ALICI SPINAL INSTRUMENTATION FOR DEGENERATIVE DISEASE OF THE LUMBOSACRAL REGION

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Degeneration of the intervertebral disc, complex begins early in life and is a variety of environmental factors as well as normal aging. With aging, there is a progressive increase in vertebral end-plate concavity, associated with decreased bone density. These changes are more evident and take place earlier in females that in males, on the orther hand, spondylarthrosis take place in addition to these disc changes. In our clinic, we have operated on 19 patients, who suffered from these diseases. Many of the disk patients are asymptomatic after surgery. Vertebral body fusion has been done in practically every case of ruptured lumbar disc. Posterior lumbar inlerbody fusion (PLIF) is accepted by many authors as the surgical treatment for hcrniated discs, degenerative disc conditions.

Recently many new spinal implants systems have been introduced. This paper presents experience with the use of a new posterior stabilization device (ALICI posterior spinal instrument).

Key Words : ALICI Spinal Instrumentation, Degenerative Disease.

The intervertebral disc is composed of three distinct parts : the cartilaginous end-plate, anulus fibrosis, and nucleus pulposus (4). The cartilaginous cnd-platc is composed of hyalin cartilage that covers the inferior and superior vertebral body surfaces central to the site of fusion of the previous cpiphyseal ring. It plays a key role as a biomechanical and metabolic interface between the vertebral body and nucleus pulposus (16).

While the cnd-platc contains numerous blood vessels at birth, in the adult the disc is the largest avascular structure in the body. Nevertheless, it remains mctabolically active and serves as the major site of diffusion from the vertebral body spongiosa. The anulus fibrosis serves as the limiting capsule of the nucleus pulposus. Its collagenous fibers arc short and stout, providing greater strength anteriorly than posteriorly, where they are thinner, fewer in number, and more closely packed. The anulus is completely circular and attaches superiorly and inferiorly into the vertebral body at the site of the fused cpiphyseal ring by Sharpcy fibers, and it also attaches to the longitudinal ligaments anteriorly and posteriorly. Its purpoe is to resist radial tension induced by axial loading of the disc (through confinement of the nucleus pulposus) as well as stresses from torsion and flexion (4,5).

During the aging process the cartilaginous cndplatc becomes thinner and more hyalinized (4). The disc becomes progressively more fibrous and disorganized, with the final stage represented.by amorphous fibrocatilage with more clear distinction between nucleus and anulus fibrosis.

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In addition to the changes within the disc, including hcrniation, secondary changes following disc degeneration arc noted both in animal models and humans (11,12).

Degeneration of the disc leads to a loss of disc height and forces the facet joints into malalignmcnt, so-called rostrocaudal subluxation.

This results in an increase in the biomcchanical forces at the facet joint with increasing joint relaxation and instability, secondary degenerative of facet joint and arthritic changes, and potentially, fractures (14). Degeneration always follows hcrniation. This could also cause a degeneration starting from the facet joints to the disk.

Historically the use of mctalic internal fixation in an effort to stabilize the spine predates the development of spinal fusion (2).

The combination of internal fixation and fusion, however, was not developed until the 1940's with the use of screws to enhance fixation during lumbosacral fixation. Various authors reported their experience with the use of short screvs placed across the facet joints during lumbosacral fusion (1,10).

Results with posterior instrumentation utilizing spinal plates, spring fixation, and Knodt rods have been reported by variotis authors (7,8,15). Although each has specific advantages and drawbacks, widespread enthusiasm was never generated for their use.

MATERIAL AND METHODS

Since August 1989 we have operated on 19 patients with degenerative disk disease and spondylarthrosis.

There were 6 males and 13 females with an average age of 47.5 years at operation (range 40-62 years).

Preoperative evaluation of all patients was standardized and included a careful neurologic evaluation; routine blood evaluation, antcroposterior and lateral radiographs, CT.

The most common complain of the patients was back pain and they had sciatalgia syndrome.

In a patient with L3-L4 lesion, a decrease in the knee jerk, 2 cm. quandriceps atrophy and hypoacsthcsia at the L4 dermatom were determined. In two patients out of seven with L4-L5 lesion, we observed a decreased in the ankle jerk, in one patient a 3 cm. and in 2 patients in each a 2 cm. gastroencmius and slocus atrophy, in 4 patients dorsiflexion of great toe with foot difficulty walking on heels and also in 4 patients hypoacsthesia at the L5 dcrmatom. In 6 patients out of a group consisting of 11 patients with L5-S1 lesion, an absence of ankle jerk was seen in 2 patients whereas we observed this jerk diminished in 4 patients. In 5 patients gastroencmius and solcus atrohy (mean 2.4; range 1-4 cm.), in 6 patients plantar flexion of foot and great toe were diminshed and in 2 patients we observed difficulty in walking on toes. We have also seen hypoacsthesia at S1 dermatom in 5 patients and in 2 patients we observed hypoacslhcsiacs, in both L5 and S1 dermatoms.

The straight leg raising (laseque) test was found 40 degrees in 6 patients, 60 degrees in 7 patients and 70 degrees in 2 patients.

Radiological findings

We found typical radiological signs of extensive degenerative disc disease at the L3-L4, L4-L5 and L5-Sl. Disc narrowing or increased calcification of the disk was seen in 5 patients and CT findings include annular bulging, herniation, vacuum phenomenon, sclerosis of the adjacent intervertcbral body. Additional advantages of CT include three-dimentional reformatting, which allows multiple planes to be reconstructed, and enhanced soft tissue discrimination of both extra and intradural disease (13).

