

GDLH IN THE LUMBAR SPINE

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ABSTRACT :

The GDLH Posterior Spinal System is a top loading system for pathology at the spine in which fixation is obtained by segmental claw hooks which adapt to multiple pathology. Rigid or semi rigid screws can be used if necessary as well as single hooks for segmental compression or distraction. In degenerate disease of the low back, it is specially indicated in instability; lateral like spondylolisthesis longitudinal as in the loss of IV space or rotational like degenerate scoliosis. Deformity, fractures, tumors etc., or simply to enhance the possibilities or arthrodesis. The main objective of this system is to provide a simple technique and a minimum of complications for spinal fusion. As an example of its use, we reproduce the abstract published for the 6th International with F.U. of 2 yrs. to 4.2 yrs. Ave. 3.2 yrs. are reported. Age: 68 to 80 yrs. Ave. 73. Stenosis of the neural canal 22/ Multiple level disease 8/ Degenerate scoliosis 9/ Degenerate spondylolisthesis 10/ Instability pos discectomy 23. 8 pts. had persistent neurologic pain at F.U. U.O. There were 7 pts. with retarded skin healing two of these went to superficial infections controlled with antibiotics and local dressings. There was one pseudoarthrosis recognized at F.U. but 24 pts. or 30% had little evidence of bone formation with no symptoms. 7 pts. had immediate post. op. minor medical complications. Although our complication rate was 24% and that \pm 30% of our patients showed little bone mass. The pain level in this group came down from Ave. 8.7 to 3.2 and in all but 3 pts. the neurological signs disappeared. The GDLH System is an effective posterior instrumentation system with equal results at 3 yrs. F.U. as other more cumbersome and difficult systems. It, as others, is not a substitute for a good arthrodesis technique.

Key words: Lumbar spine, degenerative disorders, GDLH, spinal instrumentation.

In degenerative lumbar disorders, there are three main reasons for provoking an arthrodesis:

1. **Instability:** lateral as in spondylolisthesis, rotational as in degenerative scoliosis, longitudinal as in loss of IV space.

2. **Deformity:** like loss of lumbar lordosis or asymmetry of the pelvis.

3. **Lack of support:** as in severe osteoporosis.

Not all degenerate lumbar spines are candidates for arthrodesis, most can get excellent results from physiotherapy and gentle mobilization. In our experience, approximately two thirds can improve over 50% with this type of treatment. The other third percent are candidates for surgery must be divided in two categories:

1. Those, that need support, and their symptoms are mainly due to soft tissue invasion of the neural canal, with or without laxity of the peri-spinal ligaments.

2. Those, that need decompression of the lumbar canal and besides have instability deformity or lack of support due to extensive surgical procedure.

Instrumentation should be used not as a corrective device, but one to immobilize the spine in the desired

position "physiological", while an adequate arthrodesis matures.

GDLH Design rational:

1. Permit millimetric incremental segmental translation.

2. Open, Top-tightening connectors for easy forgiving assembly.

3. Adjustable component attachments for easy assemblies.

4. It is a universal system with fewer components.

The GDLH System has a rod "5 mm" system with offset engagement connectors equal in strength to a 1/4" Cotrel or SRH soft rod.

All components in the GDLH System test out in: rotation, tension, load, sheer and slip equal to other existing systems on the market (Fig. 1, 2, 3, 4).

The main differences between GDLH and other existing systems are:

1. It brings the spine to the bar.

2. Claws and hooks are designed for translation not for distraction of compression as in all other systems. Although, distraction compression hooks are available.

3. Interpedicular bolts are conical and self-locking and permit a capacity of orientation (with wedge washers for friendly assemblage).

