuro-monitoring (IONM) has become an indispensable aspect of standard practice, required internationally, for safely performing spinal deformity surgeries (SRS Consensus Statement).***

In our own experience, intraoperative neuromonitoring (IONM) has given us added confidence in deciding the extent of deformity correction that can be done safely. We also are one of the few centers in the country to have dedicated and trained personnel (Dr.Rajkumar Singh Mahan) for interpreting and performing various modalities of IONM like TcMEPs, SSEP, EEG etc.
In our first and sixth newsletters we had presented few of our severe deformity correction surgeries including the difficulties and complications we encountered. We firmly believe that with a good co-ordinated team of surgeons, anaesthetists, theatre staff, neuromonitoring personnel and customized/standardized deformity instrumentation, we can not only address severe deformities in a safer way but also take up further challenges in the field of spinal deformities.

FURTHER CHALLENGES

Apart from Idiopathic scoliosis, the other most common cause for spinal deformity is the congenital malformation of vertebrae. This leads to crooked growth of the spine early in life and often the patient comes to us at an advanced stage with severe deformity. About 15-20% of patients with congenital deformities have associated spinal cord anomalies in the form of tethered cord syndrome or

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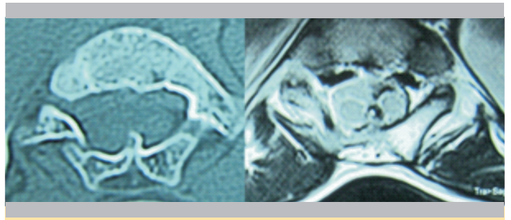
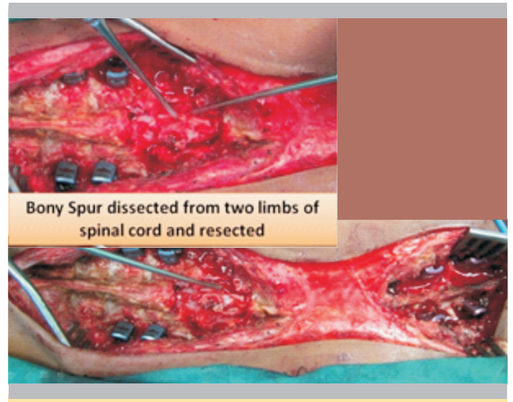
CASE 4

A 7 year girl with diastematomyelia and progressive thoracolumbar scoliosis was counseled and operated simultaneously with bony spur release and growth rod application.

CASE 4 :
Preoperative x-rays and clinical pictures with multiple vertebral anomalies. Postoperative radiographs show growth rod application with 80% deformity correction done under neuro-monitoring.



CASE 4 :
CT scan and MRI showing diastematomyelia with incomplete bony bar separating the two cords



CASE 4 :
Intraoperative pictures of growth rod application and bony spur resection done simultaneously for the patient.

CASE 4 :
Preoperative and 6 month's postoperative clinical pictures of the patient. Note the maintenance of coronal balance with re-growth of lumbar tuft of hair.

About 80-85% correction of the curve was achieved with gradual distraction under intraoperative neuromonitoring of spinal cord.

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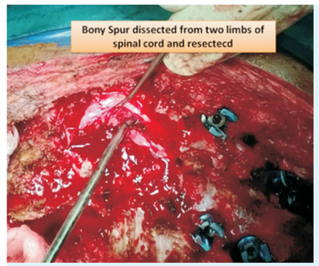
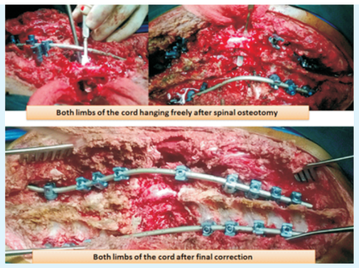
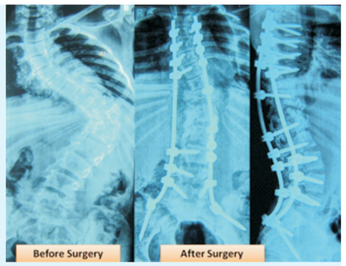
CASE 1 :



CASE 1 :
Intraoperative picture showing resection of bony spur



CASE 1 :
Stages of spinal osteotomy and final deformity correction, after removal of diastematomyelia bony spur.

