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The Value of Comparing Active Motion of the Lumbar Spine between Standing and Sitting: an Attempt of Clinical Significance.

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INTRODUCTION:

The purpose of this report is to identify a clinical significance when differences are noticed in the range of motion evaluation of the lumbar spine between a standing and sitting position. Most of the orthopedic, osteopathic and manual therapy textbooks describe the evaluation of lumbar spine motion in standing with flexion-extension and side-bending right and left ^{1,2,3}. An evaluation in sitting position has been described but for the purpose of observing the pelvis motion (through the postero-superior iliac spine) with flexion of the spine or the hips ³. The findings in sitting were then compared with the findings in standing for the same test. The Scandinavian approach appears to perform a biomechanical assessment of the lumbar spine in sitting ⁴. However no mention was made about assessing the range of motion in sitting.

The importance of comparing range of motion quantitatively and qualitatively between standing and sitting came to my interest when observing drastic changes in one of my "low back patients". The case report will describe the patient's history, symptoms and clinical findings with clinical and functional measurements. A description of intervention will follow and the resulting outcomes. In a discussion, an attempt of interpretation will be made and the case report will be completed with a conclusion.

DESCRIPTION OF PATIENT:

A 51 years-old male patient was presented to me with a diagnosis of unossified S1 vertebra being an "L6" along with mild, grade I anterior spondylolis-

thesis at the same level ⁵.

When asked about the history of his complaints, the patient recalled an onset of pain two years ago with no precipitating factors. At that time the patient remembered having been inactive for many years and decided to do some stretching. The onset was then gradual and the frequency and intensity of the pain got progressively worse to the point that the pain was rated at a 8 out of 10 with pain in sitting and lying down (Modified Visual Analog Pain Scale) ⁶. At that time the patient had some difficulty sleeping. The location of the pain was the same as during the initial evaluation which will be described later.

Previous treatment, underwent a year after the onset, included deep massage and osteopathic sessions resulting in no noticeable change. Finally, the patient stopped doing his stretching and the pain became intermittent and at a level of 6 out of 10.

The patient had X-Rays performed in March 1999 revealing the spondylolisthesis and the "additional" lumbar vertebra. Regarding the medication, the patient had been

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Notes from the Editor

The 2001 NAIOMT Symposium in Colorado Springs produced excellent information which the faculty has agreed to make available for this and future editions of the newsletter. Outcomes of the Board of Directors and Faculty meetings will also bring changes in the curriculum and examination process. Further information will be forthcoming as we get closer to implementation.

This edition of the newsletter highlights a case study written by Guillaume (Gui) Fouque, a residency candidate, in association with his mentor Kathy Stupansky, both of Denver, CO. Yours truly presented the Manual Therapists Role in Treating Patients Undergoing IDET Procedures at the Symposium. Enjoy this edition of the NAIOMT newsletter. Comments may be emailed from the web site or mailed to: NAIOMT, 1574 Coburg Rd. # 129, Eugene, OR 97401.

Bill Temes

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under anti-inflammatory for a week but without any benefits and with complaints of bad side effects.

As far as past medical history is concerned, the patient had a history of high cholesterol but under control. No other pertinent medical history was provided.

At the time of the evaluation the patient's main complaint consisted of a constant low back pain described centrally in the area from L3 down to the sacro-iliac joints and spreading toward the gluteal region on both sides. The pain intensity was rated as being at a 6. The pain was described as a deep and vague ache. The patient denied any sharp pain and any radiating pain down his lower extremities. Likewise the patient denied any bowel or bladder dysfunction, no increasing pain with coughing or weakness, paresthesia down his legs.

When asked about the pain pattern and level of irritability, Mr. X did not report any difficulty sleeping. In the morning Mr. X would have a "stiff" low back that would disappear with sitting after 10 to 15 minutes. His back would be more sore by the afternoon but less painful in evening. The patient's pain overall would get worse with standing with a maximum tolerance of 15 minutes and he would be able to walk no more than 5 minutes until feeling a low degree of back pain.

The patient's social and professional profile consisted of computer work, with sitting being the main position. In his spare time Mr. X would enjoy going to the gym to lift weights and riding a stationary bike. The patient's ultimate goals are to be able to run 6 miles, go hiking the whole day and lose about 20 pounds.

