

Clinical Study

Type 1 Modic changes was a significant risk factor for 1-year outcome in sick-listed low back pain patients: a nested cohort study using magnetic resonance imaging of the lumbar spine

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Abstract

BACKGROUND CONTEXT: It is not clear whether Modic changes (MC) is associated with low back pain (LBP) outcome.

PURPOSE: To study associations between baseline degenerative manifestations and outcome in sick-listed LBP patients.

STUDY DESIGN: Prospective nested cohort study based on a randomized controlled trial.

PATIENT SAMPLE: Out of 325 sick-listed LBP patients, 141 were consecutively examined by magnetic resonance imaging (MRI) and included and 140 completed the study.

OUTCOME MEASURES: Degenerative manifestations of the lumbar spine were quantified; associations were studied in relation to the three primary outcomes: change of back+leg pain, change of function as measured by Roland-Morris questionnaire, and 1-year unsuccessful return to work (U-RTW).

METHODS: By using a previously validated MRI protocol, a specialist in radiology, who had no access to clinical data, described the images. Associations were studied by linear and logistic regression with adjustment for previously identified prognostic factors for 1-year pain and function and for U-RTW.

RESULTS: Clinically, 43% of the patients had radiculopathy. Degenerative changes were prevalent with altered disc contours in 84%, high-intensity zones in 70%, and nerve root touch or impingement in 63% of the patients. MC was identified in 60% of the patients, 18% with Type 1 changes and 42% with Type 2 changes, Type 1 including both Type 1 and Type 1 in combination with Type 2. Patients with Type 1 changes reported more back pain and did not improve in pain or disability. They increased to include 30% of the patients with U-RTW at 1 year. Patients with Type 2 changes did not differ significantly from patients without MC but differed significantly from patients with Type 1 changes in all three outcomes. Other degenerative manifestations were not significantly associated with any of the three outcomes.

CONCLUSIONS: The only degenerative manifestation negatively associated with outcome was Type 1 MC that affected 18% of the cohort at baseline and implied an increased risk for no improvement in pain and function and for U-RTW, even after adjustment for other prognostic factors. © 2014 Elsevier Inc. All rights reserved.

Keywords:

Low back pain; Modic changes; Disc herniation; Sick listing; Return to work; Prognosis

FDA device/drug status: Not applicable.

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Introduction

In cross-sectional studies, disc degeneration consistently has been shown to be associated with low back pain (LBP) [1–4]. However, disc degeneration does not seem to influence LBP outcome [5–7].

Signal changes of the vertebral end plates, so-called Modic changes (MC) [8,9], are inflammatory changes of the disc end plates that are more closely associated with LBP than other types of disc degeneration [4,10]. MC is not visible on X-rays, but only on magnetic resonance imaging (MRI), and it may spread to the entire end plate and cephalic or caudally into the vertebra. MC is mainly located caudally in the lumbar spine and is associated with disc degeneration, disc herniation, and age but not with sex. It is rarely present in normal discs [11,12].

MC of the lumbar spine may be identified in median 6% (0%–22%) of the normal population [11] and in median 43% (25%–90%) of the clinical populations. Although definitely associated with pain, it is not clear whether MC is associated with LBP outcome [13].

Three types of MC have been identified, types 1, 2, and 3 [14]. Type 3 is rare and will not be described here. Type 1 appears hypointensive in T1-weighted and hyperintensive in T2-weighted MRI. Type 2 appears hyperintensive in both T1- and T2-weighted MRI (Fig. 1). Mixed lesions comprising both Type 1 and Type 2 changes have also been described [8], and in the literature, patients with mixed type may be included among patients with Type 1 [15]. Reliability studies of MC have shown excellent inter- and intraobserver reliabilities [16,17].

Rest, including avoiding of weight bearing, does not seem to be preferable for usual LBP care [18], and the optimal treatment of patients with MC is as yet not clarified [14].

We have previously published the results of a randomized intervention study in 351 sick-listed LBP patients showing no difference in return to work (RTW) between mini-intervention and multidisciplinary intervention [19]. Prognostic factors for 1-year pain and function [20] and risk factors for unsuccessful return to work (U-RTW) were identified in 325 of these patients [21]. Disc height reductions measured on X-ray were not associated with any of the outcomes. In a nested cohort including 141 of these patients, MRI was performed consecutively.

The aims of the present study were to analyze whether baseline degenerative lumbar manifestations visualized on MRI in these 141 patients, with special focus on MC, were associated with the change of pain, change of function, and U-RTW at 1 year and whether such associations were still present after adjustment for previously identified prognostic factors.

Methods

Design

Prospective cohort study nested in a randomized clinical intervention study.

EVIDENCE & METHODS

Context

Correlation of radiographic changes with patient symptoms and physical functions can be challenging. In particular, the extent to which Modic endplate changes of the lumbar spine are associated with low back pain and physical impairment are not well understood. In light of this, the authors present results of a prospective analysis performed in conjunction with data collected as part of a randomized clinical trial.

Contribution

The authors found that Type I Modic changes were associated with elevated levels of back pain and reduced improvement in pain and disability. Following regression analysis, the authors maintained that Type I Modic changes were significantly associated with limited ability to return to work. Similar findings were not encountered for Type II Modic changes.

Implications

The present study highlights an association between Modic endplate changes and functional outcomes in the setting of low back pain. The fact that the data used to make these conclusions were drawn from a sample collected for other purposes might indicate that this investigation was underpowered to detect differences in outcome based on radiographic results. This is particularly important in light of the findings relevant to Modic II changes. Furthermore, as the authors correctly point out, the size of their sample, resultant limitations in follow-up, and the need for multiple comparisons should also be taken into account when interpreting their findings. Finally, it should be appreciated that ethno-social and cultural differences between the population under study and patients with back pain in the United States, or elsewhere, may limit the potential for replication.

—The Editors

Patients

The patients in the present study participated in a randomized clinical intervention study previously reported [19], and the present study was planned before the intervention study was finished. All patients received clinical evaluation and guidance from a rheumatologist and a physiotherapist, and half of the patients were furthermore supported by a case manager in a multidisciplinary setting.

In the first period of the clinical intervention study, MRI of the lumbar spine was performed on clinical indication, but in the last year of the study period, it was performed in all patients. Only these patients have been included in the present study except for one patient with nonspecific

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