Guest editorial

Who should be treated surgically for a displaced clavicle fracture?

Treatment of displaced midshaft clavicle fractures remains controversial despite several randomized trials and a recent meta-analysis (McKee et al. 2012, Lenza et al. 2013, Rehn et al. 2014, Wang et al. 2015). In the current issue of *Acta Orthopaedica*, Ban et al. present results of a survey among Scandinavian orthopedic surgeons on attitudes to treatment of displaced clavicle fractures. The results indicate a high readiness toward surgery despite its unclear benefit, highlighting the difficulty to interpret current evidence and implement it in clinical practice.

At least since Nowak et al. (2004) published that some initial fracture patterns predicted a worse outcome after non-surgical treatment, orthopedic surgeons have regarded comminuted and displaced fractures as having a higher risk of mal- and non-union leading to functional impairment. This view was supported by an RCT of the Canadian Orthopedic Trauma Society (2007). After non-surgical treatment, a non-union rate of about 15% was seen, and one third of malunions were symptomatic. In contrast, a Finnish RCT (Virtanen et al. 2012) found neither statistically significant nor clinically relevant differences between surgery and nonsurgical treatment in subjective outcomes as estimated by DASH or Constant score, despite a high nonunion rate (6/28) after non-surgical treatment. These findings were partly confirmed in another, larger RCT (Robinson et al. 2013) presenting a non-union rate about 15% at 1 year after initial non-surgical treatment. When the clavicle fractures healed, no relevant difference between surgical and nonsurgical treatment was found in subjective outcome and function scores. In contrast to the Finnish study, non-unions in the non-surgical group had worse subjective results but improved after secondary plating. To prevent a single symptomatic nonunion, 6 patients would have to be operated on. Also the most recent RCT on a working population (Melean et al. 2015) found no clinical relevant differences in Constant score between plate fixation and nonsurgically treated patients but a shorter time to return to work. A similar reoperation frequency was found in both groups, 9% in the nonsurgical group because of nonunion at 4 month and 11% in the surgical group for plate removal because of local symptoms

According to the survey by Ban et al. in this issue, surgeons in Scandinavia would frequently operate on these fractures, especially when risk factors for mal- or nonunion are presented. 9 of 81 departments would offer primary plate fixation if there is dislocation exceeding one bone width as the only criterion, while most (57 of 81) would require also shortening and an intermediary fragment. Most surgeons did not regard smoking or higher age as a contraindication for surgery, while many regarded comorbidity indicated by an ASA-class >2 as a contraindication. Nevertheless, nearly half of the surgeons (40 of 85) would prefer surgical treatment with plate fixation for the smoking 62 years old lady with ASA 3 in the hypothetical patient cases in the survey. If a non-surgically treated patient would present with persisting pain 6 months after fracture, 62 of 81 of the surgeons would offer surgery.

This is surprising. Do we overestimate the potential benefits of surgery and underestimate the risks? In the latest Cochrane meta-analysis the authors stated: "Based on evidence from eight trials with high risk of bias, this review provided some low-quality evidence that surgical interventions may not result in significant improvement in upper arm function. Until conclusive evidence becomes available, treatment options must be chosen on an individual patient basis, with careful consideration of the relative benefits and harms of each intervention and patient preferences" (Lenza et al. 2013). In a health-economic perspective, non-surgical treatment is much more cost-effective (Robinson et al. 2013).

Fixation with an anatomically shaped plate is an attractive procedure with a rapid result, anatomical reduction and stable fixation. However, local problems often require hardware removal, and possible infections would lead to considerable suffering. A small number of infections would probably balance a large number of avoided minor functional problems. The infection rate varies between different RCTs and has been described to be 9% (including wound dehiscence) (Lenza et al. 2013). Still, infections with *Proprionibacterum acnes* are probably underdiagnosed. Plate removal is reported to be about as high as 15% in a Danish fracture database (Ban et al. current issue of *Acta Orthopaedica*).

How often do we discuss the expected results with our patients before choosing treatment? Non-surgical treatment may require more communication with the patient and efforts to coach him through the first months after the fracture. Pain might be less accepted, while after surgery it is an expected part of the treatment

Plate fixation prevents symptomatic mal- or non-union at the price of potential complications like hardware irritation, incisional numbness and infection. However, for the majority of patients there will be no inferior outcome after nonsurgical treatment. As only about 1 in 6 patients develops symptomatic non-union with non-operative treatment, it seems patients have to choose between risks of similar magnitude:

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symptomatic non-union or surgical complication. The question becomes which risk is worst?

So why not encourage our patients to wait at least 6 months before a decision on surgery is made? If a symptomatic non-union has developed, it can be treated by secondary plate fixation.

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