Orthotic Correction of Postural Unleveling in a Patient With Ankylosing Spondylitis

James A. Lipton, DO
Lisa J. Mitchell, DO

From Rehabilitation Medicine Services at Veterans Administration Hospital in Hampton, Virginia (Dr Lipton), and the Edward Via College of Osteopathic Medicine–Virginia Campus in Blacksburg (Dr Mitchell). Dr Mitchell is a member of the Army Individual Ready Reserve.

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Address correspondence to James A. Lipton, DO, Rehabilitation Medicine Services, 100 Emancipation Dr, Veterans Administration Hospital, Hampton, VA 33667-0001.

E-mail: jlipton@cox.net

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The authors describe the case of a patient with ankylosing spondylitis who was treated with orthotic devices for postural unleveling. The patient described specific pre-existing postural problems, both static and dynamic, that had been present for many years. A unilateral 9-mm gel heel lift was used, followed by custom-molded orthotic devices that incorporated the heel lift. The patient reported immediate resolution of these symptoms after orthotic treatment, as well as increased functionality and satisfaction in activities of daily living, which coincided with the leveling of his posture. The orthotic devices were used until the patient underwent total hip arthroplasty, at which point the orthotic treatment was discontinued.

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Ankylosing spondylitis (AS) is a progressive, genetically influenced, seronegative spondyloarthropathy. The disease can involve the axial skeleton, entheses, and sacroiliac joints, among other structures. The disease process is thought to occur by means of macrophage and then lymphocyte infiltration of the affected joints.[1] The release of inflammatory mediators with consequent bone erosion is followed ultimately by osseous ankylosis.[1] The current standard of care in patients with AS includes continuous use of nonsteroidal anti-inflammatory drugs (NSAIDs) as first-line therapy. Anti–tumor necrosis factor-α monoclonal antibodies should be used in patients with persistently high disease activity.[2] The published literature on the effects of anti–tumor necrosis factor agents on bone formation has focused primarily on NSAID nonresponders.[3] The disease course is monitored radiographically and clinically. Goals of therapy in patients with AS include maintenance of function, minimization of symptoms, diminishment of pain and stiffness, and improvement of posture, fitness, mobility, function, quality of life, and mood. Physical therapy and home exercise are mainstays of treatment.[4-7]

We report the case of a man with AS whose postural unleveling was managed with orthotics. To our knowledge, this is the first reported case involving this type of orthotic correction in a patient with AS.

Case Report

History

A 59-year-old right-handed man with AS (diagnosed at age 19 years) and osteoarthritis of the right hip was referred to our physical medicine and rehabilitation service for evaluation of leg length discrepancy (LLD). The patient reported that he had been informed of his LLD when he was in his 20s, but he had not received orthotic treatment. At the time of presentation, he was receiving celecoxib, prednisone, and infliximab (infused every 6 weeks), all prescribed by another physician. Despite prior treatment, the patient still described increased pain, particularly in his right hip, during golfing, yard work, and other activities of daily living. The patient also reported numbness in his right thigh that made it difficult for him to stand for long periods. In addition, the patient noted that before urinating, he would have to engage in a compensatory postural modification. Specifically, he would bend his right knee and push himself up on his right toe in an attempt to even out his leg lengths so that he could urinate in a stable fashion.

Physical Examination

On physical examination, the patient had level anterior superior iliac spines (ASISs), right-on-right forward sacral torsion, and a short right leg. Visual gait inspection revealed marked bilateral hyperpronation in stance phase. The patient had an exostosis on the head of the first metatarsal bone of the right foot, consistent with the repeated application of asymmetric pressure. An asymmetric sound produced on the tile floor with the patient's foot strike during the stance phase of gait was observed.

Imaging

Radiographic findings of the hip and pelvis revealed changes consistent with AS and degenerative joint disease. Hip radiographs revealed severe, right-greater-than-left degenerative changes of the hips (*Figure 1*).

Treatment

The risks and benefits of various treatments were thoroughly discussed with the patient. He stated that he wanted to delay surgical treatment until he was at least 60 years old, as another physician had explained to him that the prostheses used in total hip arthroplasty (THA) sometimes fail and can require revision surgery after 10 years.[8] He eventually agreed to undergo a trial intervention using an orthotic device to improve his posture. He was given a 9-mm gel heel lift for his right shoe. Quadriceps strength was considered adequate to prevent knee buckling.

