SPONDYLOLISTHESIS

Essay

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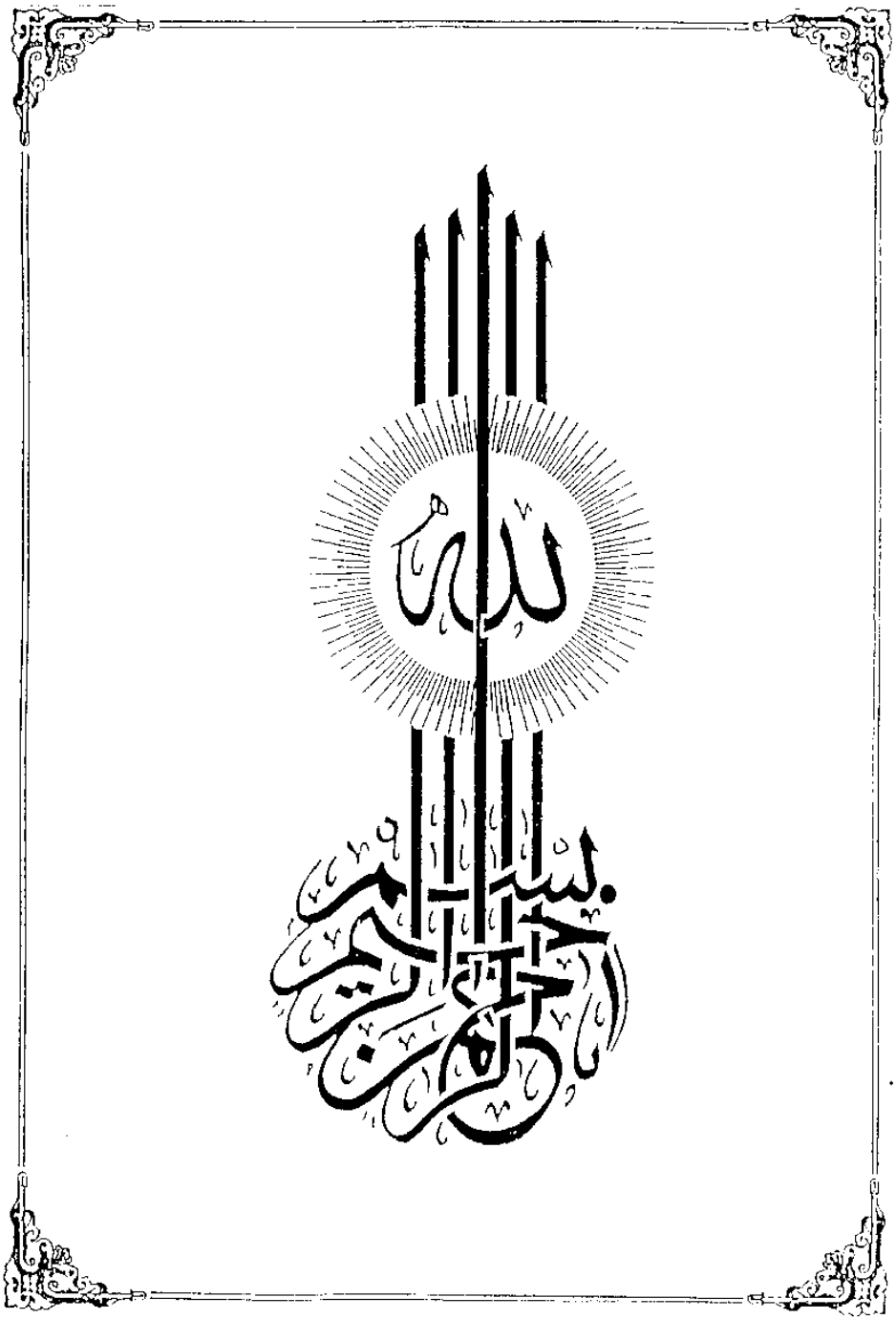

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INTRODUCTION

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- Spondylolisthesis is defined as partial or total slipping of one vertebra forward on the vertebra below.
- Spondylolisthesis could be classified according to the etiological factors behined it into,

1- Dysplastic type: In this type congenital abnormalities of the upper sacrum or the arch of the 5th lumbar permit the slipping to occur.

2- Isthmic type: Here the lession is in the pars interarticularis. This could be subdivided into

   a- Lytic type due to fatigue fracture of pars.

   b- Elongated but intact pars.

   c- Acute fracture of pars.

3- Degenerative type due to intersegmental instability of long duration.

4- Traumatic due to fracture in the pedicle.

5- Pathologic type due to the presences of generalized or localized bone disease.

- Although spondylolisthesis has been discussed long time ago it is further started to be more intersting to the orthopaedic surgeons. May be due to the participation of the young age group of population in heavy industries or heavy sports and other activities with the common complaint of low back pain with or without an occasional sciatic pain in association with radiological finding of spondylolisthesis with different grads.
- This essay will study the etiology, pathology, diagnosis and managment of spondylolisthesis with comparing of the results of different techniques of treatment.

REVIEW OF LITERATURE

DEFINITION OF SPONDYLOLISTHESIS

The term spondylolisthesis is derived from the Greek words, a "spondyl" meaning spine, and "olisthesis" meaning to fall or to slip.

Spondylolisthesis refers to forward slippage of one vertebral body over the vertebral body immediately below it. Retrolisthesis or backward displacement is much less common but can occur. *(Fredrickson, 1984).*

Historical Data:

I cited Mr Wiltse saying the following points; *Herbinaux (1782)* a Belgain obestetrician, was possibly the first to draw attention to this lesion as a cause of obstruction in labour, probably the complete type, in which the body of fifith lumbar is actually lying in front of the sacrum, in other word Spondyloptosis.

