Comment on Tong et al.: Two-stage procedure protocol for minimally invasive plate osteosynthesis technique in the treatment of the complex pilon fracture

Da-wei Chen · Bing Li · Guang-rong Yu

Received: 22 February 2012 / Accepted: 21 April 2012 / Published online: 13 May 2012
© Springer-Verlag 2012

Dear Editor,

We have read with great interest the article entitled “Two-stage procedure protocol for minimally invasive plate osteosynthesis technique in the treatment of the complex pilon fracture” by Tong et al. [4]. They describe a two-stage procedure combined with the MIPO technique to treat AO/OTA type C pilon fractures and conclude that this protocol could result in a low infection rate associated with open reduction and internal fixation (ORIF). The limited series achieved good outcomes at an average follow-up of 24 months. However, there are some concerns regarding this study.

First, which types of pilon fractures would be suitable for the MIPO technique? The authors used this technique to treat all type C pilon fractures (C1, C2 and C3 were included) and achieved good outcomes, but we do not think this is the best choice for all type C pilon fractures. Undoubtedly, the minimally invasive procedure would minimise surgical trauma and lessen the soft tissue complications. However, we should not forget that most common type C pilon fractures are usually caused by high energy forces and characterised by the severe comminution of the articular surface, especially the type C3 fractures. MIPO emphasises the use of small incisions to restore mechanical axes, decrease tissue injury and preserve blood supply. The procedure appears soft tissue friendly. However, it would cause great difficulty with the articular reduction. The limited incision is usually not large enough to allow direct manipulation of fractured

fragments and visualisation of the joint surface. Although the authors mentioned the use of additional punctiform incisions to assist reduction, we believe that it would be not so easy to reduce the comminuted fragments, especially the die-punch fragments. This is partly because the time interval between the first and the second stage was too long in this study. The relatively long time interval, which was from 24 to 38 days, may allow the formation of bony callus. This would make the reduction of both the articular and the metaphyseal fragments too difficult, even if they were approached directly. The unsatisfactory articular reduction would lead to post-traumatic arthritis. This can be certified by another study. Borens et al. [1] who retrospectively evaluated 17 patients with type C pilon fractures, who were treated using MIPO techniques. Articular reduction was maintained in only four patients and seven patients developed moderate arthritis, so the authors recommended using this technique for fractures with simple articular involvement. As far as we are concerned the MIPO technique might be more suitable for type C1 and a few type C2 fractures but not type C pilon fractures.

Second, the authors reported there was no infection. They attributed this to the staged procedure in conjunction with the MIPO technique. Whilst agreeing with this view, we thought, in addition to the surgical timing and minimal soft tissue disturbance, the infection rate and wound healing problems are associated with many other aspects, such as the timing of debridement, the fracture patterns, the incidence of open fractures, use of antibiotics and so on. Unfortunately, in this study, we are unable to find detailed information about the timing of debridement, the exact account of each subtype of type C fractures and the accurate number of each subtype of Gustilo type C open fractures. The Gustilo classification has an intimate relationship with the infection. Since 83 % of the patients had closed fractures and Gustilo type B open fractures,

D.-w. Chen · B. Li · G.-r. Yu (✉)
Department of Orthopaedic Surgery, Tongji Hospital,
Tongji University School of Medicine,
389 Xincun Road,
Shanghai 200065, China
e-mail: yuguangrong2002@yahoo.com.cn

the low proportion of Gustilo type C fractures might also contribute to the good outcomes. With regard to the surgical timing, delayed surgery gave the soft tissue the chance to recover. Perhaps, just like many reports in the literature [2, 3], conventional ORIF would also achieve a good result with the tissue's restoration after a long time, and would also be more helpful in reduction of the articular surface.

Third, the authors reported that all patients had normal functioning ankle joints. They identified the outcomes according to the objective criteria (the amount of post-traumatic arthritis, range of ankle movement, number of arthrodeses) and the subjective criteria (pain, swelling, restriction of work or leisure activities). But they only mentioned this in the abstract. Focusing on the whole paper, we cannot know how many patients developed arthritis, how many degrees the range of motion was and which criteria the authors chose, the Mazur scale, the SF-36 scale, the AOFAS scale, the Olerud-Molander scale or the others? "All patients attained normal function in the ankle joints" was ambiguous and could not explain everything. For most type C pilon fractures, one of the major complications is arthritis. Sometimes, many patients

with post-traumatic arthritis confirmed by radiography report normal function of the ankle [5]. Besides, in a two year follow-up, perhaps the mild or moderate arthritis had not developed to the level to affect the range of motion.

References

1. Borens O, Kloen P, Richmond J, Roederer G, Levine DS, Helfet DL (2009) Minimally invasive treatment of pilon fractures with a low profile plate: preliminary results in 17 cases. *Arch Orthop Trauma Surg* 129(5):649–659
2. Patterson MJ, Cole JD (1999) Two-staged delayed open reduction and internal fixation of severe pilon fractures. *J Orthop Trauma* 13(2):85–91
3. Sirkin M, Sanders R, DiPasquale T, Herscovici D Jr (2004) A staged protocol for soft tissue management in the treatment of complex pilon fractures. *J Orthop Trauma* 18(8 Suppl):S32–S38
4. Tong D, Ji F, Zhang H, Ding W, Wang Y, Cheng P et al (2012) Two-stage procedure protocol for minimally invasive plate osteosynthesis technique in the treatment of the complex pilon fracture. *Int Orthop* 36(4):833–837. doi:10.1007/s00264-011-1434-0
5. Williams TM, Nepola JV, DeCoster TA, Hurwitz SR, Dirschl DR, Marsh JL (2004) Factors affecting outcome in tibial plafond fractures. *Clin Orthop Relat Res* 423:93–98