OBJECTIVE EVALUATION:

Upon inspection Mr. X presented with a shifted lumbar spine and pelvis to the left and an apex of hyperlordosis at L3. A correction of the lumbar spine shifting did not affect the patient's symptoms. The positional evaluation of the pelvis was taken from the antero-superior and postero-superior iliac spine and showed a right iliac anteriorly rotated relative to the left iliac. The patient was slightly overweight.

In standing the active range of motion was carried out according to Magee. The assessment showed no limitation in flexion with no pain, but painful and limited extension and right side bending. The measurement of right side bending from tip of the third finger to the floor, was done with use of a measuring tape and showed 60 cm left compared to 48 cm to the right⁷. Measurement of extension with use of inclinometers, one being on T12 and the other one on L5, showed 5 degrees⁸.

When sitting, the slump test was performed in the following manner. The patient had his hands behind his back and flexed his cervical, thoracic and lumbar spine into its full position⁹. Once the position held, the patient was asked to extend one knee followed by dorsiflexion of the ankle. The test was repeated with the other leg and both legs simultaneously. The patient reported some tightness in the popliteal area unrelieved with extension of the head. The test did not reproduce any of the patient's symptoms and was judged to be negative. However, quite amazingly, the shifting and hyperlordosis of the lumbar spine disappeared due to the sitting position.

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The following examination was part of a screening test as described initially by J. Cyriax and included:

- Selective tension test
- Neurological assessment
- Compression and traction test
- Provocation tests including torsion and spring test

The selective tension test was aimed to differentiate between contractile tissue and non-contractile tissue lesion. The patient in sitting was asked to resist sidebending, flexion and extension of the spine in neutral position. This did not result in any pain. The rotation was not assessed due to the potentially high stress afflicted to the intervertebral disc.

The neurological testing was performed according to the procedure described by Magee and included myotome and dermatome from L3 to S1, the reflexes tested were L3L4 and S1². The test showed normal reflexes, sensation and strength of the lower extremities.

The provocation test included postero-anterior and torsion stress¹². The latter test was performed as following. The patient was lying prone and the torsion stress consisted of rotatory force applied on the side of each spinous process and a counter rotatory force at the opposite iliac crest. This resulted in pain response at the L4L5 and "L6" level more prevalent on the right side.

The spring test consisted a postero-anterior stress on each spinous process and was assessed for pain response and quality of end feel. The segment L5 and "L6" turned out to be more painful with a softer end feel.

The compression test was performed in lying supine with knees flexed at 90 degrees. A compressive stress was applied through the spine by pushing cranially from the forelegs.

In the same position, the traction test was applied by grabbing the patient's legs and pulling caudally.

Both tests did not result in any pain.

Following the screening test of the lumbar spine, the sacroiliac and hip joint screening tests were carried out.

The sacroiliac joints were screened using provocation tests of compression and distraction⁴. In supine, an outward stress was applied through the iliac crests causing a compressive force at the sacroiliac joints. In sidelying, a downward stress was directed

through the lateral side of the iliac crest causing a distraction force at the sacroiliac joints. None of these tests resulted in any pain.

The hip joints were screened according to the procedure used in the Magee textbook². The hips were actively and passively assessed followed by selective tension tests. The screening test showed a limitation of the right hip in extension.

The screening tests did not detect any serious nerve compromise or pathology contraindicating the use of manual therapy or further detailed biomechanical assessment. The torsion and spring test resulted in local, segmental pain at L5"L6". This would suggest some state of irritation or lesion at this level and could require some precaution in the assessment.

The biomechanical assessment of the lumbar spine was aimed to evaluate the articular status of the spine through passive physiological and accessory motion⁸. Before evaluating motions, a positional assessment, in lying, showed an anteriorly rotated pelvis on the right identical to what was found in standing.

