

Surgical treatment is generally regarded to have a low success rate. Many patients fall into the category Failed Back Surgery Syndrome (FBSS).

Burton et al ([1](#)) pointed out,

"Nerve compression can be relieved surgically but pain due to nerve injury or scar tissue can only be reduced in extent by therapy ...physical and emotional reactivation in chronic pain programmes..."

"The answer to the problem is not better FBSS salvage, but avoiding the causes of failure of lumbar spine surgery."

Resection of scar tissue is often followed by recurrence. Some specialists are now using laser techniques, but data on the outcomes is limited.

Aldrete made the following comment in his chapter on surgical treatment:

"such interventions (are) hazardous, especially when it is realized that the arachnoid membrane may react in some patients with an exaggerated inflammatory response, ensuing in further adhesions, more extensive scarring, cicatrix, and even ossification processes."

Adhesive arachnoiditis and epidural fibrosis following lumbar laminectomy may obscure the planes between the nerve roots and the thecal sac and the epidural space and the ligamentum flavum may be indistinguishable within the scar.

Dissecting through this scar risks inadvertent injury to neural structures with possibly devastating functional consequences (such as a foot drop) for the patient.

Aldrete states that patients undergoing Lumbosacral spinal surgery should consider the following conditions and complications (in ascending order of severity) which indicate a worse prognosis:

- Spondylosis
- Radiculopathy
- Epidural scarring
- Arachnoiditis

In his list of surgical principles for prevention of arachnoiditis, Aldrete lists avoiding unnecessary spine surgery.

As Aldrete points out, we nevertheless need to consider the surgical option in 3 types of patients:

- patients with arachnoiditis who require surgical intervention for an acute problem such as a herniated disc.
- patients requiring spinal fusion
- patients who require surgical intervention to treat one of the lesions caused by arachnoiditis e.g. syrinx.

Johnston and Matheny in 1978 ([\[2\]](#)) looked at 28 arachnoiditis patients, performing an extensive laminectomy and irrigation with chymotrypsin, followed by microscopic dissection of arachnoid adhesions. Oral cortisone was given for 5 days post-operatively.

The patients were followed up for 7 years. Comparing their results to a similar series by Jorgensen et al., the authors concluded that although the operation was feasible, only extremely select cases should be operate upon.

Shikata et al. reported a new technique in 1979 ([3]), in which they performed both microlysis of adhesions and spondylodesis for symptomatic spinal adhesive arachnoiditis. Good results were obtained by nonmicroscopic lysis and microlysis in only 54.8%, but when microlysis was followed by spondylodesis, the success rate increased to 80%.

Benini and Blanco ([4]) and Martynov et al ([5]) were of the opinion that only progressive, severe loss of function warranted surgical intervention. Roca et al ([6]) classified 40 arachnoiditis patients into four types and concluded that patients with diffuse sensory deficit, neurogenic claudication, bladder dysfunction and dysaesthesias were likely to have poor operative outcomes.

Laus et al. ([7]) noted that in all cases with previous arachnoiditis, further surgical intervention worsened the symptoms, as was also demonstrated by Marchetti et al. ([8]) Various authors have emphasised the need for surgical techniques that reduce tissue trauma (e.g. Carroll and Wiesel ([9]), Wilkinson ([10]) and Burton ([11])).

In their review of 146 malpractice cases, Goodkin and Laska ([12]) suggested that complications such as Cauda Equina Syndrome, incidental durotomy, nerve root injury and pseudomeningocele were to some extent unavoidable, although possibly related to 'substandard technique'.

Various recommendations as to ways in which to prevent or ameliorate arachnoiditis include: meticulous attention to good haemostasis to prevent blood accumulation, avoidance of local irritants such as Gelfoam[®] with repeated irrigation to clear them, avoidance of opening the dura, and gentle handling of the neural tissue which is of paramount importance.

Attempts at scar prevention with collagen inhibitors have included use of various methods such as those with barrier gels, which act as 'interpositional' membranes.

One of these, Adcon-L initially showed promise that now fails to deliver. Richter et al. ([13]) in 2001, looked at nearly 400 patients at 8 neurosurgical centres in Germany between 1994 and 1998 and

"found no positive effect of treatment with ADCON-L gel in patients in whom one-level lumbar microdiscectomy was performed".

This product, reputedly safe and effective in preventing epidural scarring by blocking the ingrowth of fibroblasts, has not been proven useful in repeated spinal surgery.

Indeed, it may be that the presence of this foreign material is itself a focus for further inflammatory reaction in susceptible individuals and may thus result in exacerbating rather than alleviating the scar tissue. (Note: Adcon-L is no longer available; micro-contaminants led to its withdrawal from the market).

