"Adhesive arachnoiditis with epidural fibrosis is the most common anatomic diagnosis associated with the syndrome called "failed back".

"...The frequency of symptomatic epidural and/or arachnoid scarring following lumbar laminectomy ("failed back syndrome") is high -- affecting probably as many as 15% of patients." ([i])

The nerve roots lying within the dural sac are vulnerable to damage during surgery as a result of traction on them, which irritates them causing inflammation that may lead to scar formation.

The more the nervous tissue is disturbed at operation, the greater the risk. In addition, any blood entering the spinal fluid has a potential to cause inflammation; infection is another risk factor.

There may be some months' delay between the operation and the onset of symptoms, whilst the scar tissue develops to a clinically significant degree. Indeed, one might expect as much as 18 months of remission before recurrence of symptoms.

Gradually increasing symptoms beginning a year or so after operation may represent scar radiculopathy.

As the blood supply to the nerve roots is increasingly impaired, neurophysiological compromise results in pain and other neurological symptoms.

In 1946, French ([ii]) described 13 cases of post-surgical spinal arachnoiditis; whilst Smolik

and Nash in 1951([iii]) also drew attention to this problem.

Burton et al ([iv]), in 1981, cited 6-16% of all Failed Back Surgery Syndrome (FBSS) patients as having arachnoiditis as the *primary* pathologic process.

Indeed, the authors suggest that adhesive arachnoiditis is

"found to some degree in almost all FBSS patients."

Note that of FBSS is seen in some 5-40% of spinal surgery cases.

In 1988, Cechini et al. ([v]) looked at 128 patients using post-operative CT scan.

They found epidural fibrosis in 81%, spinal canal stenosis in 29%, calcification in 9%, dural sac deformity in 58% and pseudomeningocele in 4%.

However, in the absence of a myelogram, they were unable to demonstrate intradural lesions.

However, as Aldrete points out in his chapter on spinal surgical intervention, intrathecal calcification and dural deformity are suggestive of arachnoiditis.

Matsui et al. ([vi]) conducted a serial post-operative MRI study in 10 patients to assess the effects of laminectomy on patients with prolapsed disc or stenosis.

They performed axial MRI before and then 3, 7, 21 and 42 days after surgery. They found

"Cauda equina adhesions were most severe at the laminectomised levels L3-4, L4-5 and L5-S1 (n = 16); partial adhesions were found in 9 of 16 levels at 6 weeks after surgery.

At the L3-4 or L5-S1 levels (n = 14), the area of laminar exposure without laminectomy, the cauda equina adhesions continued 1 week after surgery, but thereafter resolved; only partial adhesions were seen at 5 of 14 levels 6 weeks after surgery.

Shrinkage of the arachnoid sac was also found at the level of the laminectomy, but it re-expanded 3 weeks after surgery in all cases."

The authors suggested that the adhesions and sac shrinkage were related to "an inflammatory process of deep wound healing" that might explain "laminectomy-induced arachnoradiculitis" causing post-operative recurrent symptoms.

Wang et al ([vii]) reviewed cases of dural tear secondary to lumbar spinal operations. They looked at 641 consecutive patients in a 5 year period and found that 88 (14%) sustained a dural tear, which was repaired during the operation.

Longer-term follow-up showed that only 12 of these patients had a poor result with some residual back pain.

One patient had arachnoiditis.

The authors concluded that a dural tear did not significantly increase the risk of long-term deleterious effects.

Ozgen et al. ([viii]), in 1999, looked at 114 patients with prior lumbar disc surgery who underwent a re-exploration for intractable back and/or leg pain.

Adhesive arachnoiditis was found in 4 cases (3.5%); whereas 78% had disc herniation, 12.2% had epidural fibrosis, 3.5% had iatrogenic instability and 2.6% had spinal stenosis.

Chen et al. ([ix]) looked at cases of posterior lumbar interbody fusion using implanted fusion cages (Bagby and Kuslich), publishing their results earlier this year.

They found a "relatively high incidence of complications"; including 1.7% arachnoiditis (2 out of 118 patients) and 2.5% nerve injury (3 patients).

Recently Turkish authors Kayaoglu et al. ([x]) reported on a retrospective study of 85 patients undergoing re-operation after lumbar disc surgery.

They found "recurrent herniation (20%), epidural fibrosis alone (36.4%), small recurrent herniation with epidural fibrosis (28.2%), herniation at another level (10.6%), spinal stenosis (2.4%), lumbar pseudomeningocele (1.2%) and adhesive arachnoiditis (1.2%).2

Surgery to correct spina bifida (myelomeningocele) carries a high risk of arachnoiditis and cord tethering (see below).

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[i] University of Southern California medical school website **University of Southern California** http://uscneurosurgery.com/patient%20education/risks%20complications/lumbar%20laminectomy/risks%20complications%20lumbar%20laminectomy.htm

[ii] French JD *Surgery* 1946; 20: 718-721 Clinical manifestations of lumbar spinal arachnoiditis: report of 13 cases.

[iii] Smolik EA, Nash FP *Am Surg* 1951; 133: 490-495 Lumbar spinal arachnoiditis: a complication of intervertebral disc operation.

[iv] Burton CV, Kirkaldy-Willis WH, Yong-Hing K, Heithoff KB *Clinical Orthopaedics* 1981 June; 157: 192-199 Causes of Failure of Surgery on the Lumbar Spine

[v] Cechini A, Garbagna P, Martelli A *Radiol Med (Torino)* 1988; 75: 565-576 Computerised tomography in surgically-treated lumbar disc hernia

[vi] Matsui H, Tsuji H, Kanamori M, Kawaguchi Y, Yudoh K, Futatsuya R. *Neuroradiology* 1995 Nov; 37(8):660-6 Laminectomy-induced arachnoradiculitis: a postoperative serial MRI study.

[vii] Wang JC, Bohlman HH, Riew KD *J Bone Joint Surg Am* 1998, Dec; 80(12): 1728- 32 Dural tears secondary to operations on the lumbar spine. Management and results after a two-year-minimum follow-up of eighty-eight patients.

[viii] Ozgen S, Naderi S, Ozek MM, Pamir MN. *J Spinal Disord*. 1999 Aug; 12(4):287-92. Findings and outcome of revision lumbar disc surgery.

[ix] Chen L, Tang T, Yang H. *Chin Med J (Engl).* 2003 Jan; 116(1):99-103. Complications associated with posterior lumbar interbody fusion using Bagby and Kuslich method for treatment of spondylolisthesis.

[x] Kayaoglu CR, Calikoglu C, Binler S. *J Int Med Res*. 2003 Jul-Aug; 31(4):318-23. Re-operation after lumbar disc surgery: results in 85 cases.