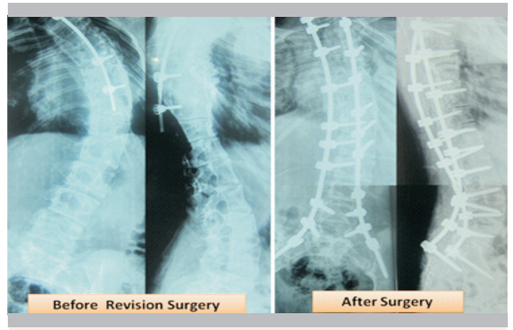


CASE 1 :
Preoperative and postoperative radiographs showing T3 to Ilium fixation with about 80% deformity correction and good restoration of coronal and sagittal balance.

The entire procedure was done under spinal cord neuromonitoring and there was slight decrease in the concave side MEPs during osteotomy closure. Appropriate measures to decrease the concave side tension were taken and the patient had no significant deficit postoperatively and started walking from second day postoperatively. The girl had pleural effusion and chest infection 1week postoperatively and recovered by 3-4 weeks with antibiotics. She is currently under follow-up and has started to go to school.

CASE 2

This case has been included to show the difficulty the patient faces and we as surgeons face if the diastematomyelia and deformity correction are not addressed in the same setting. She was a girl of 15 years with diastematomyelia and spinal deformity with previous multilevel dorsal Laminectomy for spur resection and convex short segment fusion, performed at a different centre. The patient came with severe progression of the curve with both frontal and sagittal imbalance. After adequate counseling the patient underwent vertebral column resection osteotomy with T1 to Ilium fixation and deformity correction. During the surgery we had to carefully dissect the two limbs of the thoracic cord from the bone with overlying Laminectomy scarring. This dissection is easier and much safer if there is no scarring of previous surgery.



CASE 2 :
Note the ineffectiveness of short convex fusion with severe deformity preoperatively. Postoperative radiographs show restoration of frontal and sagittal balance with T1 to Ilium fusion.

CASE 2 :
Preoperative CT scan showing Long segment thoracic Laminectomy with convex instrumented fusion.

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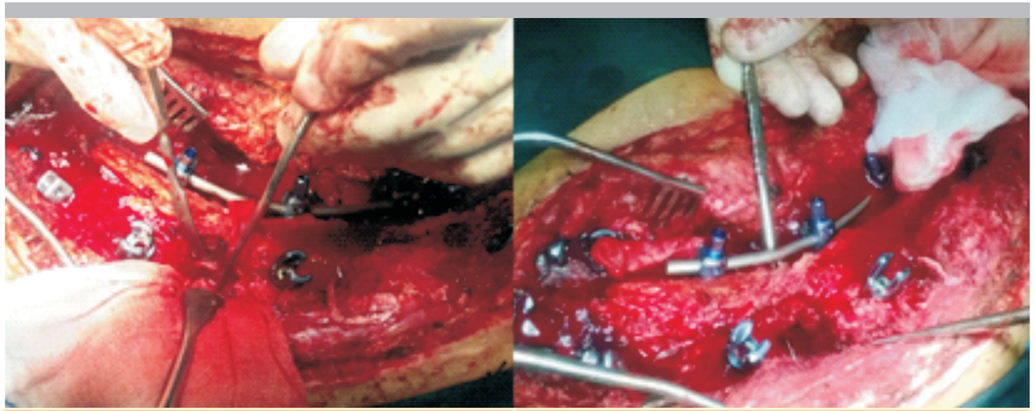
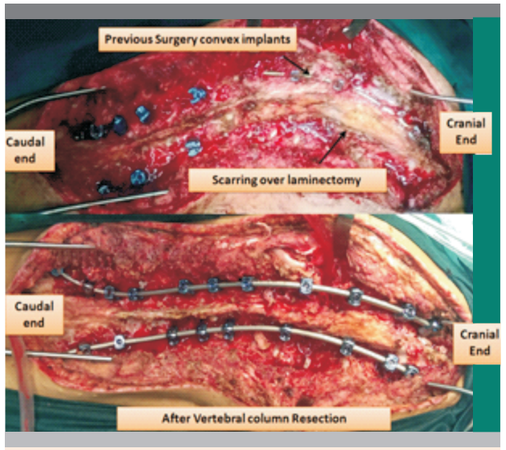
CASE 2 :