First Follow-Up

The patient returned for follow-up 2 weeks later and stated that his gait and posture had markedly improved, with no disease flare-ups in the interim. He noted that although he used to have pain in his hips while doing yard work, with the heel lift he was able to work in his yard for 8 hours continuously without pain. He commented that the lift seemed to maintain his hip posture so that he no longer had to walk on tiptoes. The thigh numbness that he had previously reported was still present but much improved with the heel lift. Physical examination revealed a level sacral base and level ASISs. The heel-lift trial was deemed successful, and the patient was fitted for custom-molded orthotic devices. The orthotic devices used were full-length bilateral inserts with unilateral complete heel lifts.

Surgical Treatment

Seventeen months after his first visit to our clinic, the patient presented to the orthopedic surgery service for the previously recommended right THA. Review of his medical record revealed that his right hip pain was successfully kept in remission for 12 consecutive months after orthotic placement. However, the patient's AS continued to progress, and by 17 months the patient opted for THA. Preoperative radiographic findings again showed severe, right-greater-than-left degenerative changes of the hips (*Figure 2*). The orthotic devices were worn up until the day of the surgical procedure and then discontinued postoperatively.

Figure 1.
Bilateral hip radiograph of a 59-year-old man with ankylosing spondylitis and osteoarthritis of the right hip.

Figure 2.
Preoperative bilateral hip radiograph of a 60-year-old man with ankylosing spondylitis and osteoarthritis of the right hip.

Figure 3.
Postoperative bilateral hip radiograph showing good prosthetic placement in a 60-year-old man with ankylosing spondylitis and osteoarthritis of the right hip.

Second Follow-Up

The patient returned for follow-up and re-evaluation of posture 4 months after undergoing right THA. He denied any hip pain and stated that his thigh numbness had completely resolved. Physical examination revealed level ASISs and a level sacral base. Further orthotic correction was not indicated. Postoperative radiographic findings (*Figure 3*) showed good placement of the prosthesis.

Comment

Of note, in the present case we identified functional LLD as a result of muscle imbalance rather than osseous causes. The former is more prevalent and is relevant to physicians interested in correcting gait dysfunction. Additional information on LLD assessment, including palpation of the medial malleoli, ASISs, sacral sulci, and inferior lateral angles of the sacrum, is available in a 2000 article by Lipton et al.[9]

Because AS is a disease process that by definition limits the range of motion in the spine, it was necessary that we carefully evaluate the entire risk-benefit ratio of using orthotic devices in our patient and proceed with caution.

Searches of the Medline and Cochrane databases yielded no studies of the use of orthotic devices to correct postural unleveling in patients with AS. However, studies have reported the use of heel lifts and orthotic devices to improve chronic musculoskeletal pain in both civilian[10] and naval special warfare populations.[9] The use of orthotic devices for postural correction in the general population has been described at length.[11]

Despite the paucity of studies specifically addressing the use of heel lifts and orthotic devices to correct gait and posture in patients with AS, interventions to modify and improve posture and functionality in these patients are well described in the literature. For example, several studies have established the benefits of physical therapy and home exercise programs in patients with AS.[1,2,4-7] Physical therapy is targeted at maintaining posture and mobility,[2,4-7] as patients with AS are known to have worse posture and balance than the general population[12] and are thus at increased risk of falling. Patients with AS are particularly vulnerable to vertebral fractures (particularly lower cervical fractures) after even minor trauma.[12,13] If posture, balance, and stability can be improved in these patients, the risk of a fall may be reduced. In our patient, the goal of treatment with the heel lift and orthotic devices was to improve posture.

Because of the high risk of fracture in patients with AS, physicians must use caution when implementing interventions that modify forces on ossified spines. Clarke and colleagues[13] described a case in which a man with AS and an extreme kyphotic flexion was placed in a

rigid cervical collar after he fell and sustained a cervical vertebral fracture. The rigid collar forced the patient's neck into hyperextension, causing spinal compression. Despite the physicians' efforts to surgically correct the complication, the patient died. Successful correction of cervical fractures and flexion deformity has been reported in cases with a more gradual approach to extension.[15]

Our patient's stated desire was to wait as long as possible before undergoing THA to maximize the therapeutics of the intervention. Outcomes after hip implantations vary according to the type of implant used and patient characteristics, but it is common for patients to require revision surgery after 10 years because of factors such as infection, dislocation, instability, wear, loosening, or mechanical failure.[8] In the present case, the use of orthotics allowed our patient to delay THA.

