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CASE REPORT

SCOLIOSIS DEFORMITY CORRECTION: CASE REPORT

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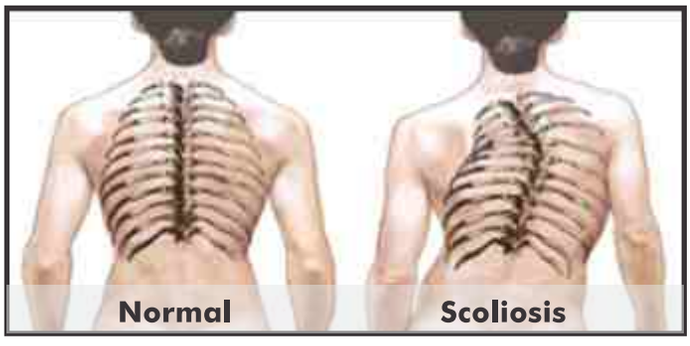
Abstract -

Scoliosis is a disease that often occurs in childhood and adolescence. It causes the spine to curve abnormally to one side or the other and it resembles the letter S or C, whereas a normal spine is straight. When the spine curves the vertebral bones rotate and this may result in a rib prominence if the curve is in the thoracic part of the spine. If left untreated, the spine may become severely deformed and in extreme cases the heart and lungs may become affected. This case was not amenable for bracing or casting as it was a major and progressive curve with cosmetic deformity. Hence a deformity correction surgery was planned.

Key Words - Spinal cord, Scoliosis, Correction.

Introduction



This surgery was performed at sancheti hospital Pune by Dr Ajay Kothari and Dr Ketan Khurjekar.Under general anesthesia patient positioned prone over padded bolsters. Posterior midline incision taken over deformity.Subperiosteal elevation of muscles done. Strategic pedicle screws inserted from T4 to L4 vertbrae. Rods applied to the screw heads. Direct vertebral rotation maneuver done and deformity corrected.

In children, scoliosis may be congenital or idiopathic. Congenital curves are caused by a vertebral defect in the early development of the spine when in utero, whereas idiopathic scoliosis occurs without a known cause. Idiopathic scoliosis is classified as infantile, juvenile and adolescent. Infantile scoliosis occurs before three years of age and is more common in boys. Many cases resolve on their own without treatment, while some may progress to severe deformity. Juvenile scoliosis occurs between the ages of three and ten, and is more common in girls. These curves often require surgical intervention because they are at high risk for progression. Adolescent Idiopathic Scoliosis (AIS) more commonly occurs in females between the age of ten to maturity and may become apparent during puberty. It often progresses during periods of the adolescent growth spurt.

Early diagnosis of scoliosis may help to prevent the progression of curvature and deformity. A thorough history of any underlying personal or family medical conditions that may be associated with scoliosis should be reviewed by a physician. The patient's age, onset of puberty and in females, the first menstrual period is important to determine the remaining spinal growth and risk for progression. Patients should then be assessed for any other neurological symptoms including pain, numbness or tingling, weakness and any loss of control of bowel and bladder functions.

A thorough physical exam provides information about the health of the patient and their spine. The exam includes observing the patient for any abnormalities including overall balance of the spine, relative shoulder and pelvis height, as well as spinal curvature and rib cage deformity. The Adam's Forward Bending Test allows the clinician to view, from behind, any prominences the patient may have while the patient bends forward at the waist. A significant rib hump can be measured in degrees by a Scoliometer. A careful neurologic exam is performed to ensure that the spinal cord and nerves are functioning properly. This includes strength and sensation testing, as well as an examination for abnormal reflexes.

Radiographs of the entire length of the spine are taken from both the front and the side to determine the magnitude, in degrees, of the spinal curve (known as the Cobb angle), overall alignment and future growth potential. Abnormalities of the vertebrae may be noticed in congenital curves. Bending X-rays may be taken to help determine flexibility of curves.

A plan of treatment is determined by the overall analysis of the patients age, history, physical exam, remaining growth, curve type and magnitude, expected progression of the curve and overall appearance. Small curves that are not expected to progress may not require treatment and may be followed by interval X-rays. Often, a brace is recommended for children with curves in the 20 – 40 degree range. The braces are usually worn in the range of 16-23 hours a day. Braces are used to help prevent progression of curves, but do not cure scoliosis. Curves in the 45-50 degree range and higher are often treated surgically. The goal of surgery is to correct deformity and prevent progression. Metal rods with screws and/or hooks and wires may be used to correct the curvature while the process of spinal fusion occurs. Excellent results can be expected with this type of procedure. Whether treatment is with serial X-rays, careful observation, bracing or surgery, close and careful follow-up with a physician is essential to achieving desired results.

Case Report -

12 year old female presented with chief complaint of deformity in back. Mother noticed it 2 years ago following which it was progressively increasing. This girl was the second child of the couple born out of first degree consanguineous marriage. She had right thoracic scoliosis with coronal decompensation. Head was not balanced over pelvis. Right shoulder was at higher level.

She had no neuro deficit. Radiographs taken are special films called whole spine scanograms in anteroposterior and lateral view along with push prone view. Whole spine scanogram enables us to calculate the cobs angle (angle of deformity), coronal or sagittal imbalance and to identify primary and secondary curves. Push prone view tells us how flexible or rigid the deformity is. In this case the cobs angle is approximately 70 degrees. Push prone films demonstrated the deformity getting corrected to 45 degrees.