Vertebral column Resection Osteotomy in progress

Vertebral column Resection Osteotomy completed with cord and laminectomy scar freely hanging

CASE 2 :
Intraoperative pictures of the spinal osteotomy and the difficulty in dissection of neural structures with the previous scar.



CASE 2 :
The pictures of deformity after exposure and after final correction with T1 to Ilium fixation giving better frontal and sagittal balance.

CASE 2 :
Preoperative and postoperative clinical pictures. Note the frontal balance and the space gained for thorax and abdomen.

Hence, we genuinely feel that such patients need to undergo the deformity correction surgery in the same setting of diastematomyelia release. The entire procedure was done under spinal cord neuromonitoring and no changes in the signals were observed intraoperatively. The patient did well and had about 80% correction of her deformity.

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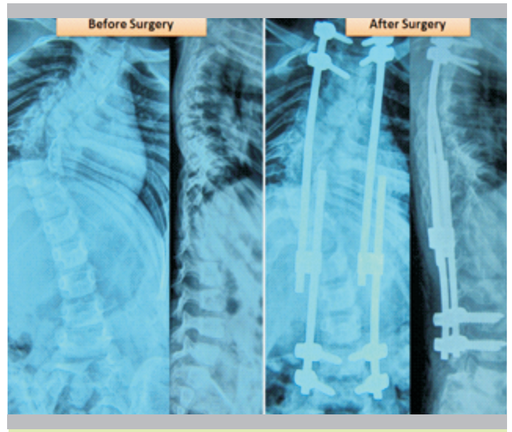
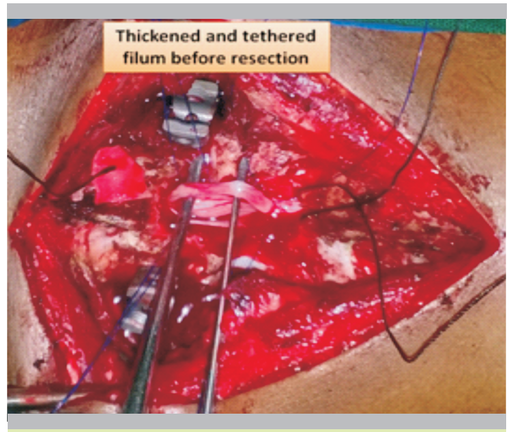
CASE 3

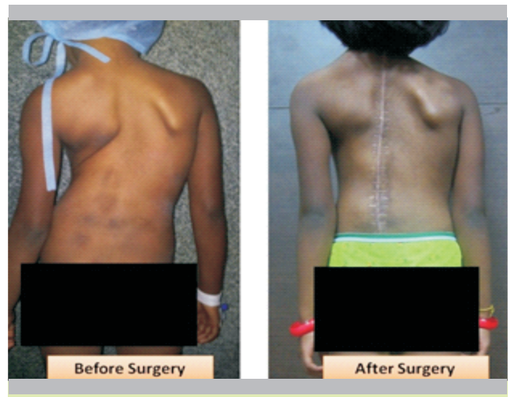
Since cord anomalies occur with congenital malformed bones, the spinal deformity develops to a severe extent at a very young age in some patients. Patients less than 10 years with severe progressive congenital deformities require maintenance of spinal growth in addition to deformity correction. Today we have advanced techniques in spinal deformity correction surgery where we can not only correct the deformity but also maintain the growth of the spine in young children. The child shown below had relentless progression of her deformity with a tethered cord. She underwent detethering of her cord and application growth rods for deformity correction simultaneously in the same setting.



CASE 3 :
6 year old girl with severe thoracolumbar congenital scoliosis with Frontal imbalance and tethered cord on MRI.