Spondylolisthesis was coined by *Kilian in (1854),*he did not recognize the fundamental defect in the pars, but pointed-out that; this lesion was due to slow subluxation of the lumbosacral facets.

One year later, *Robert* established the location of fundamental lesion to be in the pars interarticularis, and by careful dissection and freeing the fifth lumbar vertebra of all soft tissues showed that; It was impossible for the fifth lumbar vertebra to slip as long as the neural arch remained intact. *Robert* demonstrated that, if the neural arch is cut, the vertebra is free to slip.

In (1881) Naugebauer, made an extensive study of anatomic specimens throughout Europe, and was the first to recognize that; slip can occur by elongation of the pars without their comming apart.

The types of spondylolisthesis are as varied as their causes. There are several conditions that permit thus forward slip of one vertebra on another such as trauma, dysplasia, degeneration and pathological causes.

However, the type of most clinical importance in people under the age of fifty, is that in which the lesion affects the pars interarticularis, *(Wiltse, 1977)*.

ETIOLOGY AND ETIOLOGICAL TYPES OF SPONDYLOLISTHESIS

Etiology of Sponsylolisthesis

1) Racial and Hereditary Factors:

In the Eskimos and North of Yukon, the incidence of spondylolisthesis is fifthy percent more than in other location, indicating a possible hereditary factor in the etiology of spondylolisthesis *(Stewart, 1953)*.

2) Congenital Factors:

The opposition of inferior articular processes of the fifth lumbar vertebra with the articular processes of the sacrum, prevents any forward displacement of this vertebra, but if there is any dissolution of continuity between the inferior articular processes of the fifth lumbar vertebra and the articular processes of the sacrum, displacement may occur at the joint.

Owing to the superincumbent body weight acting as a shearing strain overcoming the resistance of the weaker ligamentous structures. In these cases slipping takes place slowly and gradually probably over a matter of years. *(Newman, 1963)*.

3) Pathological Factors:

(Infraction of the interarticular part of the arch)

Naugebauer, believed that secondry infraction of the interarticular portion of the arch took place and gave the patient the sensation as if there is a snap is felt in his back. The posterior part of the arch remains in place,

while the body with the anterior part of each of the lateral masses slippes downwards and forwards carrying with it the vertebral column above.

Wiltse, believed that spondylolisthesis occurs due to defects in pars interarticularis, because of two factors:

a) An inhereted dysplasia in the cartilagenous arch of the affected vertebra and perhaps other vertebrae.
b) The physical forces resulting from the erect position and the curvature of the lumbar vertebra which acts on the weakned pars interarticularis, In this series this condition was never present at birth, and seldom below the age of 4 years with the greatest slipping occuring between the age of 10-15 years. *(Wiltse, 1962).*

4) Traumatic Factors:

It is suggested that, trauma is an important factor in the etiology of spondylolisthesis. However although, a history of minor trauma is common (50%) in boys and (26%) in girls, and an episode of trauma often initiates the onset of symptoms. There is seldom a history of a severe injury. The origination of spondylolisthesis as a stress or fatigue fracture of the pars interarticularis has been substantially documented.

It has been postulated that lumbar lordosis is accentuated by the normal flexion contractures of the hip in children, and that this posture fucuses the force of weight bearing on the pars interarticularis.

Anatomical studies have suggested that shear stresses are greater on the pars interarticularis when the lumbar spine is extended. In young people, the pars interarticularis is thin, the neural arch has not reached its maximum strength and the intervertebral disc is less resistant to shear. A

fatigue fracture of the pars interarticularis can occur at physiological loads during cyclic flexion-extension motion of the lumbar spine. *(Cyron, 1979).*

It has been noted that the incidence of spondylolysis was four times higher than normal in female gymnasts and the lesion developed in some who initially had had normal radiographs.

It has been suggested that muscular fatigue plays an important role in the development of stress fractures. It is well known that the body absorbs stresses that are considerabley above bone-failure threshold. This excessive energy must be absorbed by muscle and other soft tissues.When gymnasts engage in a gradual progressive training program, strength increases in both the skeletal and muscular systems. If gymnansts over train or try skills above their physical ability, the muscular system will begin to fatigue, this leads to a decrease in its ability to absorb kinetic energy, and more of the energy must be absorbed by the bone. If activity is continued the bone is at risk of failure and development of a stress fracture. This scenario may also occur when, improper training creating a muscle imbalance by under training the agonist, and over training the antagonist, and this may place the associated skeletal system at risk. *(Mark, 1991).*

Acute spondylolysis has been documented in soldiers who carry heavy back packs, or who perform exrercies to which they have been unaccustomed. An increased incidence of acute spondylolysis has also been noted in people who perform heavy physical lobour such as weight lifters, logger, and football player in the line *(Libson, 1984).*

Fractures of the pars, which result from acute severe trauma, are considerably more common than has been beleived heterofore. They are fairly common in teen-ager boys who are playing sand-lot football and receiving repeated injuries *(Wiltse, 1977)*.

Types of Spondylolisthesis

Spondylolisthesis is usually found in the lumbar spine, and occasionally in the cervical spine, if found in the thoracic region, it is always secondry to trauma. *(Barbara, 1991)*.

I- Cervical Spondylolisthesis:

1- Atlanto-axial region

a) Congenital non fusion of the dens.

b) Fracture of the dens.

c) Inflammatory softening of the transverse ligament of the atlas.

2- Any cervical level.

II- Lumbar Spondylolisthesis:

1- Dysplastic spondylolisthesis.

2- Isthmic spondylolisthesis.

a) Lytic type.

b) Elongation of the pars without separation.

c) Acute fracture of the pars.

3- Degenerative spondylolisthesis.

4- Traumatic spondylolisthesis.

5- Pathological spondylolisthesis.