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ABSTRACT

Objective: To determine the role of dynamic lumbar spine x-ray in the diagnosis of type 1 spondylolisthesis in patients who have previously done lumbar spinal surgery.

Materials and Methods: The study was carried out at neurosurgery department, Lady Reading Hospital Peshawar, KPK from July 2015 to June 2017. He study employed prospective observational) study and a total of 1440 patients were studied.

Results: A total of 1440 patients were studied in which 974 (67.7%) were females and the remaining 464 (33.3%) were males. Mean age of the patients was between 20 to 50 years. These patients had underwent lumbar spinal surgery about 1 year ago for PIVD and Stenosis. Proper history was taken and relevant examination was done. These patients were suggested dynamic lumbar spinal x-ray .After dynamic lumbar spinal x-ray (flexion extension view) was done, it was revealed that around 672 (46.6 %) of the total 1440 patients had type 1 spondylolisthesis. This percentage of patients with type 1 spondylolisthesis is prove of how dynamic lumbar spinal x-ray plays a role in the diagnosis of type 1 spondylolisthesis in patients who have had underwent lumbar spinal surgery.

Recommendation: Dynamic lumbar spinal x-ray is recommended as a standard technique in the diagnosis of type 1 spondylolisthesis in patients who had previously underwent lumbar spinal surgery.

Keywords: *Dynamic lumbar spinal x-ray, Type 1 spondylolisthesis, lumbar spinal surgery, Instability*

INTRODUCTION

Lumbar spinal stability is maintained by the combined effects of discs, joints and ligaments. The intervertebral discs determine the extent of possible movements between the vertebrae while the intervertebral joints determine the direction of movements between the vertebrae. On the other hand, the ligaments exert a contracting force on the vertebral arches keeping the vertebrae aligned.[1]The flaval ligaments especially their medial parts, ensure stability of the arch of L5 with respect to the arches of L4 and S1.[2] Normal spinal movements has been studied by anatomists.[3, 4]. They pointed the axis of flexion extension movements between the lumbar vertebrae in or near the centres of the intervertebral discs. In a stable spine, vertebral movements occur in a fixed fashion. Whereas instability is defined as the local deviation from this fixed pattern. Instability in spondylolisthesis is characterized by abnormal location of axis of these movements.

According to flexion extension studies introduced by Knutsson, abnormal movements were noted and interpreted as the results of loss of stability. The abnormal movements consisted of parallel displacement of vertebrae as evidenced from backward displacement in extension, disappearing partially or entirely in flexion.[5] In a spondylolisthetic spine, intravertebral instability occurs requiring further radiological studies to determine the extent of instability and to assess its clinical significance with severity.

MATERIALS AND METHODS

Patients who have had previously underwent lumbar spinal surgery were studied thoroughly. The record sof these patients were observed and analyzed in detail. Prospective (observational) study was used for this purpose. The study was carried out at neurosurgery department of Lady Reading Hospital, Peshawar, KPK from July 2015 to June 2017. A total of 1440 patients were studied. Out of which 976 (67.7%) were females and the remaining 464 (32.2%) were males with a mean age of about 20 to 50 years. Patients who had previously underwent lumbar spinal surgery were included in the study and those patient who has previous history of trauma, age related degenerative disease or who haven't undergone lumbar spinal surgery were excluded. Patients included in the study belonged to different areas of KPK. Radiological and clinical features of these patients were analyzed. Dynamic lumbar spinal X-ray (flexion extension) view were carried on all patients included in the study.

RESULTS

A total of 1440 patients were studied of which 976 (67.7%) were females and the remaining 464 (33.3%) were males giving a ratio of about 1:3. The age of the patients was between 20 to 50 years. These patients had undergone lumbar spinal surgery less than 1 year ago. Detailed history was taken and it was noted that total number of patients with PIVD was 864 (60%) out of 1440. L4 – L5 involvement was in about 501 (58%) patients and L5 - S1 involvement was in about 363 (42%) patients. On the other hand, 576 (40%) had stenosis with L4 – L5 involvement in about 214 (37%) patients and L5 – S1 involvement was in about 362 (63%) patients. Dynamic lumbar spinal x ray was suggested to these patients after a proper history was taken. When Dynamic X-Ray (Flexion Extension view) was done, a total number of patients who had type 1 spondylolisthesis was 672 with 159 (24%) males and 513 (76%) females. Of the 672 patients, the number of patients with a mean age of 20 to 29 years was 20 (3%), 450 (67%) patients were of the age 30 to 39 years and the remaining 201 (30%) were of the age 40 to 50 years. Of the total 672 patients, the number of

patients with L4 – L5 involvement was 222 (33%) and those with L5 – S1 involvement was 450 (67%). Patients who developed early Discitis after lumber spinal surgery were 56 (3.88%) and when dynamic X-ray was done after 1 year of surgery on patients who were again presented with backache, all 56 patients showed type 1 spondylolisthesis. The summary of patients' data is presented in figures 1, 2, 3, and 4.

