A need for a shared paradigm in the physical therapy classification and treatment of mechanical low back pain: (Part I): **Limitations of the patho-anatomical approach**

Abbas Varamini, MPhty, BScPT, FCAMT
Bahram Jam, MPhty, BScPT, FCAMT

Abstract: The traditional paradigm in medical science has focused on the sources of pain and the specific structure at fault for the diagnosis of mechanical low back pain (MLBP). The conventional aim has been to find patho-anatomical reasons for the musculoskeletal disorder and accordingly present various treatments. Physical therapists have traditionally been also dependant on the medical theory by relying on the patho-anatomy model for diagnosis and treatment. The purpose of this initial paper is to provide a review of the available evidences that strongly support the need for a paradigm shift in physical therapy. This paper will review the lack of validity for some of the most common medical diagnoses used by many physical therapists and will discuss their questionable value for our clinical decision-making. A new paradigm for the diagnosis and the classification of MLBP is essential for physical therapy.

Key Words: *low back pain, classification and diagnosis*

Introduction

In adults between one-half and three-quarters of the population will experience back pain at some point in their life (Cassidy 1998) and it is one of the most commonly treated disorders in outpatient physical therapy practice (Jette et al 1994). Eighty percent of adults seek care at some time for acute low back pain, and one third of all disability costs in the United States are due to low back disorders (Kuritzky & Carpenter 1995). Considering the overall expenses involved in treating this condition, even with all the advances in modern medicine, there continues to be inconsistent success in the management of mechanical low back pain (MLBP). In response to this fact, many health care professionals including physical therapists, chiropractors and osteopaths are continuously attempting to improve the quality of care for this epidemic condition (Ellis 1995). A survey shows that physical therapists have generally a positive attitude about evidenced based practice and are interested in improving their skills necessary to implement evidence into their clinical practice (Jette et al 2003).

Paradigm shift in treatment of Mechanical LBP

The traditional paradigm in medical science has focused on the sources of pain and the specific structure at fault for the diagnosis of MLBP. The aim has been to find patho-anatomical reasons for the musculoskeletal disorder and accordingly present various treatments. Modern diagnostic tools such as Magnetic Resonance Imaging (MRI) and Computed Topography (CT) have made it possible to find even tiny abnormalities in the body to reveal potential “problems”. Medical practitioners have used this approach with only short-term and inconsistent success in the

management of patients with non-specific MLBP (Waddell 1998, Nachemson 2000, van Tulder et al 1997&2000, Pengel et al 2002, Lutz et al 2003).

As a result of many studies conducted worldwide in recent years, a shift away from the traditional paradigm for the management of MLBP has been inevitable (Nachemson 2000, McKenzie & May 2003, van Tulder et al 2000). The paradigm shifts supports the concept that MLBP is more a complex condition than originally believed using the 'simple' patho-anatomical approach to diagnosis and treatment (Table 1).

Old Paradigm	New Paradigm
Bed rest is the most effective management of acute LBP	There is strong evidence that support bed rest greater than 2 days is not effective in the treatment of acute LBP (5RCTs)
Restriction of activity is imperative for recovery from acute LBP	There is strong evidence to support staying active is effective in the treatment of acute LBP (6RCTs)
Slow return to normal activity should be limited by the perception of pain. This allows "healing" to occur and prevent chronic disability	There is strong evidence to support that continued ordinary activity as normal as possible can lead to faster symptomatic recovery and less chronic disability
Physical therapy needs to primarily focus on various passive modalities for the management of LBP	There is little or no evidence to support the effectiveness of ice, hot packs, short wave, massage, ultrasound, lumbar corset, traction and acupuncture for the treatment of LBP
There are definite relationship between acute LBP and spinal flexibility, isometric strength, exercise fitness, posture and leg length discrepancy	There is doubt about any relations between acute low back pain and spinal flexibility, isometric strength, exercise fitness, posture and leg length discrepancy
Psychosocial factors are of little concern and may be addressed in only those with chronic LBP	Cognitive-behavioral approaches may be appropriate for patients with acute and sub-acute LBP at risk of becoming chronic (Frost 2000)