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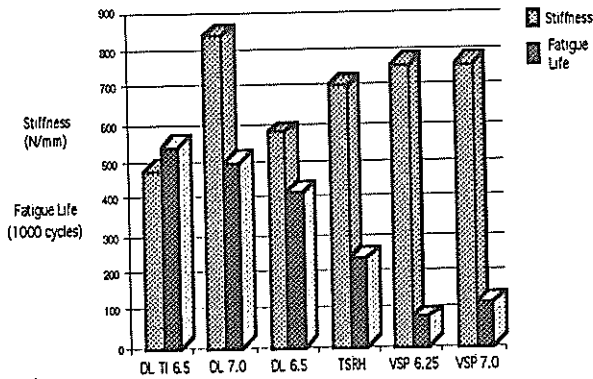


Fig. 1: Stiffness and Fatigue Life

No.	Type of Hook	Loading Condition	No. of Cycles
1	GDLH Single	10-150 lbf.	500,000 no failure
2	GDLH Single	10-150 lbf.	500,000 no failure
3	GDLH Single	10-150 lbf.	500,000 no failure
4	GDLH Single	10-150 lbf.	500,000 no failure
5	GDLH Single	10-150 lbf.	1,000,000 no failure
6	C- Closed	10-150 lbf.	1,000,000 no failure
7	C- Closed	10-150 lbf.	2,000,000 no failure
8	C- Closed	10-150 lbf.	1, hook slipped
9	C- Closed	10-150 lbf.	1, hook slipped

Fig. 2: GDLH Hook Fatigue Testing

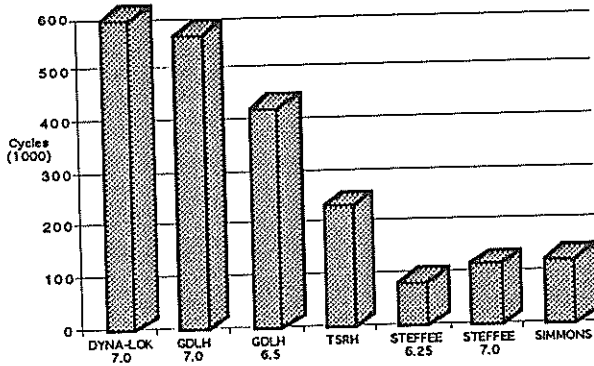


Fig. 3: GDLH Bolt Connector: Life Under Cyclic Load Compared to Other Similar Systems Loading: ± 300 N Axial

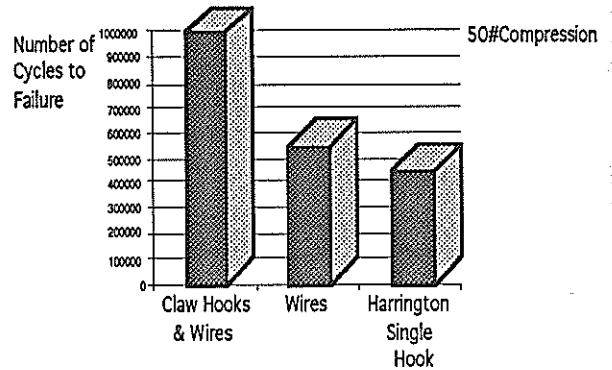


Fig. 4: Fatigue Analysis, Varying Configurations

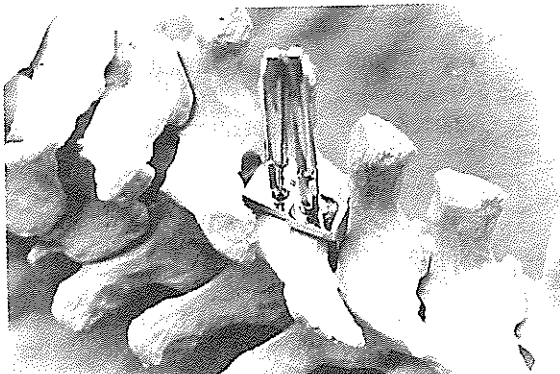


Fig. 5: Double claw hook insertion sublaminar



Fig. 6: Sagittal view of double claw hooks sublaminar

4. Cross-links are made for either distraction or compression modalities.

5. There is a multiangle screw for awkward positioning.

6. Implants can be removed or added, any line throughout the procedure.

PROCEDURE

After subperiosteal dissection and neurological procedures, a decision must be taken about the use of hooks or interpedicular screws. Screws should be used, when absolutely rigid fixation is required, claw hooks can protect against screw loosening or break-

