

OUR EXPERIENCES WITH THE LUMBAR SPINE FUSIONS

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The authors are presenting their results on spinal fusions between March 1987 and December 1990. They are pointing out the importance of the exact indications the importance of the operative technic, and careful follow up. Using internal fixation in spinal fusions result in a greater success.

Key Words: Spinal fusion, Steffee VSP system, Internal fixation

INTRODUCTION

The different methods in spinal fusions are playing bigger roles in the surgical treatment of the lumbar spine.

The spinal fusion, as a choice of surgical treatment in the cases of spinal fractures or different spinal tumors, are well accepted. But doing spinal fusions in any other pathologic conditions, concerning the consequences of the degenerated intervertebral disc (segmental instability and spinal stenosis) and concerning the spondylosis, are matter of dispute. The spinal fusions on the lumbar spine are divided into three groups:

1. Anterior lumbar interbody fusions
2. Posterior lumbar interbody fusions
3. Posterolateral spinal fusion

All these methods can be used alone and with the combination of any internal fixation devices. The internal fixation system were getting more and more popular in the last decade. The transpedicular systems seem to be the most popular due to their biomechanical advantages and because of their safety.

METHOD

We have no personal clinical experience in the surgical treatment of fresh spinal injuries.

In the case of spinal tumors, spinal fusion is performed on instabile spine due to tumor removal. In any other case, our indications are according to Cloward (2), Crock (4), Steffee (11), Our indications are below:

1. Degenerated intervertebral disc disease, where the changes are not affecting more than two levels and

no recovery is observed in detected performing, long lasting conservative treatment.

2. Failed back syndrome, with the consecutive symptomatic instability in previously operated segment, with or without any neurological sign.

3. Spondylolisthesis in any grade, if the source of symptoms are stemming from the affected segment, after prolonged unsuccessful conservative treatment.

We perform clinical, radiological examinations and laboratory tests before surgery. We point out the importance of neurological, gynecological and urological examinations as well.

Beside normal xRay, on lumbar spine, it is necessary to perform the CT scan (with or without myelography) and in certain cases, it is necessary to do discography, radiculography and MRI examination. Before all the spinal fusions we use diagnostic analgesic block technique of Akkerweken (Lateral Stenosis of Lumbar Spine, 1989).

The surgery is done under hypotensive general anaesthesia. Autotransfusion and CELL SAVER are available. Position of the patients and surgical method is according to Cloward's procedure.

Patient is in prone position, approach is median-sagittal and following decompression of neural elements we can reach intervertebral disc. We remove all the intervertebral disc with a special instrument together with the endplates of the vertebra, making well-bleeding surface. Stretching the segment, autologous bone graft and "D" form biloceramic cage are put into the space. After finishing the stretching, developed forces are stimulating bony consolidation, which is going to be fused in 10-12 weeks time. The bone graft is taken from our own bone bank. The weightbearing capacity of the bone grafts is high. Due to the forces and blood supply, chances are good as far as bony fusion is concerned. Other advantage is, that the intervertebral space is kept by the bone graft. Therefore the intervertebral foramen will be wide enough.

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After having the fusion, patient could be mobilized immediately after surgery, because of the stability of the fused segment. Gymnastics are begun at the first postoperative day in prone position, and patient is in stang position at second or third day postoperatively.

After removing the sutures patient is discharged. Regular follow up in 4 weeks time is needed and more active exercises are begun in 10-12 weeks time.

A full recovery is expected in 4-6 months time.

The internal fixation is used in cases, when degenerative changes destroy the lumbar spine and make it in stable. In the case of spondylolisthesis, for example posterior useless part of the vertebra is removed, the stability is kept by the intervertebral bone graft, bioce-ramic cage and by the internal fixation system.

At the begining Harrington-Vidal (13) and Zilke method were used. But since 1989 we use the Steffee VSP (VARIABLE SCREW PLACEMENT) system. Nowadays we are using mainly this system, quite simple to use, and very strong.

The system consists of three parts:

1. Transpedicular screw
2. Longitudinal plates, connecting to the screw on each side
3. Transversal connector, making rotational stability

Using any orthesis postoperatively is not necessary in our experience. The postoperative regimen and follow up are just the same, as it was mentioned in the case of posterior interbody fusion without internal fixation.

RESULTS

243 lumbar fusions were performed in our department between March 1987 and December 1990.

Table 1:

1987-1990	
LUMBAR SPINE FUSION	243
INTERNAL FIXATION	117
USIS (Universal Spinal Internal System)	27
VSP (Variable Screw Placement)	79
OTHER	11

The posterior lumbar interbody fusion was combined with internal fixation in 177 cases and particularly with Steffee VSP System in 79 cases.