TABLE 1: Paradigm Shift. RCT: Randomized Control Trial

The Patho-anatomic Approach and Doubt About its Benefit in Physical Therapy

Following the medical model, physical therapists have traditionally been dependent on the patho-anatomical model of classification for the diagnosis of MLBP. This model has a tendency to focus on structural and visible abnormalities as etiologies; and an inclination to trust technical diagnostic results more than clinical judgment (Lutz et al 2003). The most common diagnoses of MLBP using the patho-anatomical model of classification are disc lesions, zygapophyseal (facet) syndrome, sacroiliac (SI) joint syndromes and instability due to pars interarticularis defects (Bugduk 1995, Delito et al 1995, McKenzie & May 2003). Using differentiating diagnostic injections, a number of studies have estimated the prevalence of disc lesions, facet and SI joint syndromes to be respectively 39%, 15-36% and 13% as a cause of non-specific MLBP (Schwarzer et al 1995, Bogduk 1995, Maigne et al 1996, Dreyfuss et al 1996).

The Intervertebral Disc

Although there is little doubt that disc lesions including prolapses and extrusions can be a major source of MLBP (Bugduk 1995), nonetheless, their validity remains controversial (Nachemson

2000). Some studies have supported the value of the centralization phenomenon during a clinical examination in identifying symptomatic intervertebral discs (Donelson et al 1997, Young et al 2003), yet in another study no specific clinical history or physical presentation was demonstrated to have a high diagnostic accuracy for detecting symptomatic disc lesions (Anderson et al 1996). In addition, despite many radiological advances, the accuracy of tools such as discography, MRI and CT in diagnosis of disc disease continues to be under question (Boden & Wiesel 1996, Carragge et al 2000, Borenstein et al 2001, Saal 2002).

The Zygapophyseal Joint

Although the existence of and the histological basis for zygapophyseal joint pain have been scientifically established (Schwarzer et al 1994, Bogduk 1995), the precise clinical etiology remains uncertain (Dreyer & Dreyfuss1996). There are no unique identifying features in the history, physical examination, and radiological imaging of patients with pain of lumbar zygapophyseal joint origin. Some spine physicians can potentially accurately diagnose zygapophyseal joint pain based on analgesic response to anesthetic injections directly into the joints or at their nerve supply (Dreyer & Dreyfuss 1996, Bogduk 1997, Saal 2002). However, this method of diagnosis is costly, invasive and not available to most medical practitioners including physical therapists.

The Sacroiliac Joint

The sacroiliac joint is quite capable of being a source of low back pain (Bogduk 1995, Maigne et al 1996, Dreyfuss et al 1996). In fact provocative injections directly into the SI joint of asymptomatic volunteers can cause low back pain (Fortin et al 1994). Several studies have demonstrated the existence of SI joint pain by using fluoroscopy guided intra-articular anaesthetic injections or joint blocks (Slipman et al 1998 & 2000, Ribeiro et al 2003, Young et al 2003). In patients with chronic low back pain, various studies have established the prevalence of SI joint pain to be in the range of 18.5% to 53% (Maigne et al 1996, Dreyfuss 1996, Young et al 2003). However, there is still significant controversy surrounding the presence of reliable, valid, sensitive and non-invasive clinical diagnostic procedures for the SI joint in the absence of traumatic fractures, ligamentous ruptures, tumors or infections (Walker 1992, Dreyfuss et al 1996, Saal 2002, Riddle & Freburger 2002).

Spondylolisis, Spondylolisthesis and Instability

Another major diagnosis is based on spondylolisthesis and the instability hypothesis as a cause of MLBP. Systematic studies have doubts about the existence of this clinical diagnosis as a cause of LBP except in the rare cases (Nachemson 1999). Various clinical diagnostic criteria have been proposed for lumbar instability (Paris 1985, O'Sullivan 2000), except for these clinical signs to be valid, they must be validated against a standard criterion. Radiographic signs offer the only available criterion standard for instability, but the radiographic signs of instability are themselves

beset with many difficulties, therefore, no clinical or radiological studies have yet validated any of the proposed clinical signs of lumbar instability (Bogduk 1997).

Limitations of Diagnostic Tools for the Patho-anatomy Paradigm

Differential injections, X-ray, CT-Scan and MRI are also frequently used tools in the diagnosis and decision making of various patho-anatomical conditions. However their validity in diagnosing the cause of MLBP is continuously under scrutiny because of their limitations in differentiating between symptomatic and asymptomatic individuals (Jensen & Brant-Zamadzik 1994, Boden & Wiesel 1996, Saal 2002).