To assess the spinal motion, the patient was sidelying, lumbar spine in neutral and a component of flexion and extension was passively applied to the spine via the hips. The interspinous motion was assessed. This revealed some general hypomobility in extension of the L1L2 segments and rather hypermobility at L5"L6" levels in extension. The accessory motion of these levels was assessed in the direction of extension and showed an articular hypomobility at L1L2. L5"L6" was tested for stability anteriorly by applying a posterior shear through the level below. The posterior stability was performed in sitting using the patient's body to apply a posterior shear of the above segment. Both tests were negative. In order to differentiate bilateral versus unilateral dysfunction for the L1L2-L5L6 levels, sidebending passive motion was assessed in sidelying. This showed a symmetrical hypomobility at L1L2 and unilateral Con hypermobility to the right at L5"L6".

The biomechanical assessment of the pelvis was carried out according to the techniques described by Diane Lee¹³. In supine position, each iliac anterior and posterior motion was assessed and showed a normal mobility.

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Upon palpation, the patient had soreness over the right iliacus and psoas muscles. The palpation techniques were used according to the "surface anatomy" described in Hoppenfeld¹¹.

ASSESSMENT:

The following clinical reasoning might be held. The subjective examination did not reveal any serious pathology jeopardizing the neurological system or the patient's life. The description of the pain, intermittent, low irritability and severity would suggest a somatic source of pain and probably rules out any serious nerve impingement¹⁴. The neurological examination being negative confirms this assumption.

Objectively, the hypomobility of the upper lumbar spine and hips into extension could lead to the hypermobility found at L5-L6. This, in turn, could lead to the spondylolisthesis found on x-rays. The question remains that how much of the upper lumbar spine or hip is responsible for the L5-L6 hypermobility. As we will see, the objective clinical differences between sitting and standing could help us to answer this question.

Due to the drastic change of posture of the spine in sitting, further investigation was carried out in this position. The range of motion of the lumbar spine was evaluated in sitting ensuring that the feet were in contact with the floor. This time, the range of motion of the lumbar spine had no apparent limitation and no pain.

This significant objective findings with drastic improvement of the lumbar spine posture and motion in sitting compared to standing suggest the possible following hypothesis:

The improvement observed might be the result of underlying causes taking place in the pelvis and/ or in the lower extremities. The findings of lumbar spine hypermobility and hip hypomobility confirmed this hypothesis. The lack of hip extension could lead to an anteriorly rotated iliac and extension hypermobility of the lumbar spine to increase the hip extension during the push-off phase of the gait. The shifting of the spine away from the location of the lesion occurred probably as a way to decrease any further compression on the hypermobile segments.

The possibility of pelvis involvement might not

be likely for two reasons. First the kinetic testing of the sacro-iliac joints was negative. Second the sacro-iliac joints appeared to be moving arthrokinematically. Furthermore, physiologically, the sacro-iliac joints move with flexion of the lumbar spine regardless of the position standing or sitting¹⁵. It can then be assumed that the differences of the back range of motion would rule out a sacro-iliac joint dysfunction. On the other hand, the effect of the lower extremity on the sacroiliac joint is worth evaluating as mentioned in the first hypothesis.

Physiologically, according to Panjabi, there is an anterior translation of the vertebrae with flexion, which have been the aggravating factor in the case of spondylolisthesis¹⁵. The thoracolumbar fascia being tight in sitting could have a counter effect on the anterior translation.

The final possibility to explain the clinical difference between standing and sitting would be a different force transmission of the weight through the lumbar spine and pelvis. The anterior shearing force going through the lumbo-sacral junction might be different between a sitting and standing position. In a case of slight spondylolisthesis, this difference could be enough to observe a change in the range of motion of the lumbar spine.

TREATMENT:

Therefore, given these different hypothesis- hip dysfunction, pelvic girdle combined with lower extremities dysfunction or force transmission- a trial of different treatments was used to narrow down the source of the dysfunction.

The patient attended a total of 9 sessions, a summary of which has been attached in a table format. The treatment has been divided into three parts:

1. Treatment directed toward myofascial component included:
 - Muscle energy technique.
 - Soft tissue mobilization.
 - Transverse massage.
 - Strengthening and stretching.
2. Treatment directed to the joints:
 - Muscle energy technique.
 - Joint mobilization.
3. Treatment with antalgic purpose:
 - interferential current.
 - Massage.
 - Use of lumbar brace.

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Manual traction.

Here is the description of each technique used.

➤ Right hip extension joint mobilization (JM) in prone position. A pillow was placed under the anterior part of the thigh and an anterior mobilization was applied through the greater trochanter¹⁶.