The avarage follow up was 1 year and 8 months, the longest was 4 years and 1 month, the shortest was 6 months.

The distribution is shown on the table II according to the diagnosis.

In the case of degenerated intervertebral disc diseases, the consequence is spinal stenosis which is an operative indication.

In these cases, following the enlarged decompression the fusion was necessary to prevent secondary instability.

In the cases of spondylolisthesis, 93 patients were fused. According to the grade of slipping distrubution is shown below:

0-25 %	: 19
25-50 %	: 57
over 50 %	: 17
TOTAL	: 93 cases

Table 2:

Degenerative disc disease	49
Spondylolisthesis	93
Tumor	14
"Failed Back"	87
TOTAL	243

In the case of spinal tumors, resection and fusion on 14 patients were performed.

Following the previous lumbar spine surgery, in the cases of "Failed Back" syndrome 87 patients were fused. In the cases apart from the severe neurological complications, all the cases were treated conservatively for a longer time and surgery was recomended only in the unsuccessful cases.

The MRI is of greatest importance in this cases, which seerates different tissues and excludes any other pathological conditions (with or without Gadolinium).

To rule out the results HSU, WHITE, ZUCKER-MANN method (8).

The evaluation of all our (N = 243) cases are summarized in table III.

Out of this 243 patients the Steffee VSP cases are shown separately (N = 79).

The causes of moderate and poor results are the following in our opinion:

Table 3:

Total/VSP	N = 243	79
Excellent or good	62 %	73 %
Moderate	31 %	27 %
Poor	7 %	-
	100 %	100 %

1. Technical failures which arise in forming the bone grafts and placing them in. Bone graft collapse was detected in 21 % cases, but it was not necessarily connected with the moderate and poor results. Out of 21 % of the cases 4 % was classified as excellent and good group, but all poor cases were connected to any bone graft complications.

2. The number of previously performed procedures. Evaluating the "Failed Back" cases it seems to be evident that, as the number of previously performed procedures increase the success rate of lumbar fusion is negatively affected. Our results in this group is 49-41-10 %, highly below the average.

After all, in certain cases we are able to judge that in the cases where the posterior interbody fusion was done alone, it should have been augmented with internal fixation. This judgement is concerning the case which have been done in 1987 and in 1988. At that time we did not have any segmental transpedicular fixation system. In these cases, we have seen a relatively fast bone graft collapse, causing all the consequences, such as scar tissue development, resulting scatrice.

As far as our complications are concerned, we have not had any intraoperative complication with harmful consequence. No abdominal injury and definite neurological damage following surgery was seen. In the "Failed Back" group 11 % had temporary neurological deficit. Performing of selective electric stimulation resulted in full recovery as far as the muscle weakness was concerned. Paraesthetic signs on the leg were persistent in 7 % cases after 6 months.

Once, the fused level was missed, which was corrected during operation. This patient had a moderate recovery.

Once, bone graft was pushed retroperitoneally. We have not been able to remove it from the approach, so it was left there. The patient recovered excellent and when the bone graft was checked after 6 months, full resorption was observed.

No infection was present in any fused case. Once,

we removed granulation tissue which surrounded a deep suture from iliac crest area. Superficial thrombophlebitis were detected in 17 cases, 7 % within the first 6 months. Following adequate treatment full recovery occurred.

DISCUSSION:

The effectiveness of the lumbar spine fusions are proved by long term following studies (3, 4, 9, 10, 12, 13, 15).

The development in scoliosis surgery, late results of long rigid fusions were playing a role which point out the importance of segmental corrections and fusions.

In our material, when posterior lumbar interbody fusion and same procedure augmented with Steffee VSP system were compared effectiveness was much greater in the second group. Although the number of patients are not so high, follow up time is not so long for making serious scientific conclusion, according to our experience we have to agree to the next establishments.

1. The Steffee VSP system is able to create a solid segmental stability, even the posterior bony ligaments are removed completely.

2. Keeping the rigid fixation up, bony healing is much more successful.

3. Using a solid internal fixation, patient could be mobilized immediately, getting very good functional result.

The fusion itself requires time and technically not so simple.

Neurosurgical and orthopaedic experiences are needed.

It is very important to know the possibilities of the complications, (using internal fixation systems) and to know how to prevent them and how to choose alternative ways. Other very important point is the consistent surgical indications.

Beside professional expertise, the clever moderate-ness is playing the most important role.

According to our experience, having been doing posterior lumbar interbody fusions, we can declare, that the fusion is having a great importance in the treatment of well selected spinal disorders. The long term monitoring and correct evaluation of the results in spinal fusion cases are necessary for reaching the appropriate place in the treatment of low back diseases.

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