Management of Scheuermann's Kyphosis

Essay
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By
Mohamed Mahmoud Mohamed Abd El-Monem
M.B.B.Ch.
Faculty of Medicine
Cairo University

Supervised by
Prof. Dr. / Youssry ElHawary
Professor of Orthopedics
Faculty of Medicine
Cairo University

Prof. Dr. / Mohamed Omar Soliman
Professor of Orthopedics
Faculty of Medicine
Cairo University

Faculty of Medicine
Cairo University
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List of Abbreviations

Abb.	Meaning
ALL	Anterior Longitudinal Ligament
BMD	Bone Mineral Density
CNS	Central Nervous System
CSF	Cerebrospinal Fluid
DEXA	Dual-Energy X-Ray Absorptiometry
EZ	Elastic Zone
FSU	Functional Unit of the Spine
FVC	Forced Vital Capacity
IAR	Instantaneous Axis of Rotation
MEP	Motor Evoked Potentials
MRI	Magnetic Resonance Imaging
MS	Motion Segment
NZ	Neutral Zone
PFZ	Pain Free Zone
PI	Pelvic Incidence
ROM	Range of Motion
SS	Sacral Slope
SSEP	Somatosensory Evoked Potentials
TLSO	ThoracolumbosacralOrthosis

Abstract

The spine in patients with a variety of spinal deformities. It is important to be able to recognize the type and underlying cause of the deformity so that the most appropriate osteotomy can be chosen.Sometimes they are needed for correction of severe rigid scheuermann's kyphosis.The surgeon performing a spinal osteotomy should attempt to correct sagittal alignment to at least 25° of lumbar lordosis. To achieve this level of lordosis in the lumber spine, any hooks used in the lumber spine should be put under compression, and distraction should be avoided. Furthermore the surgeon should attempt to correct plumb coronal alignment to <2.5 cm. In this way a predictable improvement in functional outcome can be expected with the amount of deformity correction achieved. An estimation of the degree of the correction obtained intraoperatively is difficult despite intraoperative portable radiographs, and as a result, there is tendency to overestimate the degree of correction, especially in the sagittal plane

Keywords:MRI- DEXA-FVC-MEP- Scheuermann's Kyphosis

Introduction

In adults, the cervical curve is a lordosis (convex forwards), and the least marked. The thoracic curve is a kyphosis (convex dorsally). The lumbar curve is also a lordosis[(1)].

It is generally accepted that normal thoracic kyphosis ranges from 20° to 50° and normal lumbar lordosis ranges from 20° to 65° with increasing fractional lordosis in the caudal segments[(2)].

Scheuermann's kyphosis was reported in 1920 by Scheuermann as an idiopathic condition of the thoracic spine characterized by irregularities of thoracic discs with resultant thoracic vertebral body wedging and kyphosis[(3)].

The radiographic changes seem in the spine include anterior wedging, schmorl's nodes, vertebral endplate narrowing, and endplate irregularities[(4)].

The hallmark finding on radiographs remains an increase in the sagittal kyphosis of the thoracic spine measured by the Cobb's angle between the superior endplate of T2 and the inferior endplate of T12 in the presence of other radiographic findings[(5)].

Management of the disease depends of the severity of the deformity, the presence of pain and the age of the patient. Adolescents with kyphosis less than 60 degrees when need intensive exercise program with close radiological follow up.Those with kyphosis over 60 degrees Milwaukee is added to the management[(6)].

Surgical management is recommended when the curve is greater than 80 degrees with painful back of failing to correct with brace. Several approaches and instrumentations have been used[(7)].

Goals of surgery are to normalize segmental sagittal lordosis in patients with Type 1 deformity and in patients with Type 2 deformity, to

improve sagittal balance by centering the C7 vertebral body over or behind the lumbosacral disc by restoring lumbar lordosis to 10° to 30° greater than thoracic kyphosis for the given patient. This desired balance of thoracic kyphosis and lumbar lordosis are based on the normal range of data previously published by *Bernhardt and Bridwell*[8].

The surgeon performing a spinal osteotomy should attempt to correct sagittal alignment to at least 25° of lumbar lordosis. To achieve this level of lordosis in the lumber spine, any screws used in the lumber spine should be put under compression, and distraction should be avoided. Furthermore the surgeon should attempt to correct plumb coronal alignment to <2.5 cm. In this way a predictable improvement in functional outcome can be expected with the amount of deformity correction achieved. An estimation of the degree of the correction obtained intraoperatively is difficult despite intraoperative portable radiographs, and as a result, there is tendency to overestimate the degree of correction, especially in the sagittal plane[9].

Anterior release was recommended in skeletally mature patients or in patients with rigid curves where discs excision and grafting are done either via an open approach or thoracoscopically[10].
Improved union rates and correction have been shown to occur with combined anterior and posterior fusions[10].

Posterior instrumentation with segmental pedicle screws systems has improved the postoperative results compared to other device[10].

It has to be underlined the fact that the greater the degree of restoration of lumber lordosis, the better the functional outcome. It also should be understood that spinal osteotomies are difficult procedures with a high

complication and reoperation rate but that one can expect significant improvement in functional outcomes after surgery. It should be reiterated that such surgery is best performed in a tertiary care setting by an experienced team [11].

Aim of the Work

- Review of literature and recent publication on scheuermann's kyphosis and its management.

- Comparing different modalities for surgical management of Scheuermann's kyphosis as regard indications and outcome.

- Finding out optimal surgical management for scheuermann's kyphosis.

CHAPTER ONE

ANATOMY OF THE SPINE