➤ Manual traction (MTx) at L4L5 and L5 “L6” performed with the patient in sidelying, locking the above segments with rotation and extension. L4L5L6 were in neutral and caudal pull was applied at these levels with a fixation of the cranial segments.

➤ Grade IV joint mobilization into extension at L1L2 performed with the patient in sidelying. L1L2 was brought into extension from below and the upper thoracic segments were locked in rotation-flexion. An arthrokinematic glide was carried out bringing L1 into extension with L2.

➤ Deep tissue massage of the interspinous ligament between L4L5 and L5L6. This was performed according to the Cyriax principle of transverse massage with a friction perpendicular to the interspinous ligament.

➤ Interferential current with four pads in a crisscross pattern at a 80-150Hz for 15 minutes. The pads were located from L1 to S1, the intensity reached was according to the patient’s comfort.

➤ Soft tissue mobilization (STM) in a way of massage performed over the right iliacus and psoas muscles according to the palpation technique used during the assessment.

➤ Use of “criss-cross” lumbar brace with two lateral bands crossing over the abdominal area with use of Velcro. There was no addition of any metal frame.

➤ Muscle energy technique (MET) of the right iliac into posterior rotation. This technique was performed with the patient in left sidelying, spine locked in neutral position, left leg extended and right leg (hip-knee) flexed bringing the right iliac in posterior rotation. The muscle energy technique used the gluteus maximus (reciprocal inhibition) to reach further posterior rotation.

The home exercise program (HEP) consisted of :

➤ Posterior pelvic tilt performed in supine and standing against the wall.

➤ Transverse abdominal strengthening with the patient on hands and knees, he was asked to pull his lower abdominals in with expiration and hold the contraction for 10”¹⁷.

➤ Right hip extension strengthening (gluteus maximus) done in prone on the edge of a bed. The patient was asked to keep his knee bent.

➤ Self-correction of a lateral shifting in standing performed with the patient translating his body to the right against his right forearm and elbow bent at 90 degrees¹⁸.

➤ Simultaneous isometric contraction of right gluteus maximus and left psoas in supine position with the hip-knee bent at 90 degrees of flexion. The patient used his hands as resistance¹⁹.

➤ Concentric contraction of right psoas in sitting using a theraband aiming to reduce the muscle hypertonicity by increasing the metabolism.

The home exercises were performed with two sets of 10, three times a day.

The first three sessions of the treatment were aimed to address the articular component of the clinical findings. The treatment consisted mainly of joint mobilization and manual traction with goal of both decreasing the pain level by stimulating the mechanoreceptors with use of grade I and II, and increasing range of motion (grade III and IV) at the upper lumbar spine and right hip joint into extension. At that point, the home exercises consisted mainly of transverse abdominal strengthening and posterior pelvic tilt to bring the lumbar spine in flexion and alleviate the symptoms associated with spondylolisthesis and extension of the lumbar spine. Despite an improvement of the pain level (4/10) and level of function (able to walk for 10 minutes), the patient felt no major improvement. However the patient may have curtailed some improvement due to having stood and walked during a whole week-end. As a result the session #3 consisted of pain management treatment. It included interferential treatment and its effect on pain through the “gate theory”, use of lumbar brace to stabilize the lumbar spine and rest it, massage and manual traction affecting the mechanoreceptors.

At the session #4, in order to assess the importance of right hip flexor in the patient’s complaint, the patient was asked to isometrically contract his right hip flexor in standing and perform right sidebending

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and extension. Both movements improved drastically. As result the sessions from #4 to #9 included more work on the right psoas with use of muscle energy technique (reciprocal inhibition), concentric contraction in shortened position against light resistance and stretching in "Thomas position". Apart from the poor tolerance to the stretching, the patient showed an overall significant improvement from this myofascial treatment. The irritability and severity of the symptoms improved (2/10 pain intensity) and the patient was able to stand and walk for a longer time (15 minute walking).

DISCUSSION:

Throughout the treatment, the involvement of the lower extremities became increasingly obvious. The initial assumption of lower extremities influence on the low back was confirmed by the patient's progress during the treatment. This assumption was based on the difference of range of motion found between standing and sitting. However it is still not clear how much of the force transmission through the low back and role of the thoraco-lumbar fascia in standing versus sitting are contributing to the difference found.

