Precision neuromuscular therapy (PNMT) for decline in functional mobility in an obese weightlifter with a history of osteoarthritis, degenerative disc disease, a baker's cyst and bilateral rotator cuff tears: Aggressive weight lifting, friend or foe? A case report

Introduction

This case is important because the subject, an obese, aggressive weightlifter, was seeking PNMT for feeling "weak with stiffness and soreness" and reported a "recent loss of mobility in the last 7 months," specifically getting up from chairs, out of bed and ascending/descending stairs. I recommended that the subject return to the doctor to rule out any medical reason for decline and to consider a doctor's guidance for a weight reduction and exercise program to unload the joints. The subject refused.

In order to understand this case, it is necessary to consider the interconnection of the following: functional mobility, osteoarthritis (OA), degenerative disc disease (DDD), Baker's (popliteal) cyst, weight-lifting, rotator cuff tears, and the intensified stress of obesity.

Functional mobility, as defined by Brett Sears, PT, is the ability to move about in one's environment in order to participate in activities of daily living. Engaging in physical activities at home and in the community contributes to quality of life. According to Sears, PT, functional mobility includes transfers from surface to surface, positional changes such as squat to stand, walking and climbing. Functional mobility may become impaired with added stress caused by injury, illness or obesity.

The stresses identified in this study include obesity and weightlifting. The illnesses which may be linked to obesity are OA and possibly back pain caused by DDD (the research is inconclusive). The Baker's cyst was likely a result of OA and a meniscus tear. Aggressive weightlifting may have contributed to the subject's shoulder injuries.

Literature Review

According to the Mayo Clinic, "osteoarthritis (OA) is the most common form of arthritis, affecting millions of people worldwide". Common symptoms include pain, tenderness, stiffness, grating sensation in the joints, loss of flexibility, and bone spurs, making it difficult to walk, climb stairs, sleep, or perform other daily tasks. Several factors that may increase the risk of OA include older age, joint injuries, repetitive stress, obesity, bone deformities, and genetics. Obesity places added stress on weight-bearing joints, such as the hips and knees. The research of Tukker, A., et al. (2009) reports a strong relationship between obesity and medical issues of the lower extremities such as OA, indicating that adults who have been obese more than 10 years are more likely than non obese adults to develop knee OA. The research also shows the greater the individual's body mass index (BMI), the greater the likelihood of developing knee OA particularly in older adults more than 65 years of age, as a result of chronic mechanical strain on weight bearing joints (Forhan, et al. 2013).

According to Underwood, C (2012), "a Baker's cyst is a fluid-filled swelling that causes a lump at the back of the knee leading to tightness and restricted movement". The cyst is usually caused by a problem that affects the knee joint, such as arthritis or a cartilage injury. Symptoms are similar to OA, and there may not be any pain and often a Baker's cyst will not require treatment. Underwood reports, "Long-term disability due to a Baker's cyst is very rare".

Garver, et al. (2014) determined that "knee OA is a leading cause of functional disability among American adults, and that obesity is a strong independent risk factor for OA". This study (2014) assessed differences in performance of stair climbing and a 400 meter walk, anticipated results and pain symptoms of the participants. All 79 subjects reported having OA in at least one other location in the body beyond the knee(s). The obese subjects of the group were outperformed by their counterparts on nearly every measure of mobility, patient anticipated results and the evaluation of pain symptoms.

Massage therapy is not included on the Mayo Clinic's list of common treatments for OA, ie; medications, physical therapy, braces or shoe inserts, cortisone shots, and joint replacement surgery. In the study by Atkins and Eichler (2013), 40 adults with knee OA (average age 66) were taught a 20 minute self-massage routine on the quadriceps and performed it twice weekly for 8 weeks. Pain level, joint stiffness and physical function were given pre- and post-scores. The measures of pain show a significant reduction between the control and intervention groups during physical function, as well as the post-scores increased for stair climbing, rising from sitting and getting in and out of bed.

