ANTERIOR EXPOSURES OF THE SPINE
CERVICAL · DORSAL · LUMBAR

THESIS

Submitted For Partial Fullfilment
For The Master Degree in
Orthopaedic Surgery

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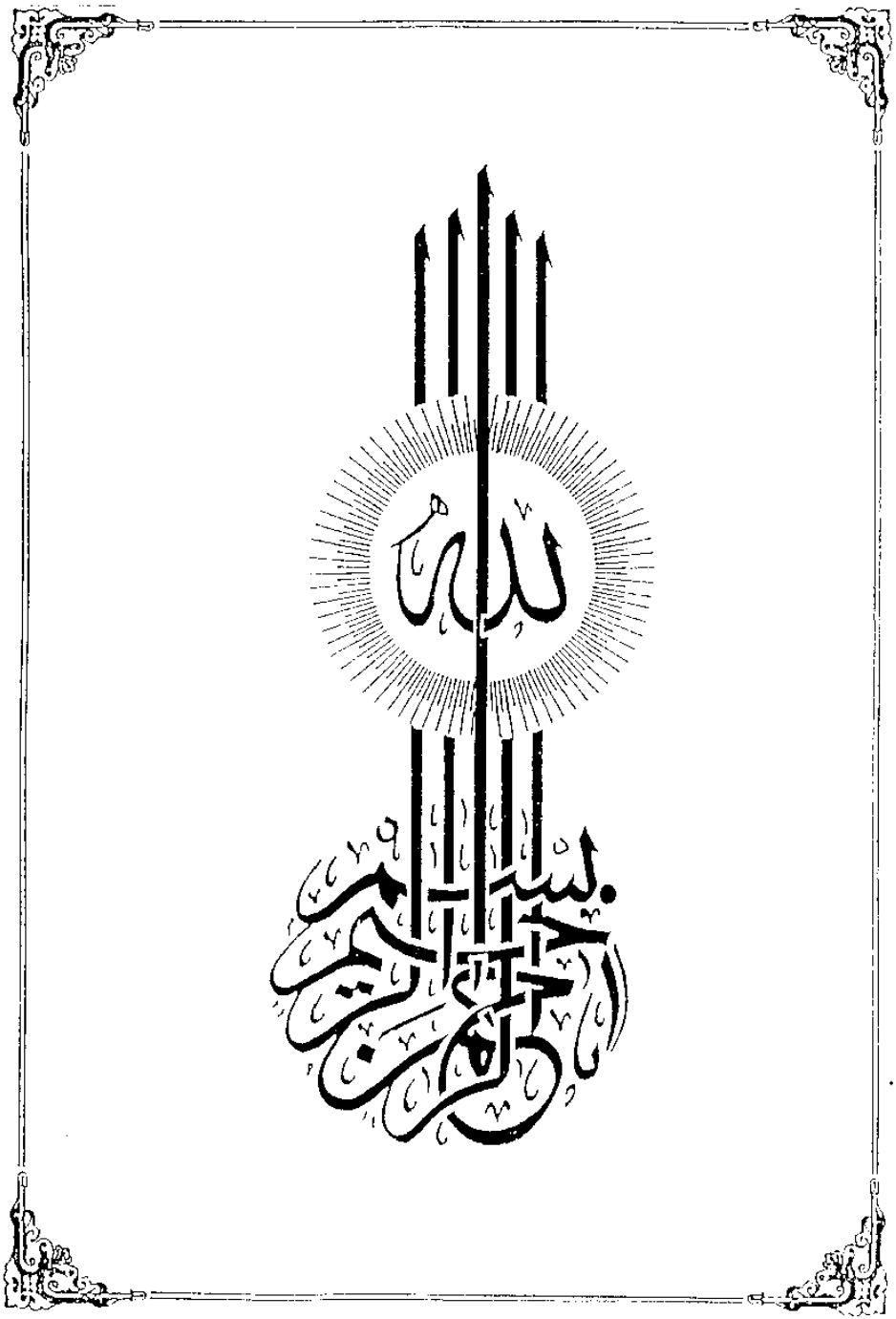
1987

ACKNOWLEDGEMENT

I would like to express my deepest feelings and sincere gratitude to Professor Dr. Mohammed Hamed El-Ghawaby, Professor of Orthopaedic Surgery, Ain Shams University, for his generous help, adivce, continuous guidance and encouragement.