Assuming that the lower extremities are a significant factor to the patient's dysfunction, the patient's hip restriction in extension turned out to be more myofascial than articular in origin, with the psoas being hypertonic and not tight. However the test used for psoas tightness (Thomas position) has found some recent controversies and the psoas function as hip flexor has been questioned²⁰. To further investigate the role of the hip flexors, the improvised test consisting of isometric contraction of hip flexor while simultaneously sidebending the back, was particularly enlightening. The patient was able to right side bend and extend with no pain. Additionally, the patient's good response to muscle energy techniques of the sacro-iliac and hip joint with contraction of hip flexor and extensor was indicative of a myofascial origin.

The effect of the myofascial component on the patient's pain could explain why the patient's initial onset of pain resulted from stretching. Given these logical and positive findings, some conflicting points could be raised up and might question this case report.

A possible contributing factor, the initial finding

of upper lumbar hypomobility in extension could have been further investigated and treated. This hypomobility could lead to an L2L3 hypermobility with segmental facilitation and explain for the hypertonic psoas. The switch from treating this area to the lower extremities may have been too precocious, and a combination of both treating the upper lumbar spine and hip could have been more productive. In the same line of thought, the thoraco-lumbar junction could have been assessed, specifically the rotation motion, since any limitation would likely lead to a unilateral hypermobility of the lumbar spine as found with the patient.

Besides this gap in the assessment, the measurements used for sidebending (measure tape) and extension (inclinometer) have a percentage of error that could render some of the measurements invalid⁵.

Finally, in session # 4, the treatment procedure that consisted of evaluating one treatment versus another may not be valid due to interaction of one intervention on the other one.

CONCLUSION:

The evaluation and treatment of "low back" patient has led to much research and the literature is abundant. In spite of this, pathology remains challenging and a source of controversies. The purpose of this case report had no intention to give a sudden solution on differentiating between "low back pain" A case study and possibly research could be granted involving a larger pool of low back patients and excluding serious pathology and disc injury. Such study could greatly contribute to the ever changing approach of looking at "low back pain" patients.

Guillaume Fouque, COMT

Kathy Stupansky, COMT, OCS.

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Table 1: summary of the treatment rendered with 9 sessions over a period of 4 weeks

Ses- sion	Therapeutic Inter- vention Each Session	Subjective Out- come	Objective Out- come
1	Evaluation, right hip ext. JM, pelvic tilt instruction, transverse and gluts max strengthening.	Good response with pain down to 5	
2	Manual Tx, right hip ext. JM, L1L2 ext. JM, standing self spinal shifting correction.	Felt better for a couple of days but pain increased due to too much standing.	Gain of 5 cm with right sidebending.
3	Manual Tx, DTM interspi- nous ligament, Interferen- tial: 80-150 Hz for 15 mn, lumbar brace	Pain level at 6	No significant gain in range of motion.
4	Massage psoas-iliacus, MET right SIJ, mob right hip ext.	Pain level at 2, distance walking 1 mile, stand- ing tolerance 1 hour.	Gain back extension by 7 degrees, right side- bending by 8 cm.
5	Same as session #4	Use of treadmill for 20 min, pain level at 3.	Same range of motion as session #4.

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NAIOMT Core and Specialty Course Titles and Numbering

Beginning in 2002, NAIOMT will be utilizing a course numbering system in conjunction with the names of the classes. This will facilitate student course data recording and transcriptions. The four course levels will be numbered with a 500 - 800 number.

For example:

Level I 500

Level II Upper Quadrant = NAI 600

Level II Lower Quadrant = NAI 610

Level III Upper Quadrant = NAI 700

Level III Lower Quadrant = NAI 710

Level IV = NAI 800

Specialty class courses will be numbered with a first digit denoting their level, and the second digits from 50-99, for example:

Spinal Instability = NAI 555

Foot and ankle = NAI 665

Shoulder Girdle = NAI 760

A complete list and descriptions of curriculum changes will be in the next newsletter.

