Introduction: Osteoporosis below the level of injury is a known consequence after SCI, and increases the risk for fractures. Most fractures after SCI occur after minimal trauma and from normal activities of daily living. We present a case series of 4 female patients with SCI who developed femoral fracture during an inpatient rehabilitation while learning lower extremity dressing (LED).

Timeline: We present four cases of women admitted to an SCI inpatient unit to learn self-care and increase independence who sustained femur fractures while learning LED. Three women, 46 to 48 years old, with chronic T5-9 complete SCI, >15 months post injury, sustained femoral fractures while working in a figure-4 position for LED. All 3 had experienced decreased mobility and reliance on caregivers for LED with Foley management prior to admission. Most of their lower extremity care needs were met while in a supine position with straight legs, and none had regular stretching of hip external rotators and abductors necessary to achieve a figure-4 position prior to admission. A fourth patient, a 64 year old who was immobilized in a TLSO with hip extender for 4 months and also managed with Foley catheter, experienced a fracture in the same figure-4 position soon after discontinuation of TLSO.

Diagnostic: An abnormal sound was reported by patients and therapists at the time of fracture. Site of sound varied – two hip, one knee, and one back. The two patients with a pop heard in hip were diagnosed immediately with hip x-rays. The other 2 patients experienced a delay in diagnosis of several days and experienced low grade fevers, malaise, abdominal discomfort, mild leukocytosis, and mild blood loss. Hip x-rays revealed intertrochanteric fractures in 3 patients, and a displaced mid-shaft spiral fracture in the fourth. In the patients >12 months post injury, incidental findings of undiagnosed healing fractures in the lower extremity were found.

Therapeutic: Orthopedic surgery was consulted for management of all four fractures. 2 of the intertrochanteric fractures and the mid-shaft spiral fracture were surgically repaired. 1 patient with non-displaced intertrochanteric fracture was managed conservatively and followed by serial radiographs to monitor for possible displacement.

Results: There were no post-surgical complications in the 3 patients treated operatively. 2 patients were recommended NWB and 1 patient was allowed to WBAT. The patient who was managed non-operatively was recommended NWB of limb with fracture. Serial exam did not reveal displacement of intertrochanteric fracture at the time of discharge 3 weeks after diagnosis. Two of the women in our series were later followed with bone density scans consistent with osteoporosis.

Discussion: Acute fractures are a known risk to patients with chronic SCI, and may be experienced by up to 50% of patients. Our case series identifies several risk factors including age, gender, decreased joint flexibility, and prior fractures that may suggest increased risk of fracture. It also reports occurrence of fractures in a figure-4 position that is necessary for independent dressing skills in paraplegics. One postulated mechanism of injury is via disuse-mediated shortening of the hip external rotators.

Learning Objectives:
- Review series of 4 chronic patients with acute fractures occurring in inpatient rehabilitation
- Discuss what is currently known about osteoporosis below the level of injury
- Discuss current evidence about management and treatment of fractures in this population
- Discuss why figure 4 stretches and LED can put some patients at risk
- Review how fracture diagnosis can be delayed in complete SCI
- Review different treatment rationale for femur fractures and how it affected continued participation in therapy

Bibliography:
