Percutaneous Transpedicular Lumbar Fixation

Submitted partial fulfillment of M.D. degree in Neurosurgery

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2013

TO MY FATHER, TO WHOM I OWE EVERYTHING, AND TO MY SIBLINGS, HAZEM , SALMA AND AHMED WHO WILL CARRY OUR FAMILY LEGACY

Acknowledgment

First of all I would like to express my great thanks to Allah: his magnificent help is the first factor that helped in completion of this work. I would like to thank all of those who taught me through the years of my life.

I would like to express my deepest gratitude to Prof. ***Dr Essam Rashad Al-Gahawy*** *(Professor of Neurosurgery, Cairo University) for his great help, continuous encouragement and endless patience.*

I would like to express my deepest gratitude to Prof. ***Dr Mohamed M. Mohi El-Din*** *(Professor of Neurosurgery, Cairo University) whose kindly advices, care and understanding, had greatly helped me to finish my work.*

I would like to express my deepest gratitude to Prof. ***Dr Hazem Abdel Badiee*** *(Professor of Neurosurgery, Cairo University) whose kindly advices, care and understanding, had greatly helped me to finish my work.*

I also express my deepest gratitude to Prof .Dr ***Ahmed Salah El-Din*** *(Professor of Neurosurgery, Cairo University) for his faithful encouragement, support and guidance.*

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- # Skin

The skin of lumbar region is thick and highly protective, but has low discriminatory sensation. The superficial fascia is thick and fatty and its attachment to the deeper fascial layers is strong in the midline but become weaker more laterally. The quantity, texture and distribution of hair vary with sex, race and the individual through well defined hair tracts have been delineated **(Fig.1)** Lines of skin tension run horizontally in lumbosacral regions **(Fig.2)**

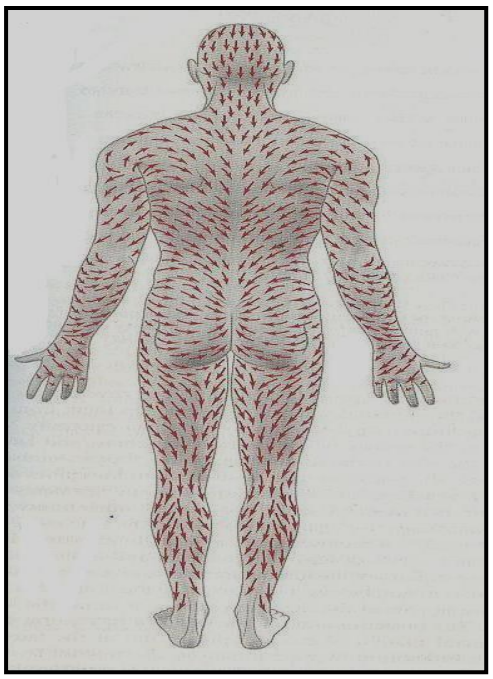
Cutaneous innervations and dermatomes: the skin of lumbar and sacral regions is innervated by lateral branch of dorsal rami of spinal nerves.

Cutaneous vascular supply and lymphatic drainage: the skin of the back of the trunk receives its arterial blood supply mainly from muscloucutaneous branches of lumbar and lateral sacral arteries, which all accompany the cutaneous branches of their respective dorsal rami. In addition, there is a supply from the dominant vascular pedicles of the superficial (extrinsic) back muscles. The skin of the back of the trunk drains into the azygoes system, via tributaries of lumbar veins. Lymph from back of the trunk drains to the lateral superficial inguinal nodes.

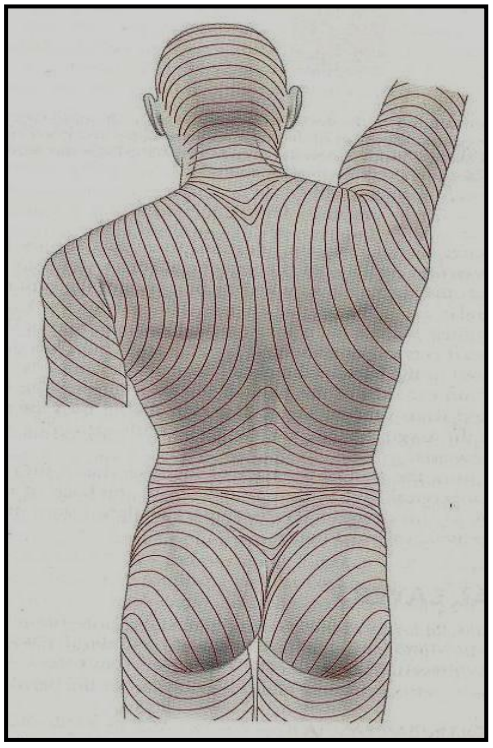
(Adams; et al, 2002)

- # Facial layers

Thoracolumbar fascia covers the deep muscles of the back and the trunk. Above, it passes anterior to serratus posterior superior and is continuous with the superficial lamina of the deep cervical fascia on the back of the neck. In the lumbar region the thoracolumbar fascia is in three layers. The posterior layer is attached the spines of lumbar and sacral vertebrae and to the supraspinous ligaments. The middle layer is attached medially to the tip of lumbar transverse processes and the intertransverse ligaments, below to the iliac crest, and above to the lower border of the twelfth rib and the lumbocostal ligament. The anterior layer covers quadratous



