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Disabling chronic low back pain with Modic type 1 MRI signal: Acute reduction in pain with intradiscal corticotherapy

Lombalgie chronique invalidante avec signal de type Modic 1 à l'IRM : réduction drastique de la douleur à court terme après corticothérapie intradiscale

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Abstract

Objectives. – The objective of the current study was to compare short- and long-term effect on chronic low back pain of intradiscal injection of methylprednisolone with or without presence of Modic type 1 MRI changes.
Patients and methods. – Medical charts of patients receiving intradiscal injection of methylprednisolone from January 1, 1995 to December 31, 1998 were retrospectively reviewed. Clinical parameters were recorded at baseline, 24 h after injection and at follow-up (12–14 months). Patients were studied in three groups: Modic I-a, if patients had Modic type 1 changes with no previous surgery or nucleolysis ($n = 30$); Modic I-b, if patients had Modic type 1 changes at the level of previous surgery or nucleolysis ($n = 37$); Control, if patients had no Modic type 1 changes ($n = 30$).
Results. – Twenty-four hours after methylprednisolone injection, higher proportion of patients with self-assessed improvement was observed in Modic I-a (90%) and Modic I-b (71%) than in Control (30%). Low back pain decreased in both Modic groups. Low back pain did not vary from baseline in controls. No effect was detected in three groups, neither for radiating pain 24 h after injection, nor for any outcome parameters at the latest follow-up.
Conclusions. – We suggest that patients with disabling chronic low back pain and Modic type 1 MRI changes have specific acute response to intradiscal injection of methylprednisolone. Clinical studies are however necessary to further investigate the effectiveness and safety of such injections.

Keywords: Back pain; Modic type 1; Intradiscal injection; Corticosteroids

Résumé

Objectif. – L'objectif de cette étude était de comparer les effets à court et à long termes d'infiltrations intradiscales de méthylprednisolone au cours de lombalgies chroniques avec ou sans anomalies de signal IRM de type Modic 1.
Patients et méthode. – Nous avons conduit une étude rétrospective sur les dossiers médicaux de patients ayant reçu une infiltration intradiscale de méthylprednisolone du 1er janvier 1995 au 31 décembre 1998. Les paramètres cliniques étaient recueillis lors de la consultation initiale, 24 heures après l'infiltration et le jour de la visite de suivi (12–14 mois). Les patients étaient divisés en trois groupes : groupe Modic I-a, si les patients présentaient des anomalies de signal de type Modic 1 sans antécédent de chirurgie ou nucléolyse ($n = 30$) ; groupe Modic I-b, si les anomalies de type Modic 1 étaient apparues à la suite d'une chirurgie ou d'une nucléolyse et au même endroit ($n = 37$) ; groupe Témoin, si les patients n'avaient pas de changement de signal IRM de type Modic 1 ($n = 30$).
Résultats. – Vingt-quatre heures après l'infiltration de méthylprednisolone, une plus grande proportion de patients rapporte une amélioration de la douleur dans le groupe Modic I-a (90 %) et Modic I-b (71 %) que dans le groupe Témoin (30 %). Les douleurs lombaires ont diminué dans les deux

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groupes Modic, alors qu'aucune différence sur l'intensité de la lombalgie entre la visite initiale et l'évaluation post-infiltration n'a été observée pour le groupe témoin. Aucun effet n'a été détecté dans les trois groupes, pour la douleur irradiant au membre inférieur 24 heures après l'infiltration, ou pour l'ensemble des paramètres lors de la dernière visite de suivi.

Conclusions. – Nous suggérons que les patients souffrant de lombalgie chronique invalidante avec anomalies de signal IRM de type Modic 1 ont une réponse spécifique à court terme aux infiltrations intradiscales de méthylprednisolone. Des études complémentaires sont cependant nécessaires pour documenter l'efficacité et la sécurité de ces infiltrations.