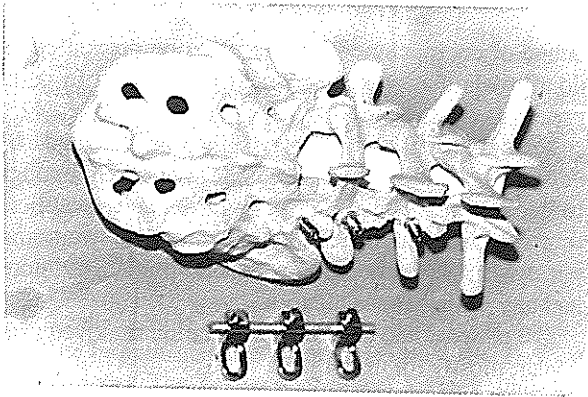


Fig. 7: One sacral screw, two interpeduncular screws in place with rod and bolt connectors pre mounted on bar

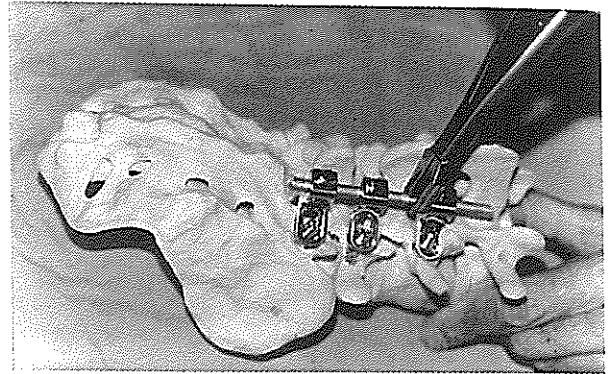


Fig. 8: Bar and rod connectors placed over head on dyna-lock bolts

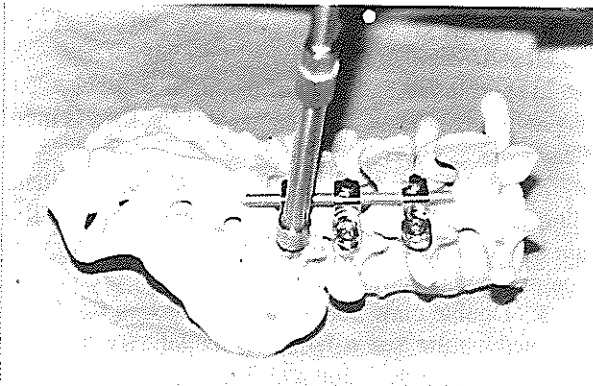


Fig. 9: Insertion of locknut over dyna-lock bolts. Tighten to 150 pounds

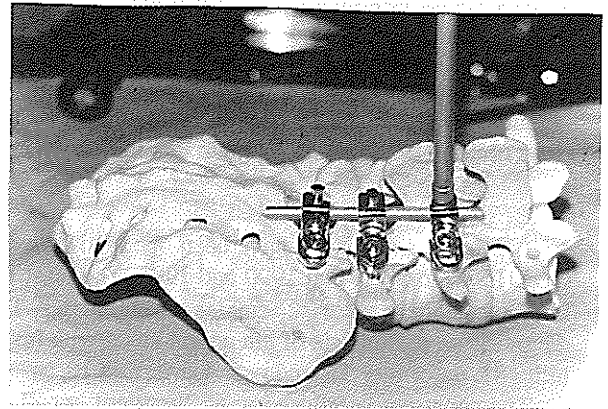


Fig. 10: Bolt connector, head screw tighten to 80 pounds, engaging rod



Fig. 11: Single sublaminar hook insertable any time during the procedure

age, and control transverse correction, rotational forces as well as flexion extension instability (Fig. 5, 6).

Screws and/or hooks (claw, or in distraction, compression) are put in place to maintain the position of the spine, corrected for the particular pathology. Rods are cut to size and physiological curves bent on to them. Connectors are pre-loaded and the rod so shaped for size and form. Rod and connectors are dropped, over the top of the implants, and tighten to maintain position (Fig. 7, 8).

Next, millimetric incremental adjustment (or correction) is made and finally the system is locked into place (Fig. 9, 10).

Any hook, screw or cross-link may be added as necessary or can be subtracted at this time (Fig. 11).