The e-health website *Spine-Health* indicates DDD is "fairly common and it is estimated that at least 30% of people ages 30-50 will have some degree of disc space degeneration, although not all will have pain or ever receive a formal diagnosis". Disc degeneration includes disc height narrowing, disc bulging, disc protrusion, disc extrusion, foramina narrowing, and nerve root compression. *Spine-Health* describes common symptoms of DDD as a "low-grade continuous but tolerable pain centered in the low back, although it can radiate to the hips and legs and may intensify for a few days or longer. Back pain is exacerbated by certain movements, particularly bending, twisting or lifting. Severe symptoms can include numbness and tingling in the legs, as well as difficulty walking".

Dario, et al. (2015) reviewed 11 articles investigating the relationship between obesity, low back pain (LBP) and lumbar disc disease and found a positive association between obesity and the prevalence of LBP but found conflicting results from the studies linking obesity to lumbar disc disease (LDD) because of a genetic component. LDD has been linked to heavy physical loading. Hung, et al. (2014) categorized 553 participants into 3 groups and found the risk of LDD increased with cumulative lifting loads. Disc dehydration and disc height narrowing were found most commonly at the L5-S1 disc level. Participants exposed to intermediate lifting loads had an increased response for disc bulging compared with the low lifting load (2014).

According to *Spine-Health*, common treatments for DDD include modifying activities to avoid lifting heavy objects and "learning corrective ergonomics such as how to lift objects, how to set up the workspace, and sleeping postures that reduce pressure on the low back". Exercise and physical therapy are often recommended, medications and injections may be necessary to manage intense pain episodes. Patients unable to function because of pain may choose spinal fusion surgery.

A search for articles relating the effects of massage therapy to DDD of the lumbar spine yielded none. The case study, Avery (2012) describes the effect of therapeutic massage on a 66-year-old female client with cervical degenerative disc disease at the lateral left facet joint C6/C7 experiencing symptoms of chronic neck pain, as well as radicular left shoulder and arm pain. Therapeutic massage included manual traction, fascial stretching, and neuromuscular techniques. Her overall pain rating decreased from a resting 5/10 down to a 2/10, and her need for NSAIDs decreased (2012).

According to Dresdin Archibald, Olympic weightlifter, weightlifting uses the snatch-and-clean overhead movements and powerlifting uses the squat, bench press, and dead lift. They both require extension of the ankles, knees, hips and spine. Archibald states, "If the path is not right or if the joints are not opened up in the right sequence, the lift will fail". He adds, "Weightlifting misses are frequent because sometimes there is not enough time to correct a badly positioned start, or sometimes there is too much weight on the bar and the lifter runs out of steam".

Siewe, et al. (2011) collected workout routines and injury data by using a questionnaire given to 245 competitive powerlifters. While 43.3% of the powerlifters complained of problems during routine workouts, a significant number of powerlifters experienced disorders which did not interrupt their training. The regions sited as most commonly injured were the shoulder, low back and knee. The rate of injury to the upper extremities was significantly increased for those over the age of 40 (2011). Raske and Norlin (2002) investigated the incidence and prevalence of injuries among weightlifters and powerlifters, with a special focus on shoulder injuries. A questionnaire was administered to 110 male and female lifters in 1995 and 2000. Low back injuries at the rate of .43/1000 hours of activity were

most common in 1995. Shoulder injuries were most common in 2000 with a rate of .51/1000 hours of activity although the total injury rate was the same during the two periods of study, on average 2.6 injuries/1000 hours of activity (2002).

According to the American Academy of Orthopedic Surgeons, “a rotator cuff tear is a common cause of pain and disability among adults. In 2008, close to 2 million people in the United States went to their doctors because of a rotator cuff problem”. Symptoms of a rotator cuff tear include pain in the shoulder (especially the anterior shoulder and arm), weakness and tenderness in the shoulder with routine activities such as reaching behind the back or combing hair, difficulty with overhead lifting and reaching, crepitis when moving the shoulder, and an inability to sleep on the affected shoulder. Rotator cuff tears are for the most part caused by “normal wear and tear” that follows with aging. Repetitive lifting and overhead activities are risk factors for rotator cuff tears, making athletes at a great risk for overuse tears. Common treatments for rotator cuff tear include physical therapy to strengthen the joint; however, serious rotator cuff tears require surgery.

