

POSTERIOR WEDGE OSTEOTOMY FOR TREATMENT OF SEGMENTARY KYPHOSIS

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Segmentary kyphotic deformities, not uncommonly caused by Pott's disease, trauma, and congenital kyphoscoliosis, are classically treated by conventional surgical methods: i.e. combined anterior and posterior approaches. For these hyperkyphotic deformities, one session posterior wedge osteotomy is an alternative method to classical ones. Twentyfour patients (13 men, 11 women, mean age 18.3 years) diagnosed as having segmentary kyphotic deformities were operated using posterior wedge osteotomy techniques from May 1991 to May 1994 in SSK İstanbul Hospital IInd Orthopaedics and Traumatology Clinics. Longest follow-up period was 32 months, shortest was 6 months (mean 18 months). Preoperative mean kyphosis angle was 68 degrees, and postoperative was 21 degrees. Fusion was detected radiologically in all cases, within 6 months. Evaluation of three patients showed 15 degree correction loss in whom anterior fusion was delayed problems related to instrumentation material was not seen. Clinical assesment of the patients according to Denis Pain and Work Scale showed excellent and good results except of one patient in whom complete paraplegia developed in early postoperative period. Improvement of neurologic deficit of the patient was up to Frankel D level in latest follow-up. With proper and experienced surgical technique posterior wedge osteotomy provides necessary correction and is effective as combined classical method is. Furthermore, being one session operation makes it more advantageous both for the patient and the surgeon.

Key Words: Kyphosis, wedge osteotomy.

Classically, combined anterior and posterior approaches are the basic surgical techniques to correct deformities in sagittal plane caused by several factors, that is to say, congenital kyphosis, congenital scoliosis, rigid Scheuerman kyphosis, Pott's disease, and fracture sequela (6, 10).

Localized kyphotic deformities, particularly those appearing in early ages and progressing later on comes out with rigid structure during adolescent period and necessitates major operations with unexpected terrible complications, for treatment.

Resection of a part of vertebrae were first declared by Rayle in 1928, and later on Leckum and Smith were performed two stage operation in 1933. Smith-Peterson described posterior vertebral osteotomy for treatment of ankylosing spondylitis patients in 1945. Total vertebral osteotomy declared by La Capella in 1946 (1, 5, 5).

In this study, we aimed to declare the results obtained from our patients operated by using wedge osteotomy technique from posterior route, which is to correct the deformity as effective as combined anterior and posterior route without a need of second major operation, and to discuss the outcome of this operative

technique for treatment of localised rigid kyphotic deformities (3).

PATIENTS AND METHODS

Twenty-four patients (13 men, 11 women, mean age 18.3) diagnosed as having segmentary kyphosis due to congenital kyphoscoliosis. Scheuermann Kyphosis, Pott's disease, or fracture sequela were operated and posterior wedge osteotomy, posterior fusion and instrumentation were performed from May 1991 to May 1994 in SSK İstanbul Hospital, IInd Orthopaedics and Traumatology Clinics.

In our series, etiologic factor for development of rigid localised kyphosis was diagnosed as congenital scoliosis for 6 patients. Scheuermann kyphosis for 3 patients, Pott's disease for 7 patients fracture sequela for 8 patients (Table 1). Eighteen patients were examined and evaluated at latest follow-ups in May 1994. The longest follow-up period was 32 months, and shortest was 6 months (mean 18 months).

Table 1. Etiologic Distrubution of Patient

Etiology	Number of Patients
Congenital Kyphoscoliosis	6
Scheuermann Kyphosis	3
Pott's Disease	7
Fracture Sequela	8
Total	24

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Preoperative mean kyphosis angle was measured as 68 degrees (53 degrees to 93 degrees) and mean scoliosis angle for kyphoscoliotic patients was 43 degrees (38 degrees to 54 degrees) (Table 2).

Table 2. Mean Kyphosis Angle.

