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# Anterior Spinal Fusion in the Treatment of Spondylolisthesis*

## —A Report of Three Cases—

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Gill Manning and White (1955) mentioned that the prevalant concept of symptoms in spondylolisthesis is based upon the belief that the instability of the lumbo-sacral junction induced by the defect in the pars inter-articul laris of the fifth lumbar vertebra and thereby a tendency for progressive forward slipping of the vertebral body. Though the source of nerve irritation symptom in this condition might be produced by fibrocartilagenous mass from the pseudoarthrosis or compression by the mobile lamina of the fifth lumbar spine. Fusion has been the accepted treatment because fixation of the lower lumbar segment of the spine upon the sacrum would seems to be the rational method of correcting instability and preventing forward displacement. This treatment has long been advocated, even though it is extremely difficult to achieve fusion consistently in this condition.

In the usual posterior operation for spondylolisthesis the fixation is indirect in so far as realised by an osseous bridge uniting the sacrum to the spinous processes and the laminae of one vertebra. In many series from different surgeons the results of this operation have been considered satisfactory. There is, however, always a certain number of unsuccessful therapeutic results, varying in the different series. The first direct anterior intercorporal fusion of the slipping body of the fifth lumbar vertebra with the sacrum performed by Burns in 1933 was acted upon the judicious reflexion, that the fusion from behind does not appear to be very sound in theory. This operation was followed by Jenkins Friberg and Kellog Speed, and Friberg (1939) had two of the patient died after operation out of 11 transperitional intercorporal fusions. Henschen (1942), two cases used a peg of fibula, Brunner (1942), one case with a peg of tibia, and Schüller (1949), two cases used autogenous bone material, Ramser (1943), one case used a three-flailed' Nail, the post-operative course in these five cases was uneventful. This also applies to the nine cases of Gjessing (1951). Merle D' Aubigne' (1952) reported 16 cases of transperitoneal fusion for spondylolisthesis by means of cancellous bone and a steel screw. The patients were allowed out of bed two weeks after the operation, the post-operative course was uneventful and the functional results were very satisfactory. Ingebrigtsen (1953) reported five cases of anterior transperitoneal fusion used a peg of tibia and three had good and two had

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unfavorable results. The dangers and possible postoperative complications of this method were reported to be post-operative ileus, thrombosis of vena cava, and a lesion of the cauda equina caused by a bone peg. Sicard(1952) has pointed out especially risk through the introduction of the screw. This operation have been performed on different indications, which also are not agreed upon, and the technique is not standardized.

The purpose of this paper is to report three cases of spondylolisthesis in different conditions operated by anterior transperitoneal intercorporal fusion used autogenous cancellous bone blocks from the iliac crests, which gave satisfactory results with comparatively early postoperative ambulation and little complication.

**Anterior fusion method used by the author**:

Principally the bony operation is similar to Mercer's (1936) method but for screwing. The patient is placed on his back and placed on the table in such a way that the table shall be bent under the lumbo-sacral junction during operation. Phannenstiehl's incision is put on the hypogastric region. The abdominal centents are packed off from the area of operation and a selfretaining retractor inserted. The subluxated vertebra and the sacrum and its relation to the iliac vessels are ascertained. The retroperitoneum is divided longitudinally over the slipping vertebral body and the sacrum, ligating small veins and the middle sacral artery and freed of overlying fatty fibrous tissue with a gauze swab well laterally on both side of the vertebra and expose the anterior longitudinal ligament. This ligament together with annulus fibrosus is cut opened rectangularly over the slipping vertebra and the sacrum. An osteotome is now used and driven in an antero-posterior direction into the lower margin of the fifth lumbar vertebra and the upper margin of the sacrum. In this way a rectangular hole is produced after the thin plates of bone and the intervertebral disc have been removed. Three pieces of autogenous bone grafts are now taken from the crest of the ilium to wedge into this gap. The grafts are now hammered tight into the gap between the sacrum and the fifth lumbar vertebra. At this moment the operating table shall be bent a little upward to open the space between the fifth lumbar vertebra and the sacrum. After the grafts have been hammered into, the table shall be bent back. In this way the grafts are compressed well between the fifth lumbar vertebra and the sacrum. Now the flap of the annulus fibrosus and the anterior longitudinal ligament is sutured tight and close the hole over the graft.