This case was not amenable for bracing or casting as it was a major and progressive curve with cosmetic deformity. Hence a deformity correction surgery was planned.

This surgery was performed at Sancheti Hospital, Pune by Dr. Ajay Kothari and Dr. Ketan Khurjekar. Under general anaesthesia patient positioned prone over padded bolsters. Posterior midline incision taken over deformity. Subperiosteal elevation of muscles done. Strategic pedicle screws inserted from T4 to L4 vertbrae. Rods applied to the screw heads. Direct vertebral rotation maneuver done and deformity corrected.

Pre- Surgery **Post Surgery**

Pre op x-ray **Post op x-ray**

Discussion -

Scoliosis from Ancient Greek:"obliquity, bending"[1,2] is a medical condition in which a person's spine is curved from side to side. Although it is a complex three-dimensional deformity, on an X-ray, viewed from the rear, the spine of an individual with scoliosis can resemble an "S" or a "?", rather than a straight line.[3]

Scoliosis is typically classified as either congenital (caused by vertebral anomalies present at birth), idiopathic (cause unknown, sub-classified as infantile, juvenile, adolescent, or adult, according to when onset occurred), or secondary to a primary condition.[4]

Secondary scoliosis can be the result of a neuromuscular condition (e.g., spina bifida, cerebral palsy, spinal muscular atrophy, or physical trauma) or syndromes such as Chiari malformation.[5]

Recent longitudinal studies reveal that the most common form of the condition, late-onset idiopathic scoliosis suffer more commonly from lower back pain [6] however their health is physiologically unharmed and self-limiting.[7][8] Larger curves (greater than 60 degrees) of scoliosis pose risks of complications including cardiopulmonary comprimise.[9]

The deformity may begin in the intervertebral discs, producing distortions in the epiphyseal cartilage which may influence the end of growth and therefore the deformity of the vertebrae, resulting in wedging and rotation of the vertebrae.[10,11]

Signs and symptoms

The signs of scoliosis can include:

- Uneven musculature on one side of the spine
- A rib prominence or a prominent shoulder blade, caused by rotation of the ribcage in thoracic scoliosis
- Uneven hips, arms or leg lengths
- Slow nerve action (in some cases)

Causes -

An estimated 65% of scoliosis cases are idiopathic, about 15% are congenital and about 10% are secondary to a neuromuscular disease.[12]

Adolescent idiopathic scoliosis has no clear causal agent, and is generally believed to be multifactorial, although genetics are believed to play a role.[13][14] At least one gene, CHD7, has been associated with the idiopathic form of scoliosis.[14][15]

Studies in 2006 showed evidence of a linkage between idiopathic scoliosis and three microsatellite polymorphisms in the MATN1 gene (encoding for Matrilin 1, cartilage matrix protein), respectively consisting of 103, 101 and 99 base pairs, .[16]

Congenital scoliosis can be attributed to a malformation of the spine during weeks three to six in utero. It is a result of either a failure of formation, a failure of segmentation, or a combination of stimuli.[17]

Scoliosis secondary to neuromuscular disease may develop during adolescence, such as with tethered spinal cord syndrome.[18] Scoliosis often presents itself, or worsens, during the adolescence growth spurt and is more often diagnosed in females than males.

Diagnosis -

Scoliosis is defined as a spinal curvature of more than 10 degrees to the right or left as the examiner faces the patient (in the coronal plane). Deformity may also exist to the front or back (in the sagittal plane).

Patients who initially present with scoliosis are examined to determine whether the deformity has an underlying cause. During a physical examination, the following are assessed to exclude the possibility of underlying condition more serious than simple scoliosis

The patient's gait is assessed, and there is an exam for signs of other abnormalities (e.g., spina bifida as evidenced by a dimple, hairy patch, lipoma, or hemangioma). A thorough neurological examination is also performed, the skin for café au lait spots, indicative of neurofibromatosis, the feet for cavovarus deformity, abdominal reflexes and muscle tone for spasticity.

During the examination, the patient is asked to bend forward as far as possible. This is known as the Adams forward bend test[19] and is often performed on school students. If a prominence is noted, then scoliosis is a possibility and the patient should be sent for an X-ray to confirm the diagnosis.

As an alternative, a scoliometer may be used to diagnose the condition.

When scoliosis is suspected, weight-bearing full-spine AP/coronal (front-back view) and lateral/sagittal (side view) X-rays are usually taken to assess the scoliosis curves and the kyphosis and lordosis, as these can also be affected in individuals with scoliosis. Full-length standing spine X-rays are the standard method for evaluating the severity and progression of the scoliosis, and whether it is congenital or idiopathic in nature. In growing individuals, serial radiographs are obtained at three- to 12-month intervals to follow curve progression, and, in some instances, MRI investigation is warranted to look at the spinal cord.

The standard method for assessing the curvature quantitatively is measurement of the Cobb angle, which is the angle between two lines, drawn perpendicular to the upper endplate of the uppermost vertebra involved and the lower endplate of the lowest vertebra involved. For patients with two curves, Cobb angles are followed for both curves. In some patients, lateral-bending X-rays are obtained to assess the flexibility of the curves or the primary and compensatory curves.

Management -

The traditional medical management of scoliosis is complex and is determined by the severity of the curvature and skeletal maturity, which together help predict the likelihood of progression.

The conventional options are, in order

1. Observation
2. Physiotherapy
3. Chiropractic
4. Occupational therapy
5. Casting (EDF)
6. Bracing
7. Surgery

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