

PERCUTANEOUS CEMENT DISCOPLASTY IN THE TREATMENT OF DEGENERATIVE DISC DISEASE. CASE SERIES

CIMENTO DISCOPLASTIA PERCUTÂNEA NO TRATAMENTO DA DOENÇA DEGENERATIVA DO DISCO. SÉRIE DE CASOS

CEMENTO DISCOPLASTIA PERCUTÂNEA EN EL TRATAMIENTO DE LA ENFERMEDAD DISCAL DEGENERATIVA. SERIE DE CASOS

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ABSTRACT

Introduction: Percutaneous cement discolplasty (PCD) is a minimally invasive surgical technique, which provides segmental stabilization and an indirect decompression effect in cases of severe degenerative disc disease with vacuum phenomenon, useful in patients with comorbidities that contraindicate invasive surgical procedures. **Materials and methods:** A retrospective analysis of 6 patients undergoing PCD was carried out, reporting the demographic variables, the segments treated and the clinical result evaluated by means of the visual analog pain scale (VAS) both in the presurgical and in the 6-month follow-up. Finally, a literature review was carried out. **Results:** 6 cases of PCD were included, of which 5 had a diagnosis of dysarthrosis and 1 dysarthrosis with spondylolisthesis. 4 female and 2 male patients. In 3 patients, PCD was performed in 1 segment and in 3 patients in multiple segments. Regarding the clinical result, an improvement was presented in 5 of the patients (mean 5.6 VAS points), 1 of the patients did not present improvement and required another surgical intervention. **Conclusions:** PCD is a minimally invasive technique useful in the treatment of spine pain secondary to degenerative disc disease in those patients with comorbidities that contraindicate a major procedure. Indirect foraminal decompression by PCD in one or more segments appears to contribute to pain relief. **Level of Evidence III. Series of cases and controls.**

Keywords: Discarthrosis, degenerative disc disease, cement discolplasty.

RESUMO

Introdução: O cimento discolplastia percutânea (PCD) é uma técnica cirúrgica minimamente invasiva, que proporciona estabilização segmentar e efeito descompressivo indireto nos casos de doença discal degenerativa grave com fenômeno de vácuo, útil em pacientes com comorbidades que contra-indicam procedimentos cirúrgicos agressivos. **Materiais e métodos:** Foi realizada uma análise retrospectiva de seis pacientes submetidos à PCD, relatando as variáveis demográficas, os segmentos tratados e o resultado clínico avaliado por meio da escala visual analógica de dor (EVA) tanto no pré-cirúrgico quanto no de seis meses acompanhamento. Por fim, foi realizada uma revisão da literatura. **Resultados:** foram incluídos seis casos de PCD, dos quais cinco apresentavam diagnóstico de disartrose e um de disartrose com espondilolistese. Quatro pacientes do sexo feminino e dois do sexo masculino. Em três pacientes, o PCD foi realizado em um segmento e em três pacientes em vários segmentos. Em relação ao resultado clínico, houve melhora em cinco dos pacientes (média 5.6 pontos EVA), um dos pacientes não apresentou melhora e necessitou de nova intervenção cirúrgica. **Conclusões:** A PCD é uma técnica minimamente invasiva útil no tratamento da dor da coluna secundário à doença degenerativa do disco em pacientes com comorbidades que contra-indicam um procedimento de grande porte. A descompressão foraminal indireta por PCD em um ou mais segmentos parece contribuir para o alívio da dor. **Nível de Evidência III; Série de casos e controles.**

Descritores: Descartrose; Doença Discal Degenerativa; Cimento Discoplastia.

RESUMEN

Introducción: La cemento discolplastia percutânea (PCD) es una técnica quirúrgica de mínima invasión, la cual brinda estabilización segmentaria y un efecto de descompresión indirecta en caso de enfermedad discal degenerativa severa con fenómeno de vacío, útil en pacientes con comorbidades que contraindican procedimientos quirúrgicos más agresivos. **Materiales y métodos:** Se realizó un análisis retrospectivo de 6 pacientes sometidos a PCD, reportando las variables demográficas, los segmentos tratados y el resultado clínico evaluado mediante la escala visual análoga del dolor (EVA) tanto en el prequirúrgico como en el seguimiento a 6 meses. Finalmente se realizó una revisión de la literatura. **Resultados:** Se incluyeron 6 casos de PCD, de los cuales 5 presentaron diagnóstico de discartrosis y 1 discartrosis con espondilolistesis. 4 pacientes de género femenino y 2 masculino. En 3 pacientes se realizó PCD en 1 segmento y en 3 pacientes en múltiples segmentos. Respecto al resultado clínico se presentó mejoría en 5 de los pacientes (promedio 5.6 puntos EVA), 1

Study conducted at the Centro Médico Puerta de Hierro, Zapopan, Jalisco, Mexico.

