

Lumbar spine fusion—conclusions

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The number of fusion operations has dramatically increased during the last few years. For example in USA about 20,000 fusion operations annually were reported (Essex and Huler 1992). This increased interest in surgical procedures also reflects the introduction of an increased number of different surgical techniques, transpedicular screws, rods, plates etc.

However, the reported results of these operations vary a lot. Good results are published in between 16% and 95% (Turner et al. 1993).

Thus, up today, there are no convincing concepts about:

- the basic principles of the fusion operation,
- the preoperative evaluation to ascertain a positive result,
- the preferable type of surgical procedures,

An "instability" between two segments is considered to be one cause of low back pain and should consequently be fused. However, the definition of instability is not yet clear and if we ask different orthopedic surgeons to define instability, a great variety of definitions will be achieved.

The two most used definitions of instability are "the loss of stiffness" and "the presence of increased pain provoking movements beyond the normal range of movements."

Instability is considered to be seen in some of a great number of spinal disorders such as spondylolisthesis, some vertebral fractures, tumor-metastasis, spinal stenosis, extensive post-laminectomies and more controversially in degenerative disc changes. However, it must be emphasized that an instability observed on the radiographs or suspected clinically must not necessarily be the cause of back pain.

In most of these cases the main indication for the fusion operations is to obtain a pain free condition. In only a few cases prevention of increasing deformity and increasing compression of the neural structures are to be added.

One important factor to achieve good postoperative results is to make a very careful preoperative analysis of the patients including physical examinations, presence of instability and, maybe as important, the psycho-social conditions such as depression, work envi-

ronment, family conditions, compensation and perception of injury, education, income etc. Rothman and Wisnesky (1989) assumed that the majority of failures of the fusion operation is primarily poor patient selection rather than operative technical errors.

Personality factors are doubtless of great importance when trying to predict the results of fusion operations. Spengler et al. (1990) demonstrated this in discectomies. They observed that the clinical outcome of the surgical treatment was more influenced by the results of the scores for psychological factors than the preoperative clinical findings. Patients with abnormal score had no good outcome even if a clear disc herniation was excised. Much indicates that this is true also for fusion operations.

A great number of different surgical techniques have been published in the literature. Posterolateral fusion, PLIF or ALIF have been recommended by different authors. This was also seen in this symposium. The presented results, however, did not differ between these techniques. On the other hand a great variety of results have been seen when using the same technique. This is shown by Turner et al. (1993). The question here can therefore be "do the results depend on superior techniques or superior surgeons?"

Beside the type of surgical exposures, the type of intern stabilization is discussed. The transpedicular screw technique is now one of the most used methods. A good stabilization is doubtlessly achieved, but the number of complications is not negligible. Therefore some authors hesitate to use intern stabilization for example in young patients with spondylolisthesis (Saraste 1993). On the other hand, in patients older more than the age of forty, the fusion healing is considered to be slower and needs an increased rate of stabilization.

Preoperative estimation of the presence of instability is mainly analyzed by radiography, but its accuracy has been seen to be limited. Radiographic projections in maximal forward and backward bendings have been used since 1944 (Knutsson 1944). This method, however, is now generally considered to be appropriate only in cases with a more pronounced instability between two segments. Instability of the spine can also

be analyzed by comparing the positions of two segments of the spine in loading and unloading positions of the spine in standing erect position. This has been demonstrated in spondylolisthesis (Friborg et al. 1987, Kålebo et al. 1990). However, a complete accuracy of determining the presence of a loss of stiffness is only considered to be achieved by implanting metallic markers (Pope et al. 1992).

One reason for the observed great variety of the results of fusion operations is incomplete scientific methods studying these materials. Many errors are seen. This has been emphasized during the last decade, especially. The clinical studies must be proper. A prospective study is of importance, for example Turner et al. 1993 showed in their meta-analysis study, that the outcome in prospective studies were less successful than those in retrospective studies, 54 and 73%, respectively. Furthermore, a follow-up study must be made by unbiased observers not the treating physicians themselves. The follow-up study must also be long enough. Now a minimum follow-up of two years is recommended to be accepted for publication in international journals. More than 85 to 90% of the original material must be included (Nachemson and LaRocca 1987). A randomized prospective controlled study must be the aim.

Before a definite concept concerning the indication and the choice of treatment finally can be determined proper studies must be done. Unfortunately up today there are very few papers published of these. Therefore, today "the State of the Art" concerning fusion operation is still controversial and the question—to fuse or not to fuse—is not yet answered.

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