Although, differential injections are one of the most common methods of patho-anatomical diagnoses, there is doubt about their accuracy for determining a structure at fault (North et al 1996**,** Saal 2002) and the potential source of nerve root or spinal nerve pain (Huston & Slipman 2002, Slosar et al 1998). Discography with injection in patients with LBP could not reliably indicate the presence of symptomatic internal disc disruption (Carragee et al 2000) in addition; zygapophyseal joint injections were also unable to support the existence of a "facet syndrome" (Schwarzer et al 1994).

Within the first three months following a medical consultation as much as 70% of all patients are sent for X-rays (Carey & Garrett 1996). Although X-rays can be of great value for identifying serious pathologies such as spinal fractures and tumors, their value for detecting most other benign conditions remains questionable. To date, no firm evidence exists for the presence or absence of an association between X-ray findings and non-specific MLBP for conditions such as mild to moderate degenerative changes, spondylosis, spondylolysis, spondylolisthesis, spina bifida, transitional vertebrae, and Scheurmann disease (van Tulder et al 1997). It is interesting to note that inter-observer and intra-observer variations in the interpretation of plain radiographs by radiologists were poor for spina bifida, degenerative spondylolisthesis, facet joint arthrosis, sacroiliac joint arthrosis and for narrow central spinal canal (Espeland et al 1998).

Although MRIs have significantly improved the differential diagnosis of LBP related to infections, bone disease, malignancies or other systemic diseases, there is significant controversy if this relatively expensive imaging technique has improved the diagnosis or the treatment outcome of non-specific MLBP (Videman et al 2003, Jarvik & Deyo 2002, Boos & Lander 1996, Deyo 1994).The clinical relevance of detecting various discogenic pathologies may be questioned due to the fact that up to 78% of asymptomatic individuals have been shown to have disc bulges and protrusions on MRIs (Jensen & Brant-Zamadzik 1994) and up to 47% of patients with LBP have been shown to have normal MRI (Savage et al 1997). Inaddition,in a seven year follow-up study, asymptomatic individuals presenting with disc extrusions on MRI did not develop sciatica or have more than expected amount of corresponding back pain (Borenstein et al 2001). Computed

tomography also has some value for the differential diagnosis of LBP and it has some advantages over MRI in the detection of related cortical pathologies such as fractures. In a comparative study of CT and MRI, a panel of experts concluded that CT had a similar sensitivity but insufficient specificity for herniated discs (Thornbury et al 1993). Also, CT scans have been unable to predict pain originating from the lumbar zygapophysial joints in patients with chronic low back pain (Schwarzer et al 1995).

Conclusion:

To date, the above-mentioned pathological diagnostic techniques including x-rays, MRI, CT and injection blocks have not been shown to be reliable in explaining the cause in the majority of non-specific MLBP. Radiological tests and diagnostic injection blocks are of some value for medical practitioners whose treatments focus on the resolution of pain from the structure in fault by using pharmacological and/or surgical interventions. The patho-anatomical method of diagnosing MLBP may be beneficial to Physicians and Surgeons, but how do these medically adopted method of diagnosis help physical therapists in their management of MLBP? Can physical therapists actually change any patho-anatomical conditions by their non-invasive treatment techniques? Can herniated discs be reduced or can degenerative changes in zygapophyseal joints and intervertebral discs anatomically change following conservative methods of treatments? In fact, an overemphasis on the simplistic biomedical approach of identifying and treating the structural cause of pain has led to excesses in diagnostic testing, bed rest, narcotic analgesics, and surgery (Waddell 1998).

Although of limited value to physical therapists, the existence of a possible patho-anatomical structure at fault must be still appreciated, as it provides a medical perspective on the condition, which may help establish certain medical indications and contraindications. It is not the intention of this paper to completely ignore patho-anatomical diagnosis for MLBP, but rather to provide some evidences for the need to change the focus of diagnosis into a system that would potentially be more clinically valuable and applicable to a non-invasive and non-pharmacological management approach. It is recommended that physical therapist need to shift their paradigm from the traditional medical model to a more appropriate model of evaluation, diagnosis and the treatment of MLBP. A comparable paradigm shift has already occurred in neurological physical therapy. In this model, physical therapists can assess and treat all neurological conditions regardless of their pathological diagnosis, but rather based on the movement impairment dysfunction. Orthopedic physical therapy may also greatly benefit from a similar shift toward the movement impairment paradigm that is continually evolving.

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