SURGICAL METHODS IN FIXATION OF DORSO-LUMBAR SPINE

ESSAY
SUBMITTED FOR PARTIAL FULLFILMENT
FOR THE M.Sc. DEGREE OF ORTHOPAEDIC SURGERY

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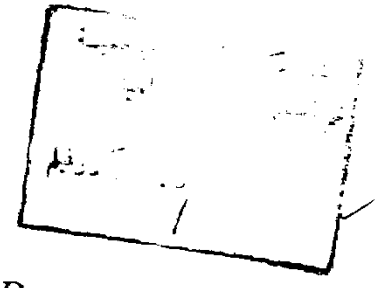

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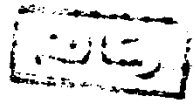

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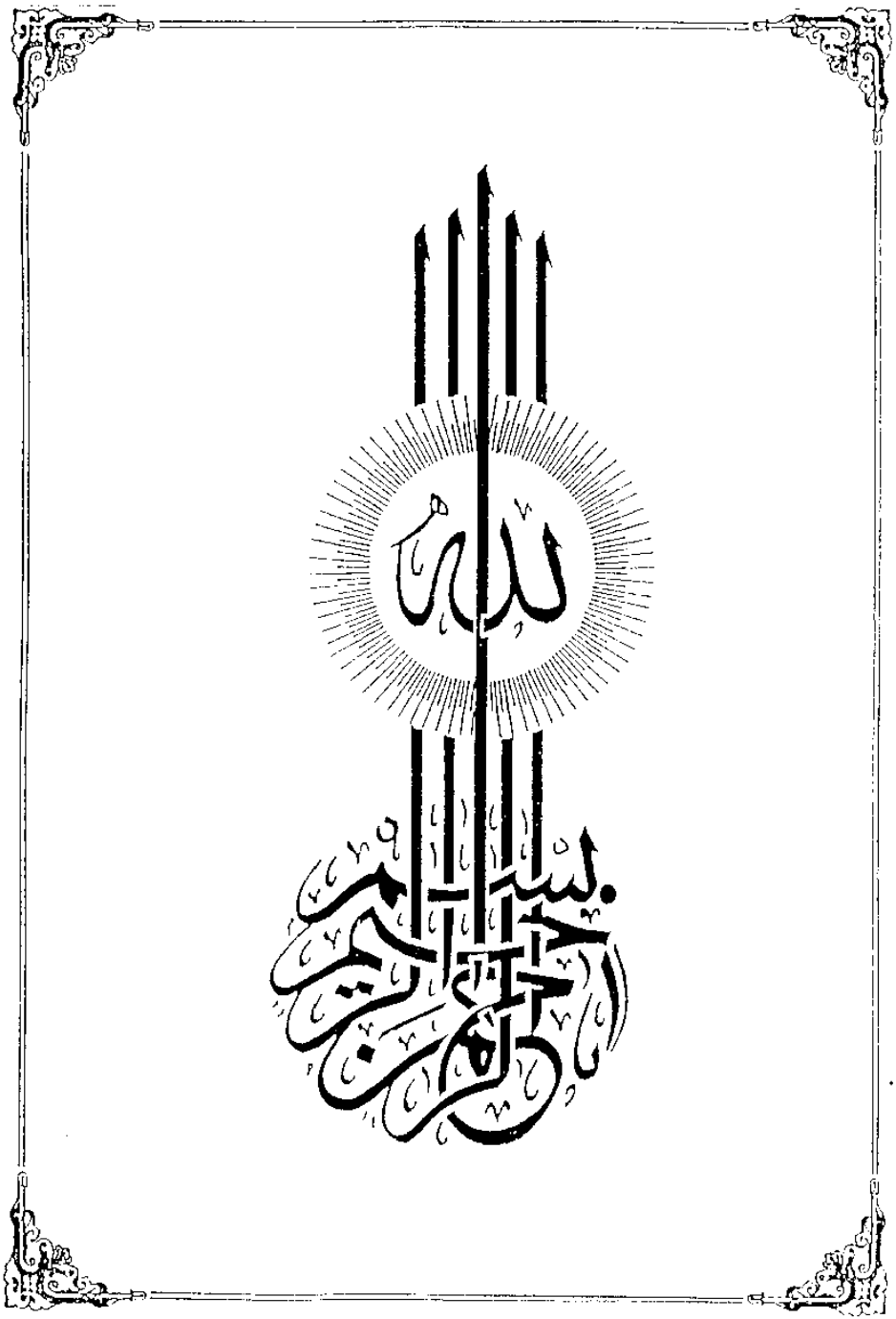

