Anterior fusion for thoracic scoliosis

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Introduction

A major advantage of anterior instrumentation in Adolescent Idiopathic Scoliosis (AIS) is its ability to preserve one or more distal motion segments as compared to the posterior approach (1). In general, fusions can be stopped at the end vertebra using an anterior construct but it needs to be extended to the neutral or the stable vertebra when a posterior approach is used (1). The other advantage of anterior correction is restoration of near normal sagittal balance and complete correction of rotation. Moreover, the blood loss and transfusion are minimal. Anterior corrective instrumented fusion is indicated in Lenke Type 1 and Type 5 scoliosis, with Cobb angle <80 degrees. This procedure is safe even in skeletally immature patients.

Case description

A seventeen year old boy presented with a gradually progressive deformity of the spine since two years. There was

no back pain or neurological symptoms. His standing AP and lateral radiographs demonstrated a right thoracic scoliosis from T5 to T12 with Cobb angle of 41 degrees. Side bending radiographs showed correction of the deformity to 23 degrees. No cord or vertebral anomalies were seen on the MRI.

Surgical procedure

The patient is positioned on the left lateral position with kidney break. The 5th rib is marked prior to cleaning and draping. The skin incision was made in a curvilinear fashion paralleling the 5th rib till the anterior axillary line and extended distally along the anterior axillary line till the 9th rib. The latissimus dorsi and serratus anterior were divided along the line of skin incision from the angle of scapula down to the ribs. A decision to make a double thoracotomy was made as the number of levels to be instrumented and fused was eight. The proximal thoracotomy was done along the upper border of the 5th rib after elevating the periosteum. The pleura was incised along the upper border of the rib to avoid the intercostal nerve and vessels in the lower border. The distal thoracotomy was planned at the 7th rib level. Similarly, the periosteum was elevated from the 7th rib and the posterior three-fourths of the rib was resected as far posterior as necessary. The thoracotomy was made along the bed of the 7th rib. The intercostal space was opened with a rib retractor. The lung was retracted after adequately protecting it with moist pads. The anterolateral part of the spine was thus exposed. The parietal pleura over the spine was incised from the upper border of T5 till the lower border of T12, exposing the intervertebral discs, the vertebrae & the segmental vessels and retracted using malleable retractors, protecting

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the great vessel and the mediastinal structures. The segmental vessels in the mid portion of the vertebral body were clamped and divided. The discectomy was done at all levels between T5 & T12. The anterior longitudinal ligament and the posterior longitudinal ligament were preserved. Thorough cleaning of the endplates were done using ring curettes to obtain bleeding surfaces, taking care not to breach them. All the disc spaces of the levels to be fused were prepared in a similar fashion. This makes the curve more flexible. The rib heads from 5th to 9th ribs were excised to enhance the rotatory correction (4). The entry points for the screws were made in the middle of the vertebral body laterally, at the intersection of anterior 2/3rds, posterior 1/3rd. The screws were directed perpendicular to the axis of the body and angled appropriately according to the rotation. Adequate sized screws were inserted to get bicortical purchase. A straight rod was cut to measured length and contoured to the desired sagittal profile. This rod is then fixed from the proximal screw to the distal screw by cantilevering and secured with locking caps. The rod was then rotated to achieve the desired sagittal profile. The cantilevering and the rod rotation correct the scoliosis in the frontal, sagittal and the axial planes. Morselised rib graft (7th rib) was placed at all disc levels and an end to end compression was achieved at all levels. At the distal most level a cage was placed to achieve parallelity. The set screws were tightened to secure the rod in the corrected position. The moist pads were removed and the lungs were inflated to relieve all the atelectasis. A chest tube was inserted and the intercostal muscles were closed by approximating the ribs with a towel clip. The muscle, subcutaneous tissue and skin was then closed in layers.

Post-op procedure

The chest tube was removed when the drainage decreases to less than 50 ml for two consecutive 8 h period. The

patient was mobilized after the chest tube removal and no brace was recommended. The patient was taught chest physiotherapy and deep breathing exercises.

Discussion and conclusion

Anterior thoracoabdominal approach affords excellent exposure and correction possibilities. It is a safe procedure with minimal blood loss and low risk of neurological injuries. Although there are reports of increased morbidity in the older literature, recent papers have shown that the pulmonary function returns to near normal levels at 3 months post operative. Horizontalization of the disc space of the end instrumented level is important to achieve a well balanced postoperative spine. The anterior correction gives the best three dimensional correction of the scoliotic spine in select cases.

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