



Table 1. Fracture Types

Fracture Type	NPWT (n = 49)	Gauze (n = 41)
Acetabular fracture	33 (67.3)	33 (80.5)
Pelvic ring	10 (20.4)	4 (9.8)
Displaced femoral neck fracture	5 (10.2)	3 (7.3)
Femoral head fracture	1 (2)	1 (2.4)

Data are presented as no. (%). NPWT, negative-pressure wound therapy. Reproduced with permission from BD Crist, MD.

reduction and internal fixation [Rightmire E et al. *Clin Orthop Relat Res.* 2008]. Letournel found that infection following acetabular fracture surgery occurs in $\leq 5\%$ of cases for the most common approaches; obese individuals are at heightened risk [Porter SE et al. *J Orthop Trauma.* 2008].

NPWT, which reportedly decreases wound-related complication in high-risk [Stannard JP et al. *J Trauma.* 2006] and acetabular fractures [Reddix RN Jr et al. *J Surg Orthop Adv.* 2010], applies a vacuum through a specialized dressing to the wound to accelerate healing.

The aim of the present study was a prospective comparison of NPWT and standard gauze dressings over primarily closed surgical incisions—a popular surgical option for hip, pelvis, and acetabular fractures. The techniques were compared in terms of postoperative surgical wound drainage, infections, and cost-effective hospitalization. A multitude of secondary characteristics were compared.

Reflecting the anatomic similarity of the affected bones and the similar surgical approach typically used, patients with fractures of the hip, pelvis, and acetabulum were grouped. The 115 patients were randomized to receive NPWT for at least 2 days (n = 55) or standard gauze (n = 60). They were followed up for 12 months; 49 NPWT-treated patients and 41 standard gauze-treated patients completed the follow-up, meaning that the study was underpowered. The types of injuries treated in each group are shown in Table 1.

At 12 months postoperatively, deep infection had occurred in 5 of 49 NPWT-treated patients (10.2%) and 2 of 41 gauze-treated patients (4.9%; $P = .44$); while the difference was not significant, NPWT-treated patients were 2.3 times more likely to develop a deep infection. All deep infections occurred in patients with acetabular fractures involving the posterior wall or column requiring a Kocher-Langenbeck surgical exposure; of these 7 patients, 6 had medical comorbidities.

Deep infections were not associated with body mass index ($P = .54$), contrary to a study of morbidly obese

patients [Porter SE et al. *J Orthop Trauma.* 2008] but consistent with a study of obese patients treated with NPWT [Reddix RN Jr et al. *Am J Orthop (Belle Mead NJ).* 2009]. Those patients that ended up with infections spent significantly more time in the intensive care unit ($P = .015$) and had significantly prolonged hospitalization ($P \leq .001$). A cost comparison proved impossible.

Acknowledging the limitations of sample size and grouping of patients with different fractures, Dr Crist concluded that NPWT may not reduce the risk of infection, especially in patients with acetabular fractures involving the posterior wall or column who have other comorbidities.

Cast Immobilization as Good as Surgery for Intra-Articular Distal Radial Fracture in Elderly Patients

Written by Wayne Kuznar

Closed reduction and cast immobilization appear to be just as effective as surgery on health-related quality of life and functional measures in older patients with displaced intra-articular distal radial fractures. This was the main finding of a randomized controlled trial [ISRCTN76120052] presented by Christoph Bartl, MD, Ulm University, Ulm, Germany.

Fractures of the distal radius are the most common fracture in older patients and may be an indicator of the onset of osteoporosis. Treatment options include (1) closed reduction and plaster casting and (2) open reduction and internal fixation with volar locking plate fixation.

Angle-stable volar locking plates have been especially advocated for use in the surgical fixation of distal radial fractures in osteoporotic bone, with the proposed rationale being that threaded screws in the screw hole of the plate reduce shear forces to prevent loosening of the surgical construct, although the benefits have not been proven. Closed reduction and cast stabilization for 6 weeks is simple, convenient, and readily available, whereas surgical management requires hospitalization but allows for early mobilization and functional rehabilitation. The superior strategy remains controversial, said Prof Bartl.

In this multicenter clinical trial, 185 patients aged ≥ 65 years with an intra-articular distal radius fracture agreed to participate: 94 were assigned to surgical management with volar locking plate fixation and 91 were assigned to closed reduction and cast immobilization for 6 weeks. The primary outcome was the Short Form-36 (SF-36) Physical Component Summary score 1 year after

randomization. Other outcomes assessed were the Disabilities of the Arm, Shoulder, and Hand (DASH) score, the EuroQol-5D (EQ-5D) visual analog scale and utility index, and wrist range of motion (ROM), in addition to radiographic evaluation of the wrist at 3 and 12 months.