Obesity is defined by the Centers for Disease Control and Prevention (CDCP) as “the ranges of weight that are greater than what is considered healthy for a given height” because of an “increase in the likelihood of certain diseases and other health problems”. In an adult, obesity ranges are determined by using weight and height to calculate body mass index (BMI), which for most parallels with their amount of body fat. The CDCP categorizes an adult who has a BMI of 30 or higher as obese. A study by Forhan, et al. (2013) found the abnormal weight of body fat in the abdominal area is likely to cause weight distribution toward the front of the foot, reducing postural control, making the ability to adapt to changes in terrain during walking and climbing more difficult, and hindering balance in the obese person. Existing evidence gathered by Forhan, et al. (2013) shows that obese people adapt their gait in order to accommodate excess weight and temporarily protect bones and joints putting themselves at greater risk for damage to knee joints, associated pain and a higher risk for falls with resulting injuries.

The research by Vincent, et al. (2013) concludes that individuals with musculoskeletal pain exhibit abnormal movement patterns: i.e., a limp during ambulation, abnormal posture, increased back stiffness, and a variation in the firing of abdominal and extensor muscles. Forces caused by abnormal movement patterns over time produce damage to the joints which results in pain, and excessive weight can accelerate the process. Vincent, et al. (2013) state that obesity contributes to chronic pain and diminished mobility and recommends pain medication, intra-articular injections to control pain, and weight loss as the proposed therapeutic intervention for musculoskeletal pain with a goal of reducing the risk of functional dependence and improving quality of life.

The Case

The subject is a 68 year-old male, 5’9” tall, weighing 260+ pounds that has a desk job. He started competitive weightlifting at age 14. His hobbies include martial arts and aggressive weightlifting.

History: In 1994 the subject was involved in a car accident and was diagnosed with left shoulder tendonitis and a possible rotator cuff tear. At that time he received no intervention and returned to aggressive weightlifting. In 1999 the subject returned to the doctor with a complaint of low back pain and intermittent left shoulder symptoms. His x-rays revealed degenerative osteoarthritis left glenohumeral joint, AC joint and calcification and irregularity of the coracoid process. The x-rays also revealed degenerative disc disease at T11-12, T12-L1 levels. The subject received PT, which resulted in, pain relief and return of full ROM at spine and left shoulder. Later that year the subject received arthroscopic surgery for a medial meniscus tear of his left knee. His doctor’s discovered a subtle Baker’s cyst on the left knee. He received PT to his left knee, which resulted in pain relief, reduced swelling, regained strength and normal gait. He continued aggressive weightlifting.

The subject reports medical history unremarkable since 2000 and provides no other history of medical or alternative treatments. What led to such a significant decline and inability to recover without intervention? The subject states he works out 2-3 days a week, using weight machines; he rides a reclined stationary bike; and he leg presses 180 pounds on a squat machine.

The subject's goals are: 1) Return to prior level of function 7 months ago where there was ease of bed mobility, locomotion, getting up and down from surfaces, 2) Relieve "soreness" and weakness, 3) Return to the gym weightlifting as strong as prior to decline.

Treatment

Pre treatment measurements: 10/6/14

Posture: The subject demonstrates a powerful upper body, elevated and internally rotated shoulders with pronated forearms, abducted shoulder blades, minimal visibility of neck, protruding abdomen with hyperlordosis , a "Pottinger's Saucer" at the thoraco-lumbar junction and wasting of the gluteal complex.

Gait: The subject ambulates independently (I) with a wide base of support (BOS) and a left foot flat (FF) gait as compared to a right toe off (TO) pattern. He ascends/descends steps with *step to* pattern (one step at a time, STP) instead of *step over step* pattern (SOSP).