Operation Technique

The patient is placed prone on the table with the abdomen protected from pressure. Through a longitudinal midline incision, a muscle-splitting approach is made to expose the lumbosacral spine. The laminae is removed partially and the nerve roots arc examined. Herniatcd disc is removed with forceps. Intcrvertcbral disc space is prepared with round type gauge, and this

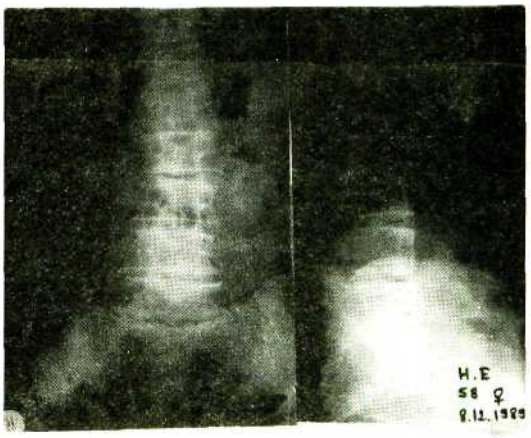

Fig. 1 Preop A/P and lateral x-rays.

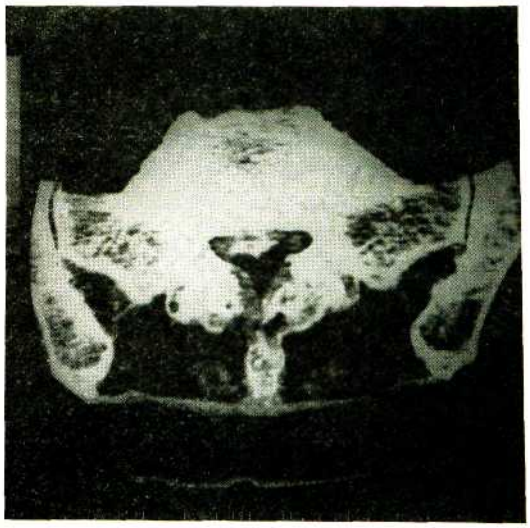

Fig. 2 : Pre-operative CT slice is showing the calcifed disc prolapsus

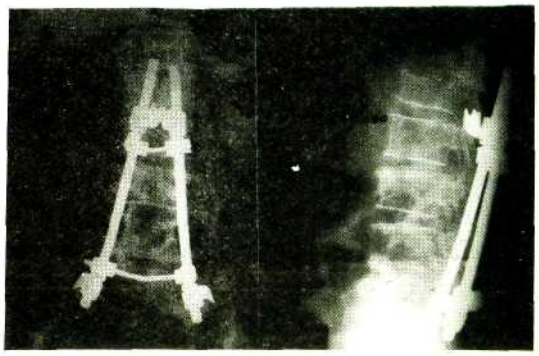

Fig. 3 : Post-operative A/P and lateral x-rays. (After using Alıcı PSI)

space is filled with autogen bone grafts. Closed pedicle hooks are inserted into the facet joints of the upper vertebrae and distal hooks arc inserted into the sacral alaes. Distraction is performed with turning the nuts. Rotational stability is obtained with inserting transverse connectors. The posterior elements are decorticated and fusion is performed with the bone grafts.

RESULTS

The patients were maintained in the supine position for 48 hours postoperativcly. An early postoperative evaluation revealed that the hypoacsthesia had diminished in 6 of 12 patients. The lasequc test was negative in 15 patients. In the other 4 patients it was positive between 60-70 degrees and the contralatcral lcsaquc test was negative in all patients.

The sympthoms of the sciatica syndrome showed rapid regression in almost all of the patients in the postoperative period. Distinct marked improvement was observed in 4 of the 12 patients who had weak dorsal flexion of the toe. The patella areflexia in 1 patient and the Achilles areflexia in 3 patients persisted. Any other complication was not observed in any patient.

DISCUSSION

The part of the spine that is under stress mostly is the lumbosacral region. Therefore degenerative arthritis of this region develops quite often. Whether the process begins in the intervcrtebral disc or the facet joint does not change the outcome. Both degenerative arthritis of the facet joints and degenerative changes is the intervertebral discs spread to all of the motion segment and instability, hypertrophic ossification and vertebral stenosis develop. In the early stages of the disease or later when the clinical symptoms become prominent treatment is salibilization of this region.

Because the lumbosacral region is too mobile, the pscudoarlhrosis incidence is high in fusion interventions of this region. That is why various spinal instruments have been used for the fusions in the lumbosacral region (3,6,9). Some of these are attached to the sacrum with screws (3,6) but the posterior content of the sacrum is thin and the spongious tissue is loose and the loosening of these sccrws are inevitable.: In the beginning of our parctice we placed the proximal hooks to the facet joints and laminae of the lumbar second and third vertebra and the distal hooks to the sacral laminae.

Level of Injury	No of cases	Laseque Test				Reflex				Motor Loss		Artrophy		Hypoaesthesia					
		Pre - op		Post - op		Pre - op		Post - op		Pre - op	Post - op	Pre - op		Pre - op			Post - op		
		L	CL	L	CL	RP	RA	RP	RA			C	T	L4	L5	S1	L4	L5	S1
L3/L4	1	1				1		1					1	1					
L4/L5	7	5	2	2			2		1	4	1	3			4			2	
L5/S1	11	9	3	2			6		2	8	3	5			2	7			4

L. Laseque
CL. Contrlateral Laseque
C. Crural
T. Thigh
RP. Reflex of patella
RA. Reflex of aschille

Since complication due to sacral 1,2,3, compression developed in one patinet, we replaced the hooks to the sacral wings. We observed that the sacral wings were strong enough for application of distal hooks. In some of the middle aged patinets with intervertcbral disc lesions we observed slackness of the ligaments at the lesion level preopcrativcly. Considering that this instability will increase after the removal of the intervertcbral disc, we applied short fusion along with the ALICI PS I Instrument to these patients.

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