Historical Review

Spondylolysis has been recognized in human material dating from as early as 6000 BC. It appears to exist only in humans, and probably only in human who have stood and walked.

In the town of Carmarthen in west Wales in 1282, a monastic institution was opened in which both monks and lay brothers lived and worked. Archaeologic excavations on the site of the priory during the 1980s revealed a large amount of human skeletal material from monastic burials carried out while the priory was active. Among the finds were two well preserved lumbar vertebrae with defects of the pars interarticularis. In one subject, identified from other remain as a male about 16 years old, the defect was unilateral (Fig. 1), in the other, a mature male, the defect was bilateral, with a complete and separate distal fragment (Fig. 2).

The first observation of a spondylolisthesis was made by the Belgian obstetrician, Herbiniaux, in 1772. In 1854 Killian first coined the term spondylolisthesis. One year later Sir Robert of Coblenz was the first demonstrate that an olisth can occur if the neural arch was sectioned.

(Fig. 1 Lumbar vertebra showing unilateral spondylolysis. (Newell; 1995)

(Fig. 2 Lumbar vertebra with bilateral pars defect and separate fragments. (Newell; 1995)

(Sagi et al; 1998)
The condition of spondylolisthesis was recognized and described many years before that of spondylolysis. Robert zu Coblenz was the first to recognize the importance of the integrity of the neural arch in preventing forward slip of the fifth lumbar vertebrae on the first sacral. In 1865, writing in the same journal in which Robert zu Coblenz had reported his findings, Hartmann was said by Newman and Stone to have been the first to point out that in "obstetric" spondylolisthesis, although the vertebral body moves forward, the spinous process does not. In almost all of early descriptions, spondylolisthesis appears to have been of the type IIa (Isthmic lytic) variety. Once the presence of the defect had been recognized, a new controversy began. This related to the relative importance of trauma and developmental dysplasia in causing the defect.

(Newell; 1995)

The concept of spinal fusion surgery was first reported in 1911 by Albee, who thought to inhibit tuberculosis spread in pott's disease by providing mechanical support and stability to involved vertebrae and by Hibbs, who later used fusion surgery to halt the progression of scoliotic deformity.

(Boden and Sumner; 1995)

Albee implanted a tibial graft in the spinous processes, which he thought might provide an internal splint and hasten stabilization of the spine. In 1917, surgeons made use of the scapular spine as an internal splint and source of bone grafting material.

In the same year, Hibbs reported on spinal fusion to prevent increase deformity of scoliosis. In these earlier experiences, no internal fixation was used although Harda in 1891 had reported a technique for wiring of the spine, and Lange in 1902 had developed a system of steel rods and a celluloid cylinder to provide structural support.
Modification and broadening of the applications of spinal fusion ensued during the next 30 years. In addition to infectious disease and scoliosis, fractures and developmental deformities were managed with spinal arthrodesis.

*(Hanley; 1995)*

The technique of posterolateral fusion, including fusion of the facet joints, pars interarticularis, and bases of the transverse processes was first described by Watkins in 1953 and later modified by Wiltse who included the laminae in his fusion technique. Since that time, posterolateral lumbar fusion has remained the most commonly used method of arthrodesis.

*(Fraser; 1995)*

The year 1994 marked the 50th anniversary of King's publication on the first use of bone screws to aid in the fusion of the spine. In 1959, Boucher first reported on the use of a screw in the pedicel of the spine. In 1969, Harrington first reported on the use of his rod instrumentation connected to pedicle screws he designed for his clinical use.

*(Wood et al; 1995)*

The general failure of facet fixation as a means of producing a lumbosacral fusion led to the next stage of development, which was the introduction of screws from behind, across the lamina or pedicle into the vertebral body. Pedicle screw fixation, as presently practised, has largely developed from the pioneering work of Roy-Camille and colleagues in Paris in the 1960s, who initially used the technique in the treatment of fractures, then in the management of vertebral tumors, and finally in the low back disability. The pedicle screws was used together with metal rods or plates that span the interspace or spaces to be fused, while bone graft fusion, usually posterolateral in site, is concurrently performed.
Where do we stand today? More than two hundred years ago John Hunter wrote "... the spine in animals is that which is thew basis of the whole body, on which every thing is built... the keel of the ship from which the whole superstructures is built..." Like a ship's keel, the spine must therefore be stable and strong. Functional disability must arise in the absence of these basic demands. Until we are able to prevent degenerative and other forms of disease, or to replace those components of the normal spine that fail, we must depend on successful arthrodesic procedures to ensure the strength and stability demanded. These methods will remain the mainstay of lumbosacral surgery until new techniques for repairing the spine are developed, while leaving it mobile. This is the next problem to be faced, and hopefully the next hundred years of spinal surgery will show how we are to cope with these challenges.

(Robin and Margulies; 1996)