Disc herniation is defined as rupture of the fibrocartilaginous annulus fibrosus that surrounds the intervertebral disc, associated with the release of the central gelatinous nucleus pulposus. Most herniations take place in the lumbar area of the spine. They occur more frequently in middle aged and older men, especially those involved in strenuous physical activity. They cause physical disability with significant social and economic effects.

Although first described by Virchow in 1857, the physiopathology and therapeutics of disc herniation remain controversial (CASTRO et al. 2005). There is no single, clear explanation as to why disc rupture causes axial spinal pain and/or radicular pain. When disc herniation contacts a nerve root, radicular symptoms (leg, arm or intercostal pain) appear. However, physical pressure on a peripheral nerve alone produces paraesthesia but no pain. It is postulated that biochemical factors somehow cause pain.

Pain management in disc herniation relies mainly on conservative care combining rest, physiotherapy and oral medication (analgesics and anti-inflammatory drugs). If 6 weeks of conservative therapy and a minimum of one selective image-guided periradicular steroid injection fail, treatment turns to percutaneous techniques directed at the disc (GANGI et al. 1998a).
Despite its acceptance, open discectomy is a major surgical procedure. In a prospective study of 412 primary and 69 reoperations for lumbar disc herniations, Stolke et al. (1989) reported an intraoperative complication rate of 7.8% for microdiskectomies, 13.7% for macrodiskectomies and 27.5% for reoperations. Postoperative complications ranged from 1.4% for reoperation, 3.9% for microdiskectomies up to 4.2% for macrodiskectomies. The risk of complications correlates with the age of the patient and the operating time. In their review of 28,000 discectomy procedures, Ramirez and Thisted (1989) reported 1 in 64 patients having a major complication, 1 in 335 having a neurological complication, nearly 1 in 500 having a cardiovascular complication and 1 in 1,700 dying from the procedure. The long term outcome, complications and suboptimal results associated with open disc surgery have led to the development of minimally invasive techniques that avoid opening the spinal canal and extensive disc ablation.

The minimally invasive percutaneous techniques in use today aim at removing a small amount of central nucleus pulposus to reduce intradiscal pressure and thus obviate disco-radicular compression. Chemonucleolysis with papaine was introduced by Smith et al. (1963) in an early attempt to treat herniation without surgery. It was used for treating sciatica due to disc herniation and proved the effectiveness of disc decompression for treating disc herniation. Although the technique showed good results with a 70%–80% success rate, it had unacceptable adverse reactions and is no longer used in the USA or Europe. Since then, several alternative percutaneous nucleotomy techniques have been developed: purely mechanical decompression (automated percutaneous lumbar discectomy), chemical decompression (alcohol, oxygen-ozone) or thermal decompression (laser, radiofrequency) (Andreula et al. 2004).

6.2
Periradicular Steroid Injection

6.2.1
Principle

As proven by Ian Macnab (MB, CHB, FRCS, FRCS(C), 1921–1992), radicular pain due to disc herniation cannot be explained by a purely mechanical approach. The manifestation of pain has a close relationship with the release of mediators from macrophages. Inflammatory cytokines, prostaglandins, nitrous oxide (NO), phospholipase A2 (PLA2) and cyclooxygenase-2 (COX-2) may be involved in radiculitis caused by mechanical compression (Kawakami et al. 1999; Kobayashi et al. 2005). Periradicular steroid injection (PSI) is the first minimally invasive technique to be considered early in the treatment regime. PSI is effective, probably because of its anti-inflammatory effects. It should be performed under image guidance to ensure proper deposition of steroid.

6.2.2
Patient Selection

6.2.2.1
Indications

The main indication for PSI is radicular symptoms due to discal compression, resistant to conventional medical treatment. Patient selection is based on a precise clinical examination supported by discal abnormalities on CT or MR imaging at the corresponding level. This is mandatory to avoid misdiagnosing extra-discal causes of radiculitis.

Pure axial back or neck pain due to disc herniation and post-discectomy syndromes may sometimes benefit from epidural infiltration.

6.2.2.2
Contraindications

Steroids are contraindicated in patients with diabetes or gastric ulcers or who are pregnant. In patients with bleeding diathesis, epidural puncture is contraindicated and a foraminal approach should be performed carefully. In severe spinal stenosis, long-acting synthetic steroids should be avoided, due to their hyperosmotic effect. Adjuvants in long acting steroids can also produce allergic reactions in patients with atopic tendencies. This should be checked by prior interview.

6.2.3
Technique

The procedure is performed on an outpatient basis. Image guidance is provided by CT, MR imaging or C-arm fluoroscopy. CT guidance is preferred as it allows for exact planning and positioning of the