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de los pacientes no presento mejoría y requirió de otra intervención quirúrgica. Conclusiones: La PCD es una técnica de mínima invasión útil en el tratamiento del dolor de columna secundario a enfermedad degenerativa discal en aquellos pacientes con comorbilidades que contraindiquen un procedimiento mayor. La descompresión foraminal indirecta mediante PCD en uno o varios segmentos parece contribuir a la mejoría del dolor. **Nivel de Evidencia III. Serie de casos y controles.**

Descriptor: Discartrosis, enfermedad discal degenerativa, cemento discoplastia.

INTRODUCTION

Low back pain secondary to intervertebral disc degeneration is a common pathology in elderly patients,¹ and leads to changes in the biomechanics and structure of the spine.²

In advanced stages of degeneration, the disc space collapses and the nucleus pulposus disappears, generating a vacuum phenomenon that can be seen via axial tomography or radiographs.^{3,4} Degeneration will lead to the loss of disc height and consequently of foraminal height. Clinically, the patients present low back pain and pain radiating to the pelvic limbs due to nerve root compression, which will increase when standing and decrease when lying down.⁵

In these cases, surgical treatment is considered necessary, however, due to the advanced age of these patients, it has a high morbidity rate.⁶ Percutaneous cement discoplasty (PCD) is a minimally invasive surgical technique that provides segmental stabilization and indirect decompression in cases of severe degenerative disc disease with the vacuum phenomenon, achieving pain relief and, thus, could be considered an option in this type of patient.⁵

The objective of this study was to report a series of PCD cases in our practice and conduct a literature review.

METHODS

A study of 6 cases of patients submitted to PCD between 2018 and 2020 was conducted. The demographic variables, the segments treated, and the clinical conditions, evaluated using the visual analog scale (VAS) both preoperatively and at the 6-month follow-up, were collected.

Patients who underwent PCD, had complete medical records, had signed the informed consent form, and who were considered candidates for this technique due to their age, clinical characteristics (low back pain of more than 3 months of evolution without an adequate response to conservative treatment), comorbidities that contraindicated fusion due to surgical risk, as well as radiographic evidence of degenerative disc disease with the vacuum phenomenon, the accordion phenomenon, or subchondral sclerosis of the vertebral endplates, regardless of whether they had a history of spine surgery at another level, were included (Figures 1, 2).

The surgical technique performed was that described by Varga et al.⁵ PCDs are performed under local anesthesia, with intravenous sedation. The patients were placed on a radiolucent table in prone decubitus with two 25-cm diameter rolls to increase lordosis.

Under fluoroscopic vision, the segment to be treated was located. In the technique described by Varga et al., posterolateral access is used, similar to the technique used in discography to access the disc space. In our practice, we placed the vertebroplasty cannula via a unilateral transpedicular approach, directing it to the disc space to be treated. Once the placement of the cannula is verified, 3 to 5 ml of PMMA was slowly injected into the disc space, paying special attention to detect any sign of cement leakage into the canal or foraminal space (Figures 3-6).

Following the procedure and once recovered from the effects of the anesthesia, the patients were permitted to walk. Follow-up appointments were scheduled every two months and a new VAS is administered at 6 months, comparing the result with the preoperative one.

RESULTS

The study sample consisted of 6 cases of PCD, 5 of which were diagnosed with degenerative disc disease and one with degenerative disc disease with spondylolisthesis.

Four of the patients were female and two were male. The mean age was 74.3 years (65 to 86 years).

The PCD procedure was performed in one segment in 3 patients and in multiple segments in 3 patients.

Regarding the clinical results, there was improvement in 5



Figure 2. Coronal CT slice with vacuum phenomenon.

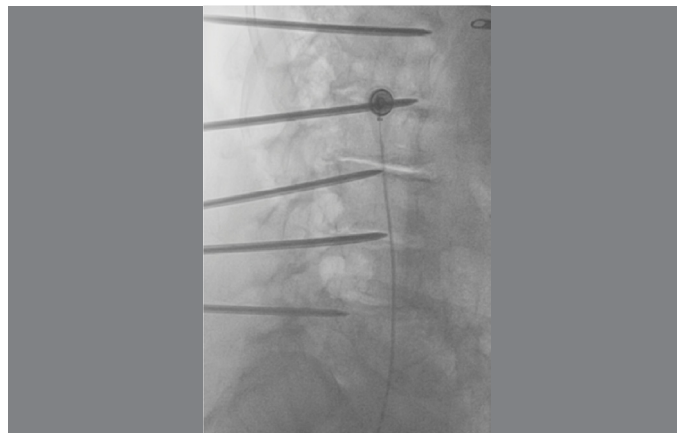


Figure 3. Positioning of the cannulae – lateral projection.



Figure 1. Sagittal CT slice with vacuum phenomenon.

