شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

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Pulmonary function before and after surgical correction of scoliosis

Thesis

Submitted for Partial Fulfillment of Master Degree
In Chest Diseases

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List of Abbreviations

AIS.....Adolescent idiopathic scoliosis

ERV .....Expiratory reserve volume

FEF.....Forced expiratory flow

FEV1 .....Forced expiratory volume in the first second

FRC .....The functional residual capacity

FVC .....Forced vital capacity

IC.....The inspiratory capacity

IRV .....Inspiratory reserve volume

PFTs .....pulmonary function tests

R.V .....Residual volume

T.V.....Tidal volume

TLC.....Total lung capacity

VC.....Vital Capacity

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INTRODUCTION

Scoliosis is a three-dimensional deformative abnormality of the spine. Approximately 85% of cases are idiopathic ***(Johari et al., 2016).*** Based on the age of presentation, scoliosis is further categorised as infantile, juvenile or adolescent idiopathic. Adolescent idiopathic scoliosis (AIS), which accounts for the majority of the three categories, presents at age ten and lasts till the end of growth ***(Tsiligannis et al., 2012).*** Its prevalence is dependent on the curvature of the spine and gender of the patient, and is higher among females, who have been observed to have more severe curvature ***(Cza prowski et al., 2012).***

There is substantial interest in the relationship between spinal deformity and pulmonary function due to the potentially high rates of morbidity and mortality when progressive scoliosis results in pulmonary impairment. Decreasing pulmonary function is a major concern in progressive severe scoliosis. Once documented, the progression of scoliosis needs to be addressed to arrest thoracic cage deformity and concomitant pulmonary compromise ***(Davidson et al., 2012).***

Thoracic cage deformity can arise intrinsically from fused ribs and/or secondarily from the curvature, rotation

and shortening of the thoracic spine. Severe thoracic cage distortion leads to extrinsic restrictive lung disease from the diminution of lung volume under the convex rib hump and on the concave side, where the ribs impinge on the lung ***(Negrini et al., 2014).*** Thoracic cage deformity often accompanies spine deformity in patients with AIS. The deformed structures compress the lung parenchyma, causing a decrease in lung volume and compliance. These changes, along with the increased effort to breathe, may result in alveolar hypoventilation, hypercapnia and hypoxaemia. Due to hypoxaemia and vascular bed restriction, pulmonary hypertension follows, leading to cor pulmonale and right-sided heart failure ***(Johnston et al., 2011).***

Previous studies have indicated that severe scoliosis leads to poor pulmonary function. Since poor pulmonary function may lead to a higher incidence of postoperative pulmonary complications, preoperative pulmonary function tests (PFTs) have commonly been used to predict postoperative pulmonary complications ***(Lee et al., 2014).***

Aim of the Study

Our study aimed to evaluate the effect of scoliosis correction operation on the pulmonary functions.

CHAPTER (1)
ANATOMY OF SPINE

In order to understand problems related to scoliosis it is essential that there be a basic understanding of normal structure of the spine and thorax.

When describing the body in three dimensional space, the planes are defined as in figure .The median plane divides the body into left and right halves. Any plane parallel to this is called a sagittal plane. The vertical plane normal to the sagittal plane is coronal plane. It divides the body into anterior and posterior. At right angles to both these planes is the horizontal or transverse plane that divides the body into upper and lower portions ***(Grimshaw et al., 2007).***

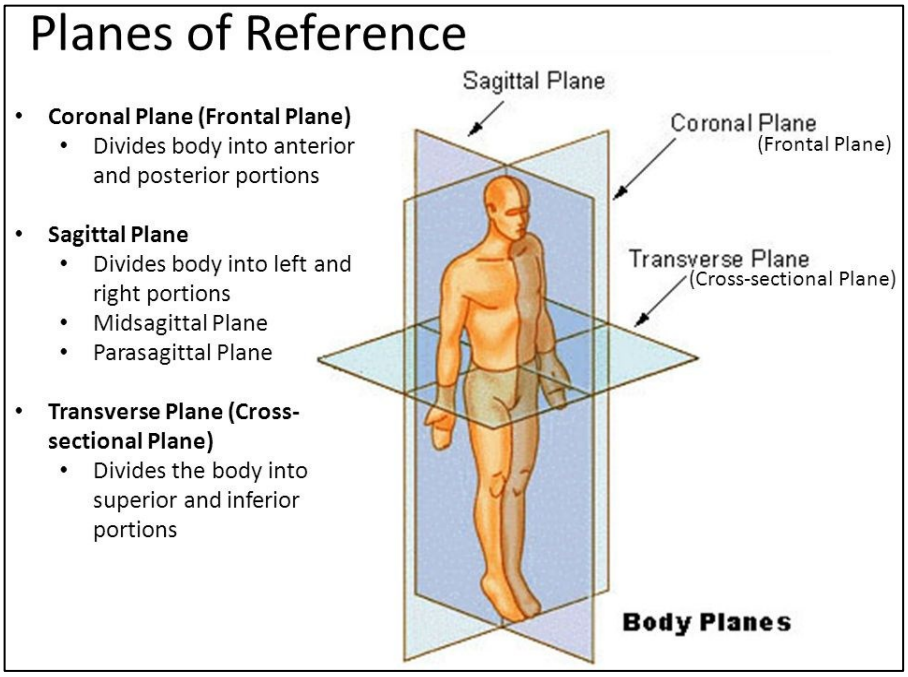

Fig. (1): Body planes

The vertebral column is the central bony pillar of the body. It supports the skull, pectoral girdle, upper limbs, and thoracic cage and, by way of the pelvic girdle, transmits body weight to the lower limbs. Within its cavity lie the spinal cord, the roots of the spinal nerves, and the covering meninges, to which the vertebral column gives great protection. The adult vertebral column usually consists of 33 vertebral segments.

Each presacral segment (except the first two cervical) is separated from its neighbor by a fibro cartilaginous intervertebral disc. The usual number of vertebrae is 7 cervical, 12 thoracic, 5 lumbar, 5 sacral and 4 coccygeal ***(Bruce, 2020).***

Curves of the Vertebral Colum:

Curves in sagittal plane

In the fetus, the vertebral column has one continuous anterior concavity. As development proceeds, the lumbosacral angle appears.

After birth, when the child is able to raise his or her head and keep it poised on the vertebral column by muscular activity, the cervical part of the vertebral column becomes concave posteriorly.

Toward the end of the first year, when the child begins to stand upright as the result of muscular activity, the lumbar part of the vertebral column becomes concave posteriorly.

The development of these secondary curves results in a modification in the shape of the vertebral bodies and the intervertebral discs.

In the adult in the standing position the vertebral-column therefore exhibits in the sagittal plane the following regional curves: cervical, posterior concavity thoracic, posterior convexity; lumbar, posterior concavity; and sacral, posterior convexity.

During the later months of pregnancy, with the increase in size and weight of the fetus, women tend to increase the posterior lumbar concavity in an attempt to preserve their center of gravity.