TABLE OF CONTENTS

PAGE

INTRODUCTION

Introduction

The past generation has seen a total revolution in surgery of spine, many years ago, the common practice of spinal surgery in orthopaedics consisted mainly of posterior midline fusion for various diseases, accompanied with many months and often years of bed rest. Simple disc excission with or without posterior midline fusion was common. The changes from the above state are still dramatic.

Following the guidance of Hodgson in the thoracic and lumbar spine and Bailey, Badely, Smith and Robinson and Cloward in the cervical spine, anterior surgery has taken place.

Following the leadership of Harrington (1947) and Dwyer (1969) combined with the idea of Moe and others, internal fixation of the spine has become a reality, and so deformity is no longer accepted.

Spinal surgery became necessary and newer techniques have been developed and applied to give patients with malignant diseases better palliation for remaining alive.

ANATOMY OF DORSO-LUMBAR SPINE

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Osteology of thoracic vertebrae :

There are twelve thoracic vertebrae, they vary in size and shape from above downwards, they are further divided into atypical thoracic vertebrae [first and last three vertebrae] and typical thoracic vertebrae [from the 2nd to the 9th vertebrae.]

Typical thoracic vertebra

Has the following elements :

(1) Body :

Heart shaped with two articular facets (demi facets) on each side, the upper articulates with the lower facet on the head of corresponding rib, the lower facet with upper facet on head of the rib below.

(2) Pedicles :

Extend from posterolateral surface of the body to the base of transverse process where they meet the laminae. On each side it is notched inferiorly and superiorly to form intervertebral

foramen between two adjacent thoracic vertebrae.

(3) **Laminae** :

Each lamina passes medially and backward to meet its fellow at the base of the spine.

(4) **Spinous process** :

Projects downward & backward.

(5) **Articular processes** :

The articular processes project from the neural arch at the junction of the pedicles, laminae and the root of transverse process. Articular processes of adjacent vertebrae meet to form a small synovial joints permitting a little degree of movement.

(6) **Spinal canal** :

Narrow and circular.

(7) **Transverse process** :

Stout, they project posterolateraly with groove on the anterolateral surface at their tips to articulate with the tubercle of corresponding ribs.

Atypical thoracic vertebrae

The first and last three vertebrae of dorsal spine differ from the remainder in having a complete facet for the heads of corresponding ribs which articulate relatively at lower level.

Osteology of lumbar vertebrae

They are five in number, characterized with :
The body is kidney shaped with thick pedicles, the laminae pass downward and backward to meet the spinous process which is short, thick and rectangular. At the junction of the pedicles and laminae i.e. at the root of transverse processes, superior and inferior articular processes are found. The distance between the two articular processes is the parsinterarticularis. The mamillary process is a breast shaped convexity projecting backward from the superior articular process behind the margin of the articular process. The accessory tubercle lies below this at the root of transverse process. **(Last 1988)**
The superior articular process bears gently concave vertical articular facets which face medially & backwards. The inferior articular process has slightly convex vertical articular facet which faces laterally and forwards. **(Rothman & Siemeone 1975)**