Mobility: The subject tolerates 15-20 minutes in either side-lying positions and supine; unable to lie prone. In order to move from supine to side-lying or get off the table, the subject rocks, shakes and rolls (RSR) his body to gain momentum in order to slide his lower body off the table until both feet touch the floor like a stiff board in a three-quarter turn while pushing his upper body up with both arms to right himself. A normal progression would be with trunk and pelvic dissociation to roll to side-lying and push up with upper extremities (RSL PU) to a sitting position. He rises from chairs with support (w/sup). The subject was observed lowering his head to his right hand (using his left arm to lift his right arm) in order to scratch his nose. He bends forward to "shimmy" his shirt off in order to remove it because he is unable to reach overhead.

The subject is unable to tolerate muscle length testing and ROM testing of the spine or lower extremities due to pain complaints and is hypersensitive to touch.

A Leseque's and crossed Leseque's test for radicular pain is negative.

Measurement of hip and spinal ROM, as well as muscle length Thomas test, Ober test and piriformis test would have been ideal but were not feasible because movement was increasingly difficult and uncomfortable.

Session 1 (60 minutes) on 10/6/14, and Session 2 (60 minutes) on 10/22/14: The first two 60-minute treatment sessions consisted of myofascial warm-up with the intention of beginning PNMT to the low back, but the subject tolerated nothing beyond fascial work. I performed 20 minutes of spinal and pelvic myofascial warm-up on each side and supine myofascial stretching to the gluteus medius and the iliotibial bands with light, working toward medium pressure within the subject's tolerance. With the subject in side-lying, first, I began with sacral traction moving with the respiratory cycle, ending in counter nutation. Second, I followed with pelvic decompression, taking the fascia over the sacrum inferiorly, pressing superiorly on the ischial tuberosities. Third, I progressed to a long axis stretch of spinal fascial warm-up, pulling the fascia in opposite directions while varying the amount of hip flexion from 45 to 75 degrees. Fourth, I tractioned the spinal fascia transversely by pulling it toward me while pushing my forearms in an opposite downward direction. Fifth, I ended with an ipsilateral spinal fascial stretch by pulling the fascia inferiorly with my lower hand and superiorly with my upper hand, adding rotation by pushing the top shoulder in a posterior direction. I repeated each fascial stretch approximately 4-6 times. The remaining time was divided between bilateral gluteus medius and iliotibial bands with the subject lying supine with his lower extremities over a bolster. I performed fascial

stretching in the superior and inferior directions, and added compressions with medium pressure to lift the iliotibial band off the femur and Vastus Lateralis.

Session 3 (50 minutes) on 11/6/14: The subject complained that when he sat down on a low couch he had to be pulled out by 2 people, that getting up from a low toilet seat was difficult and that he can no longer get into a "horse stance" (squat with feet apart) in martial arts, all because of weakness.

First, I performed myofascial warm-up to the bilateral gluteal complex in side-lying position for several minutes before the subject could tolerate trigger point therapy to the gluteus medius and minimus. Second, I spent 10-15 minutes releasing trigger points of both gluteal muscles and the piriformis on each side, especially around the greater trochanter. The following 3 trigger point approaches were used interchangeably because of the subject's hypersensitivity to touch; the "75%" approach, "8-12 second compression" and "10 second on, 10 second off". Third, I initiated PNMT to the gluteus medius, minimus and piriformis on each side using compression and gliding strokes with the subject's hip flexed at varying angles from 45 to 80 degrees in the side-lying position. I performed cross-fiber motion at the inferior aspect of iliac crest for the gluteal muscles and along the anterior border of the sacrum for the piriformis.

Session 4 (60 minutes) on 11/10/14: The subject returned with an antalgic limp (AL) left leg because of an apparant muscle pull in the medial left calf from "overdoing it" at the gym. **Homan's Sign (DVT) negative** for heat, swelling, redness in the left posterior calf.

