Gluteus Medius Weakness Resulting in Trendelenburg Gait Leads to Femoral Neck Stress Fracture

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Background: Stress fractures may develop in up to 15% of runners and military trainees, and of those, 5-10% are to the femoral neck. The typical mechanism of injury for stress fractures is overuse, and they are more prevalent in females, especially those that are amenorrheic. Forces to the femoral neck may exceed 3-5 times body weight during running, and muscles, especially the gluteus medius, help to absorb the force and distribute the load.

Case Presentation: An 18-year-old female collegiate cross-country and track runner reported to the athletic trainer with a chief complaint of right hip pain and stiffness of the lower back. Initial evaluation revealed mild right hip pain that increased at the end range of flexion. All manual muscle tests were 5/5. The hop test and FADIR (flexion, adduction and internal rotation) test were positive. Differential diagnosis included hamstring strain, hip flexor strain, hip adductor strain, hip sprain, sacroiliac joint sprain, impingement, or disk pathology. The athlete was placed on crutches and non-weight bearing. X-rays were negative. MRI indicated a mild bone edema at the medial base of the right femoral neck consistent with a stress reaction. The final diagnosis was a stress fracture of the right femoral neck. Conservative treatment consisted of rest, non-weight bearing, electric stimulation for pain control, and aqua-jogging. Fifty-nine days post injury, conservative treatment was determined to be unsuccessful, and an in-depth biomechanical analysis revealed a Trendelenburg gait while walking with severe weakness of the transverse abdominus and right gluteus medium, which most likely was the cause of the increased stress on femoral neck. Manual muscle testing (MMT) of gluteus medius was a 2-/5 with an inability of the core to stabilize the lumbosacral region during walking, and during squatting the right hip revealed a dynamic valgus. The rehabilitation program was adapted to include gluteus medius strengthening and core stabilization exercises with progressive aerobic conditioning (aqua-jogging and elliptical machine). Eighty-three days post, MMT of the right gluteus medius was 3+/5, core stabilization and right hip dynamic valgus had improved, but not to the level of the contralateral side. At 93 days, the athlete was pain-free, MMT of the right gluteus medius was 4/5, and core stabilization and squatting were nearly equal to the contralateral side. The athlete was cleared to begin a progressive return to run protocol, while closely monitored. At 106 days, a video analysis revealed a Trendelenburg gait during running with an 18.7 degree hip drop from horizontal in the left hip compared to a 9.3 degree hip drop from horizontal in the right hip. By 135 days, the athlete was running 30 miles per week, MMT for gluteus medius was 4+/5, core stabilization and squatting were equal to the contralateral side. Therefore, that athlete was cleared for full participation.

Conclusion: Typically, rest and non-weight with a progressive return to running protocol are sufficient for a femoral neck stress fracture to heal. In this case, conservative treatment was unsuccessful after 59 days. An in-depth biomechanical analysis revealed a Trendelenburg gait during running and severe weakness of the transverse abdominus, right gluteus medius and a right hip dynamic valgus with squatting, which most was the cause of the increased stress to the femoral neck.

Clinical Bottom Line: This case should point out the importance of an in-depth analysis of an athlete’s actual activity patterns. Therefore, if a typical treatment for an injury does not seem to be progressing at the expected rate, the athletic trainer should reevaluate the situation and reconsider other potential etiology.

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