

## TWO STAGE RESECTION OF HEMIVERTEBRAE FOR THE TREATMENT OF CONGENITAL LUMBAR SCOLIOSIS

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### SUMMARY:

*Hemivertebrae, being one of the leading causes of congenital scoliosis following unilateral unsegmented bars, may change in number, localization and type. Especially fully segmented ones with lumbosacral localizations lead to lumbar take-off and secondary non-structural curves which deteriorate progressively intra-spinal and other congenital anomalies must be carefully evaluated in order to avoid any kind of possible neurological injury, before planning the treatment schedule.*

*We are going to present a patient, 12 years of age who admitted to our clinic with the complaints of left knee pain and limp. Her routine evaluation revealed a lumbar scoliosis of 38° with a fully segmented L4 hemivertebra. Tethered cord was apparent on the M.R.I. Patient had no abnormal neurological findings other than tight hamstrings on the left side.*

*Surgical treatment is planned and at first a posterior approach was utilized for the release of the tethered cord and removal of posterior elements of the hemivertebra. In a week an anterior procedure is combined excising the remaining corpus with anterior fusion and instrumentation (Z-Plate).*

*At the post-operative 16th month, the curve was reduced to 6° and there was no complication.*

**Key words:** Scoliosis, Congenital, Hemivertebrae, Two Stage resection.

Hemivertebrae, causing varying degrees of scoliosis is a result of unilateral failure of formation. It is the second most important reason of congenital scoliosis following unsegmented bars (3, 4, 7). It can vary in number, localization and type. Mc Master has stated that the degree of scoliosis depends mostly on the type of hemivertebrae. Also in decreasing manner number, relationship to each other, and the age of the patient effects the degree of scoliosis (9).

Fully segmented hemivertebrae is the most common type which has the greatest potential for progression and have to be treated early by surgical means whereas incarcerated hemivertebrae are usually treated with conservative means (6, 9).

Posterior fusion, hemiarthrodesis, hemiepiphysiodesis and soft tissue release on the concave site are

surgical treatment modalities (1, 5, 10, 14). Resection of hemivertebrae was first described by Royle 1928. Afterwards Compera reported two successful resection in 1932. In 1988 Winter reported his series with 42 patients. Despite the two step surgical procedure was founded to be safer, successful results were also obtained by one step surgical procedure (3, 4, 8, 9, 12, 13, 14).

### MATERIALS AND METHODS

All patients with the diagnosis of congenital scoliosis that attended to are asked about their complaints and their neuralgical examination is made carefully. Bilateral radiological examination of the vertebra is made. Afterwards if a surgical operation has been decided then a Magnetic Resonance Imaging (M.R.I.) or if necessary a myelography is performed. Somatosensory Evoked Potentials. (S.E.P.) defines the neuralgical state of the patient. Renal Ultrasonography (U.S.G.) and Intravenous Pyelography (I.V.P) are performed to define the accompanying congenital anomalies.

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The degree of the scoliosis is measured by the Cobb method and for the follow up the progression, measurements have to be made with short intervals.

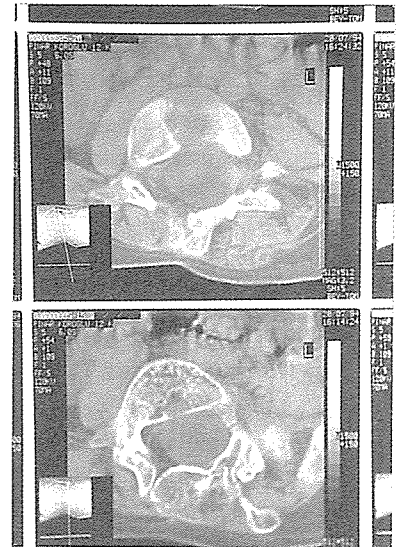
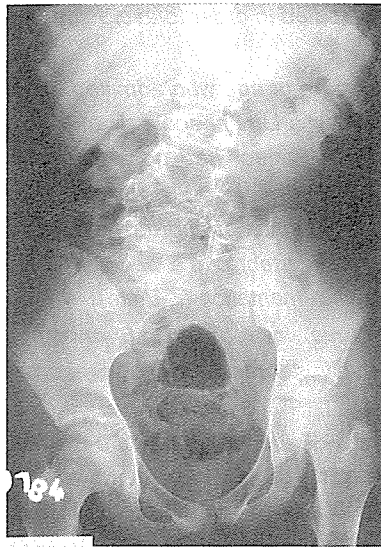
**CASE REPORT**

12 years old girl has attended to our clinic with left knee pain and gait disturbance. Her routine examination have revealed a left lumbar congenital scoliosis secondary to a completely segmented hemivertebrae in L4. The degree of scoliosis was measured as 38° (Fig. I A, B, C).

Physical examination showed no additional congenital anomalies. A left thigh hamstring muscle

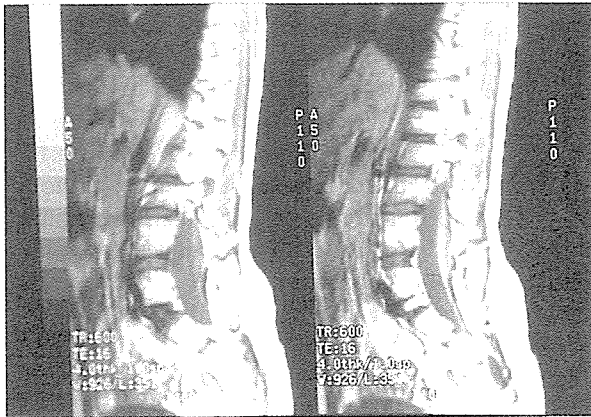
group has been found in neurological examination. Preoperative MRI proved tethered cord. There was no diastematomyelia (Fig. I D, E). Renal U.S.G. and I.V.P. were completely normal.

