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Management of a low back pain patient with a prosthesis and a foot drop orthotic

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INTRODUCTION: *The effect of altered gait on body mechanics presents a stress on patient's sacroiliac joints (SIJ). The gait of the patient is this case report is altered because of a transtibial amputation with prosthesis; he also has a foot drop orthotic.*
CLINICAL FEATURES: *A 40-year-old man had left sacroiliac pain. The pain began 3 days before visiting the clinic and has been constant since its onset. It is alleviated by resting on his side. He reported that he had been painting his mother's house for 3 days before the pain started. Past history is significant for a spinal cord injury with resultant right leg foot drop; in addition, he has a left leg prosthesis.*
INTERVENTION AND OUTCOME: *Adjustments to the sacroiliac joint were performed on a Zenith-Thompson Terminal Point adjusting table, utilizing only motion palpation to assess for subluxation. The adjustments consisted of contacting the left posterior superior iliac spine (PSIS) and applying 3 successive high-velocity, low-amplitude thrusts to it. Initial visit schedules were bi-weekly and progresses to bi-monthly as needed.*
CONCLUSION: *Patient with prosthesis can benefit greatly from chiropractic care, to assist them in maintaining proper joint motion and gait patterns that allow them to walk more freely.*
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INTRODUCTION : *Une posture altérée affecte le mécanisme du corps et présente du stress pour l'articulation sacro-iliaque. La posture du patient, décrite dans le rapport de cas suivant, est altérée, due à une amputation transtibial avec prothèse; le patient porte également une orthèse pour un pied tombant.*
CARACTÉRISTIQUES CLINIQUES : *Un homme de 40 ans éprouve une douleur sacro-iliaque, au côté gauche. La douleur s'est manifestée 3 jours avant qu'il ne se présente à la clinique et depuis son apparition, elle est constante. La douleur est allégée lorsqu'il se repose sur le côté. Il a rapporté qu'il avait effectué de la peinture dans la maison de sa mère pendant 3 jours, avant que la douleur ne se manifeste. Les antécédents personnels sont significatifs pour un traumatisme médullaire qui résulte en un pied tombant à la jambe gauche. De plus, il porte une prothèse à la jambe gauche.*
INTERVENTIONS ET RÉSULTATS : *Les ajustements à l'articulation sacro-iliaque ont été effectués sur une table Zenith Thompson Terminal Point, en utilisant uniquement une palpation dynamique pour évaluer la subluxation. Les ajustements consistent à contacter l'épine iliaque postéro-supérieure gauche (EIPS) et y appliquer 3 poussées consécutives, à basse amplitude. Au départ, les visites étaient effectuées sur une base bihebdomadaire et ont progressé en visites bimensuelles, tel que nécessaire.*
CONCLUSION : *Les patients qui ont une prothèse peuvent bénéficier avantageusement des soins chiropratiques pour les aider à maintenir un mouvement approprié des articulations et obtenir des exemples de*

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MOTS CLÉS : lombalgie, amputation, prothèse

Introduction

Low back pain in amputees can be a significant problem. It has been shown that a biomechanical, rather than degenerative etiology, may be the cause of the pain.[1] The 3 joints of the pelvis, including the 2 sacroiliac joints and the pubic symphysis, allow for subtle movements during gait. Normally, as people walk, their pelvis sways from side to side; however, with fixations, the swing-out step is gone.[2] A structural imbalance may be due to numerous factors, including but not limited to chronic sacroiliac stress, pelvic tilt, pelvic internal rotation and pelvic anterior tilt. The prolonged pronation requires compensating movements to minimize the abnormal forces and reactions which result; over time, specific muscle imbalances and shortenings develop. The tissues which attempt to provide proper joint alignment under such long term stresses are the connective tissues and ligaments; eventually, they undergo plastic deformation and a dysfunction syndrome develops.[2]

It is now generally accepted that a small amount of motion exists in the SIJ, and dysfunction is defined as a state of relative hypomobility within a portion of the joint's range of motion, with subsequent altered structural (positional) relationship between the sacrum and ilium.[3]

Chiropractors realize the importance of the pelvis as the foundation of the spinal column; maintaining proper motion allows for subtle movements during gait. Gait alterations due to structural changes from prosthetics and foot drop orthotic were some of the issues faced in managing the patient described in this below.

Case report

A 40-year-old male sought care for pain in the low back, specifically at the lateral aspect of the left iliac crest. The low back pain began upon awakening 3 days earlier. He described the pain as a dull ache which worsened as the day progressed. The pain was constant, non- radiating, and alleviated somewhat by resting on his side with a pillow between his knees. Past history was significant for a fracture at the T12 and L1 vertebrae with associated spinal cord traction and surgical fusion. Right leg foot drop occurred because of the spinal cord injury and as a result he began wearing a foot drop orthotic. In 1986, a below the knee amputation was performed on his left leg due to osteomyelitis.

He was therefore fitted with a prosthetic. He uses a cane when ambulating; crutches are used only when he is not able to wear his prosthetic. The patient stated that he is aware that he uses his upper body to facilitate his locomotion.