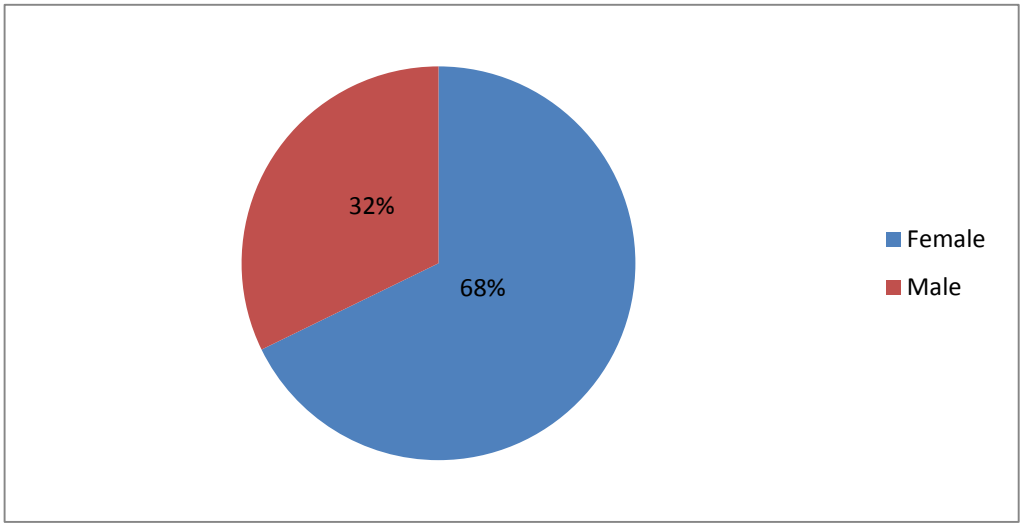

Figure 1: Gender wise presentation of patients under study

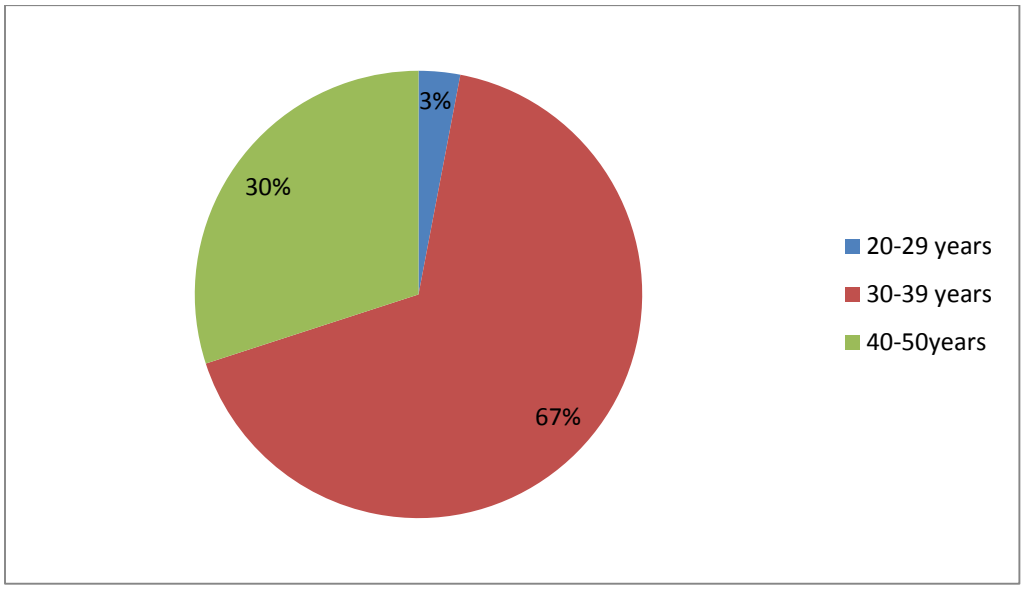

Figure 2: Age wise Gender wise presentation of patients under study

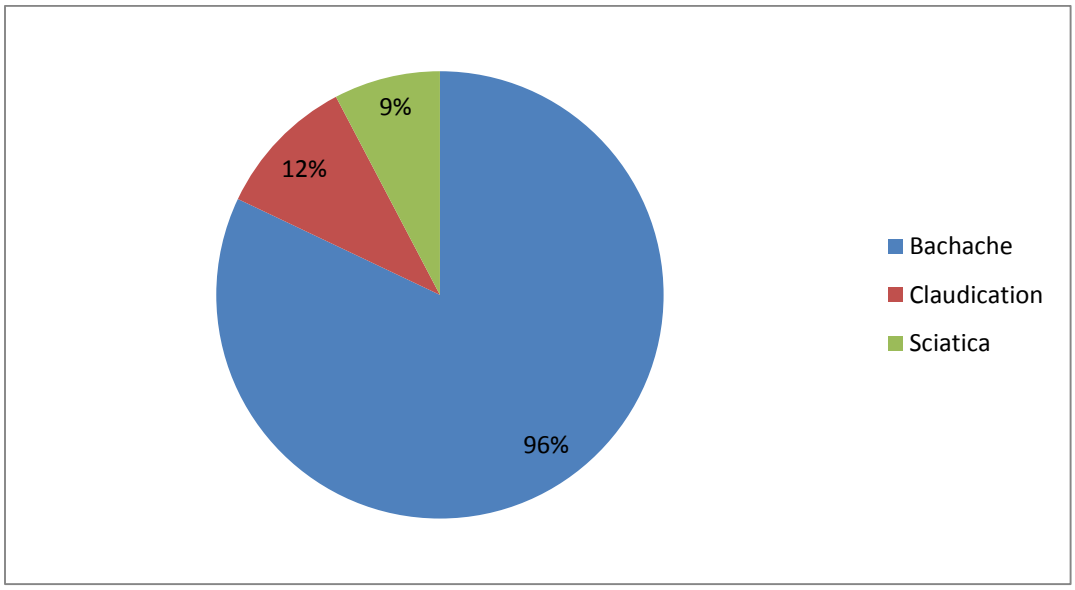

Figure 3: Percentage of patients with signs and symptoms

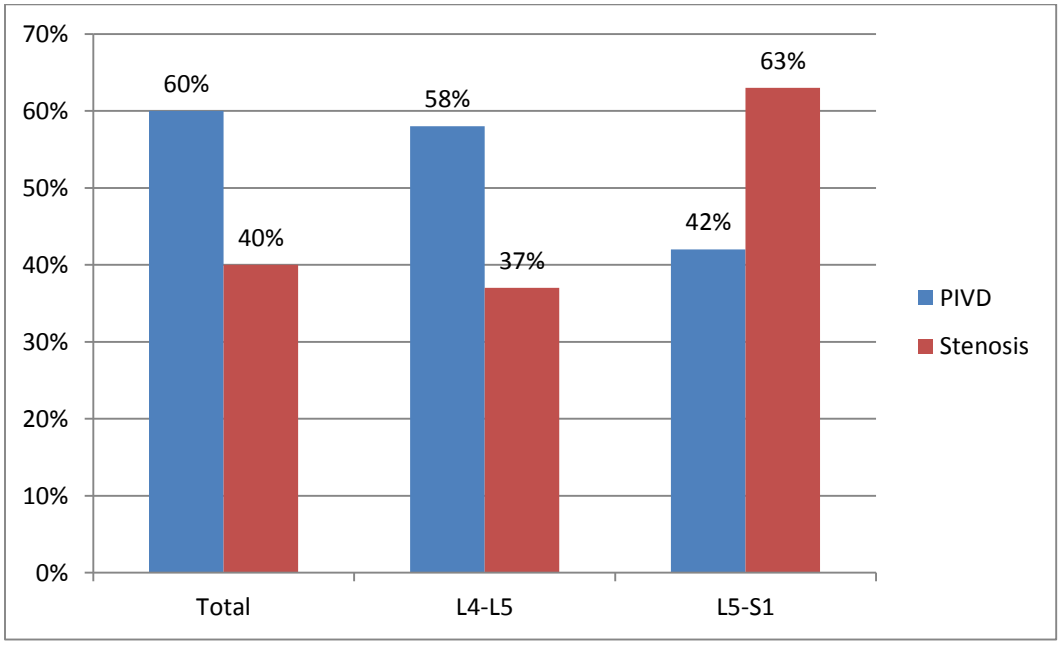

Figure 4: Percentage of patients with PIVD and Stenosis each involving L4-L5 and L5-S1 Levels

DISCUSSION

Lumbar spinal segments can move with translational rotational movements along the x, y, and z axis as a result of physiological load [6]. Lumbar spinal instability can occur which according to frymoyer and Selby is defined as an abnormal response to applied loads [7] . In which a less than maximal force can produce abnormally large amount of displacement in the neutral zone.[8]

In this study, dynamic lumbar spinal X-ray is used to assess its role in the diagnosis of spondylolisthesis in patients with previous lumbar spinal surgery. Pitkanen et all found flexion extension positioning for radiological investigations to more oftenly revealed signs of instability as compared to traction-compression positions [9] and is considered a standard technique, which most of the surgeons uses in the assessment of degree of instability in almost all types of spondylolisthesis.[10, 11]Although it has been questioned by several authors in the assessment of lumbar instability.[12, 13]. Nizard et all explained the weak side of flexion extension positioning in taking radiographs by limited reproducibility.[14] These studies have been carried out years ago and recent studies clearly explains that this technique (flexion extension position) in taking radiographs is the standard one by proving it to be one of the easily accessible, cheaper and less time consuming, as it is much helpful in the diagnosis of spondylolisthesis especially in patients who have had previously undergone lumbar spinal surgery. Figure 4 and figure 5 shows L4-L5 Spondylolisthesis on X-ray and MRI respectively.

Figure 5: L4-L5 Spondylolisthesis on flexion extension X-Ray

Figure 6: MRI showing L4-L5 Spondylolisthesis

RECCOMENDATION

According to this study, dynamic lumbar spinal is recommended as a standard technique in the diagnosis of spondylolisthesis in patients with a history of lumbar spinal surgery. It has proved to be one of the cheapest, easily accessible, less time consuming and more potent in the diagnosis of type 1 spondylolisthesis in patients who underwent lumbar spinal surgery.

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