Ann Porter Hoke
PT, OCS, FAAOMPT

Exam Process

Also beginning in 2002, NAIOMT is moving toward placing its exams on the internet in an effort to make the examination process more accessible and convenient to a larger number of student interested in pursuing the NAIOMT certification process.

The number of examinations held on the internet will be limited in the Winter of 2002, but by the fall of 2002 most course examinations should be available on the internet to those seeking certification.

In Winter 2002, a limited number of NAIOMT faculty will be making this option available. You may ask the course coordinator if it is expected to be available for your course. Exam applications will be made available the first day of the course for you.

The new style of examinations will consist of a

pre-course assignment(PCA) that will be mailed to you prior to you class. These will be open book and are designed to help prepare you for the course as well as get a sample of the type of questions to expect on the actual exams. For students applying to take the examinations, there will be a Course Assignment Test (CAT) and Post Course Test (PCT) for Level I and each Quadrant of Level II and III. These will be taken over the internet with a proctor present. The Case Studies and Oral Practical Exams will continue to be required as before for Level III and IV certification.

As these exams become available, more information will be given. For the next 1-2 years, the old style of exam and certification will still be available for those who wish.

If you have further questions, please contact:

Exam Coordinator Shari Keyser at 541 344-4777

New CRI

Congratulations to Virginia Mortara Larsen, PT, OCS, COMT

Virginia received her MS in Physical Therapy from Pacific University in 1989. She earned her COMT from NAIOMT in 1996 and her OCS from the American Board of PT Specialties in 1997. Virginia is a graduate of the NAIOMT Residency Program and anticipates her Fellowship with the AAOMPT in October 2001. She became a clinical residency instructor and is currently a faculty in training. She has served on the Oregon Orthopedic Physical Therapy Study Group Board since 1996. Virginia has practice in a variety of outpatient orthopaedic settings, seeing a variety of diagnoses, including working with pregnant clients. Currently, she is working for PT on Call to keep her schedule flexible.

Manual Therapists Role in Treating Patients Undergoing IDET Procedure

The management of chronic low back pain presents a formidable challenge to those who treat spinal pain. A discogenic etiology of low back pain exists in a subgroup of these patients.¹ Internal disc disruption is suggested to account for approximately 40% of patients suffering chronic low back pain.² The theoretical model described by Bogduk and Twomey is the consequence of an end plate fracture and subsequent disc degradation which may spread radially into the annulus fibrosis causing a radial fissure.³ If radial fissures reach the outer 1/3 of the annulus fibrosis the disc would be expected to be symptomatic, for not only could inflammatory chemicals reach the innervated portion of the annulus, but also so little of the annulus would remain intact that it would be subjected to excessive strains in the course of normal activities. CT scan post discography provides an axial view of the disc which demonstrates the radial extent of any spread of contrast medium injected in to the nucleus pulposus. Meanwhile, the disc stimulation provided that pain is not reproduced when one, but preferably two adjacent discs are stimulated. Apart from these internal features of disruption, the annulus is intact and the condition is distinct from full thickness tears or disc herniation. Pain may be referred to the lower limb but the patient is usually neurologically intact with no features of radiculopathy.

Treatment of internal disc disruption has typically been conservative care and surgically by interbody fusion. An alternative to this has come about by the introduction of a flexible intradiscal thermal catheter (Spine Cath, Oratec Interventions, Menlo Park) threaded from within the nucleus to engage the annulus from the inside and pass circumferentially around the lateral and posterior annulus. This electrode is used to heat the annulus, to coagulate the collagen of the annulus and any nociceptive fibers in it.

Patients considered appropriate for this procedure typically meet the following inclusion criteria:

- functionally limiting low back pain of at least 6 months duration

- lack of improvement with comprehensive non-operative care (exercise, cortisone, manual treatment, oral anti-inflammatories, activity modification).
- cortisone, manual treatment, oral inflammatories, activity modification)
- normal findings on neurological exam
- negative SLR
- negative MRI for neural compressive lesion
- pain reproduced with provocative discogram at one or more levels with typical symptoms

Exclusion criteria include:

- inflammatory arthritides
- non spinal condition that could mimic lumbar pain
- medical or metabolic disorder that would preclude appropriate follow-up