Baseline characteristics—age, sex, fracture severity, general health status, and activity status—were similar between the 2 groups. Thirty-seven patients (41%) assigned to cast immobilization had subsequent surgery due to significant loss of reduction in the cast. After 1 year, in the intention-to-treat population, surgery showed a marginal nonsignificant advantage when compared to cast treatment (SF-36 Physical Component Summary mean difference, 3.3 in favor of surgery; 95% CI, -0.2 to 6.8). The mean difference in DASH scores (5.0 in favor of surgery; 95% CI, 1.0 to 11.0), EQ-5D visual analog scale scores (3.0 in favor of surgery; 95% CI, -1.9 to 7.9), and EQ-5D utility index (0.0 in favor of surgery; 95% CI, -0.06 to 0.06) were also not significantly different between the treatment groups.

In both treatment groups, patients returned to their preinjury activity statuses without significant differences between them. Although the group that underwent surgery had a faster improvement in wrist ROM at 3 months ($P < .05$), there was no significant difference in wrist ROM in all planes between groups at the 1-year follow-up. Although anatomic restoration of the distal radius in palmar tilt, ulnar variance, and radial height was significantly superior in the group that received surgery (each $P < .05$), these improvements did not translate into better function, said Prof Bartl.

The outcomes were similar when the analysis was conducted according to the actual treatment received. Patients in the group with secondary conversion to surgical management achieved equivalent scores when compared to those with primary surgery. Patients with a higher fracture comminution grade (AO/OTA C3) in the cast group had a 2-fold increased risk for conversion to secondary surgical management vs patients with AO/OTA type C1/C2 fractures. Both procedures are safe, as the researchers did not observe cases of infection in the surgical group or relevant cast pressure marks. There was only 1 case of complex regional pain syndrome overall.

Prof Bartl concluded that closed reduction and cast immobilization remain a valid first-line treatment option for elderly patients with displaced intra-articular distal radial fractures. If cast treatment fails, conversion to secondary surgery within 3 weeks does not compromise final outcome results. Patients with high fracture comminution grades and those in high-demand populations may benefit from primary surgical management.

Augmentation Plating Superior to Nail Exchange for Femoral Shaft Nonunion After Nail Fixation

Written by Wayne Kuznar

The optimal treatment for femoral shaft nonunion after intramedullary nail fixation is controversial and is a challenge for orthopaedic surgeons. Bosong Zhang, MD, Jishuitan Hospital, Beijing, China, described a retrospective study comparing nail exchange with augmentation plating to treat femoral shaft nonunion after nail fixation.

The nonunion rate for femur shaft fracture after nailing is as high as 12.5% [Pihlajamäki HK et al. *J Orthop Trauma*. 2002]. Strategies for the treatment of femur shaft nonunion are bone grafting, exchange nailing, nail removal plus plating and bone grafting, leaving the nail in situ plus external fixation, and nail retention plus augmentation plating and bone grafting. In the literature, the union rate for exchange nailing ranges from 72% to 100% [Brinker MR, O'Connor DP. *J Bone Joint Surg Am*. 2007], compared with almost 100% for augmentation plating and bone grafting [Park J et al. *J Orthop Trauma*. 2010; Choi YS et al. *Int Orthop*. 2005].

The results of augmentation plating were compared with exchange nailing for femoral shaft nonunion after nailing in 104 cases. From March 2003 to June 2011, exchange nailing without autogenous bone grafting was performed in 21 patients, and augmentation plating with nail retention and autogenous bone grafting was performed in 83.

Exchange nailing was performed by nail removal, followed by use of a reamer to enlarge the femoral canal and insertion of a larger-diameter nail to enhance fixation stability. Prof Zhang noted that rotational instability is one reason for nonunion of femoral shaft fracture after interlocking nailing [Park J et al. *J Orthop Trauma*. 2010; Zhao G et al. *Chinese J Surg*. 2009; Ueng SW et al. *J Trauma*. 1997]. Augmentation plating combined with leaving the nail in situ in this instance can resolve the rotational instability and allow fracture healing [Choi YS et al. *Int Orthop*. 2005; Wu CC et al. *Int Orthop*. 2002]. The augmentation plate procedure in this study used a nonrotating plate and insertion of 3 screws on each side of the fracture. Screws were placed bicortically; the locking screw was placed monocortically. Simultaneous bone grafting was performed in patients who received an augmentation plate.

There were no significant differences between the 2 groups in age, sex, volume of postoperative drainage, and length of hospital stay. For patients who underwent augmentation plating and bone grafting, operation time was significantly shorter, and volume of both