First, I performed myofascial warm-up to the left calf, posterior knee and medial thigh with the subject in left side-lying position for several minutes prior to slow passive gentle left knee flexion/extension and left ankle dorsiflexion/ planter flexion mid range 8-10x each. Second, I scanned the left gastrocnemius and soleus for trigger points and discovered 3 large areas of lumpy tissue in the muscle bellies referring pain distally. The trigger points were treated interchangeably with the three approaches used in Session 3 as well as the "flying under the radar" approach to the subject's tolerance. Third, the subject turned supine for 15 minutes for a relaxation massage to his neck and shoulders requiring a rest break from the work to the left lower extremity. Fourth, I started with compression and gliding strokes to the left gastrocnemius, soleus, and popliteus with the subject's left knee flexed and foot secured on treatment table in supine position. I used pincer palpation to the medial head of the gastrocnemius to separate it from the soleus. I frictioned the subject's inferior tibial condyle on the popliteus, and used compression glides superior to the split heads of the gastrocnemius with the left knee flexed. I proceeded to pincer palpate the left soleus, adding the pin-and-stretch technique gliding superiorly while the subject actively dorsiflexed his left ankle with the left knee flexed. I repeated the pin-and-stretch technique on the medial head of the gastrocnemius with the left knee extended. The left gastrocnemius, soleus, and popliteus were all very tender.

Session 5 (60 minutes) on 11/17/14: First, I performed the first and second steps of Session 4; however, less time was required on myofascial warm-up and more time was spent releasing trigger points in the left calf muscles. Second, with the subject in left side-lying, I repeated the same PNMT treatment as in Session 4 for the left calf muscles. Third, when the subject turned to right side-lying, I discovered several trigger points had returned to the subject's left gluteus medius and minimus, and I released them with the "flying under the radar" approach. Fourth, I followed up with the same PNMT treatment as in Session 3 over the left gluteus medius and minimus. Fifth, I repeated step 3 and 4 for the trigger points that had returned to the subject's right gluteus medius and minimus.

Session 6 (75 minutes) on 12/17/14: The subject returned, complaining of "debilitating low back pain" right side greater than left, right hip pain and right knee "locking up" with "weakness".

With the subject in side-lying, first, I began with the same myofascial warm-up described in Sessions 1 and 2 for several minutes. Second, I started myofascial stretching over the right and left hamstrings and adductor magnus and then examined the area for trigger points (which were present in both right and left adductor magnus). After releasing the trigger points, I began compression glides from the adductor tubercle along the muscle belly, followed by cross-fiber friction at the ischial tuberosity on both sides. Third, I progressed to PNMT with pincer palpation to the right erector spinae; then I cross-fiber frictioned the transverse processes and accessory processes of L1-5, the deep thoraco-lumbar fascia and the transverse processes of T9-12. I followed with compression and gliding strokes along the longissimus and iliocostalis lumborum at these levels. Fourth, I treated multifidi starting with the surface of the sacrum covering the area from S3 to L5 spinous processes to the right PSIS, followed by compression glides superiorly and inferiorly L5 toT9. Fifth, I examined the right quadratus lumborum for trigger points and released several along the right iliac crest. Sixth, I repeated the entire process for the left longissimus, iliocostalis lumborum and multifidi with the subject in right side-lying. Finally, with the subject supine, I examined the right patellar tendon, ligament and medial retinaculum with cross-fiber motion, and performed compression glides to the articularis genu and rectus femoris.

Session 7 (60 minutes) on 12/22/14: The subject returned, reporting back feeling much better but still having mild residual right side low back discomfort.

First, I repeated the same PNMT treatment as stated in Session 6 for the right and left multifidi. Second, I examined the right and left gluteals for trigger points and there were none. Third, I repeated the second step in Session 6 to the right and left hamstrings and adductor magnus. Fourth, the subject turned supine and I repeated the same PNMT treatment for the right patellar tendon as in Session 6 adding pretrissage to the vastus medialis and compression glides to the rectus femoris for both the right and left legs. Fifth, the subject returned to left side-lying for the same PNMT treatment as described in Session 4 for the left calf muscles.

