Unstable intertrochanteric hip fractures and certain subtrochanteric hip fractures have been successfully treated with the Medoff Sliding Plate\textsuperscript{1,2} which allows two axes for sliding compression: 1. fracture compaction in the femoral neck similar to the traditional sliding hip screw and 2. axial compression parallel to the femoral shaft.

The failure in the following case in which the sliding plate became disengaged from the four-hole plate is thought to be due to limitations of the four-holed plate design.

Case Report

A 69-year-old male, community ambulator, with a seizure disorder, slipped and fell at home and immediately complained of hip pain. Physical examination revealed a painful right hip with a normal neurovascular exam. Radiographs revealed an unstable intertrochanteric hip fracture and, at operative stabilization, a four-hole Medoff sliding plate was applied using the recommended technique. The surgery was uneventful and the initial postoperative course was initially uneventful. However, one month postoperatively the patient had a seizure. He had also seeded his hip with an infection secondary to systemic sepsis from an unrelated medical complication. He presented to the emergency room with a complaint of hip pain. Radiographs revealed that the sliding plate had become disengaged from the four-hole side plate (Fig. 1). The patient was returned to the operating room and underwent removal of the Medoff plate, with resection arthroplasty. The patient expired five months later from multisystem organ failure.

Discussion

Figure 2 shows a comparison of the superior ends of the failed plate and a new Medoff plate; it is apparent that one of the sides forming the slot of the failed plate had permanently bent. The outer gap of the slot of the failed plate was measured as 8.2 mm compared to 6.9 mm for the new plate. The base of the sliding element was 8.8 mm. Therefore to disassociate the two components a further elastic (or plastic) deformation of the slot of 0.6 mm would be required.

To determine if over tightening the plate fixation screws could cause the observed deformation, the new plate was attached to a composite Sawbones femur with a 2 mm round spacer placed under the plate on one side adjacent to the two plate fixation screws causing a 3 mm gap on the other side of the plate. The other two screws on the gap side were manually tightened with a torque screwdriver to 3.5 times the maximum torque used by an average surgeon.\textsuperscript{3} This tightening caused only a 0.2 mm elastic increase of the outer gap.

We feel that the most likely mode of plate failure was overloading of the sliding element by a laterally directed force – possibly due to the patient’s seizure. The wedge design of the sliding element and slot caused the slot to open with a lateral load. Basic biomechanical analysis shows that this force can be more than 1.5 times body weight during normal walking. This type of loading becomes more significant if the fracture is unstable (e.g., reverse obliquity) or if the plate does not act as a lateral buttress to the fracture. The longer the unsupported
length of the sliding element the greater the bending moment at the plate-sliding element junction.

**Conclusion**

If a four-holed Medoff plate is used for treatment of an unstable or reverse obliquity intertrochanteric fracture, the plate should serve as a lateral buttress for the proximal fragment or a stronger, six-holed plate (the four-hole plate does not have a horizontal strut for reinforcement, which the six-hole plate has) should be used. Furthermore, the sliding element should only be extended the amount anticipated to be needed for axial consolidation.

**References**