Mots clés : Lombalgie chronique invalidante ; Modic 1 ; Infiltration intradiscale ; Corticostéroïdes

1. English version

1.1. Introduction

Morphologic abnormalities detected by standard imaging and corresponding to degenerative discopathy are poorly specific of chronic low back pain [31]. They are found in 40% of asymptomatic subjects. Vertebral degenerative changes at the lumbar spine level are classified according to a 3-stage system (Modic) based on MRI signals of bone marrow adjacent to vertebral end plates [21]. Stage 1 is hyposignal in T1-weighted sequences and hypersignal in T2-weighted sequences (Modic type 1); stage 2 is hypersignal in T1- and T2-weighted sequences (Modic type 2); and stage 3 is hyposignal in T1- and T2-weighted sequences (Modic type 3). Moderate to excellent inter- or intraobserver reliabilities have been reported for Modic classification [13,17,23,33]. In Modic type 1 changes, end plates of vertebral bodies are characterized by subchondral bone fissuring, high concentration of pro-inflammatory cytokines, and by increased vascularity and mononuclear cell content [21,22]. Modic type 2 corresponds to a fatty infiltration of peritrabecular bone marrow, and Modic type 3 consists in osteosclerosis of vertebral end plates [21]. A prospective study indicates that these three MRI types may be successive stages of a single process [14]. In contrast to other degenerative modifications of the spine, Modic type 1 changes are closely associated with chronic low back pain as suggested by observational studies [16]. Such changes are uncommon in asymptomatic controls [7,32]. Modic type 1 changes are also associated with specific features in patients with chronic low back pain: patients with Modic type 1 changes have more pain in late night and morning, and higher serum high-sensitivity C-reactive protein level than patients without Modic 1 changes, independent of evidence of spondylarthropathy [26].

Modic type 1 changes may therefore reflect inflammatory reaction in bone marrow adjacent to vertebral end plates and to intervertebral disc undergoing active degenerative process. This provides a rationale for intradiscal injection of corticosteroids [4,12]. Furthermore, one level IV study suggests specific response to intradiscal injection of corticosteroids in patients with severe disabling chronic low back pain and Modic type 1 changes [12]. These patients appeared to have lower pain than patients with Modic type 2 changes, 1 month after the therapy. However, such a specific response on shorter and longer follow-up, has not been demonstrated.

We aimed to perform a retrospective chart review of a case series of patients with chronic low back pain who had been treated by intradiscal injection of corticosteroids to investigate short- and long-term clinical response of such injections in patients with or without Modic type 1 changes seen on MRI. Modic type 1 changes have been reported after surgery [21], but they have not been specifically evaluated [4,12]. We therefore considered separately Modic type 1 changes in patients with and without previous surgery or nucleolysis treatment.

1.2. Patients and methods

This was a retrospective study of data from medical records for 3 years, 1995 to 1998, which corresponds to a period when intradiscal injections of corticosteroids were not yet restricted to patients with chronic low back pain and Modic type 1 changes in our unit.

1.2.1. Patients

The selection of the population was consecutive. Data were included for patients with severe, disabling chronic low back pain whose disease had not responded to usual conservative treatments and who lacked evidence of systemic inflammatory disorder, metabolic bone disease, local infection or malignancy. All patients had undergone lumbar spine MRI with T1 and T2-weighted sequences. MRI results were assessed by a panel of at least two spine specialists (JB, PD, SP, MR). Data for patients with previous spinal surgery or nucleolysis treatment within the previous 6 months were excluded. In our experience, edema of the bone marrow adjacent to vertebral endplates is common on MRI just after disc surgery or nucleolysis, without any pathologic significance. Conversely to persisting Modic type 1 MRI changes, it disappears within 6 months after the intervention and is not related with clinical features. Patients were investigated in three groups on the basis of Modic type 1 MRI changes: Modic type 1 changes and no previous surgery or nucleolysis treatment (Modic I-a), Modic type 1 changes with previous surgery or nucleolysis treatment (Modic I-b), and degenerative disc disease without Modic type 1 changes (Control).

1.2.2. Intradiscal methylprednisolone injection

During 3-day hospitalization, patients underwent discography under fluoroscopic control as previously described [12], then received one injection of methylprednisolone (2 ml; Solu-Medrol®, Pharmacia, Saint-Quentin-en-Yvelines, France) into the center of the disc. Patients were asked to remain in bed for 12 to 24 h and to wear lumbar support for 2 weeks after rest.