Session 8 (60 minutes) on 1/5/15: Trigger points returned to the gluteals and piriformis on both sides and to the right adductor magnus.

First, I treated the gluteal complex and piriformis on both sides as described in Session 3. Second, I repeated the second step of Session 6 for the right adductor magnus. Third, I performed the same treatment as stated in Session 4 for the left calf muscles and cross-fiber frictioned the left Achilles tendon. At this session I was able to progress into the deeper levels of the gastrocnemius, soleus and popliteus and clean up most of the trigger points. Fourth, the subject tolerated work to the inner side of the tibia superiorly and inferiorly following the posterior tibialis tendon down the inner lower leg. This area was very tender but significant. I worked the new area 2-3 minutes at a time and came back to it several times. Finally, in supine, I used compression and gliding strokes along the right gracilis muscle belly stopping along the way to release trigger points found there.

Session 9 (60 minutes) on 1/12/15: First, while the subject was in right side-lying, I released the trigger points found in the left piriformis, followed with compression gliding strokes along the muscle belly and cross-fiber frictioned thoroughly around the trochanteric notch. Second, I worked my fingers over the muscle belly of the left plantaris and found it to be extremely tight and tender. I treated above the crease of the left knee between the biceps femoris and iliotibial band with a superior and inferior motion; then I followed the inside line on the medial aspect of the calcaneus to the muscle belly. Third, I spent the remainder of time on the elevated shoulders beginning with the left shoulder, compressing and gliding over the upper trapezius. Fourth, I examined the spine of the scapula and lateral third of the clavicle, treating the attachments. Fifth, I glided from the transverse process of C1 out to the superior angle of the left scapula along the muscle belly and then added cross-fiber friction to the transverse

processes of C1 and C2, to the posterior tubercles of C3 and C4 and to the superior angle of the scapula. I repeated this same PNMT process to the right upper trapezius and levator scapula.

Session 10 (60 minutes) on 1/28/15: First, I provided myofascial warm-up to the subject's neck and shoulders in left side-lying position. Second, I continued with the same PNMT treatment as described in Session 9 for the right upper trapezius and levator scapula. Third, placing a pillow beneath the subject's right arm, I performed pincer palpation compressing the posterior deltoid. Fourth, I isolated the long head of the triceps to friction. Fifth, I provided myofascial warm-up to the right latissimus dorsi. I compressed the latissimus dorsi along the side of the ribs in a lifting motion. The axillary area was very painful for the subject. I compressed and glided with the fiber direction of the teres major at the posterior inferior apex of the scapula. Then I anchored the lower apex of the scapula with my palm while the subject actively lifted his right arm in shoulder abduction and ER for a pin-and-stretch 3x. He repeated the pin-and-stretch technique with active shoulder flexion and ER 3x. Next, I anchored the lattissimus dorsi against the ribs as the subject performed active shoulder abduction and shoulder flexion 3x each. Sixth, with the subject in supine, I compressed the right teres major and pulled the fibers like a guitar string. I had time to provide the same PNMT treatment for the left upper trapezius and levator scapula as described in Session 9.

Session 11 (60 minutes) on 2/23/15: First, I repeated the same PNMT treatment as described in Session 10 to the right and left posterior deltoid, latissimus dorsi, and teres major. Second, I performed trigger point release on the infraspinatus and the teres minor and followed with compression and gliding strokes along the muscle bellies on both sides. Third, I proceeded with myofascial warm-up to the pectoralis area. I followed the pectoralis minor along the alignment of the muscle, adding gentle cross-fiber motion at the corocoid process. Next, I anchored the tissue while I instructed the subject to squeeze his shoulder blades together (horizontally abducting and externally rotating his shoulder actively). This procedure was repeated for both upper extremeties. Fourth, I repeated the same PNMT treatment as described in Session 9 for both right and left upper trapezius and levator scapula.

Session 12 (60 minutes) on 3/4/15: I repeated the same PNMT treatment as described in Session 11 with a focus on the bilateral teres major muscles.

