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Sacroiliac joint dysfunction in patients with imaging-proven lumbar disc herniation

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Abstract A dysfunction of a joint is defined as a reversible functional restriction of motion presenting with hypomobility according to manual medicine terminology. The aim of our study was to evaluate the frequency and significance of sacroiliac joint (SIJ) dysfunction in patients with low back pain and sciatica and imaging-proven disc herniation. We examined the SIJs of 150 patients with low back pain and sciatica; all of these patients had herniated lumbar disks, but none of them had sensory or motor losses. Forty-six patients, hereinafter referred to as group A, were diagnosed with dysfunction of the SIJ. The remaining 104 patients, hereinafter referred to as group B, had no SIJ dysfunction. Dysfunctions were resolved with mobilizing and manipulative techniques of manual medicine. Regardless of SIJ findings, all patients re-

ceived intensive physiotherapy throughout a 3-week hospitalisation. At the 3 weeks follow-up, 34 patients of group A (73.9%) reported an improvement of lumbar and ischiadic pain, 5 patients were pain free. Improvement was recorded in 57 of the group B patients (54.8%); however, nobody in group B was free of symptoms. We conclude that in the presence of lumbar and ischiadic symptoms our presented data suggest consideration of SIJ dysfunction, requiring manual medicine examination and, in the presence of SIJ dysfunction, appropriate therapy, regardless of intervertebral disc pathomorphology. This could avoid wrong indications for nucleotomy.

Key words Lumbar disc herniation · Sacroiliac joint dysfunction · Manual therapy

Introduction

Disc herniation leading to nerve root displacement with compression and causing radicular symptoms is only one of a variety of possible causes of lumbar and ischiadic pain. Pain radiating into the leg is not necessarily caused by irritation of the root [18, 19]; Norman and May [25] identified the sacroiliac joint (SIJ) as one of the possible starting points of such complaints via injection of local anaesthetic. Disc herniations were detected on CT and MR scans in a high percentage of asymptomatic patients [5, 16, 17, 31, 32]. Likewise it has been shown that the

size of herniations does not correlate with displayed clinical symptoms [6, 8, 34]. If, despite the lack of sensory or motor losses, the incidental finding of pathologic disc morphology is concluded to be the source of pain, the wrong therapy may be initiated, e.g. nucleotomy, leading to unsatisfactory postoperative results [7, 28–30]. This has to be considered when a choice between surgical and non-surgical treatment is made.

The lack of consideration of alternatives to disc-triggered pain is encouraged by the fact that some alternative diagnoses are undetectable by imaging procedures. Functional disorders in general, and dysfunction of the SIJ in specific, cannot be detected by CT or MRI. Reversible

functional restrictions of motion of spinal segments or peripheral articular malfunctions, each presenting with hypomobility, are defined as dysfunctions according to manual medicine terminology. SIJ dysfunctions have been acknowledged as causes of localized or pseudoradicular pain (see the review by DonTigny [11]). Studies identified SIJ dysfunctions as the cause of pseudoradicular pain in 10–23% of patients following nucleotomy [1, 2, 15, 23]. Following manual therapy, 87.5% [1] and 90% [23] of these patients reported significant improvement, some even reported complete relief of complaints. Numerical data on the presence and clinical relevance of SIJ dysfunction in conservatively treated patients with lumbar disc disease do not exist.

The aim of our study was to observe the frequency of SIJ dysfunction and to evaluate its significance for lumbar and ischiadic pain displayed by non-operatively treated spine patients with imaging-proven lumbar disc herniation.

Patients and methods

One hundred and fifty patients with MRI- or CT-proven disc herniation were studied. Mean age for the 77 male patients was 40.6 years (range 24–70 years) and for the 73 women it was 45.3 years (range 18–79 years). Leg pain was the major complaint in all patients, associated with low back pain in most of the patients. Duration of symptoms averaged 4.6 months (range 1–28 months). Onset of symptoms after a particular event and a slow onset progressing with time were reported with equal frequency. All patients responded normally on neurological examination. The presence of neurological findings such as reduced dermatomal sensitivity, diminished or absent tendon reflexes or motor weakness excluded a patient from the studied groups. All patients had failed to improve under outpatient treatment with physiotherapy, balneotherapy, local anaesthesia and pain medication.