Kemaloglu et al. ([\[14\]](#)) recently published the results of a rat study on the use of recombinant tissue plasminogen activator (rt-PA) in preventing postlaminectomy epidural fibrosis.

They reported,

"Findings suggest a beneficial effect of rt-PA in decreasing the epidural fibrosis following laminectomy when compared with control groups for all investigated parameters such as intermuscular scar (P=0.04), middle scar (P=0.001), deep scar (P=0.001) and dural adhesion (P=0.01) except new bone formation.

The presence of arachnoiditis was less in treatment group (P=0.01)." Further investigation is required, but the authors optimistically suggest, "Thrombolytic therapy with rt-PA after spine surgery may come to play an important role in the prevention of epidural fibrosis and arachnoiditis."

Burton suggests that to date autogenous fat grafting is the "best means developed" for dealing with post-operative epidural scar, with revascularised fat tissue protecting the dura. ([\[15\]](#)

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Use of steroids perioperatively has shown mixed results. Ota et al. ([16]) showed apparently improved outcomes, whereas Manniche et al. (

[17]

) failed to demonstrate any difference between this and placebo in patients undergoing first spinal surgery.

Decompressive surgery to remove adhesions remains controversial and the minimally invasive techniques have yet to be demonstrated as useful.

Lazar and Bland ([18]) used microlysis of the adhesions in patients with arachnoiditis, followed by application of a silastic dural graft, but failed to show significant benefit.

Nussbaum et al. had only minimally positive results using Polyglactin 910 as a dural substitute. Poloxamer 407, a non-ionic block copolymer which is cited as having

"extremely low dermal and mucosal toxicity,"

has been found to reduce peritoneal and uterine horn adhesions, and in a rabbit study ([19]) produced a 50% reduction in leptomeningeal adhesions when applied intradurally and peridurally, without apparently affecting the neurological function or structure of the spinal cord of peripheral nerves.

The authors close by reminding the reader that "lesions of ARC go beyond the anatomical injuries, and also include functional alterations of the dorsal horn of the spinal cord."

Long([20]): in his first series operating on patients for pain, direct operation with microlysis of adhesions had a success rate of 55% at 5 years, although 13% developed significant worsening of bladder and bowel function.

In the second series, operation was reserved for those with clearly progressive neurological

deficit. 12 patients were operated on, of which 5 gained satisfactory pain control, although this was not lasting.

In 9, neurological deficit was stabilised or improved (of which 5 experienced significant improvement in strength). Neither sensory nor bladder/bowel dysfunction were changed.

Long therefore suggests that the majority of patients are not candidates for direct operation, reserving it for those with severe progressive problems with the aim of stabilising the loss of function.

Warnke et al. in Germany ([\[21\]](#)) recently published a series of articles on thecaloscopy, in which they advocate this procedure for conditions involving "arachnitis".

They looked at 9 patients with suspected arachnoiditis that was not imaged on MR as well as 3 cases with established diagnosis (e.g. arachnoid cyst) and reported:

"The pathomorphology of the arachnoid was detected and endoscopically treated in almost all cases. Arachnoid cysts were successfully fenestrated and an intraspinal meningocoele treated with endoscopic assistance."

In cases of arachnoiditis with Hoffman grade 2 and 3 adhesions, these were successfully dissected and inflammatory tissue removed, but grade 4 adhesions were impossible to remove.

In 45% of patients the pre-operative pain disappeared completely and did not recur for a period of 6 months. The other 55% experienced a significant reduction in pain (to 40% of pre-operative levels). Aside from headache, no serious adverse events occurred.

The authors conclude:

"Thecaloscopy is a safe procedure if skilfully performed. It provides an opening for a wide range of new diagnostic and therapeutic options."

However, Burton stated: ([\[22\]](#))

"The patient with a minimally invasive procedure is at significantly higher risk of developing recurrent or other problems. When all is said and done a surgical discectomy remains the "gold standard" of care when performed by a qualified individual"

Warnke et al. did note:

"We accept that it is widely acknowledged that removal of scar tissue produces new scarring. It is not clear whether the use of the thecaloscope can provide longer lasting relief but technical progress will hopefully give rise to better and more suitable instruments in the future...With regard to the therapeutic possibilities, further research is required."

As we have seen, the various types of attempts to reduce scar tissue, including endoscopic resection, will at best only have short term benefit as the scar tissue tends to recur.

In fact, these procedures may exacerbate the problem considerably and of course a procedure such as Racz, which uses such a toxic cocktail of injected agents, carries a risk of causing arachnoiditis.

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