

**Case Report**
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## Endoscopic Medial Facetctomy and Decompression Release Locked Facet Joint and Correcting Degenerative Spine Deformity

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**Abstract**

Multilevel spine degenerative deformity should be described in 3 column theory of lumbar degenerative cascade to detect completely the degenerative damages or deformers. Theory of degenerative spine deformity is a combination between 2 factors: 1. spine stabilizer (disc, 2 facet joints, anterior and posterior longitudinal ligament, supraspinatus ligament, multifidus muscle) and 2. Spine deformer (degenerative damages). Normal facet joint is a gliding joint in flexion, rotation, and lateral bending, in degenerative facet joint the hypertrophy will lock the joint function in deformity.

The concept of minimally invasive endoscopic spine surgery is removing the deformers with decompression, release locked facet joint through medial facetctomy and retain the stabilizers. After locked facet released and deformers are removed, the stabilizer's function is reapplied, and the deformity can be corrected naturally.

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**Introduction**

The axial stability is maintained along a vertical column system, all three columns from C2 to the sacrum. The anterior column is formed by the vertebral bodies and discs, and the two posterior columns by posterior joints. Anterior column consists of vertebral bodies, discs, anterior and posterior ligament. The articular facet joint and flavum ligament are middle column, while the posterior column consists of spinous process, inter and supraspinatus ligament include multifidus muscle [1-6].

Three joint complex theory of lumbar degenerative cascade by Kirkaldy -Willis et al, 1978 described the detail of pathologic changes of the disc and two posterior joints, but this only describe the 2 vertical columns, anterior and middle column. Christian Ingerslev Bastrup a Danish radiologist Copenhagen described degenerative cascade of the posterior vertical column, pathologic changes on the spinous processes in the lumbar vertebrae including the soft tissues between them which is mentioned as kissing spine. His publication was supported by studies by Auckland and Bristol study group (2010), described a breakdown of the interspinous ligament and leading to a development of neo-arthritis between adjacent spinous processes, characterized by abutment, enlargement, sclerosis and bursa [7-10].

The new three columns theory of Lumbar degenerative cascade related to the nature illness of lumbar degeneration, is built to combine both theory and providing clear understanding about

lumbar degenerative process: that may start from either one of the three columns, alone or together, starting from inflammatory to a compressive reactions, change the bio-mechanic construct of the lumbar spine, single or multi-levels and leading to a degenerative deformity [11-15].



**Figure 1:** Degenerative Deformity

The lumbar spine stability during the dynamic movement is supported by disc, facet joint and strong ligament: anterior longitudinal, posterior longitudinal, and supraspinatus ligament complex. According to Wolfgang Rauschnig the supraspinatus ligament complex is not a ligament, but multiple tendon insertion of multifidus muscle. All the above anatomy including the muscle

are known as spine stabilizers [16-20].

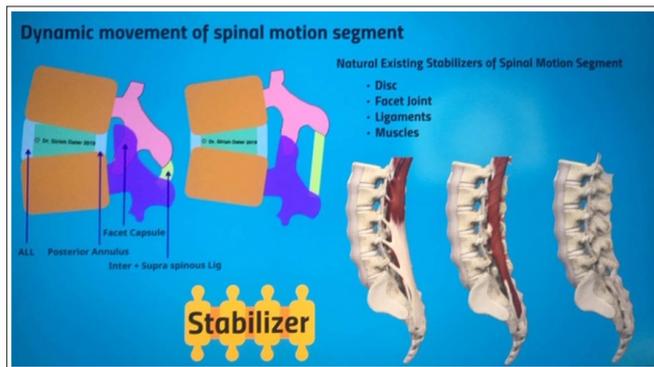


Figure 2: Spine Stabilizers

Anatomical changes due to degenerative damage occur in three columns: osteophyte, facet hypertrophy, canal stenosis, disc herniation, disc narrowing, flavum in-folding and hypertrophy, kissing spine, kissing lamina, all of these are known as deformers in degenerative cascade because it will dysfunction the spine stabilizers [21-25].

