EARLY OUT COME OF FUSION SURGERY FOR SPONDYLOLISTHESIS

Muhammad Zahid Khan, Muhammad Saeed, Abdul Satar, Khurram Iqbal, Syed Hammad Ali Shah

INTRODUCTION

Spondylolisthesis is subluxation of one vertebra over the other in sagittal plane. The reported incidence is about 6 %. This may be anterior or posterior subluxation. Anterior slip is the most common type and lower lumbar spine is the common location of slip to occur[1]. There are different types; isthmic, degenerative, dysplastic and rarely traumatic or pathological. Isthmic is the most common type and slip is due to the defect in pars interarticularis. Degenerative is also quite common and is due to the degeneration of facet joints with or without disc degeneration. In the isthmic type, as there is defect in the neural arch, the width of the canal increases with slip and they may remain asymptomatic for long time with out neurology. In contrast, degenerative type due to intact neural ring rapidly gives rise to stenosis like symptoms[2].

The clinical presentations may be different. There may be an episode of back pain, radiculopathy and stenosis like symptoms in degenerative type. The natural history of isthmic Spondylolisthesis is still unclear[3]. This is why the treatment of Spondylolisthesis is still controversial. It should be clear that nonsurgical treatment should be the initial treatment in all cases of isthmic and degenerative Spondylolisthesis[4]. Surgical intervention is required in patients with backpain or claudication compromising daily life, persistent back pain with failed conservative treatment, neurology or cuada equina[5].

There are a variety of surgical procedures ranging from simple decompression to various kinds of instrumentation with fusion. Usually fusion with stabilization is performed. These are basically posteriolateral fusion (PLF) or interbody fusion done from the posterior or anterior. PLF with instrumentation and without reduction is being a standard surgical treatment for long time with consistently good results[6]. Surgical reduction of the high-grade slip is another controversial issue. According to many authors it carries a great risk of neuronal injury while in situ fusion is simple with out complications and has good results[7]. With pedical screws fixation and interbody fusion, slip can be reduced fully or partially without major complications and increasing the chances of fusion. It also addresses basic pathology and theoratically improve biomechanics of the spine[8,9]. In this study we present our early results of surgical interventions in terms of functional outcome, slip reduction and complication rate. Functional outcome was assessed with Oswestry Disability Index ODI preoperatively and post operatively[10].

Department of Orthopaedic & Spine Surgery,
KGMC/Hayatabad Medical Complex, Peshawar.

Address for correspondence:
Dr Muhammad Zahid khan
Registrar, Department of Orthopaedic & Spine Surgery,
KGMC/Hayatabad Medical Complex, Peshawar.
Sector N-3, Phase 4, Hayatabad, Peshawar.
Email add: zahidwazirkmc@yahoo.com
Cell No: +92333-9396005

MATERIAL METHODS

This observational prospective study was performed in the department of Orthopedic and Spine surgery, Hayatabad Medical Complex Peshawar and Aman Hospital Peshawar from Jan 2012 to Jan 2014. All those patients were included who were treated for lumbar Spondylolisthesis of any origin at our centers and were successfully followed up for at least 6 months. Informed consent was taken from all the patients. There was thorough preoperative evaluatvation of the patients with detailed history and required investigations. MRI was done in all cases and 3D CT scan performed in patients with traumatic and dysplastic Spondylolisthesis.

On the day of surgery patients were given intravenous antibiotics one hour before incision. Patients were catheterized and put in prone position. Fusion Level identified with fluoroscope and midline incision was given. Exposure was performed subperiostealy to the tip of transverse processes. Then if only PLF with decompression was planned, all the screws were put in and checked with image intensifier if in doubt. Then decompression was performed and bed prepared for fusion. Bone graft was then harvested from the iliac crest or laminectomy chips were used if sufficient. Rods were placed & tightened. Wound closed over suction drain.

In acute traumatic Spondylolisthesis, after screw placement and decompression, reduction was performed and rods applied**.** In dysplastic Spondylolisthesis delta construct was used. The only difference is that pedicle screws of sacrum passed through S1 into L5-S1 disc and into L5 vertebra. If TLIF was planned then we put screws in the pedicles opposite to cage side. In L5 spondylolisthesis, reduction screws were used. On the TLIF side, only screws hole were made, then facetectomy done and disc space identified. Disc space dilated end plate curetted and while the dilator in place the rod on opposite side is tightened. Then bone graft put in the space and then cage with bone graft. And then the rest of screws and PLF was done.

Post operatively intravenous antibiotics were used for 5 days. Initial mobilization was done as early as possible. All patients were followed at 2 weeks, then monthly for 3 months and then every 3 months for 2 years and thereafter at patient's convenience. At every follow up plain radiographs were obtained to assess the implant, any sign of failure or other complications. At 3 months and thereafter every three months functional assessment was done using ODI. All data was analyzed using SPSS VERSION 16.

RESULTS

In this study a total of 29 patients were included, in whom spinal fusion was performed for Spondylolisthesis of different origin. Out of these 29 patients, 22 (75.9%) were female while only 7 were male (24.1%). Patients with isthmic spondylolisthesis were exclusively female. Mean age of the patients was 38.7 with standard deviation of 12.2. Minimum age in our sample was 6 year while maximum was 55 years. This is because we had included in this study patients with Spondylolisthesis of different etiology. Isthmic Spondylolisthesis was the most common type in our study, 16(55.2%) out of total 29 patients.

Eight (8) patients were with degenerative, 3 with traumatic and 2 with dysplastic type of Spondylolisthesis. Out of 29 patients in our study, in 19 patients the level of Spondylolisthesis was L5-S1 (65.5%) while in 10 (34.5%) it was L4-L5.

