



## Spine Surgery by Spinal Fusion: Benefits vs. Risks

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### Abstract

The fixation of the lumbar spine allows to recover the stability or to correct the alignment of the vertebrae in the cases in which there is an alteration, either by degenerative, post-surgical, congenital or traumatic processes.

In many cases, this fixation will be carried out by means of transpedicular screws, which are inserted into the vertebrae through the pedicle (portion that unites the anterior part (body) and the posterior part (arch) of the vertebra). This path allows you to obtain a good anchor point in order to achieve the desired correction. In other cases intersomatic boxes will be associated, a kind of wedges that are placed between the vertebrae. These will allow another point of support, while providing greater stability to the column. While these are the most frequent methods there are many others, such as interspinous devices, screws to lateral masses, laminar screws, among others.

It consists of the subsection of two or more vertebrae by fusion ("welding") of the bone thereof.

It is a surgical option in cases of spinal instability, isthmic and/or degenerative spondylolisthesis, facet arthropathy, post-operative instability, disc hernia recurrence and degenerative scoliosis.

The common denominator of many of these conditions is the segmental instability of the spine, defined as loss or reduction of the mechanical integrity of a mobile segment of the spine, which is manifested by pain or neurological symptoms when loads are applied to it. The main objective of spinal lumbar arthrodesis is to minimize or eliminate mobility by increasing the load capacity of the injured mobile segment.

### History

Since the beginning of the last century these interventions were carried out, which required placing bone grafts from the patient himself at the level of the back of the vertebrae, once the muscles had been carefully removed. The problem was that the patient had to stay in bed for six months in a plaster bed to reduce mobility and thereby allow consolidation (fusion) of the bone grafts. In order to avoid the long period of bedding and increase the success rate of bone fusion, in the 60s it was started in Europe and especially in France, to place screws at the pedicle level of the vertebrae, which were connected between yes through bars or plates. Over time the type of screw has evolved (the first ones broke frequently) and the type of bars (now there are no plates and there are elastic bars to allow some mobility). However, the problem remained that in order to place the screws, the bars and the grafts, large incisions had to be made and the de-vascularization and denervation of large portions of the spinal musculature had to be removed. The postoperative period was very heavy and long, largely due to the damage inflicted on the muscles by the surgical approach.

In order to reduce the damage to the muscle mass and achieve a faster and fuller recovery, they began to apply minimally invasive surgery techniques. At the level of the spine they have allowed the reduction of the size of the incisions (already begun when the microscope, the endoscope and the percutaneous techniques were introduced with laser or with nucleotomy) and the reduction of the damage to the para-spinal muscular masses.

Among these new techniques, percutaneous postero-lateral lumbar arthrodesis stands out. Through incisions of a little more than 1 cm for each screw, it is possible to instrument areas extensive spine. The result has been a faster recovery, a reduction in the need to transfuse blood, a reduction in hospital stay and costs, and an earlier reincorporation to work.

### Results

A Mayo Clinic study found that the best results were seen in patients with degenerative disc disease, followed by patients with spondylolisthesis and finally patients who had undergone previous discectomy.

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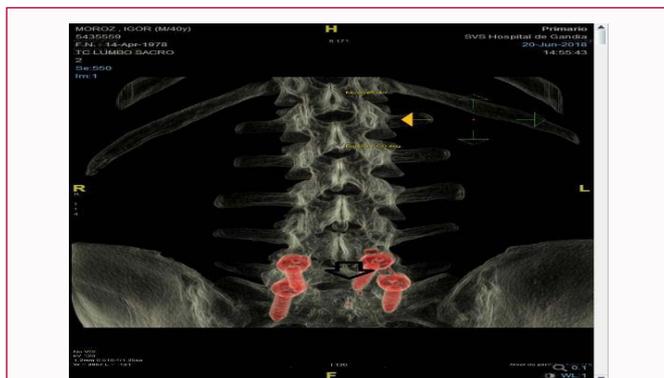


Figure 1: Lordosis recovered after surgery.



Figure 2: Screw in the left lateral recess (Black arrow).

## Discussion

### Benefits of column fixation for the patient

The benefits come from the recovery of the stability of the spine (Figure 1). The lumbar instability initially causes lumbar contractures, and may appear difficulties in ambulation, in the most severe cases, in which there may be a nervous entrapment secondary to this instability. Regarding the alteration of the balance, the situation is similar; when the spine works in an unfavorable alignment it causes an early muscular fatigue that, likewise, ends up causing contractures, fatigue and pain. In cases of advanced discopathy, we will need intersomatic boxes to recover the height lost secondary to the discopathy.

### Possible risks of column fixation

The main risk of spinal fixation is associated with the neurological injury that can occur when inserting the material of fusion (fixation). That is why neurosurgeons use radiological methods to control at all times the location of the implanted material, either by means of X-rays, intraoperative CT or neuronavigation systems (Figure 2). They also have intraoperative monitoring systems to check the correct location of the system once it is implanted. For them a small current

is applied to the fixation and, depending on the response obtained, it will be known how close the system of arthrodesis of the nerve roots is. Other complications of any surgery, such as infection or hemorrhage, should be taken into account. To avoid them, antibiotic prophylaxis is established before surgery and careful hemostasis is performed during surgery.

## Conclusion

After surgery, whenever possible, early mobilization is established. This initial ambulation must be prudent. The goal during the first month is not to recover muscle tone but to let the muscles heal and avoid complications in the arthrodesis system, which can appear when subjected to excessive tension when it is not yet integrated into the bone. From 3-4 weeks, a mild rehabilitative treatment will be started, which will normally last for a month. During this time it is advisable to avoid physical efforts, especially load weights (>3 kg).

Once this period has passed it will be important to maintain a good muscle tone, so it is recommended to perform physical activities, avoiding the impact (running) and rotation (golf) and, especially, the combination of them (squash). Toning the abdominal and lumbar musculature is of vital importance in patients with lumbar pathology. The muscles are the cables that support the spine and, the better the tone of the same, the lower the load that must support the joints, bones and ligaments.

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