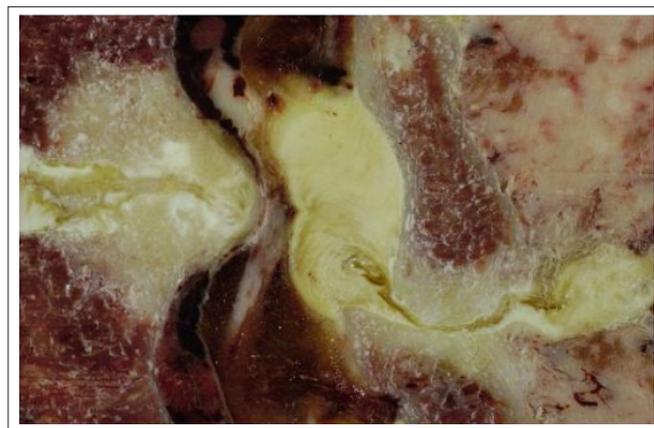


Figure 3: Kissing Lamina as Deformer (Courtesy of Rauschnig)

Facet joint is a gliding joint in flexion, extension, rotation and lateral flexion. Facet hypertrophy will lock the facet joint in certain deformity.

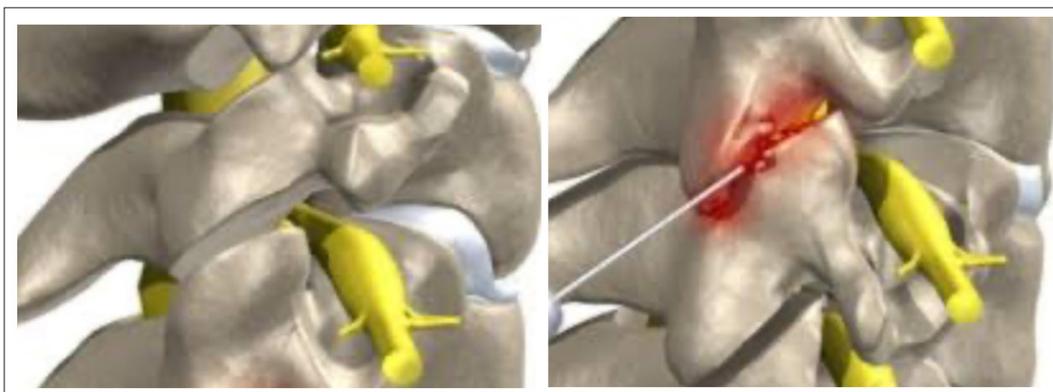


Figure 4.1: Normal facet joint.

Figure 5.1: Facet hypertrophy. Deformer

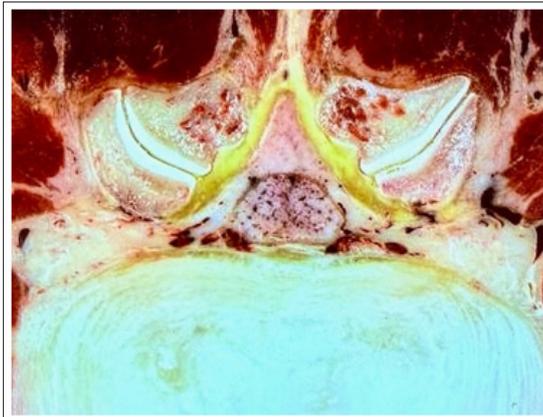


Figure 4.2: Normal facet joint



Figure 5.2: Facet hypertrophy Deformer

The degenerative spine deformity is a combination between two factors: stabilizers and deformers, creating instability and degenerative deformity in the three columns [26-29].