(Fig.1) Hair tract on the dorsal surface of the body



(Fig.2) Lines of skin tension on the dorsum of the trunk and head

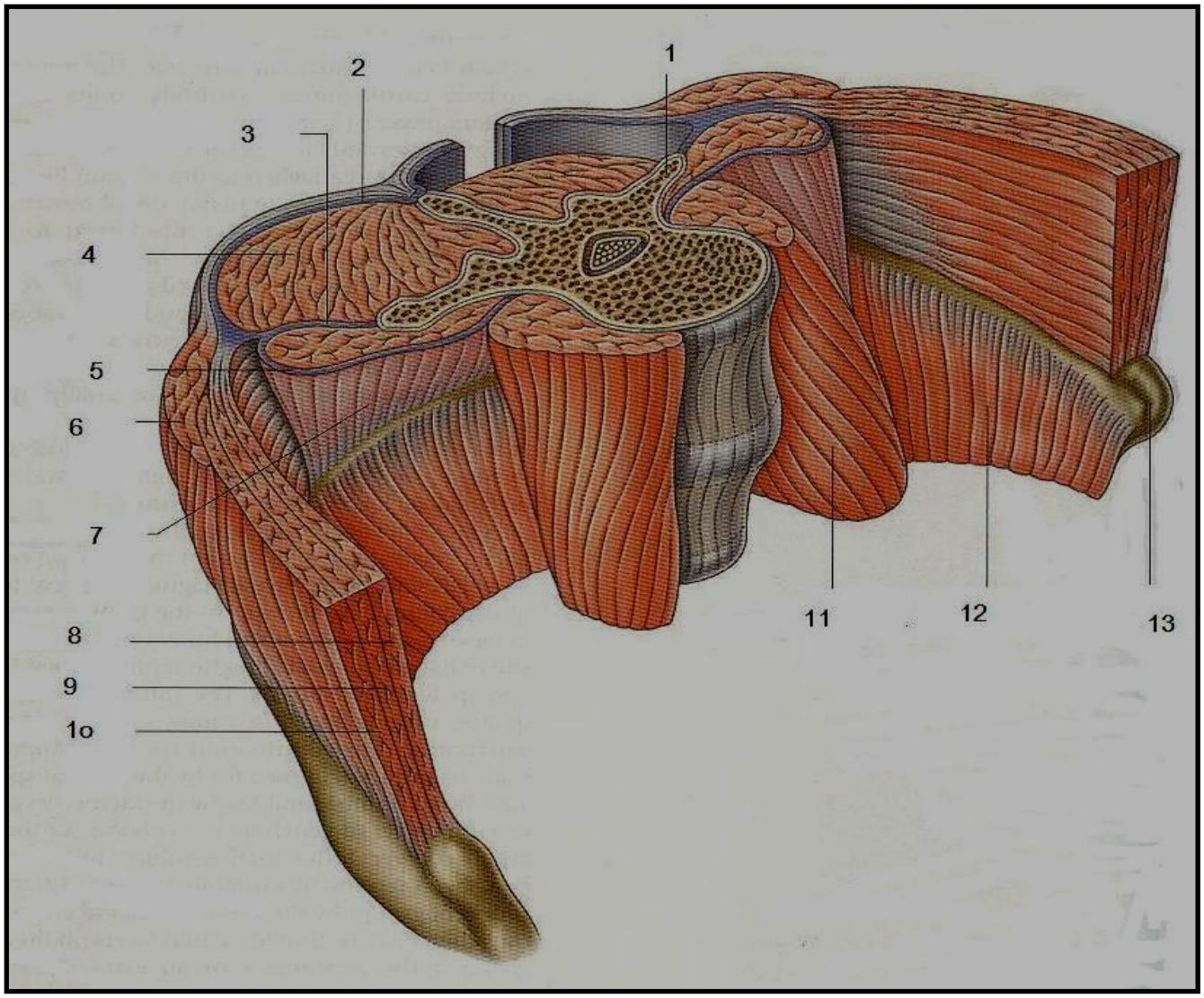
iliolumbar ligament and the adjoining part of the iliac crest; above, it forms the lateral arcuate ligament **(Boelderl; et al, 2002)**.

The posterior and middle layers unite to form a tough raphe at the lateral border of quadratous lumborum they are joined by the anterior layer to form the aponeurotic origin of transversus abdominus. Bogduk (1997) describes two laminae in the posterior layer at lumbar levels with varying orientation of the constituent collagen fibers relating to the biomechanical function of the fascia. The posterior and middle layers of the thoracolumbar fascia and the vertebral column together form an osteofascial compartment which encloses the erector spinae muscle group **(Boelderl; et al, 2002)**.

The attachments of the fascia, especially those which give it continuity with the abdominal wall musculature, gives it an important role in lifting, through the exact details of this role remain controversial. The fascia may play an important role in load transfer between the trunk and the limbs; its tension is affected by the actions of latissmus dorsi, gluteus maximus and the hamstrings. An erector spinae compartment syndrome may be one cause of low back pain. **(Fig.3)**

- # Vertebral column

The **lumbar vertebrae** are the largest segments of the movable part of the vertebral column, and can be distinguished by the absence of a foramen in the transverse process, and by the absence of facets on the sides of the body. **(Fig.4)**
The **body** is large, wider from side to side than from before backward, and a little thicker in front than behind. It is flattened or slightly concave above and below, concave behind, and deeply constricted in front and at the sides. The **pedicles** are very strong, directed backward from the upper part of the body; consequently, the



(Fig.3) Muscle and fascia of the posterior abdominal wall

1-transverse process of lumbar vertebra
2-thoracolumbar fascia:posterior layer
3-thoracolumbar fascia:middle layer
4-eractor spinae
5-thoracolumbar fascia:anterior layer
6-latissimus dorsi
7-quadratus lamborum
8-transverse abdominis
9-internal oblique
10-external obliqe
11-psoas major
12-iliacus
13-anterior superior iliac spine