Nucleolysis percutaneous laser disc decompression

Introduction: Disc disease occurs mainly at adult age and can generate different degrees of pain, which can sometimes become incapacitating and have a major impact on quality of life at a family and at an occupational level, thereby entailing a high economic cost for both companies and the public health system. The most frequent and characteristic radicular pain is that caused by herniated discs, which mostly appear in the lumbar region. Treatment depends on the aetiology, and there are different therapeutic options, ranging from the conservative across to surgical interventions which are invasive to a greater or lesser extent. The latter include nucleolysis or percutaneous laser disc decompression (PLDD), which consists of a percutaneous approach to the intervertebral disc to perform denaturation, through vaporisation of the nucleus pulposus by means of laser energy.

Objective: To assess the safety and effectiveness of PLDD in the treatment of lumbar, cervical and thoracic herniated discs.

Method: Systematic review of the literature, with bibliographic search in January 2016: of databases specialising in systematic reviews, such as HTA (Health Technology Assessment) DARE (Database of Abstracts of Reviews of Effectiveness), NHS EED (Economic Evaluation Database of the National Health Service) and Cochrane Library Plus; and of general biomedical databases, such as Medline, Embase and ISI Web of Science. Acting independently, two reviewers selected and reviewed the papers on the basis of pre-established inclusion criteria.

Results: The bibliographic search retrieved a total de 369 original papers. After a review of the abstracts, 89 were selected for full-text appraisal. Finally, 10 studies were included which fulfilled the pre-established inclusion criteria, comprising one systematic review, one randomised controlled trial (RCT) and 8 observational studies.

The principal outcome measure to assess the effectiveness of the treatment was pain reduction measured via different scales or questionnaires that rate patient-reported pain and mobility.

Although a reduction in pain in the lumbar region was observed in 60%-89% of patients intervened by PLDD, one must nevertheless stress the technique's high failure rate, which resulted in as many as 38% of successfully treated patients having to be reoperated with conventional surgery. Moreover, the failure rate due to the impossibility of performing PLDD itself, was 9%. At the cervical and thoracic sites, a 54.5%-83% improvement in symptoms was observed at 24 months of follow-up. Notwithstanding the fact that PLDD is a minimally invasive treatment, it is not free of complications, with studies of the lumbar region reporting the appearance of muscle spasm (7.7%), inflammation in the sacroiliac joint (4.5%), transient nerve root injury (5%), recurrences (1.5%) and discitis (1.2%). In addition, bleeding, haematomas, recurrence of radicular deficit, and sigmoid artery injury have also been observed. In the cervical and thoracic regions, the intervention could entail the risk of appearance of retropharyngeal abscess or pneumothorax, owing to the anatomy of vital structures in these areas.

Conclusions:

1. In general, the level of scientific evidence used to assess PLDD interventions for treatment of herniated discs is limited, and is essentially based on observational studies having a medium-low methodological quality. Our search located only one recent RCT with a good methodological design, which compared PLDD to conventional surgery in the lumbar area and indicated that PLDD (with additional surgery where necessary) was not inferior to conventional surgery.
2. Based on these studies, and bearing in mind their limitations, good results were observed in terms of pain reduction (60%-89% of patients) and improvement of symptoms (54-83%) following PLDD interventions on the herniated discs.
3. Special mention should be made of the laser technique's high failure rate after its initial success, which may necessitate reoperation with conventional surgery in up to 38% of cases treated with PLDD in the lumbar area.
4. PLDD is a minimally invasive technique, which normally poses a slight risk and a low risk of complications. In lumbar treatment, discitis due to heat damage during the use of the laser is frequent in this technique; and in the cervical and thoracic regions there is a risk of appearance of retro-pharyngeal abscesses and pneumothorax, owing to the anatomy of vital structures in these areas.
5. The PLDD approach is not incompatible with subsequent reoperations, whether by PLDD again or by conventional surgery.
6. To ensure effective and safe outcomes with PLDD, patients must be correctly selected, by exclusively including only those who meet the inclusion criteria. The principal indication is contained lumbar disc herniation which does not respond to conservative treatment, but PLDD would be contraindicated in the case of sequestered herniated discs and degenerative disease.