On consultation with Neurosurgery department, we decided to release the tethered cord anomaly before any correction is done. By a posterior route all contracted fibrous bands were released. Spinal cord release has resulted in a 2-2.5 cm proximal migration. All posterior elements related to the hemivertebrae has also been resected (Fig. I F). Peroperatively a wake-up test was performed to evaluate the neuralgical status. Then a halo femoral traction was used for a week.



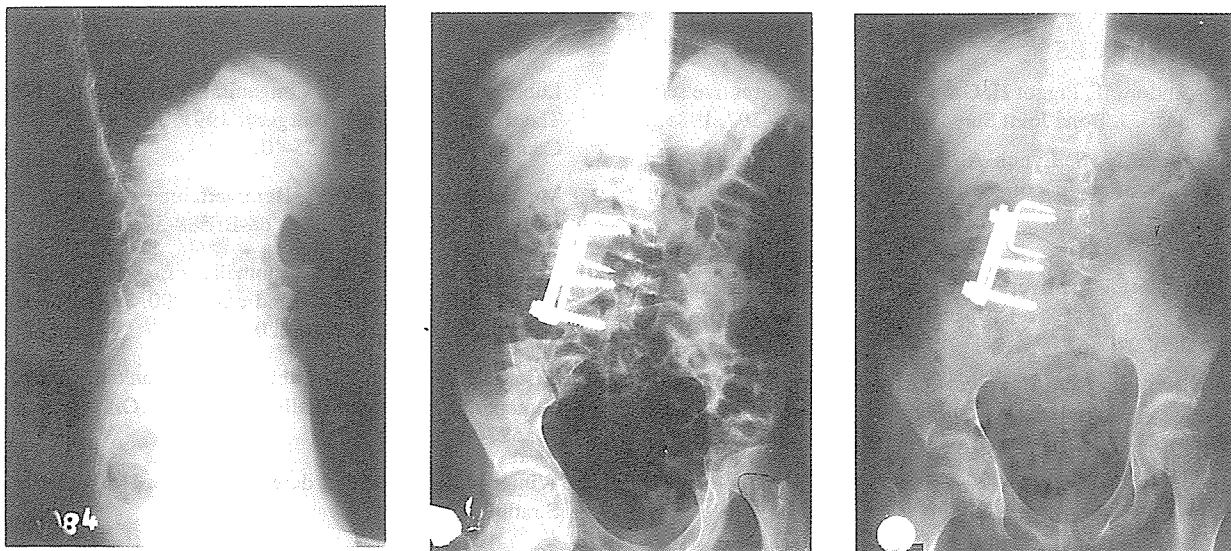
A, B: L4 hemivertebra on admission, 38° lumbar scoliosis on standing X-Ray. A.P. and lateral.

C: C.A.T. of the hemivertebra, note the disorganized posterior elements.



D, E: M.R.I., coronal and sagittal sections, note the tethered cord in the latter.

Fig.1. 12 years old female patient, 2 stage resection of the hemivertebra.



F: Lateral view of lumbar colon after the removal of posterior elements.

G, H: Post operative 4th. and 16th. months following curve is reduced to 6° on standing X-Ray.

Fig.1. 12 years old female patient, 2 stage resection of the hemivertebra.

Second surgical procedure was done by an anterior retroperitoneal route, hemicorpus was resected. Internal fixation with Z plate was done after correction of the deformity.

Postoperative mobilization was allowed as soon as possible with a rigid brace which is used for 4 months. S.E.P. was found to be normal. Patient is still under follow-up at the postoperative 16th month with no complication and the curve is reduced to 6° (99% correction) (Fig. I, G, H).

## DISCUSSION

The treatment of curves in congenital scoliosis due to hemivertebrae is still controversial. The most important prognostic factor is the type of the hemivertebrae (9). Several authors have reported that a completely segmented hemivertebra with disk space on both sides of the corpus causes progressive scoliotic curve. Thoracic localization has a better prognosis when compared with its lumbar and thoracolumbar junction localization (1, 11, 13).

Resection of the hemivertebrae is the most radical surgical treatment modalities. Because of the possibility of developing serious neurological complications it is a demanding surgical procedure. This procedure is indicated mostly for single, fully segmented hemiver-

tebrae in lumbar region which causes secondary compensating curves (3, 7, 8, 10, 13, 14).

Performing this procedure by either one stage or a two stage (first anterior then posterior) resection is still controversial. Two stage resection is safer with reduced neurological complication rates (7, 13).

Most serious complication is neurological deficiency. Although root compression is more common, total paraplegia can also be seen following one stage surgical resection. Preoperative evaluation of intraspinal pathologies and their treatment are essential (2, 6, 10, 12).

We had released the tethered cord before any surgical correction is done. Because of this pathology, first step was a posterior surgical procedure instead of an anterior procedure. Perioperative monitoring of spine or wake-up tests are essential. Otherwise treatment of neurological complications can be impossible.

As a result we could state that two stage resection of the hemivertebrae is a safe procedure, when preoperative assessment is carefully done. Although total correction of the congenital scoliosis is usually impossible, with highly selected indications, removal of a single hemivertebrae with arthrodesis can result in total cure, especially for lumbosacral localizations.

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