Once the implants are in place, introducing the rods and connectors and locking them, should not take more than 10 minutes.

In spite of the rigidity of the system and the ease of insertion, it is not a substitute for a careful, well, executed arthrodesis technique.

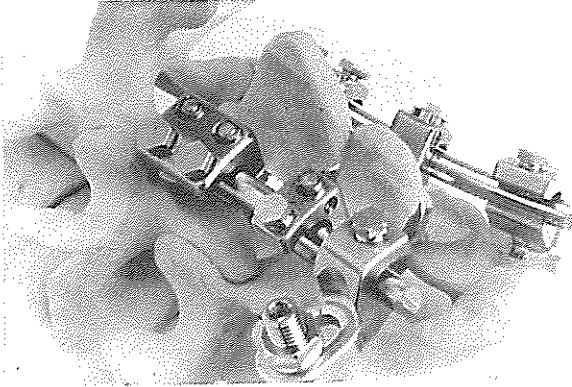


Fig. 12: System in place, dyna-lock bolts in S1, compression sublaminar single hook L5, double sublaminar hook on L4. Notice that the L3-L4 facet joint has not disturbed

Sacral fixation in degenerate pathology is usually obtained by large dynalock bolts, inserted in the sacrum running in the sacral IV plate (Fig. 12).

CLINICAL EXPERIENCE

122 consecutive cases have been operated with the GDLH System, between 1990 and 1994. The least FU is 16 mos. There were 72 females and 50 males. The diagnosis were Stenosis of the neural canal with instability 81, deformity 31, and pseudoarthrosis 10.

The construct is tailored to each patient, mostly it is used in alignment and compression. Lordosis is built in all cases. Dynalock bolts were used in the sacrum in 74, as interpeduncular fixation in 76, double claw hooks in 61. There were 82 lumbosacral fusions and the average number of spaces arthrodesed were 3 from 5 to 1.

All cases were decorticated in the entire area of the instrumentation. Facetectomies were done only when necessary. Autogenous graft was always used in the posterio lateral suture. Anterior arthrodesis was not done in any of these cases.

COMPLICATIONS

There were 32 patients with excessive bleeding (over 2000 cc.), ave. blood loss was 1200 cc. The surgical time varied from 1 hrs. 30 mins. to 6 hrs. There were no intra operative complications.

24 patients had paresthesias post. op. that lasted from 2 weeks to 3 months. They were treated with mild mobilization and corticoids. Tomograms were taken on all the patients without finding visible evi-

dence of encroachment. There was one proven pseudoarthrosis that was subsequently corrected in compression.

11 patients had minor infections cleared by debridement and antibiotics; none was severe enough to need removal of the implants. Medical complications in these patients, included depressive symptoms, paralytic illius, pneumonia, thrombophlebitis, none had any lasting consequences.

10 patients had their instrumentation removed after a year, mostly for minor pain.

Patients graded their pain and discomfort from 0-10, Ave. 8.3 (in a scale of 0-10) pre.op. and on final FU, the range was 0-7, Ave. 3.2.

Neurological sings were changed to normal in the final FU in 79 patients.

DISCUSSION

In short instrumentation of the lumbar spine:

1. No cross-link is necessary unless there is more than 3 spaces covered.

2. A single sacral screw seems adequate in these short fusions, longer fusions may need to go to the ilium and stabilized at L5 or L4 with instrumentation in compression.

3. Double claw hooks are slightly less rigid than interpeduncular screw but are excellent for applying forces such as translation and flexion extension movements (control of lordosis).

The GDLH System not only is friendly for use, but it is the only system approved on the market that brings the spine to the rod in millimetric increments, making final placement mechanical and simple.

Addition or subtraction of implants at any time during the instrumentation, add an advantage to correct, stabilize, or re-enforce the original planned strategy at any given moment.

CONCLUSION

The GDLH System performs equal well in degenerate lumbar pathology than any other recognized method, the fact, that it is easier and friendlier to insert, is translated in less operative time and consequently less complications.

The fact that not all patients were totally cured can be attributed to other factors, such as age, general arthritis, diabetes or chronic smokers. Certainly, our low rate of pseudoarthrosis shows that it is an efficient adjunct to produce an arthrodesis.

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