**The proeperative invalidity and the postoperative results**: have been evaluated according to the proposal of Friberg in four classes:

1. Absoultely free from trouble.
2. Free from trouble in light work.
3. Troubled in light work.
4. Disabled.

**Case 1.** 42-year-old housewife developed back pain suddenly in Sept. 1966, while she was lifting a bundle of firewood. Soon after she became confined to bed for five months because of aggravated low back pain associated with radiating pain on both buttocks. Ever since she had been bed ridden until she visited us in February 1967. (Class 4). Clinical examination has showed a remarkable back pain, however, no neurological finding was present. X-ray picture revealed first grade of slipping of the L 5 upon the sacrum. She started to be up and walk from two weeks after the operation. Period of observation was 16 months. Result: Class 1.

**Case 2.** 39-year-old female developed low back pain in 1965 without having any preceded trauma. The low back pain aggravated gradually and in a month radiating pain on posterior aspects of both lower limbs developed. Two years later in 1967 she became almost disabled in such a grade to go only for toilet. (Class 3).

On examination in May 1967, she could not manage sitting more than 10 minutes. X-ray picture revealed second grade of slipping of the L-5 upon the sacrum. Four days after the operation she started to be out of bed and walked without complaining of low back pain, however radiating pain remained unchanged. This radiating pain became worse gradually in the following couple weeks and she was apt to have bed rest. Four weeks after the operation a myelography was taken in order to rule out the cause of the severe radiating pain and it was found an extensive angulation of the cauda equina upon S-1 as well as cauda equina was sharply compressed by the lamina of the fifth lumbar spine posteriorly. On the 29th post-operative day, laminectomy of L5 was performed and a body plaster cast was put on for two weeks. Thereafter she began to stand and walk without any complaint. Period of observation was 18 months. Result: Class 1.

**Case 3.** 63-year-old man developed mild low back pain while he was in his 50th in 1957 without having any preceded trauma. Six years later in 1963, his age of 59 the back pain aggravated, however, he could manage his daily activities. In 1965, twe years before he visited us the low back pain aggravated badly, in addition radiating pain from both buttocks down to both feet developed. From November 1966 he became disabled as such a grade to go only for toilet until he visited us in July 1967 (Class 3). On examination he could hardly change his position also he was not able to keep any position for more than five minutes on the bed eventually he had to change his position always with five minutes intervals. The X-ray picture revealed second grade of slipping of the L5 upon the sacrum. Following day of operation his low back pain as well as radiating pain subsided and he was able to lie quietly in supine on the bed. Two days after operation he began to sit and on 7th post-operative day he started to walk. Period of observation was 12 months. Result: Class 2.

### Complication

In case No. 3, abdominal distension developed on the third post-operative day and it was subsided after two days by insertion of a stomach and rectal tube.

### Comments

Transperitoneal anterior lumbo-sacral fusion in three cases of spondylolisthesis with 1-2 grade of slipping gave good results in early releasing of pain and establishment of fusion. In this series no post-operative complication was observed except a transient abdominal distension in one case. The second case had recurrence of pain two weeks after anterior spinal fusion, and severe angulation of the cauda equina on the sacrum was demonstrated by myelography. This symptom was released by subsequent laminectomy. All the three cases were able to be up and about in relatively earlier days after the operation, one case in two days, another in two weeks, one who had a subsequent laminectomy started to walk four days after the anterior spinal fusion for further two weeks and became bed-ridden because of recurrence of back pain. Laminectomy was performed on 29th post-operative day and two weeks after laminectomy, she started to be up and about without complaint. The result of the operation according to the invalidily was satisfactory. Sitting and standing in early post-operative day seems to give good compression mechanism, provided the bone graft is inserted properly and deeply, it also prevent intestinal complication after operation.

### Conclusion

The results of the anterior spinal fusion in three cases of spondylolisthesis, where the autogenous cancellous bone blocks from the iliac crest was used, were constantly satisfactory. Early post-operative ambulation seems not produce any harm in establishment of the bony fusion.

## Summary

Three cases of spondylolisthesis with I to II grade of slipping of the L5 operated by anterior spinal fusion, is reported and the result was analyzed.

The results have been:

Excellent .....Two patient (Class 1)

Satisfactory..... One patient (Class 2)

Sitting and standing in earlier post-operative days seems not produce harm in establish ment of bony fusion and to prevent postoperative intestinal complication.


**Fig. 1.** A rectangular window is made on the intervertebral space between L5 and S1, all the disc material are removed as well as bony plates from the both vertebrae and bed for bone graft is prepared.