Conclusion

The use of heel lifts and custom orthotic devices to correct posture may be beneficial in appropriate patients with AS. In the present case, the use of these devices allowed the patient to delay surgical treatment and coincided with a remarkable increase in the patient's satisfaction with life and his ability to perform activities of daily living.

References

1. Sangala JR, Dakwar E, Uribe J, Vale F. Nonsurgical management of ankylosing spondylitis. *Neurosurg Focus*. 2008;24(1):E5. http://thejns.org/doi/full/10.3171/FOC/2008/24/1/E5. Accessed January 2, 2014.
2. Braun J, van den Berg R, Baraliakos X, et al. 2010 update of the ASAS/EULAR recommendations for the management of ankylosing spondylitis. *Ann Rheum Dis*. 2011;70(6):896-904. doi:10.1136/ard.2011.151027.
3. Haroon N, Kim TH, Inman RD. NSAIDs and radiographic progression in ankylosing spondylitis: bagging big game with small arms [editorial] [published online August 3, 2012]? *Ann Rheum Dis*. 2012;71(10):1593-1595. doi:10.1136/annrheumdis-2012-201844.
4. Gyurcsik ZN, András A, Bodnár N, Szekanecz Z, Szántó S. Improvement in pain intensity, spine stiffness, and mobility during a controlled individualized physiotherapy program in ankylosing spondylitis [published online December 25, 2011]. *Rheumatol Int*. doi:10.1007/s00296-011-2325-9.
5. Widberg K, Karimi H, Hafström I. Self- and manual mobilization improves spine mobility in men with ankylosing spondylitis—a randomized study [published online April 29, 2009]. *Clin Rehabil*. 2009;23(7):599-608. doi:10.1177/0269215508101748.
6. Elyan M, Khan MA. Does physical therapy have a place in the treatment of ankylosing spondylitis? *Curr Opin Rheumatol*. 2008;20(3):282-286. doi:10.1097/BOR.0b013e3282fa13c9.
7. van den Berg R, Baraliakos X, Braun J, van der Heijde D. First update of the current evidence for the management of ankylosing spondylitis with non-pharmacological treatment and non-biologic drugs: a systematic literature review for the ASAS/EULAR management recommendations in ankylosing spondylitis [published online April 17, 2012]. *Rheumatology (Oxford)*. 2012;51(8):1388-1396. doi:10.1093/rheumatology/kes066.
8. Sedrakyan A, Normand SLT, Dabic S, Jacobs S, Graves S, Marinac-Dabic D. Comparative assessment of implantable hip devices with different bearing surfaces: systematic appraisal of evidence. *BMJ*. 2011;343:d7434. doi:10.1136/bmj.d7434.
9. Lipton JA, Brooks JS, Hickey MJ, Drew BG, Eggleston MT, Gemmer CH. Lift treatment in naval special warfare personnel: a retrospective study. *Am Acad Osteopath J*. 2000;10(1):31-37.
10. Lipton JA, Flowers-Johnson J, Bunnell MT, Carter L. The use of heel lifts and custom orthotics in reducing self-reported chronic musculoskeletal pain scores. *Am Acad Osteopath J*. 2009;19(1):15-21.
11. Irvin RE. Enduring relief of chronic pain: using orthotics to correct postural imbalance. In: Dalton E, ed. *Dynamic Body: Exploring Form, Expanding Function*. Oklahoma City, OK: Freedom From Pain Institute; 2011:342-365.
12. Vergara ME, O'Shea FD, Inman RD, Gage WH. Postural control is altered in patients with ankylosing spondylitis [published online November 22, 2011]. *Clin Biomech (Bristol, Avon)*. 2012;27(4):334-340. doi:10.1016/j.clinbiomech.2011.10.016.
13. Clarke A, James S, Ahuja S. Ankylosing spondylitis: inadvertant application of a rigid collar after cervical fracture, leading to neurological complications and death. *Acta Orthop Belg*. 2010;76(3):413-415. http://www.actaorthopaedica.be/acta/download/2010-3/22-Clarke%20et%20al.pdf. Accessed January 2, 2014.
14. Vosse D, Landewe R, van der Heijde D. Ankylosing spondylitis and the risk of fracture: results from a large primary care-based nested case-control study [published online December 9, 2008]. *Ann Rheum Dis*. 2009;68(12):1839-1842.
15. Schneider PS, Bouchard J, Moghadam K, Swamy G. Acute cervical fractures in ankylosing spondylitis: an opportunity to correct a preexisting deformity. *Spine (Phila Pa 1976)*. 2010;35(7):E248-E252. doi:10.1097/BRS.0b013e3181c7c8d2.