CT or MRI scans had demonstrated paracentral or intraforaminal disc herniations in all patients. Herniation in our terminology denotes a posterior focal extension of the disc with the sagittal images showing a narrow and distinguishable pedicle of the nucleus. Bulging discs – a generalized extension of the disc margin beyond the margins of the adjacent vertebral endplates – and protrusions – small focal extensions of discs without clear pedicles – were excluded from the study. Discograms were not available to evaluate the distribution of contrast media beyond the upper and lower level of the disc, as it is pathognomonic for ruptured posterior longitudinal ligaments. In 70 cases imaging procedures located disc herniations at level L5/S1, in 69 cases at level L4/L5 and in 4 cases at segment L3/L4. In seven cases two segments were affected, namely L4/L5 and L5/S1.

All patients were admitted to hospital for 3 weeks for a trial of conservative inpatient treatment, possibly followed by nucleotomy if symptoms did not subside. Conservative inpatient treatment included intensive physiotherapy to stabilize and balance the muscles of the trunk, with special emphasis on the rectus abdominis, erector trunci, pelvitrochanteric, iliopsoas and rectus femoris muscles, for 5 days a week. Physical therapy included axial traction, back school and water exercises, while electrotherapy emphasised hydroelectric baths. Premature discontinuation of only part of the conservative treatment protocol led to automatic exclusion from the study. Adjunct pain medication was minimal and not standardized.

The key element of the diagnostic protocol was a manual medicine examination on all patients to inform the physician on the presence or absence of dysfunction of the SIJ. The manual medi-

cine examining technique followed three well-defined steps to diagnose SIJ dysfunction [3]. Firstly, both SIJs were tested for hypomobility using the spine test [12, 20]. Standing behind the upright patient, the examiner localizes and palpates the posterior superior iliac spine (PSIS) with one thumb and the medial sacral crest at the same level with the other thumb. Then the patient is requested to lift the ipsilateral leg (hip and knee flexion). With unaltered movement of the SIJ, the PSIS will move inferiorly as a result of the nutation of the joint. In cases of hypomobility, the PSIS will remain at the same level [12]. We always carried out the test on both sides to compare the range of motion of one SIJ to the contralateral one.

In the second step, the SIJ of concern was examined for so-called “zones of segmental irritation” [12] or, according to the new international glossary, “irritation points” [4, 13], which are topographically well-defined sites in the musculofascial tissue exclusively assigned to the specific SIJ. The irritation points are detected by palpation at the origin of the gluteus medius and maximus muscles. Their characteristics are tenderness to palpation, increased palpatory resistance and nonuniform consistency and plasticity. The irritation points directly relate to the dysfunction of the individual SIJ in terms of time and quality, as they will disappear once the dysfunction is corrected.

Dysfunctions in the sense of manual medicine are functional restrictions of motion, in contrast to structural changes restricting motions (e.g. arthrosis deformans). Mandatory clinical signs of dysfunctions are the presence of painful directions as well as the obligatory presence of at least one pain-free direction [4, 12, 13]. The functional provocative examination elicits pain upon movement in the painful directions and diminishes pain with movement in pain-free directions. Thus, the third step completes the manual medicine examination by testing the irritation points during a functional examination. In cases of SIJ dysfunction these points will react to relative movements of the sacral bone to the adjacent iliac bone in cranial, caudal, ventral and dorsal directions with an increase in the level and consistency of pain in painful directions and with a decrease of these qualities in pain-free directions, thereby qualifying the SIJ disturbance as a dysfunction in the sense of manual medicine [4, 12, 13]. A decrease of pain or any palpable tissue response at the irritation points indicates the appropriate therapeutic direction.

If dysfunctions of the SIJ were present they were treated by manual therapy accordingly. Mobilizing techniques without impulse as well as manipulative techniques with high-velocity impulses were applied to resolve the dysfunction. Patients were only treated in prone position, thereby avoiding rotational forces acting on lumbar discs. Early or delayed complications did not occur during hospital stay. Besides, only complications occurring within 24 h following manual therapy can be attributed to that procedure, and no complications are known following manual therapy of the SIJ in prone position [22, 27, 33].

On the day of admission each patient underwent a manual medicine examination of the SIJs. If a dysfunction was present the patient was treated with manual therapy as outlined. The first follow-up examination was scheduled after 1 week of conservative inpatient treatment. The re-examination provided information regarding any remaining complaints. In cases of recurrent SIJ dysfunction, usually described by patients as a pain increase after temporary relief, patients were treated with manual therapy again. Patients without SIJ dysfunction at the first examination were also re-examined, to exclude the possibility of having overlooked such a dysfunction the first time.

A second follow-up examination was performed after 3 weeks of inpatient treatment. We then categorized the patients by outcome into three groups: free of lumbar and ischiadic pain, improved, not improved. At that time it was decided whether nucleotomy was indicated among the group of patients without any improvement. Patients undergoing nucleotomy remained classified as not improved. An evaluation of whether nucleotomy resulted in a relief of symptoms was not part of this study.