Also I wish to express my sincere gratitude to Professor Dr. Hussein El Khateeb, Ass.Professor of Orthopaedic surgery, Ain Shams University, for his kind care, help, and advice.

Furthermore, I am greatful to all members of the orthopaedic department. Ain Shams University.



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INTRODUCTION

INTRODUCTION

This thesis is submitted for partial fullfilment for the Master degree in orthopaedic surgery.

Our aim is to study various indications and techniques of anterior exposures of various levels of the vertebral column and it is hoped that this study would point out the values of these exposures.

The thesis is divided into five chapters.

The first one deals with the anatomy of the vertebral column, with special reference to its anterior relations.

The second chapter deals with anterior exposures of cervical and cervico-thoracic spine.

The third chapter deals with anterior exposures of the thoracic and thoraco lumbar spine.

The fourth chapter deals with anterior exposures of the lumbar and lubmo sacral spine.

In each chapter the study includes the indications, the advantages, preparation of the patient, anasthesia, and a description of various techniques of anterior exposure of the spine. Also the possible risks and complications which can occur are discussed, and how can these be avoided.

The fifth chapter includes an English summary of the thesis, a list of references and an Arabic summary also.

Finally, we should like to emphasize that anterior exposures of the spine have proved to be excellent means of dealing with various pathological conditions of the spine.

ANATOMY OF THE VERTEBRAL COLUMN

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The spinal column is the central pillar of the body, through which many varied and complicated motions are combined. It functions as two segments: the superior , long, flexible portion supports the head and carries the thorax and abdomen; theinferior, short, rigid, pelvic portion carries the lower extremities. Through the pelvic portion the weight of the body and the effect of shock are transmitted to the lower extremities.(Mc Vay, 1984).

The spinal column is composed of the vertebrae, enveloped and bound together by a series of well-distributed and strongly resistant ligaments, and balanced one upon the other by strong active musculature. The vertebrae articulate anteriorly through their bodies by the inter position of fibrocartilaginous discs and posterolaterally through articular processes.

The column has a considerable range of movement,but movement beyond its normal range unduly compresses the vertebral discs and may permit fracture of the related bodies, with consequent injury to the spinal cord or its root nerves.

The visceral, anterior or flexor surface of the pillar presents in the midline a cylindrical column composed of the suprimposed vertebral bodies. This surface is in

relation throughout with the viscera, and supports and protects them and their vessel and nerve supply, it is separated from them by a cellular layer that occupies the prevertebral space.

The posterior or extensor surface of the pillar descends along the midline of the body posteriorly. It is made up of the superimposed spinous processes, laminae, transverse processes, pedicles and articularl processes of the vertebrae with their retrospinal soft parts. The bony part of this portion, covered only by the skin and a single heavy layer of muscles, is relatively superficial and therefore is accessible to clinical examination and surgical intervention. For the same reasons these bony structures are exposed to direct trauma, buckling and crushing.(Mc Vay, 1984).

The vertebral column is divided into four topographical regions: the cervical, thoracic and lumbar, embraced in the superior segment, and the sacrococcygeal in the inferior segment. The component vertebrae are morphologically equivalant and conform to a real type.

Of the 33 skeletal units in the vertebral column, 24 remain movable, while 9 become fixed through fusion. Of the 9 fused segments, the sacrum contains 5, the coccyx 4.

Of the 24 movable segments, 7 are cervical, 12 are thoracic and 5 are in the lumbar region.(Mc Vay, 1984), (Fig.1).

General characteristics of any typical vertebra:(Fig.2):

Any typical vertebra is formed of the following parts:

- A body, which is situated anteriorly. Its function is to support weight.
- A vertebral arch, placed behind the body. They enclose between them the spinal canal where in lodges the spinal cord. The function of the vertebral arch is to afford protection to the cord.
- Three processes, 2 transverse and 1 spinous they project from the vertebral arch like spokes from a capstan. They afford attachment to muscles and thus help to move the vertebrae.
- The part of the neural arch between the spinous process and transverse process is known as the lamina, and that between the transverse process and the body is called the pedicle.
- Four articular processes: 2 superior and 2 inferior.These project upwards and downwards respectively from the arch and come into apposition with the corresponding processes of the vertebrae above and below. Their function is to

restrict movements to certain direction, and to prevent the vertebrae from slipping forwards.(Grant, 1980).

