Bilateral femoral neck fractures resulting from a grand mal seizure in an elderly man with Down syndrome

Jonathan P. Marsh,1 Jeff R.S. Leiter,1,2 Peter MacDonald1,2
1Section of Orthopedic Surgery, University of Manitoba, Winnipeg, Manitoba, Canada; 2Pan Am Clinic Winnipeg, Manitoba, Canada

Abstract

Simultaneous bilateral hip fractures are exceedingly rare and usually occur following a seizure. To our knowledge, only 22 cases of such injuries have been reported in the literature during the past forty years and the majority of fractures are treated with open reduction and internal fixation. We present a case of a 66-year-old man with Down syndrome and severe dementia who was diagnosed with bilateral displaced femoral neck fractures following an epileptic seizure. He was treated with single staged bilateral uncemented monopolar hemi-arthroplasties through lateral Hardinge approaches. The treatment choice was governed by fracture displacement, the lack of pre-existing osteoarthritis, length of time to diagnosis, the patient’s age, ambulatory status and mental impairment, with the intention to minimize post-operative complications such as avascular necrosis, non-union and hip dislocation.

Introduction

Hip fractures are amongst the most common injuries presented to orthopedic surgeons. Although many surgeons will manage several femoral neck fractures in one day, it is exceedingly rare to have a patient present with bilateral hip fractures. To our knowledge, 22 cases of bilateral femoral neck fractures have been presented in the literature over the past forty years, all of which were the result of seizures,1 and only one of these cases involved a patient with Down syndrome.2 Such injuries raise many questions ranging from the optimal type of operative fixation to rates of post-operative complications and overall patient prognosis.

Case Report

We present a case of a 66-year-old man with Down syndrome, advanced dementia, and a seizure disorder. He was brought to the emergency department following a six-minute tonic-clonic seizure witnessed by his home worker. He had been seizure free for over one year and was treated with oral phenytoin. He was verbally non-communicative due to his dementia, but he had previously been fully ambulatory without walking aids.

While in the emergency department, he complained of abdominal pain and was diagnosed with an ileus. Unable to ambulate after the seizure, he could not leave the hospital and was seen by a general surgeon who ordered a CT scan of his abdomen. The radiologist reported findings consistent with an ileus, right lower lobe pneumonia and bilateral displaced femoral neck fractures. An anteroposterior X-ray supported this diagnosis (Figure 1) and a frog leg lateral image was obtained since the patient could not elevate either limb for a cross table lateral film.

In our case, the time from injury to diagnosis was almost 72 hours, rendering the probability of femoral head avascular necrosis after reduction and internal fixation very high. The patient had no pre-existing hip pain and minimal evidence of osteoarthritis. With this information, and considering his age, mental status, seizure disorder and prior ambulatory status, the decision was made to perform single staged bilateral uncemented monopolar hemi-arthroplasties (Synergy, #11 stem, -3 mm insert, 49 mm head) (Smith and Nephew Andover, MD, USA) of the hips through lateral Hardinge approaches.

Intra-operatively, the fractures were found to be more comminuted than typical femoral neck fractures. On the left side, the fracture extended into the greater trochanter in the sagittal plane, representing what may have been an avulsion fracture of the abductors (Figure 2). This fragment did not interfere with fixation of the femoral stem, and it was affixed to the femur with non-absorbable sutures. Post-operatively, the patient was allowed to weight-bearing as tolerated immediately and was sent home on a 28-day course of low molecular weight heparin in accordance with the American College of Chest Physicians guidelines.3

Discussion

When presented with bilateral femoral neck fractures resulting from a seizure, most surgeons advocate urgent reduction and internal fixation.4 However, many factors play a role in operative decision making. The rates of avascular necrosis and non-union of displaced femoral neck fractures treated with open reduction and internal fixation are 9.7% and 18.5%, respectively.5 This results in re-operation rates of 20-26%.6 For these reasons, most authors consider arthroplasty a reasonable option, particularly in an individual over 60-65 years of age. Life expectancy must also be considered, and the survival rate of individuals with Down syndrome is only 13% to 68 years of age.7 The debate between total hip arthroplasty and hemi-arthroplasty in the elderly population persists, but there is some evidence to aid in decision making.