Early studies have demonstrated encouraging results with improved outcome measures of objective pain scores, functional outcomes and reduction of pain medication requirements.⁴⁻⁶ Complication rates have been very low. In a recent paper published in *Spine*, Dr.'s Michael Karasek and Nicolai Bogduk produced the first controlled study with one year follow-up.⁷ In this paper, 36 patients with discographically proven internal disc disease were treated with IDET. Seventeen patients with similar characteristics to the study group but were denied insurance coverage for the procedure (as investigational) served as the control group. Both groups had similar VAS scores pre treatment with the treatment group having significant reduction in VAS post IDET. The percentage of improvement was further classified based on the VAS scores as excellent, good, fair and poor. Sixty-seven percent (67%) of the patients reported at least 50% improvement of their pain at 12 months, with 89% reporting at least a 25% pain reduction. This data was also split out according to Workers Compensation patients treated in this group. They demonstrated an average VAS decrease of 50% as well, 67% (8/12) of at least 50% reduction of pain.

Besides the technical considerations of the procedure IDET must be considered part of a larger treatment program including comprehensive evaluation, discography and the patient enrolled in a pre and post IDET rehabilitation program. This program should be supervised by individuals knowledgeable in spinal anatomy, biomechanics, pathology and in particular treatment of patients with

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spinal functional instability. Decision making of program progression needs to be individually based within guidelines established to allow adequate disc healing. Our therapy protocol is based on experience the past 3 years with over 200 patients. It has been modified several times as we gain more experience as to how various patients tolerate activity early and late in their recovery. Pain levels may increase the first two weeks and it may be 6-12 weeks until we see significant change in symptoms. Patients are typically evaluated 1-4 weeks prior to the procedure depending on scheduling, travel distance, insurance approval.

During the initial visit the therapist will perform a modified lumbar scan including inclinometry and segmental stress testing if tolerated. Patients complete an Oswestry Low Back Pain Disability Questionnaire and indicate a self report of pain by visual analog scale (VAS) level. Activity guidelines are reviewed in particular as it relates to their usual activity routines. We review bending and lifting for the limited amount they can lift (5# the first 2 weeks, 10# for the next 6 weeks). We review comfortable resting positions, encourage a progressive walking program and go over corset wear and weaning after 6 weeks. When time permits for follow-up visits before the procedure we begin introducing the segmental stabilization program which is the main focus of the early physical therapy intervention. We have also shifted much of the rehab emphasis and begun the program by doing as much pre conditioning as possible, mostly aerobic and often in water at the local pool. Patients will usually return for Phase 1 of the follow up rehabilitation at 6-8 weeks post procedure. Trials of earlier participation have proven to be too irritating for most patients. The heat treated disc is hypothesized to remodel for the first 12 weeks. Motions such as flexion and rotation are to be avoided until the end of the remodeling phase since these promote shear and torque forces to the disc. Occasionally, patients may flare up during this stage as they wean away from the lumbar support without adequate muscle control, proprioception and/or overactivity as they resume various activities. Therefore, we progress slowly with a protective yet progressive exercise program.

At the 12 week mark mid range lumbar movements are initiated, however end range motion is limited for several more weeks to determine the patients tolerance to lumbar movement without load. The

heavy laborer needs strict instructions on what NOT to do for the first 6 months. Additionally, manipulation and traction at the treated levels (mechanical and manual) should be avoided for 6 months. Patients are encouraged to continue to exercise daily at home and reassess exercise programs on a once a week basis for up to 16 weeks. These would include higher level training and conditioning in particular as it related to their goals for return to work and recreation. This usually will include weight training, swimming, etc. Aerobic activity is encouraged. Any flare is dealt with by decreasing activity, return to corset wear, use of modalities, and return to physician if symptoms become radicular. Occasionally, selective blocks and cortisone is helpful.

Return to work guidelines are critical since most people cannot afford to take 12 weeks off from work and need to be counseled on activity procedures depending on type of activities required on the job- sitting, change of position, lifting, carrying, light versus heavy work.

Success of this program is based on proper patient selection and understanding the activity program.

In summary, the manual therapists role is to:

- assist in evaluating candidacy for procedure
- guide the patients activity
- restore mobility within guidelines
- educate patient on precautions and body mechanics
- establish stabilization and conditioning program pre and post procedure

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