OUR GALVESTON TECHNIQUE EXPERIENCE IN THE TREATMENT OF SPONDYLOLYTIC & SPONDYLOLISTHETIC PATIENTS

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Between June 1989 and May 1994, 56 patients with spondylolysis and spondylolisthesis were treated by posterior instrumentation and posterolateral fusion in our clinic. Since May 1992, we have been performing Galveston technique in L5-S1 lytic and olysthetic lesions and treated 9 patients with this technique using ISOLA Spinal System. All of these patients were female and had low back pain which was unresponsive to conservative treatment. The average age was 45.6 years, ranging between 14 and 61 years. The mean follow-up was 12 months, ranging between 8 and 23 months. We prefer this technique as it is much more reliable than sacral fixation in our opinion.

INTRODUCTION

Spinal instrumentation was first reported in 1891 by Hadra, who used a silver spinous process wire (12, 26). Lange in 1902, developed a system of steel rods for attachment to the spine (12). But the era of spinal fusion really began after 1911; when Hibbs and Albee first reported their technique of posterior fusion for Pott's disease.

Early fusion were performed for infection, scoliosis and fractures, but in 1929 Hibbs and Swift published the first paper dealing with lumbosacral fusion for degenerative conditions such as spondylolisthesis, degenerative disc disease and degenerative scoliosis with spinal stenosis. Although early reports of lumbosacral posterolateral fusion with only bone graft noted high fusion rates, more recent authors have been unable to duplicate these results. (3, 7, 26)

In early 1980's most authors treating neuromuscular scoliosis, have reported high rates of loss of lumbar lordosis and pseudoarthrosis in using Harrington distraction instrumentation for lumbosacral fusions. To increase the fusion rate, a stable fixation that neutralizes the large forces acting across the lumbosacral junction is essential. Galveston technique provides this stability through the long leverarms of the rods inserted into the pelvis.

Since these pelvic portion of the rods project both lateraly and anteriorly, lateral bending, flexion-extension and torsional stresses can be easily resisted and reduced. We have chosen this technique for a safe and stable lumbosacral fusion.

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MATERIALS AND METHODS

Between June 1989 and May 1994, 56 patients with spondylolysis and spondylolisthesis, were treated by posterior instrumentation and posterolateral fusion in our clinic. Since May 1992, we have been performing Galveston technique in L5-S1 lytic and olysthetic lesions and treated 9 patients with this technique using ISOLA Spinal system. All of these patients were female and had low back pain. The avarage age was 45.6 years, ranging between 14 and 61 years. The mean follow-up was 12 months, ranging between 8 and 23 months.

The patients underwent the Galveston procedure, had back pain, which was unresponsive to conservative treatment for at least two years. In association with back pain; 5 patients have lower limb pain and 4 patients have hip pain. All of the patients had spondylolisthesis in varying degrees but two with bilateral spondylolysis and one with spondyloptosis. All patients underwent one-stage posterolateral fusion and instrumentation according to Galveston technique. In one patient, alos sacral fixation was combined. Fusion and instrumentation was performed from L4 to pelvis in 7 patients, L3 to pelvis in 1 patient and L5 to pelvis in 1 patient.

The patient with spondyloptosis was reduced with axial distraction of the lumbo-pelvic column and then horizontal traction with a towel clamp from L5 spinous proces. After the reduction, vertebrae were fixed to the rod.

Mean operative time was 3 hours and 40 minutes in our series. An average of 4 units of blood were transfused to the patients. During induction of anesthesia and every 12 hours postoperatively for 3 days, second generation cephalosporins were given prophylactically. Closed suction drainage was performed in all

patients for 48 hours. No corsets or braces was used for external immobilisation.

RESULTS

After the procedure, all the patients were pain-free except one with tolerable hip and back pain. All the limb pains had recovered completely but a mild limb pain had developed postoperatively in a patient who was asymptomatic before. The evaluation of that patient concluded that there was a screw protrusion into the disc space.

Lasegue sign that had been positive in two patients preoperatively, turned to negative in one patient and stayed the same in the other postoperatively.

In the early postoperative period, 2 patients developed deep wound infections which both responded well to surgical debridement, lavage and iv antibiotic therapy.

In another patient, asymptomatic nut loosening with dislocation of the slotted connector from the screw head had been detected.

Radiologic signs of fusion was detected at an avarage of 8 months (Range: 7-12) and no pseudoarthrosis was developed.

DISCUSSION

Galveston technique which is used in the treatment of various spinal disorders; provides early fusion without the need for external immobilization and allows the patients a tolerable treatment modality.

It is known that, great forces act across the lumbosacral junction. For an effective lumbosacral stabilization; the implant must be sufficient to resist lateral bending, flexlon-extension and torsional stresses or alternatively must be shielded from those stresses in some manner such as by a cast or brace (1, 22).