Total hip arthroplasty in the acute fracture setting results in greater dislocation rates than elective primary total hips or hemi-arthroplasties for acute fractures.8 This risk increases further in demented patients and those with seizure disorders. Although a true difference has not been shown, the lateral Hardinge approach does not violate the posterior joint capsule and theoretically, should have a lower posterior dislocation rate than the posterior Moore’s approach.9

Unlike most femoral neck fractures caused by minor trauma, those resulting from seizures may be significantly more comminuted. This is likely the effect of persistent muscle contracture during the seizure, but also due to increased rates of osteopenia in epileptic patients and decreased bone mineral density in individuals with Down syndrome.8-10 There is also evidence to suggest that certain anti-
Conclusions

In older adults with Down syndrome and limited communication skills, diagnosis of orthopedic injury may be even more difficult and should be given strong consideration upon presentation. The immediately non-ambulatory patient post seizure should be suspected as having a hip fracture until proven otherwise. Although bilateral femoral neck fractures present more challenges than unilateral hip fractures, the goals of treatment should remain the same: to restore early mobility, to reduce the chances of re-operation, and minimize the likelihood of post-operative complications such as avascular necrosis, non-union and hip dislocation.

References

1. Grimaldi M, Vouaillat H, Tonetti J, Merloz P. Simultaneous bilateral femoral neck fractures secondary to epileptic seizures: treatment by bilateral total hip arthroplasty. Orthop Traumatol Surg Res 2009;95:555-7.
2. Rossi R, Blonna D, Germano M, Castoldi F. Multidisciplinary investigation in Down syndrome: bear in mind. Orthopedics 2008;31:279.
3. Geert WH, Bergqvist D, Pineo GF, et al. Prevention of venous thromboembolism: American College of Chest Physicians evidence-based clinical practice guidelines (8th Edition). Chest 2008;133:S453S.
4. Bhandari M, Devereaux PJ, Swiontkowski MF, et al. Internal fixation compared with arthroplasty for displaced fractures of the femoral neck. A meta-analysis. J Bone Joint Surg Am 2003;85-A:1673-81.
5. Leighton RK, Schmidt AH, Collier P, Trask K. Advances in the treatment of intracapsular hip fractures in the elderly. Injury 2007;38:S24-34.
6. Baird PA, Sadovnick AD. Life tables for Down syndrome. Hum Gen 1989;82:291-2.
7. Jolles BM, Bogoch ER. Posterior versus lateral surgical approach for total hip arthroplasty in adults with osteoarthritis. Cochrane Database Syst Rev 2006;3:CD003828.
8. Sepulveda D, Allison DB, Gomez JE, Kreibich K, Brown RA, Pierson RN, et al. Low spinal and pelvic bone mineral density among individuals with Down syndrome. Am J Ment Retard 1995;100:109-14.
9. Kashima I, Kanno M, Oguro T, et al. Bone trabecular pattern analysis in Down’s syndrome with the use of computed panoramic tomography with a laser scan system. Quantitative analysis with the power spectrum method. Oral surgery, oral medicine, and oral pathology 1988;55:366.
10. Angelopoulos N, Souflas V, Sakadakis A, Mandroukas K. Bone mineral density in adults with Down’s syndrome. European Radiology 1999;9:648-51.
11. Mattson RH, Gidal BE. Fractures, epilepsy, and antiepileptic drugs. Epilepsy Behav 2004;5:S36-40.
12. Pack AM, Morrell MJ. Epilepsy and bone health in adults. Epilepsy Behav 2004;5:S24-9.
13. Finelli PF, Cardi JK. Seizure as a cause of fracture. Neurology 1989;39:858-60.
14. McGlone R, Gosnold JK. Posterior dislocation of shoulder and bilateral hip fractures caused by epileptic seizure. Arch Emerg Med 1987;4:115-6.
15. Ribacoba-Montero R, Salas-Puig J. Simultaneous bilateral fractures of the hip following a grand mal seizure. An unusual complication. Seizure 1997;6:403-4.
16. Vanderhoof E, Swiontkowski M. Bilateral femoral neck fractures following a grand mal seizure. Ann Emerg Med 1994;24:1188-91.
17. Khan SK, Kalra S, Khanna A, Thiruvengada MM, Parker MJ. Timing of surgery for hip fractures: a systematic review of 52 published studies involving 291,413 patients. Injury 2009;40:692-7.
18. Van Allen MI, Fung J, Jurenka SB. Health care concerns and guidelines for adults with Down syndrome. Am J Med Genet 1999;89:100-10.