Results

Functional movement:	10/6/14 (1)		10/22/14 (2)	11/6/14 (3)	11/10/14* (4)	
	Pre	Post			Pre	Post
Sit<->Stand:	w/sup	w/sup	w/sup	I	w/sup	w/sup
Squats:	unable	unable	unable	able	unable	unable
Gait:	wide BOS, FF	wide BOS, FF	wide BOS, FF	wide BOS, FF	AL	<AL
Stair climbing:	STP	STP	STP	STP	avoids	STP
On/off table:	w/sup	w/sup	RSR	RSR	w/sup	RSR

*The subject went to the gym the evening of 11/6/14 after treatment, loaded the squat machine with 30 additional pounds, increased reps and "felt a tear and severe pain" in the back of his left knee. The subject refused to see a doctor.

Functional movement:	11/17/14 (5)	12/17/14 (6)	12/22/14 (7)	1/5/15 (8)	1/12/15 (9)
Sit<->Stand:	I	I	I	I	I
Squats:	unable	unable	able	able	able
Gait:	slight AL	wide BOS, FF	FF	TO	TO
Stair climbing:	STP	STP	STP	STP	SOSP
On/off table:	RSR	RSL PU	RSL PU	RSL PU	RSL PU

LE ROM:	11/10/14 (4)		11/17/14 (5)	12/17/14 (6)	12/22/14 (7)		1/5/15 (8)	1/12/15 (9)
	Pre	Post						
L DF:	104	100	90	90	85		80	80
L knee ext:	165	175	177					
					Pre	Post		
R hamstring:					162	168	170	170
L hamstring:					154	162	168	170

Shoulder ROM:		1/28/15 (10)		2/24/15 (11)	3/4/15 (12)		1/28/15 (10)		3/4/15 (12)	3/4/15 (12)
		Pre	Post				Pre	Post		
Flexion	R	98*	103*	103	110	L	106	113	110	116
Abduction	R	84*	84*	90	100	L	105	114	114	116
Extension	R					L	42			
ER	R	**		20		L	**		26	
IR	R	**		34		L	**		20	

Measured in degrees of motion with goniometer.

*The subject supports right arm with left arm.

**The subject was not able to horizontally abduct UE into test position for accurate ROM of ER or IR bilaterally. Both shoulders are painful at end ranges of all motions. There is audible crepitis in the right shoulder with movement.

Discussion

This case is important because multiple factors affected the reason this obese, aggressive weightlifter lost the mobility to get up and down, out of bed, ambulate and climb stairs. Observation of compensatory movements and altered posture provided clues to the soft tissues involved.

The limitations of this case included a lack of medical history from 2000 to 2015, hypersensitivity, and limited tolerance to baseline assessments due to apparent discomfort in major joints with difficult and guarded movement. I chose to forego the possibility of increasing discomfort with baseline measurements and relied on observation as the baseline. As the sessions progressed, the subject was able to tolerate ROM of the extremities.

A baseline assessment pre-and-post treatment is essential in the PNMT approach in order to determine the effectiveness of the treatment provided. Careful observation of the subject's mobility in this case proved to be a viable baseline assessment for determining and prioritizing treatment. The

limited and guarded movement between the subject's trunk and pelvis directed me to that area first. I was unable to access the region with PNMT because it was too painful for the subject. Once I observed the apparent weakness in the gluteals as the subject raised and lowered from a chair, I treated them for trigger points. The left calf injury took my attention away from the subject's trunk and pelvis. Later, when pain localized to the subject's back, I considered the tight structures that might be pulling against the erector spinae and multifidi causing increased tension in them. Once the subject's hamstrings and adductors were treated, I was able to treat the back successfully. I was ultimately led to the plantar flexors that cross the knee joint because of the subject's inability to toe off during ambulation.