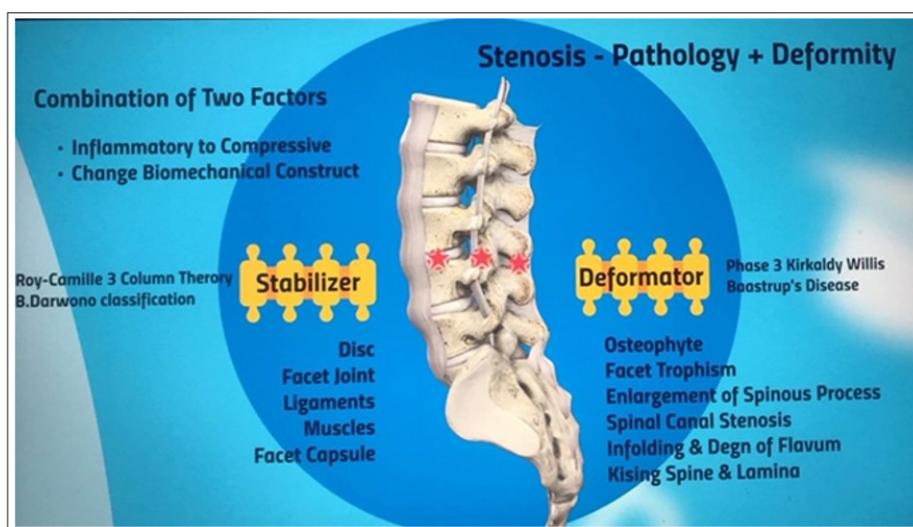


Figure 6: Degenerative Deformity is a Combination of Two Factors

### Option of Treatment

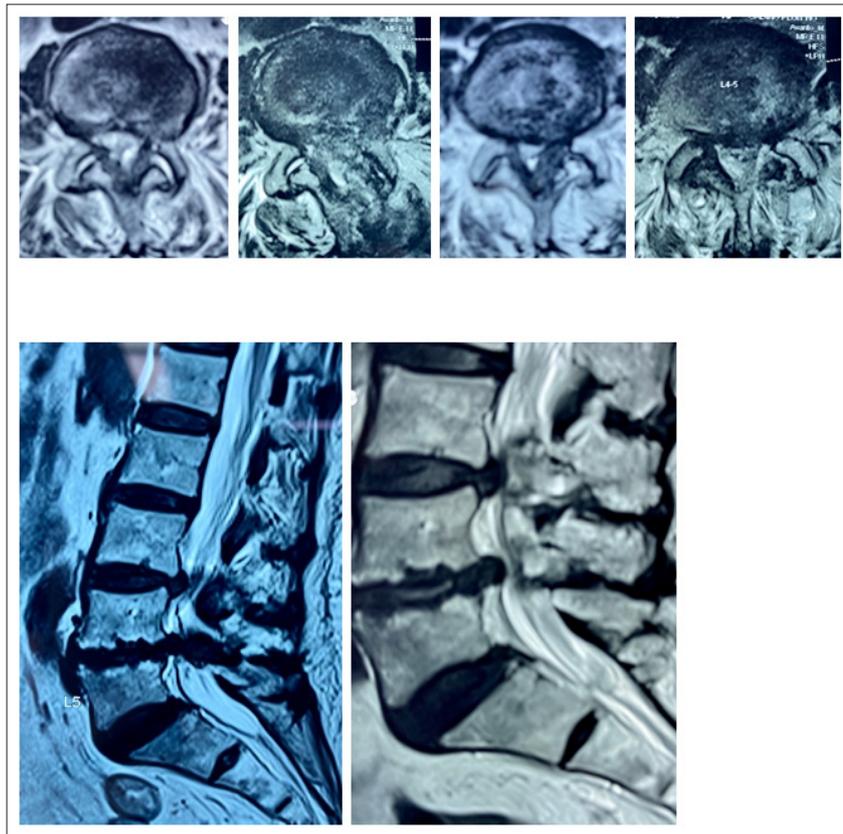
The minimally invasive spine surgery using endoscope was developed to answer the option of treatment. A long evolution in developing this technology starting from Hijikata 1970s, Parviz Kambin 1980s, Scriber, Suezawa, Leu using discoscopy late 1980, Anthony Yeung transforaminal under continuous irrigation 1990s, Sebastian Rutten interlaminar and application of arthroscopic technique 2000s

The disruptive surgical technology of spine endoscope is from dry environment in simple endoscopy to arthroscopic surgical dissection performed in the spine underwater environment with continuous irrigation and suction. The advantages of disruptive technology are:

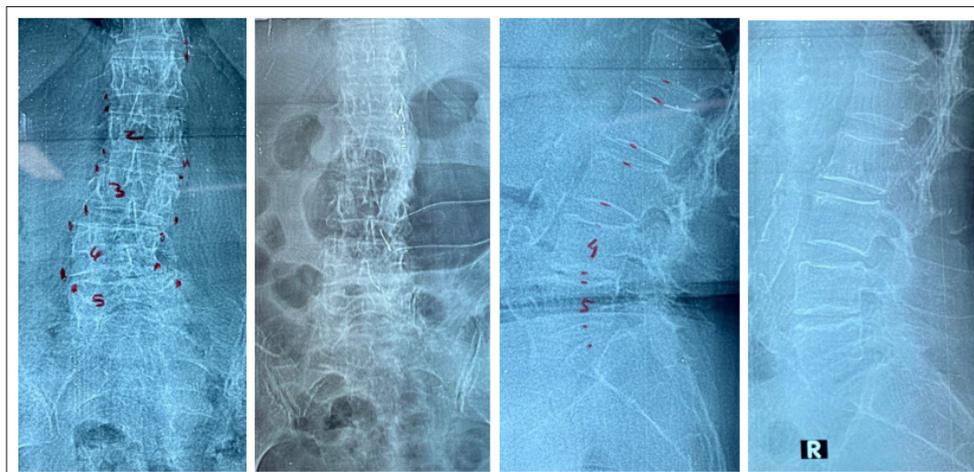
- docking system and closed system irrigation, the water irrigation and suction could be controlled better,
- the continuous water irrigation will create a better visibility in the surgical area, reduce intra and postop bleeding and infection rate significantly,
- the range of approaches increased from pure transforaminal or posterolateral to interlaminar, because rongeur, high-speed drills, other instruments could be used and has a wider horizon of view.
- The current indication spectrum for lumbar, thoracic, and cervical applications becomes wide and covers all types of degenerative (and other) pathologies, which have been the domain of microsurgical techniques in the past.
- The new concept of endoscopic surgical technique based on three columns theory is:
- Preserve the three columns spine stabilizers.
- Release the locked facet joint through medial facetectomy
- Decompression to remove spine deformers due to degenerative damages wear and tear and causing deformity in three columns.
- Decompression will naturally regain the function of spine stabilizers and could correct the deformity naturally without using artificial stabilizer.
- The deformity correction itself is mentioned as the second decompression, because the best decompression is deformity correction.

**Cases**

**Case 1:** Female 83, Low back pain and sciatica, spine deformity, wheelchair case. MRI show lumbar spondylosis with severe stenosis on L 3-4 and L 4-5. Treatment by endoscopic decompression from interlaminar, remove deformers, preserve stabilizers, medial facetectomy and deformity was corrected well. (Fig. 7, 8)



**Figure 7:** MRI L 3-4, L 4-5, before and after Endoscopic Treatment



**Figure 8:** Deformity Corrected

**Case 2:** Female 62, Low back pain and sciatica with rigid deformity, on MRI lumbar spondylosis L 2-3, 3-4, 4-5. Deformity was corrected after decompression by endoscopic interlaminar, remove deformers, preserve stabilizers, medial facetectomy. (Fig. 9, 10)



Figure 9: MRI L2-3, 3-4, 4-5 before and after Surgery



Figure 10: Deformity Corrected

**Case 3:** Female 55, low back pain and sciatica with deformity, claudication, wheelchair case. On MRI lumbar spondylosis and severe stenosis L 4-5. Deformity correction after endoscopic decompression interlaminar, remove deformaters, preserve stabilizers, and medial facetectomy. (Fig. 11, 12)