Results

Forty-six patients (hereinafter referred to as group A) displayed dysfunctions of the SIJ at the initial visit. The remaining 104 patients (hereinafter referred to as group B) did not have a SIJ dysfunction.

Group A

Dysfunctions were recorded on the side of the imaging-proven disc herniation in 39 out of 46 patients. However, seven patients had a dysfunction of the contralateral SIJ. One week after initial manual therapy and adjunct conservative treatment as outlined, 22 out of 46 patients in group A reported a steady improvement and 3 patients reported complete relief of symptoms. Seven patients reported a temporary relief after initial manual therapy; however, this was followed by a recurrence of the pain, at a lower intensity, after a few days. These patients presented with identical SIJ dysfunctions as were found at initial examination, and again these dysfunctions were resolved by manual therapy. After 3 weeks, 34 out of 46 patients of group A (73.9%) reported a lasting improvement of lumbar and ischiadic pain, with 5 of them reporting a complete relief of pain. Twelve patients remained with no improvement; five of those patients (10.8% of group A) with persistent pain underwent nucleotomy.

Group B

Eighteen of the 104 patients of group B showed an improvement of symptoms after 1 week. However, no patient of group B was pain-free. Repeat examination after 1 week did not reveal SIJ dysfunction in any of those patients. At final examination after 3 weeks, 57 of the 104 patients of group B (54.8%) reported an improvement, but no patient of group B claimed complete relief. The remaining 47 patients complained of lumbar and ischiadic pain of unchanged intensity. In 19 patients of group B (18.3%) with persistent symptoms nucleotomy was advised.

Statistical analysis was performed using the Fisher test [14, 26] on the significance of SIJ dysfunction with re-

spect to outcome. Outcome measured as improvement or not of lumbar and ischiadic pain, was found to be associated with SIJ dysfunction (Table 1).

Discussion

A trial of intensive physical therapy as an inpatient is always justified in the absence of sensory and motor losses, even if a relevant disc herniation is present [21]; the benefits of conservative therapy were seen in the patients of both groups. Improvement of lumbar and ischiadic pain was seen more frequently in patients of group A than in those of group B (73.9% vs 54.8%) which one may attribute to the resolution of SIJ dysfunction. It is striking that five patients in group A had a complete relief of symptoms compared to none in group B, in the presence of the same conservative treatment with the exception of manual therapy. We assume that the resolution of SIJ dysfunction, at least in these five patients, was a major therapeutic gain towards relief of symptoms. We conclude that physical therapy is more likely to reduce lumbar and ischiadic pain in patients with disc herniation if those patients present with a SIJ dysfunction that is successfully resolved by manual medicine techniques prior to physical therapy. Lumbar disc herniation cannot be the primary source of displayed lumbar and ischiadic pain if applied techniques of manual medicine on the SIJ result in a marked or complete relief of these symptoms. This statement holds true regardless of the duration of relief of symptoms, though the literature acknowledges that manual medicine gives long-term benefits [24]. Likewise, in our studied patients without clinical signs of nerve root compression, and especially in those without neurology deficits, the anatomical position and size of intervertebral disc pathomorphology was secondary in the pathogenesis of lumbar and ischiadic pain when manual therapy to the SIJ resulted in the relief or disappearance of symptoms.

We conclude that in the presence of lumbar and ischiadic symptoms, our presented data suggest consideration of SIJ dysfunction, requiring a manual medicine examination and, in the presence of such a dysfunction, appropriate therapy, regardless of intervertebral disc pathomorphology. A number of nucleotomies may be avoided through this procedure. We found it safe to treat patients in a prone position, using techniques without rotational impulses to the spine.

It is worth discussing whether a disc herniation and the manual-medicine-proven SIJ dysfunction develop independently from each other or whether they are related to each other. A tense iliopsoas muscle may have a transmitter function in this pathogenesis [10]. Positive correlations between SIJ dysfunctions and tense hamstrings have also been observed [9]. A tense quadratus lumborum muscle may also be able to act on the SIJ via the iliolumbar ligament. The resolution of such causal connections will be left to further studies.

Table 1 Fisher test on the significance of sacroiliac joint (SIJ) dysfunction with respect to outcome of low back pain and sciatica in 150 patients. The patients in group A ($n = 46$) were diagnosed with SIJ dysfunction, those in group B ($n = 104$) had no SIJ dysfunction

	Improved	Not improved	Nucleotomy
Group A	34	12	5
Group B	57	47	19
	91	59	24

Fisher's $P = 0.020$

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