CASE 3 :
Intraoperative picture showing thick filum being dissected and resected.



CASE 3 :
Clinical photographs of the girl preoperatively and 1 month postoperatively. Note the correction of the frontal balance.

CASE 3 :
Preoperative and postoperative radiographs showing about 50% correction of the curve to minimize the stretch on the detethered cord.

Note that the deformity is not corrected more than 50% in the final radiographs. This is to avoid undue stretch on the cord after release of the tethering. The entire procedure was carried out under intra-operative spinal cord monitoring which guided us on the amount of deformity correction we could safely attempt without undue stretch on the cord. The girl did well postoperatively and is going to school without any bracing. She is due for her first growth distraction procedure to maintain her spinal growth.

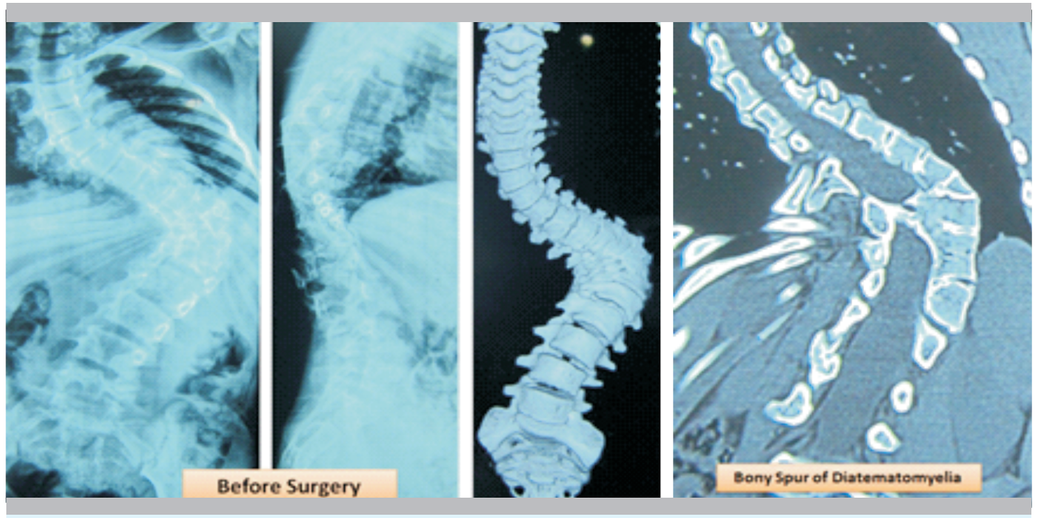
diastematomyelia (Split cord malformations SCM1). All patients with associated cord anomalies usually undergo surgery in two stages with the first stage addressing the spinal cord anomaly and the second stage addressing the spinal deformity. This is essential to prevent abnormal stretch on the cord with tethering or by the spur of diastematomyelia while correcting spinal deformity. However this entails two surgeries for the patient with added morbidities.

There have been very few reports of performing both the surgeries simultaneously in the world literature (Largest - 13 case series1) and none from India. The advantage of performing both the surgeries are well acknowledged1 as it not only decreases the morbidity of two surgeries but also reduces the risk of neurological deficit by fibrous retethering and inadvertent cord stretch during deformity correction. However, performing both the surgeries simultaneously puts an enormous challenge on the operating team, theater staff and anesthetists with further prolongation of operative time and extensiveness of the procedure.

WE AT **JISAR HAVE BEEN SUCCESSFUL** IN ATTEMPTING A FEW OF SUCH **CASES AND PRESENT** THEM BELOW.

CASE 1

A 13 year old girl came to us with severe progressive thoracolumbar kyphoscoliosis and diastematomyelia (Split cord syndrome with bony spur (SCM-I). The parents were counseled about both the problems the girl was suffering from and the surgeries required for both. She underwent resection of the bony spur with careful dissection of the two limbs of the spinal cord PLUS vertebral column resection and kyphoscoliosis correction in a single setting. Her preoperative and postoperative radiographs with intra-operative spur resection pictures are shown below.



CASE 1 : Preoperative radiographs and CT scans showing diastematomyelia and severe thoracolumbar kyphoscoliosis.