Prone position would have been ideal to access the posterior leg and low back musculature but the subject was unable to tolerate the position. Sessions were mostly performed in side-lying position instead. Supine position was used to relieve weight from the hips and shoulders. As his discomfort decreased and mobility improved, the subject began to tolerate longer periods in one position.

Releasing trigger points provided muscle recruitment for efficient contractibility and lengthening tissue around the major joints, improving the subject's ease and ability to get up and down from low surfaces and the treatment table without assistance. PNMT increased the subject's transfer mobility on and off the treatment table, aided the subject to ambulate with a normal base of support, heel strike, toe off gait pattern, climb stairs step over step and returned the subject to his prior level of function of 7 months ago. As the subject's mobility became more efficient and gait pattern more normal, requiring less effort, his complaints of "soreness" diminished. The subject achieved his original 3 goals and continues to be seen for PNMT for his neck and shoulders in order to progress toward optimal mobility.

Trigger point release was essential for improving this subject's functional mobility. It was fortunate that the subject complained about his need for assistance in Session 3, which turned my attention to the gluteals and releasing trigger points. The release of trigger points and PNMT for the gluteus medius, minimus and piriformis muscles gave the subject immediate ability to get up and down from low surfaces, such as a low chair and toilet, and perform controlled squats. Having this new mobility after Session 3, the subject went to the gym, over did his work out, and ended up with an injured left calf. The subject's left calf injury dictated my treatments for Sessions 4 and 5.

The amount of time between treatments of Session 5 and Session 6 was not ideal at the point where the subject was in his progress. The subject's compensatory gait pattern likely caused added stress up the kinetic chain into the low back, an already compromised area from the DDD.

Releasing trigger points and lengthening tight structures that may cause a stress or a "pull" on the area of hypersensitivity offered accessibility to the hypersensitive area. In this case, trigger points and tightness in the hamstrings, adductor magnus, and the gluteal complex, likely caused a pulling stress and tension in the subject's low back. Once the trigger points were released and PNMT was performed for the hamstrings and adductor magnus muscles in Session 6 and 7, the subject was able to tolerate PNMT for his low back area. PNMT to the posterior leg muscles and low back was effective in allowing for dissociation between the trunk and pelvis, offering greater efficiency and ease of functional mobility thus relieving the subject's pain complaints. The added PNMT work to the quadriceps in Session 7 immediately resulted in the subject's ability to perform active leg raises and high martial art kicks.

It is likely that the trigger points returned to the treated gluteals and piriformis muscles (Sessions 5, 8 and 9) because of the injury to the left medial calf, which caused the subject to alter his gait pattern (limp, foot flat contact, wide base of support) and translate up the kinetic chain. Once the calf problem was resolved and the trigger points were released (Sessions 4,5,7,8), they did not return and PNMT treatment progressed to the subject's shoulders.

Although active ROM appears to be slow to progress in this subject's shoulders with PNMT, it is worth mentioning that the subject is now able to raise and lower his right arm throughout the entire available range of motion, without the assistance of the left arm, giving him added functional mobility in the upper extremities (Session 12).

While the muscle pull of the subject's left calf interrupted the original progression of treatment, it assisted me in finding significant tightness in the left plantaris muscle. On Session 8 (1/5/15) the subject mentioned that he had been to a podiatrist who recommended a cam stabilizing walking boot. Further questioning revealed that the subject had been seeing a podiatrist because of a left Achilles injury 7 months ago. On Session 9 (1/12/15), PNMT to the left plantaris muscle proved to be very effective in improving the subject's gait pattern, stair-climbing and pain complaints. After Session 9, the subject returned to tai chi practice and the weightlifting regime he was performing 7 months ago.

This case calls attention to the important role tightness of the plantaris muscle had on this subject's left ankle during the gait cycle and I almost missed it. What might be thought of as an "accessory" muscle to the gastrocnemius and soleus, the plantaris may have been the first domino to fall in the subject's compensatory movement pattern and altered posture during ambulation on level surfaces and stairs, resulting in his recent decline of functional mobility. Further research on the role of the plantaris muscle in the gait cycle would be beneficial.

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