Fenestration of the Femoral Shaft: A Standard Procedure in Revision Hip Surgery Without Bypassing the Cortical Defect

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In revision hip arthroplasty, implant retrieval and residual bone cement removal may be major problems. Complete removal of the bone cement is key for the stable anchorage of the revision stem. As proximal access does not always provide an optimal view, fractures or inadvertent perforations of the cortical bone with the chisel or drill are frequently reported complications.1-3

Windowing of the femoral shaft facilitates the procedure and ensures greater accuracy.1,4-7 Although it may weaken the femoral shaft and thus increase the risk of postoperative femoral fractures, the revision stem should bypass the window distally by at least twice the diaphyseal width.4,6-10 We have not followed this recommendation because we believe bridging of the cortical defect by 4-5 cm is irrelevant. As our technique is controversial to the literature, we have analyzed its clinical and radiographic outcome.

MATERIALS AND METHODS

Thirty-four patients (24 women and 10 men) underwent 38 revision procedures (4 bilateral). Mean patient age at revision was 72 years (range: 60-84 years). In all patients, loosened cemented implants were replaced by cementless stems. Mean follow-up was 6 years (range: 3-9 years). Radiographs were recorded immediately postoperatively, 2-3 months postoperatively, and at scheduled follow-up.

To remove bone cement, pedestal formations, and canal plugs, an anterolateral window was made in the femoral shaft along its longitudinal axis (Figure 1). The distal extension of the window was determined by the cement to be removed without regarding the level at which the tip of the revision stem rested (ie, distal or proximal to the distal end of the window) (Figure 2). At the intended site, the vastus lateralis muscle was split lengthwise and pushed anteriorly, and the underlying bone was stripped of its periosteum. At the corners of the future window, holes were drilled with a 3.2-mm drill. The bone between these holes was cut with an oscillating saw using a small saw blade and continuous irrigation. The bone flap was elevated and placed in physiologic saline. The resultant window with an approximate 1-cm width provided access for a slim chisel to remove the cement. To ensure more efficient morselizing of the cement, multiple perforations were made in the cement core with a 3.2-mm drill. Once the tapered titanium revision stem was implanted, the corti-
cases, it was distal to the distal mm distance. In 55.3% of cases, the implant tip was proximal to the distal end of the window at a mean 29.29% of cases, the implant tip was distally. In 6.3% of cases, the implant tip was proximal to the distal end of the window (arrow). Radiograph 8 years postoperatively demonstrates incorporation of the fenestration area (C).

RESULTS

Mean window size was 6.3 × 0.8 cm, and 15.7% of the windows were level with the revision stem tip distally. In 29% of cases, the implant tip was proximal to the distal end of the window at a mean 29-mm distance. In 55.3% of cases, it was distal to the distal end of the window at a mean 25.6-mm distance (Figure 3).

The revision stem did not bypass the distal end of the cortical defect by twice the diaphyseal width in any patient, as recommended in the literature. The cortical flaps were impacted in the cortical defect without any further anchorage in 24 cases, reattached with PDS, Vicryl, or Mersilene sutures in 5, and stabilized with titanium cerclage bands in 9. All showed bony union on follow-up radiographs (Figure 4).

Two fissures occurred—one intraoperatively between the window and proximal femur, and one through the distal end of the window 4 months postoperatively after a fall. A female patient sustained a periprosthetic fracture during an automobile accident 15 months postoperatively, which necessitated plate fixation. Fractures related to windowing were not reported. Subsidence of the stem with secondary stabilization was seen in two patients, late infection necessitating revision in one patient. No signs of implant loosening were noted at follow-up.

DISCUSSION

Anterolateral windowing of the femoral shaft for removal of bone cement is routine at our institution. The window is placed for optimal cement removal without regard to the position of the revision stem tip. The tip did not extend beyond the window by at least twice the diaphyseal width or by 4-6 cm in any patient, as recommended in the literature. Nevertheless, expected implant loosening or stress fractures because of non-existent or inadequate bridging with consequent insufficient anchorage did not occur. Windowing of the femoral shaft offers several advantages—it facilitates surgery, prevents cortical perforations with the chisel or drill, eases residual cement and canal plug removal, and shortens operating time. Among its disadvantages are a larger wound surface, the need to split the vastus lateralis muscle, and weakening of the femoral shaft. The last mentioned disadvantage proved not to have any negative effects in our experience.

REFERENCES