A neurological examination revealed lack of sensation along the L4, L5 and S1 dermatomes.[4] There was no sensation along the anterolateral aspect of the right leg. He did perceive sensation on the posterior aspect of his right calf. Patellar reflexes were absent bilaterally. The Achilles reflex was absent in his right foot and could not be performed on the left. Bilateral hip flexor and extensor muscle testing were +5. Leg extension and flexion were +4. Plantar flexion, dorsiflexion, and eversion of the right foot were 0/5. The patient was unable to balance without support of his cane or by contacting the wall. There was sharp pain in the lower lumbar region when he performed Valsalva's maneuver.[5] Flexion of the lumbar spine produced pain on the left side of his lower back near the sacroiliac joint (SIJ); this was described as a dull pain on extreme end-flexion. A left scoliosis was noted near the surgical site at the thoracolumbar junction that did not change with forward flexion. There was a dull localized pain near the left SIJ on left Kemp's maneuver.[5] The Nachlas-Ely test did produce some left SIJ pain.[5]

Radiographic examination showed evidence of an old compression fracture at T12-L1, with surgical stabilization at T12 through L2 using surgical wiring. There was surgical debridement of the T11, T12, and L1 spinous

processes. Advanced degenerative disc disease was noted at T11, T12, L2 and L3. There was a donor graft site involving the left ilium.

My working diagnosis was sacroiliac subluxation/joint dysfunction with accompanying pain at the left SIJ due to alterations in gait.

Management was begun at a frequency of 2 times per week and decreased eventually to 1 time per week and then to every 2 to 3 weeks as his subjective complaints improved and fewer objective findings were seen, notably freely moveable SIJ on palpation and fluid motion. The adjustments to the left SIJ were done with the patient lying on a Zenith-Thompson Terminal Point adjusting table. The adjustments consisted of contacting the left posterior superior iliac spine (PSIS) and applying an inferior to superior and posterior to anterior thrust. Three successive high-velocity, low-amplitude thrusts were given.[6] Pre-checks consisted of fluid motion evaluations of the SIJ in the following manner. The doctor stands on the opposite side of the side being tested and exerts pressure on the posterior superior spine of the ilium in a superior to inferior direction. If the joint is moving freely, the physician should see the foot on the side being tested move freely on the foot-rest bar. The procedure is then repeated on the other side of the patient. Pre-checks on this patient were done in the manner described above, with one exception, the motion of the femurs was used as a guide as to when to adjust or not. His prosthetic's weight and the foot drops orthotic prevent free motion of the leg on the adjusting table. Post-checks were done looking for increased fluid motion at the SIJ; the femur moved freely on the table when comparing right to left side. Management did not deviate from this methodology, as the patient continued to show improvement.

Discussion

The gait cycle in its simplest form is comprised of stance and swing phases. The stance phase further is subdivided into 3 segments, including initial double stance, single-limb stance and terminal double-limb stance.[7] One of the contributions of the pelvis is a forward rotation on the side of the swinging leg and an opposite rotation near the end of the stance phase. Pelvic angular momentum must be counterbalanced, either directly by counter-rotating the thorax or indirectly by swinging an arm. When evaluating gait, a physician looks for a consistent sequence of motion. As the body moves forward, one limb typically provides support while the other limb is advanced in preparation for its role as a support limb.

A patient with an amputation has his/her own gait pattern, just as do patients with fixed ankle joints. Much research has been done on comparison between amputees and non-amputees; the amputee can never walk in the way that normal walkers can. An amputee must compensate with movement to overcome the different locomotive ability between the sound leg and the prosthetic leg. The most noticeable point of body movement is at the shoulder and lateral displacement between shoulder and pelvis.[8] Insufficient force output by muscles may result from neurological impairment. Substitution for impaired motor function is likely. With decreased maximum muscle force, endurance is compromised and is demonstrated by characteristic gait patterns. Isolated hamstring weakness, which may be secondary to paralysis leads to increases in anterior pelvic tilt during the stance phase of walking.[9] The patient demonstrates this phenomenon when standing or walking especially pre-adjustment.

The patient's walk pre-adjustment was that most of his motion occurs at the left SIJ, with the support of a cane he twists in a lopsided motion on his left leg from the waist to bring his right leg forward. To bring his left leg forward he supports himself on his cane and right leg and "throws" his left leg forward with minimal knee bend. He uses his abdominal muscles to move his legs on each stride. It seems he must rotate his pelvis to keep his legs as parallel as possible. The patient's gait pattern is a combination of various activities allowing him to move forward without loosing his balance. Post adjustment there is much less twisting at the waist. He is able to move forward at a faster pace using both of his hip joints to swing his legs forward.

Gait alteration was further complicated by the fact that the patient does not have normal ankle motion on either side. Several models of gait analysis have been proposed, one being that active plantar flexion occurs at the ankle and does not serve to propel the body forward, but instead functions as part of the closed kinetic chain to initiate knee and hip flexion in preparation for swing. This phenomenon may account for the increased knee and hip power requirements in individuals who do not plantar flex actively in pre-swing such as transtibial amputees.[7]

With excessive dorsiflexion weakness , foot drop and

toe drag can be observed during swing phase. Compensation for his foot drop is achieved through circumduction of the ipsilateral limb, increased ipsilateral knee plus hip flexion and hip hiking of the contralateral limb. Circumduction is the most energy efficient and most commonly observed technique for dorsiflexor insufficiency.[7]

As the patient demonstrated most of these abnormal findings, I feel we were justified in concentrating on his SIJ as the point of dysfunction. We found that with continued adjustments using the previously described methodology we are able to increase his walking speed and decrease the amount of anterior pelvic tilt he has. His overall quality of life is improved and he is able to do many activities such as hunting, working on cars and painting.

Conclusion

Evaluation of gait in normal walkers allows us to assess SIJ motion; when the patient has a prosthetic, there is an alteration of gait that certainly affects SIJ motion. This report is written in the hopes of encouraging all of us to be aware of these alterations and to encourage patients with amputations and foot drop orthotic to seek chiropractic care recognizing that no major alterations are needed in managing these patients. There is no literature on the chiropractic management of a patient with prosthesis. What there is primarily addresses medical intervention. Additional case reports and other studies are needed to further address the many issues involved in the management of patients with amputations and prosthesis.

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