The cervical vertebrae:

The cervical vertebrae are seven in number. They can be identified easily from other vertebrae owing to the pecularity of their transverse processes, being perforated by a formen. The first, second, and seventh cervical vertebrae present special distinguishing features, but the remaining four conform to a common type (typical vertebrae). (Davies, 1973).

General features of typical cervical vertebra:

The body is small and broader from side to side than from before backwards. The vertebral foramen is large and triangular in outline. The pedicles project laterally as well as backwards.

The superior and inferior vertebral notches are almost equal. The laminae are long and narrow.

The spine is short and bifid with two terminal tubercles. Usually the fifth cervical vertebra is the last one with a bifid spine and, therefore, may be used for orientation by the surgeon. However, there is considerable variation in this feature, the sixth and seventh sometimes

being also bifid. The superior and inferior articular processes from an articular pillar, which projects laterally at the junction of the pedicle and lamina. The transverse process is pierced by the foramen transversarium.

The anterior surface of the body is convex from side to side, and its upper and lower borders give attachment to the fibers of the anterior long itudinal ligament. On each side of the ligament is a slight depression gives attachment to the longus colli. The posterior surface is flattened and presents two or more vascular foramina which transmit the basivertebral vein. Its upper and lower borders give attachment to the posterior longitudinal ligament. The anterior border of the lower surface projects downwards and hides the intervertebral disc. The foramen transversarium transmits the vertebral artery and veins and sympathetic nerves from the stellate or inferior cervical ganglion. The anterior tubercle of the transverse process of C_6 is enlarged and lies posterior to the common carotid artery, which can be compressed against it and therefore termed the carotid tubercle.(Davies, 1973).

ATYPICAL CERVICAL VERTEBRAE:

The first cervical vertebra (The atlas):(Fig.3):

The first cervical vertebra is named the atlas because it supports the globe of the head. It differs from all other vertebrae in the following:

- It has no body: Its centrum is fused with the centrum of the second cervical vertebra forming the dens(odontoid process).
- It has no spinous process.
- It consists of two bulky lateral masses, connected to each other in front by a short anterior arch and behind by a long, curved , posterior arch. Therefore it forms a ring of bone.

The anterior arch is slightly curved from side to side, with a forward convexity which is the anterior tubercle. The anterior tubercle gives attachment to the anterior longitudinal ligament in the median plane. Its lateral aspect provides insertion for the upper oblique portion of the longus colli.

The superior articular fact of the lateral mass is kidney shaped and deeply concave for the o cipital condyles, the inferior articular facet is flat for the axis. (Davies, 1973).

The second cervical vertebra (Axis):(Fig. 4):

The axis provides the pivot upon which the atlas,and with it the skull, rotates.

It can be identified easily from other vertebrae by means of the strong, toothlike process, the dens (odontoid process) which projects upwards from the body.The odontoid

process bears on its anterior surface a small oval facet for articulation with the facet on the posterior surface of the anterior arch of the atlas, and posteriorly it is grooved by the transverse ligament of the atlas which helps to retain it in position.

On each side a large, oval or circular facet is brone on the lateral part of the upper surface of the body and the adjoining part of the pedicle for articulation with the inferior facet of the lateral mass of the atlas.

The laminae are thick and strong and the vertebral foramen is large. The spine is large and strong.

The transverse process is very small. The foramen transversarium is directed upwards and laterally.

The inferior articular facets face downwards and forwards as in typical cervical vertebrae.(Davies, 1973).

The seventh cervical vertebra:(Fig.5).

The seventh cervical vertebra is named vertebra prominens, because of its long spinous process, the tip of which can be felt through the skin at the lower end of the nuclal furrow.The process is thick and nearly horisontal in direction.

The transverse process is large. The foramen transversarium is small, and sometimes may be absent. It