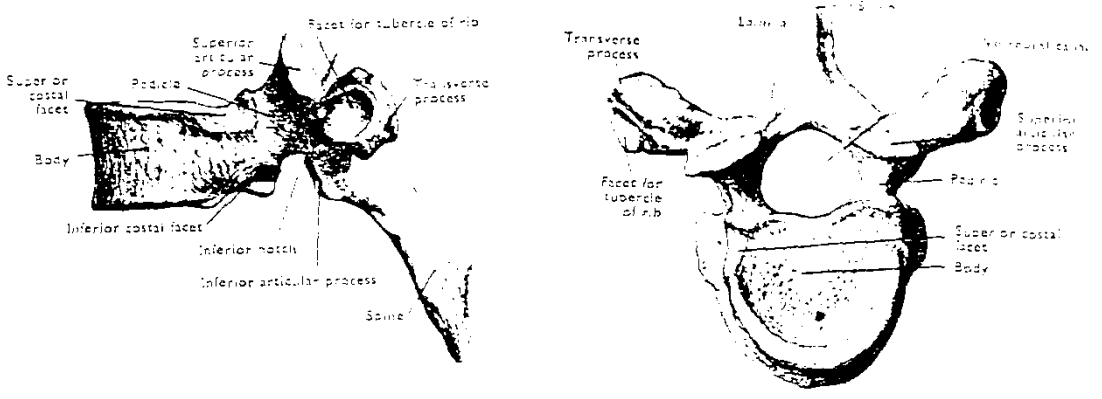

Fig. (1) Superior and lateral surface of the Fifth Thoracic Vertebra (Last 1988)

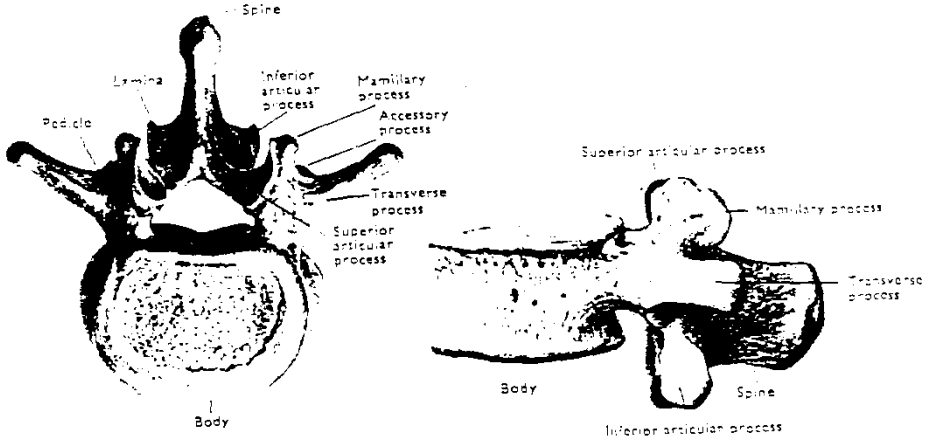

Fig. (2) Superior and lateral surface of the Third lumbar vetebra (Last 1988)

Articulation Between Vertebrae

A- Articulation Between Bodies of Vertebrae :

(1) Intervertebral Disc :

It is a secondary cartilagenous joint formed of peripheral ring of fibrous tissue named the anulus fibrosus. It can withstand strain in any direction. Inside the anulus fibrosus is a bubble of semiliquid gelatinous substances known as nucleus pulposus. The anulus fibrosus is the shock absorber not the nucleus pulposus. The main function of the nucleus pulposus is to maintain height of vertebral column.

(2) Anterior Longitudinal Ligament :

It extends from the anterior tubercle of atlas to the front of the upper part of the sacrum. It is firmly united to the periosteum of the vertebral bodies, but it is free over the intervertebral discs.

(3) Posterior Longitudinal Ligament :

It extends from the back of axis to the sacral canal. It narrows gradually as it passes downwards.

It has serrated margin which is broader over the intervertebral spaces to which it is firmly united. The ligament narrows over the vertebral bodies from which it is seperated by the emerging bivertebral veins. **(Last 1988)**

B- Articulation Between Neural Arches :

(1) Facet Joints :_

They are between articular processes, they're true synovial joints, possess true capsules, and they are capable of a limited gliding movement. The capsules are thin, lax and attached to bases of engaging superior and inferior articulating processes of opposing vertebrae.

(2) Ligamentum Flavum :

The strongest ligament between the borders of two adjacent laminae.

(3) Supraspinous Ligament :_

Between tips of adjacent spinous processes.