**Fig. 2.** Three pieces of bone blocks are impacted into the space between L5 and S1.

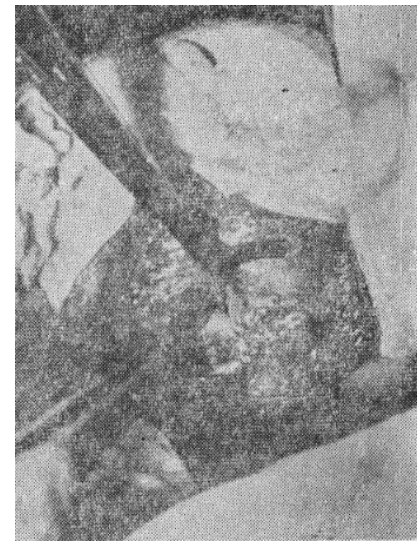

**Fig. 3.** Annulus fibrosus and anterior longutidinal ligament are closed after the bone grafts have been placed in the space.

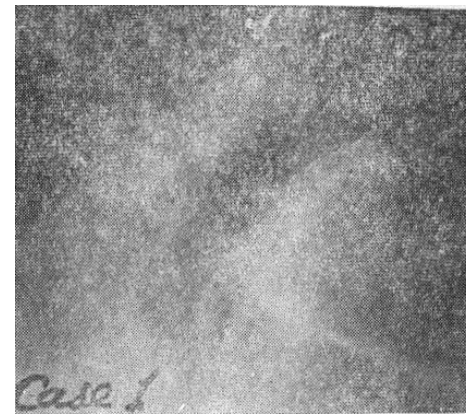

**Fig. 4.** 42-year-old housewife with slipping of grad 1, who wasconfined to bed for five months because of low back pain radiating pain on both buttocks.

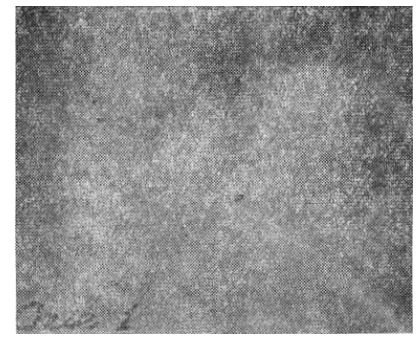

**Fig. 5.** Two months after anterior spinal fusion with good sign of bony union, and the patient was up and about without complaint.

## REFERENCES


1) Friberg, S.: *Studies on spondylolisthesis. Acta. Chir. Scandinav. 1939(Suppl. 55.)*

2) Gjessing, M.: *Osteoplasic anterior fusion of the low lumbar spine in spondylolisthesis, localised spondylosis and tuberculous spondilitis. Acta. Orthop. Scandinav. 20: 200, 1951.*

3) G.G. Gill, J.G. Manning and H.L. White..: *Surgical treatment of spondylolisthesis without spine fusion. J. Bone Jt. Surg. Vol. 37-A, 493-520, 1955.*

4) Henschen, C.: *Operation der Spondylolisthesis durch Transabdominelle lumbosacrale Verschraubung und Zusatzliche Transplantative Spanversteifung. Helvet. Med. Acta 9:25, 1942*

5) Brunner, A.: *Remarks in discussion of the above named paper. Helvet. Med. Acta 9:28, 1942.*

6) W. Mercer.: *Spondylolisthesis with a description of a new method of operative treatment and notes of ten cases. Edinb. Med. J. N.S. IV., XLIII, No. IX, 545-572, 1936.*

7) Merle D'Aubigne: *Arthrodese par voie Transperitoneale pour le Traitment des Spondylolyses et Spondylolisthese de la 5e Lombaire. Mem. Acad. de Chir. 78:210, 1952.*

8) Sicard, A.: *Remarks in discussion of the above-named paper. Mem. Acad. de Chir. 78: 216, 1952.*

9) R. Ingebrigtsen: *Indications for anterior transperitoneal fusion. Acta. Chir. Scandinav. Vol, CV 105, 172-181, 1953.*

10) Ramser, R.: *Transabdominal surgery for spondylolisthesis with special three-flailed nail and replacement of intervertebral disc by substantia spongiosa following extension reduc ion. Helvet. Med. Acta 10: 365, 1943.*

11) Schüller, J.: *Zur Operativen Behandling der Spomdylolisthesis auf Transabdominellen Wege. Med. Monatsschr. 3:529, 1949.*