For an unsupplemented pelvic fixation, there are two alternatives. First one is developing a sacral fixation with such great mechanical strength that the large forces acting across the lumbosacral junction can be safely neutralised (1, 2). the problem with this approach is that the cancellous bone of the sacrum is not sufficiently dense and the cortical shell is rather than for a safe fixation. So there is consequently a need for multiple point fixation, to share the load.

The second alternative is creating long lever arms with rods passing through the ilia for pelvic fixation therefore lowering the tissue load to a tolerable range (1).

In 1991, Devlin et al. reported 12 of 27 patients who underwent reconstruction for adult scoliosis using CD instrumentation to the sacrum, had sacral screw failure by pull-out and one patient had sacral screw breakage (5).

Osebold et al have reported a 30 % loss of sacral hook fixation in a series of patients with anterior and posterior surgery for myelomeningosel.

Hook cut-out with Harrington instrumentation to the sacrum in patients with spine fractures was noted by Mc Affee et al 517) as being a significant problem.

Kostuik (9) reported a 15 % sacral fixation complication rate overall, which increased to 30 % when only adult scoliotic patients were considered.

In two biomechanical studies performed on bovine spinal segments, it was shown that bending of sacral screws with axial loads may be important in their failure (21) and best fixation can be achieved by obtaining purchase between the iliac cortices down into the superior acetabuler bone. The maximum moment at failure was significantly greater for ISOLA Galveston and ISOLA iliac screws that extended fixation into the ilium than sacral fixation (18).

Also in a biomechanical study performed by camp et al, three methods of sacro-pelvic fixation were evaluated, i.e., iliosacral screws, sacral screws and Galveston technique. The authors conciude that Galveston technique was the strongest and safest method of the three tested (4).

We have chosen Galveston technique since May 1992 for difficult lumbosacral fusions demanding rigid and dependable fixation. Although we do not have a suffiiently long follow-up period, untill now, we have not experienced any implant failure or pseudoarthrosis. the clinical outcome is good. the few complications were not related to the technique itself. We think parallel with the authors whom reported fixation with Galveston technique is excellent and fusion rate is high (14, 20).

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lute stenosis made diagnosis (in our series, 3 cases among cases who could be followed-up.

Although our series is small, it is harmonius with literature knowledges according to age and sex. The thoracic stenosis was occanionally reportliterature, and showed as reason some methabolic and rheumatismal factors (1, 9) (hypophosphatemic D vitamine resistance osteomalasia, Paget etc.). In the people with spinal stenosis which had this type etiology there are thickness of ligamentum flavum and posterior longitudinal ligament. For imaging of spinal stenosis, myelography and MRI is more useful than CT (1). However CT is one of the most important methods in imaging of spinal stenosis. But the saccoradiculography may show better root pressure and displacement than CT and MRI in the nerve root irritation cases (3).

All cases have been imaged with CT outwith clinic findings, but in 3 cases with added to this, MRI was used. This methods have been preferred as they were noninvasive (14), but in 2 cases, myelography was used.

The decompression in spinal stenosis has not been causing to degenerative changes in lumbar vertebrae (10). Postoperatively, the stenozan factor may continue and develop the stenosis of canal and lateral recessus in the late period. So, the case number which have been made 2nd operation was reported as 5-13% cases (12). We think that a stable instrumentation with large decompression and fusion is suitable. Our averege follow-up time is 13 months and there are no cases who is made reoperation.

The other situation which it should not be forgetten is that, in scoliosis which was not ended bone maturation during instrumentation, the sublaminar wiring may cause not only to the longitudinal and transvers growthing into the lamina but also spinal stenosis by the growthing into the spinal canal (17). The extra foraminal pressure reasons should not be forgetten in the cases who had spinal stenosis findings and neurological symptoms. Kleiner et al., in one of their studies (13), in 12125 cases had lumbosacral radiculopathy have been found in 12 cases tumour, obturatorartery aneurysm, hematoma, siatic nerve tumour as reason of lumbar radiculopathy (extra foraminal reason 12/12125). Although the ratio is 1/1000, the importance of diagnosis and its treatment is quitely different.

Deya et al (5) have been reporting 18% as complication ratio in stenosis cases aged over 75 years, this high risk rate is concern to the high age as the risk about procedure in the same publication has been reported as 0.12% and the mortality as 0.07%. In our series, the average age is 56.3, and there are no complication about the procedure.

RESULTS

1. The diagnosis was made by CT, MRI and myelography.
2. In the beginning, the conservative treatment and phsyotheraphy should be applied.
3. The surgical indication of spinal stenosis should not be given easily.
4. The surgical treatment should be applied for the pain which prevent the daily activities and neurological deficit which may be improved.
5. Decompression should be made enough in spinal stenosis.
6. The stable instrumentation is necessary and the posterior-posterolateral fusion should be performed.

Table 1. Results according to Oswestry criterias.

Excellent	2
Good	3
Fair	1
Poor	1

Table 2. The Frankel evalution.

Frankel	Preop.	Postop.
A	-	-
C	-	-
D	(2)	(1)
E	(5)	(6)

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