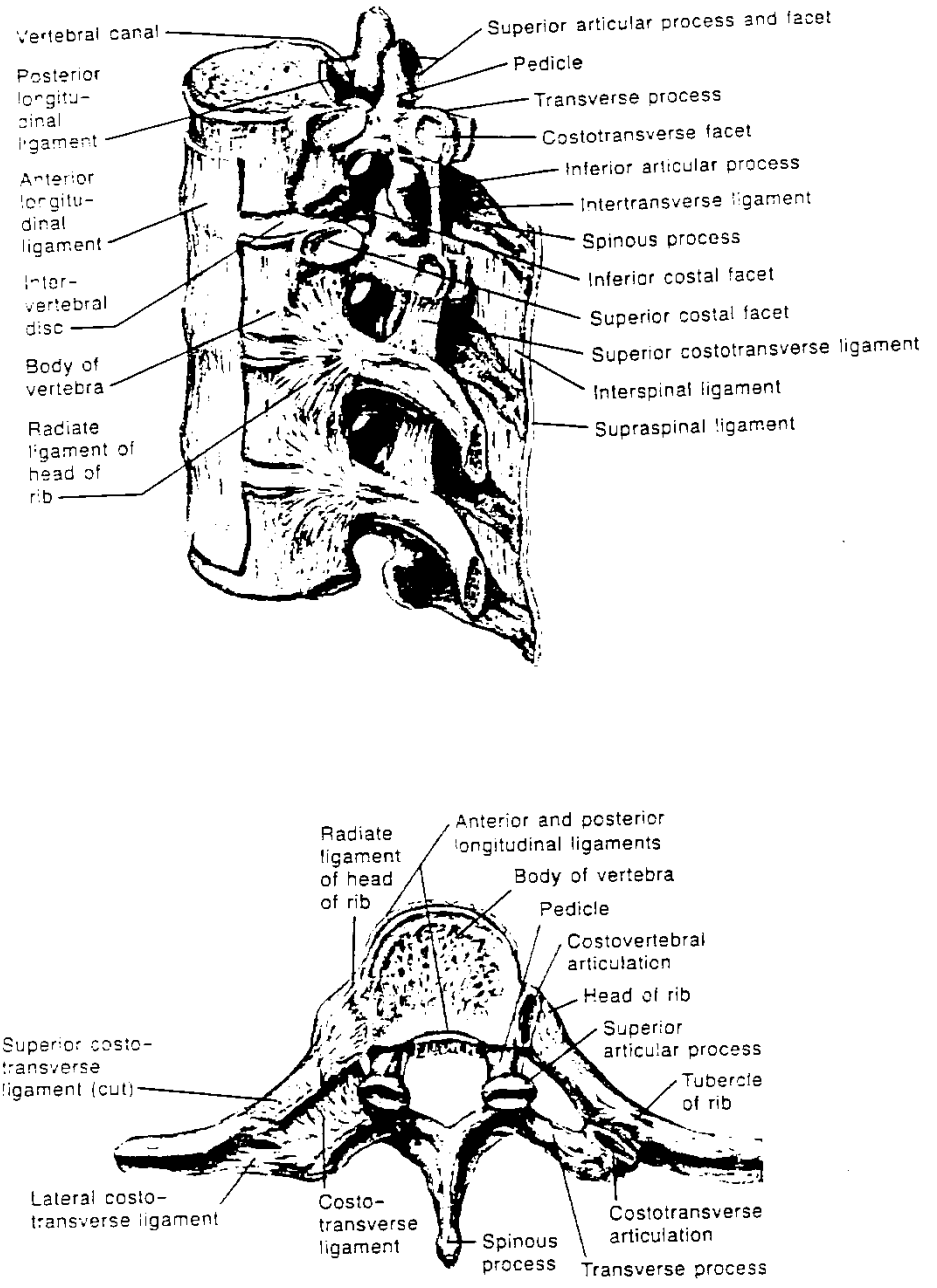

Fig. (3) Articulation between Vertebrae
(Keim 1969)

(4) Interspinous Ligament :

Uniting spinous processes along their adjacent borders.

(5) Intertransverse Ligament :

Joining the transverse processes along their adjacent borders.

(6) Costo-Transverse Ligament :

From tip of the transverse process to the corresponding ligament. **(Last 1988)**