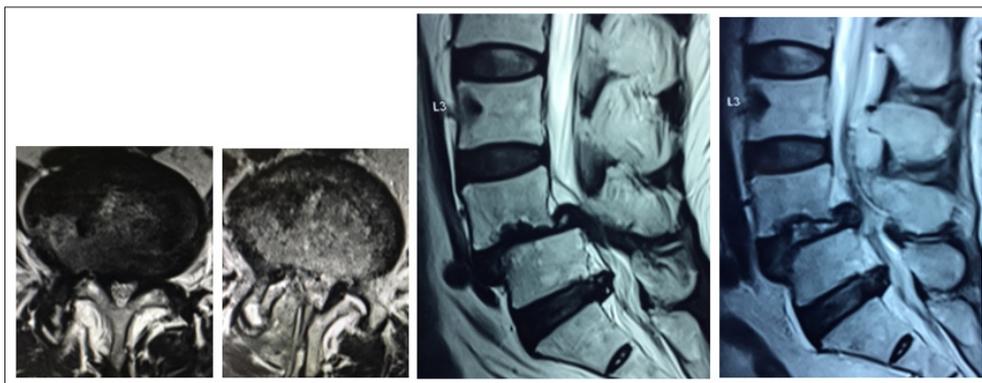
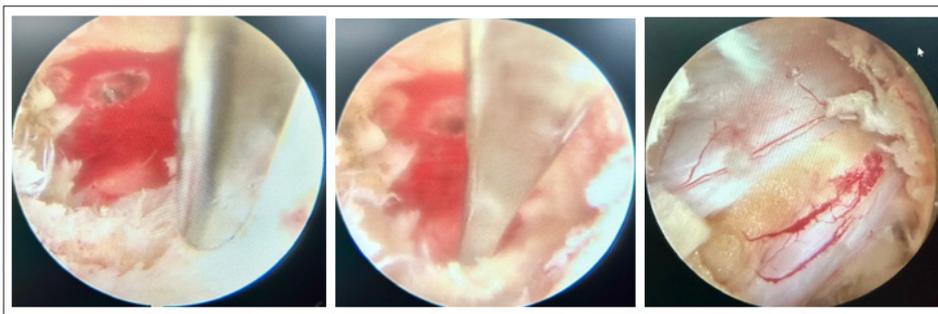