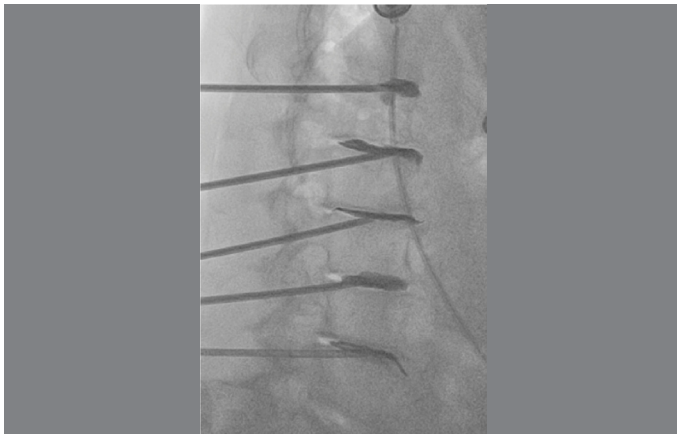


Figure 4. Injection of the cement – lateral projection.



Figure 5. Positioning of the cannulae – AP projection.



Figure 6. Cement in the disc space – AP projection.

patients (mean value of 5.6 points on the VAS scale), decreasing from a mean of 8.4 to a mean of 2.8. One of the patients did not improve and required a new surgical intervention (Table 1).

DISCUSSION

With the increase in life expectancy, the incidence of degenerative disc disease has grown. Elderly patients are afflicted by disc degeneration, which, in some cases, causes vertical instability, clinically manifested as back and leg pain, drastically impacting the patient’s quality of life.⁷

Instrumented spinal fusion is considered the gold standard treatment for this type of pathology, however, in elderly patients there is a

Table 1. Description of patients and their results.

	Sex	Age	Level treated	Previous surgery	Preoperative VAS	VAS at 6 months
Patient 1	Female	78	L4-L5	No	8	3
Patient 2	Female	65	L2-L3, L5-S1	No	9	3
Patient 3	Male	79	L1-L2	Yes, L2-S1 fusion	7	7
Patient 4	Female	86	L2-L3	No	9	3
Patient 5	Female	71	T12-L5	No	8	2
Patient 6	Male	67	L3-L4, L4-L5	No	8	3

higher risk of complications such as infection of the surgical wound, nonunion, pneumonia, thrombosis, and urinary tract infections.^{8,9} Carreon et al. reported a complication rate of 79.6% in patients above 65 years of age who underwent posterior decompression and fusion, 21.4% of whom had major complications.¹⁰ The complication rate increased in proportion to age, blood loss, surgical time, and the number of fused levels.

Given this scenario, minimally invasive surgery has emerged as an option for patients with comorbidities that could potentially complicate major surgery. PCD was first described by Varga et al.⁵ This procedure is based on the concept of stabilization of the disc space and partially restoring its height by injecting the quantity of cement necessary to fill the empty disc.

PCD has been indicated in elderly patients with low back and leg pain secondary to degenerative disc disease at one or more levels who present the vacuum phenomenon, foraminal stenosis, and sclerosis in the vertebral endplates in radiographs and CT scans.⁵ Sola et al.¹¹ also noted the accordion phenomenon, which entails a variation in disc height when compared in standing and supine positions, in the presence of the vacuum phenomenon, as a key sign of instability for the indication of this technique. There are few studies that address this technique; however, favorable results have been achieved with it. In our case series, there was an average 5.6-point improvement on the VAS scale in 5 of the patients. There was no improvement in one case, which had previously undergone multiple-level fusion in addition to having been diagnosed with spondylolisthesis of the treated segment. It is possible that the application of cement was not sufficient to achieve stability, which did not relieve axial pain and required additional support from fusion.

Although this procedure has a low complication rate, its potential risks include bleeding at the puncture site, bone infection, nerve root or spinal cord damage, extravasation of cement into the epidural or paravertebral space, and introduction of cement into the venous system, possibly resulting in a pulmonary embolism. Contraindications for PCD may be relative, as in the case of osteoporosis, severe deformity, and obesity, or absolute, which include active infection and tumors.¹¹

The case series does not provide a high level of evidence about the use of PCD on a regular basis, however, based on the results we obtained, we consider that this technique could be a safe and useful alternative in patients who meet the indications mentioned above. Prospective studies with long-term follow-up are required to understand the real benefits and limitations of PCD. However, it seems to be a promising and highly useful technique in our environment.

CONCLUSIONS

PCD is a minimally invasive technique useful in the treatment of axial pain secondary to degenerative disc disease in elderly patients with comorbidities that contraindicate major surgery.

This procedure is based on the concept of stabilization of the disc space and partial restoration of its height by injecting the amount of cement necessary to fill the empty disc.

Indirect foraminal decompression from PCD in one or several segments seems to contribute to pain improvement.

Prospective studies with long-term follow-up are required to understand the real benefits and limitations of PCD. However, it seems to be a promising and highly useful technique in our environment.

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