The preoperative and postoperative severity of slip according to Meyerding's grading was as follow. The mean preoperative slip grading was 2.24 (SD=1.1) with minimum being 1 and maximum 5. Minimum postoperative slip was 0 while maximum was 5 with mean of 1.03 (SD=1.3). Grade 2 slip was the most common. 15 (51.7%) out of 29 patients had grade 2 slip. Postoperatively grade 0 was the common grade of slip with 15 (51.7%) patients had grade 0 slip after surgery. After surgery we were able to achieve reduction in majority of low grade Spondylolisthesis. In 15 (51.7%) patients, full reduction was achieved, in 3 (10.3%) partial while in 10 (34.5%) no reduction was achieved. TLIF was the most common type of surgery followed by PLF with decompression. TLIF was performed in 18 (62.1%) while PLF in 9 (31.0%) patients. In two dysplastic type Spondylolisthesis, delta construct was done. In TLIF, full reduction of the slip was achieved in 13, partial in 4 while none in 1 patient. Only 2 patients achieved full correction with only posterior fixation. Both were post traumatic.

Preoperative minimum ODI scoring was 43 while the maximum was 66, with mean of 52.6 (SD=6.3). The mean ODI scoring at last follow up was 24.55 (SD=8.3) with the minimum of 14 while maximum of 56. Majority of our patients, 19 (65.5%) out of 29, had moderate disability with ODI score between 20 and 40. 09 (31%) patients had minimal disability while 1 patient had severe disability. All patients except one were subjectively satisfied and were willing to undergo the same surgery if they had a chance to reselect. This young patient with sever disability, came two year after surgery with implant failure and non-union. We had total of 3 complications, one nonunion (3.4%) and 2 (6.9%) early deep infections.

DISCUSSION

Lumbar Spondylolisthesis can be a significant source of morbidity and whenever conservative treatment fails we perform fusion surgery in these patients with or with out decompression. The segmental instability is a major factor in generation of symptom and fusion becomes mandatory to achieve good results[11]. Whenever possible we use interbody fusion and like others we are of the opinion that it enhances the chances of fusion. Although many studies have reported similar clinical out come[12]. Like other studies the most common type of spondylolisthesis was isthmic followed by degenerative spondylolisthesis. Traumatic and dysplastic are rare types. 16 (55.2%) out of 29 patients were with isthmic Spondylolisthesis. 8 patients were with degenerative ,3 with traumatic and 2 with dysplastic type of Spondylolisthesis. The most common level of injury was L5-S! 65.5 % and 34.5 % had .L4-L5 level[13].

In our study majority of the patients were female 22(75.9%) out of 29 patients while only 7 (24.1%) were male patients. For isthmic spondylolisthesis male predominance is shown by many authors with male to female ratio of 2:1.1[14]. In degenerative spondylolisthesis, female gender is shown to be predominant[15]. In contrast to this, in our study majority of the patients with isthmic Spondylolisthesis were female. One out of 16 patients with isthmic spondylolisthesis was male while all the rest were female. In degenerative Spondylolisthesis female were predominant in our study like other studies. This difference may be due to the small sample of our study.

Musluman AM et al in their study on comparison of PLF with Posterior lumbar interbody fusion (PLIF) reported better results in the last group. Their assessment was on the basis of VAS and ODI. They reported 88% satisfactory results in PLIF group while 76% in PLF group[16]. We achieved satisfactory results in 93% of the patients.

Hackenberg L et al in their study reported the results of TLIF with minimum follow up of 3 years[17]. In their study, along with low grade Spondylolisthesis they included patients with disc degeneration disease in whom TLIF was performed. But like our study their main focus was on the functional out come and the tool was ODI scoring like in our study. Their mean ODI scoring preoperative was 41.6% and 31.6 % at latest follow up. Butterman G et al in there study reported improvement in mean ODI from 63% to 33% 3 years after fusion surgery for Spondylolisthesis[18]. Like these studies, our mean preoperative ODI was 52.6 while postoperatively it was 24.5. Our sample is not uniform

like theirs. They had mainly patients with low-grade isthmic Spondylolisthesis. In our study we had different types of Spondylolisthesis both low and high grade. Interbody fusion was not the only procedure done in all patients but the most common one. Our follow up is short compared to them.

Slip reduction is the most controversial part of the Spondylolisthesis treatment and there are many who advocate against it. They claim that in situ fixation has good comparable results with low rate of complications[19]. Still there are proponents of reduction who think that it is against the basic principles, leaving the basic pathology unadressed[20]. We never focused on reduction but we observed that while doing TLIF with the help of spondylo reduction screws without extra efforts, significant reduction could be achieved. Like Pan J achieved average reduction from 24% (grade 2) to 10 % (grade 1). According to them it was spontaneous and was due to circumferential release[21]. We think that even with one sided release and disc removal easy reduction can be obtained with out increasing the complication rate.

We had complications in 3 patients. There was non-union and implant failure in one patient while 2 patients were suspected for early deep infection. This patient with nonunion, a young male, came 2 years after surgery with sever back pain. There was implant failure.

He was assessed for infection but no signs of infection were found. On 3D scan there was no sign of union. We could only relate it to tobacco addiction, which he restarted after some time against advice. He restrained from tobacco for 6 weeks preop. He was reoperated with implant revision and bone grafting. He improved dramatically post operatively. 2 patients were re explored within 2 weeks for some discharge and fever. Both responded well to early debridement with wash and postoperative antibiotics and have not reported any complaint till date.

CONCLUSION

In properly selected patients, fusion surgery offers better results for spondylolisthesis patients. TLIF and PLF both are reliable methods but TLIF additionally achieve significant reduction of slip.

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