	Mean Angle (Degrees)
Preoperative	68
Follow-up	43

Operation Procedure:

In our method following classical posterior approach the apical vertebrae of kyphotic deformity is detected, and through removal of lamina, facet joint, and spinous process, spinal cord and nerve roots are exposed. Wedge osteotomy of which apex is in anterior part and base in posterior is performed later on. The extend of wedge osteotomy differs depending on severity of kyphotic deformity, and may be extended to include upper and lower vertebrae of the apex up to anterior longitudinal ligament. Removal of lamina should not be extensile, but be large enough large enough to be able to visualise spinal cord.

Following completion of osteotomy, posterior instrumentation of the vertebral column is done by using pedicular hooks and screws, and rods. During this process and compression of the canal nor stretching or compression (accordion effect) of the cord. Attention should be paid to safely guard the original length, which is the length before compression or distraction of system, of spinal cord.

Being provided correction and stabilisation, routine posterolateral fusion (decortication) should proceed on vertebral column. If any space is left empty at osteotomy site after correction of deformity, graft is inserted from posterior site through posterolateral edge to anterior and anterolateral vertebral column, while observing anterior and anterolateral aspect of spinal cord not to cause compression of cord and obstruction of canal. Another important point to be kept in mind is that upper and lower disk space of the osteotomy site should be removed.

In our series Coutrel Debousse and Modified Stable System instrumentation materials were used.

RESULTS

Clinical assessments of patients were done according to Denis Pain and Work Scale Patients were eval-

uated radiologically in preoperative, early postoperative and latest follow-up period by measuring kyphosis and scoliosis angle, and searching for progression of fusion.

Preoperative mean kyphosis angle was measured as 64.2 degrees, and postoperatively at latest follow-up was 21 degrees. In patients having kyphoscoliotic deformity, mean correction angle in frontal plane was 30.7 degrees. Overall correction loss was 4 degrees, except 3 patients of which correction loss was 15 degrees.

Fusion was detected within 6 months in all patients. In 3 patients with excessive correction loss delayed fusion occurred at anterior osteotomy site due to insufficient grafting.

Except in one patient having kyphotic deformity due to Pott's disease sequel, postoperative neurological deficit was not observed. Complete paraplegia was detected in that patient, and early postoperative removal of the implants were performed. Neurological problem of that patient was improved later on and at latest follow-up, neurologic examination of the patient was at Frankel D level.

DISCUSSION

Segmentary kyphotic deformities due to several different factors develop especially during early years of life and comes out in adolescent period as advanced rigid deformities (7, 10, 14). Classical method for treatment of these pathologies is combine anterior and posterior approaches either in one session or in two separate sessions. This classical method, especially for advanced rigid kyphotic or kyphoscoliotic deformities, has some technical limitations.

By using posterior wedge osteotomy method, deformity may effectively be corrected in one session along with both anterior and posterior fusion, and posterior stabilisation. during this process, spinal cord can safely be observed and guarded. Separation and cutting of posterior longitudinal ligament may easily be done through this approach.

If proper operative technique is used carefully by experienced operators, the risk to cause neurologic deficit is not greater than as it is in other methods. In patients with kyphotic or kyphoscoliotic deformity due to Pott's disease sequel, the possibility of causing postoperative neurologic problems is thought to be higher. Infection in posterior part of vertebral body generate granulation and scar tissue that adheres spinal cord and without appropriate release of these tis-

sues, attempt to correct the deformity increases bending and compression of spinal cord, i.e., development of postoperative neurologic deficit. During the operation of the patient with kyphotic deformity due to Pott's disease sequel, who had neurologic deficit in early postoperative period, granulation tissue adhered to spinal cord was detected, too.

Search of recent literature showed us that Domanic et al used this technique for several cases and declared short term good results (11).

La Chapella (1946), Adam (1952), Herbert (1959), Law (1959), Dickson (1979), Mc. Master (1985), Steib (1986) used posterior osteotomy or combined posterior and anterior osteotomies especially for ankylosing spondylitis patients (1, 4, 5, 8, 9, 13, 15).

As a result, posterior wedge osteotomy, especially for patients with hyperkyphotic rigid deformity, is an effective operation for both correction and stabilisation of the deformity.

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