Figure 11: MRI before and after Surgery L 4-5

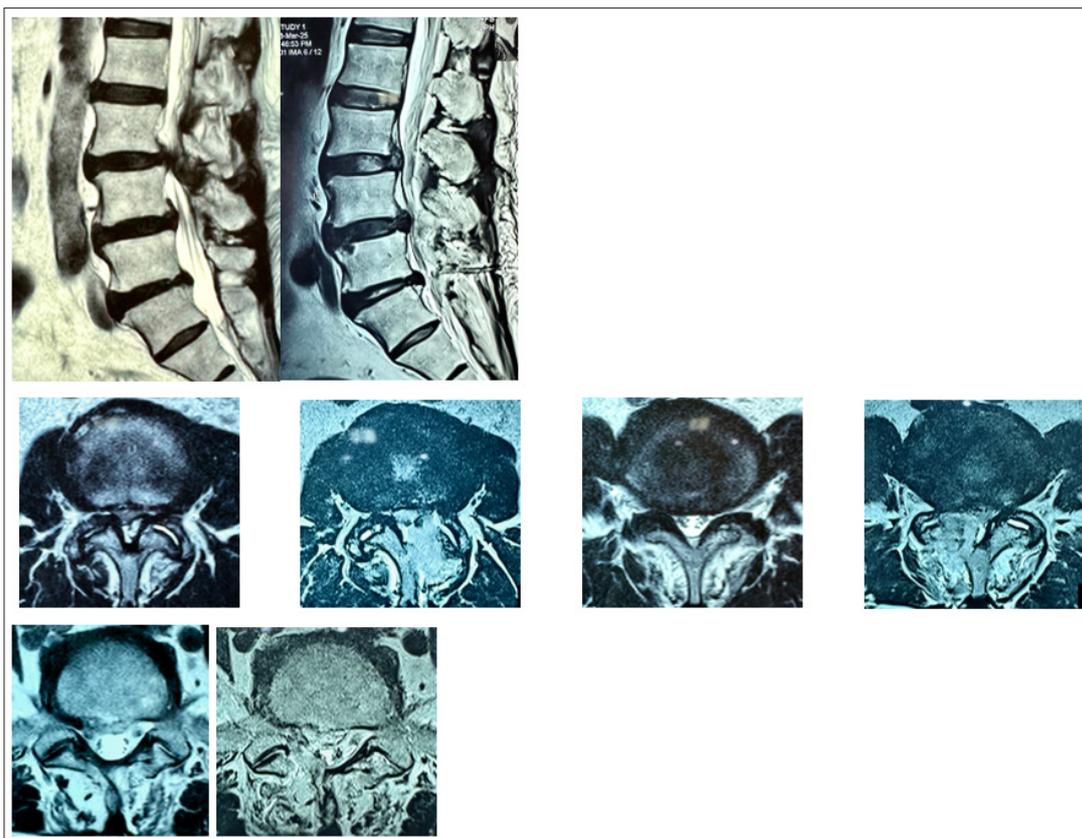


Figure 12: Deformity Corrected

Case 4: Male 74, Low back pain and bilateral sciatica. Endoscopic decompression interlaminar, remove deformers, preserve stabilizers and medial facetectomy. (Fig. 13, 14, 15)



**Figure 13:** Medial Facetectomy Inferior Articular Process (IAP), Superior Articular Process (SAP), Complete Decompression after Medial Facetectomy

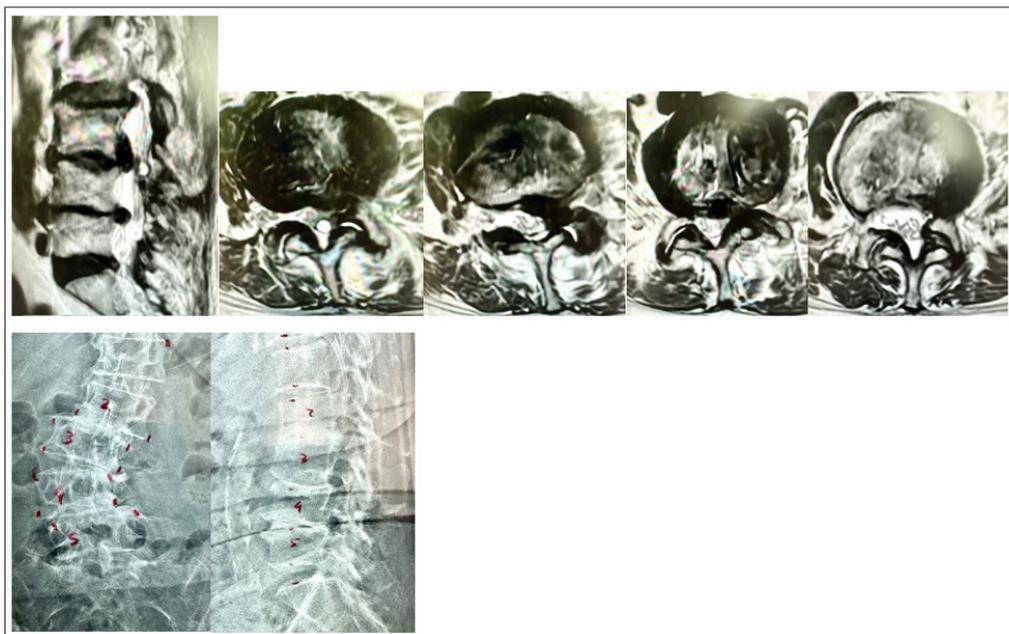


**Figure 14:** MRI before and after Endoscopic Surgery



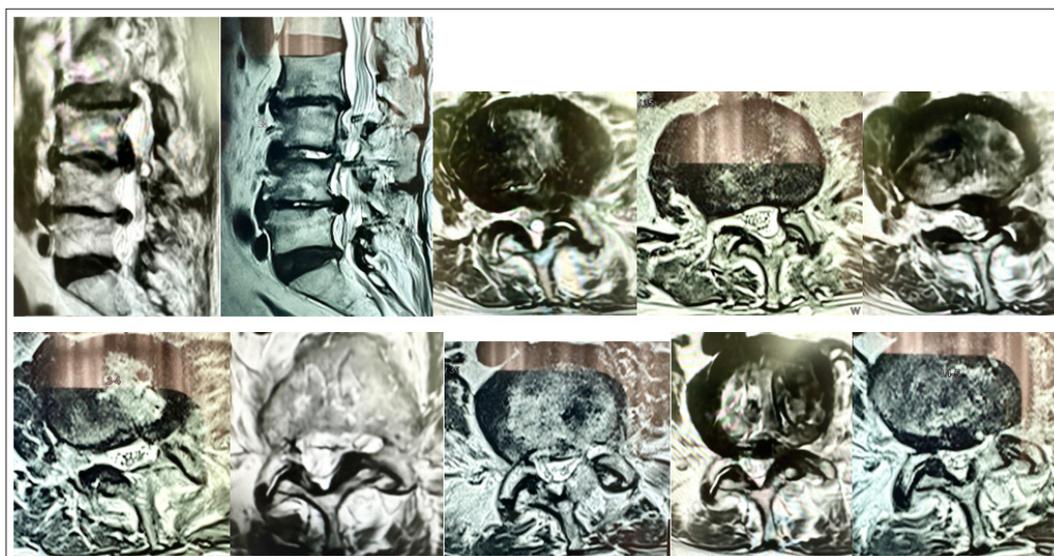
**Figure 15:** Deformity Corrected

**Case 5:** Female 77, Low back pain, bilateral sciatica, rigid degenerative deformity



**Figure 16:** Facet Hypertrophy and Degenerative Deformity

This case was treated with Endoscopic surgery interlaminar over the top, remove deformers, preserve stabilizers and medial facetectomy. (Fig. 17, 18)



**Figure 17:** MRI before and after Endoscopic Surgery



**Figure 18:** Deformity Corrected

Case 6: Male 59, Low back pain and sciatica, fracture of pars interarticularis and rigid deformity 30 years. (Fig. 19,20)



Figure 19: Fracture Pars, Instability



Figure 20: Right Stenosis and Facet Hypertrophy

Treated with Uni-portal endoscopy interlaminar, remove deformers. preserve stabilizers, medial facetectomy. (Fig. 21)

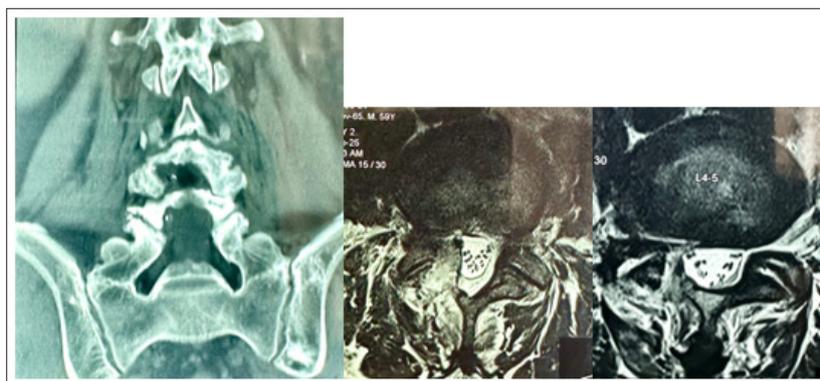


Figure 21: Remove Deformers, Preserve Stabilizers, Medial Facetectomy

Deformity corrected, fracture pars reduced and union, without fusion device. (Fig. 25, 26, 27, 28)



Figure 22: Deformity Corrected, Fracture Pars Reduced



Figure 23: 1 Month

Figure 24: 2 Months



Figure 25: 3 Months, Fracture Pars Union

## Conclusion

Spine is a life tissue and has the nature of healing after surgery that should be well supported. The new classification of spine degeneration describes all deformer of spine degeneration in three columns. Degenerative spine deformity is a combination of 2 factors: spine stabilizers and deformer. Release the locked facet joint through medial facetectomy, removing all deformer, could regain the function of spine stabilizers and reducing the deformity. The disruptive technology of endoscopy using arthroscopic concept for spine surgery, could release the locked facet joint, remove all deformer and preserve the spine stabilizers. The result is regaining the function of stabilizers and correction of the spine deformity significantly.

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