BJR

EDITORIAL

The forgotten phase of fracture healing: the need to predict nonunion

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The British Editorial Society of Bone & Joint Surgery, London, United Kingdom

Trauma care has improved dramatically over the last three decades with decreased mortality and improved techniques for soft tissue cover and fracture stabilisation. After trauma, it is recognised that there is a golden hour in which optimum resuscitation is essential. Following the golden hour there is an early phase in which debridement of open wounds and soft tissue cover should be obtained along with fracture stabilisation, usually within 48 hours.[1] Recovery of muscle strength and function starts once the fracture has been stabilised but progresses more rapidly in the rehabilitation phase after fracture union. However, in between the early treatment phase and the rehabilitation phase, there is a prolonged "forgotten" phase during which patients are monitored infrequently except for cast treated fractures having alignment checks[2] and the patient and clinicians wait for the fracture to heal.

However, at present clinicians treating fractures are powerless in this phase as they do not have a technique for monitoring the early rate of healing. This is compounded by the fact that healing times are known to vary according to the bone, type of fracture and location within the bone.[3] For clavicle fractures, symptoms and smoking status can indicate that a patient is at a greater risk of impaired healing, but does not identify individual nonunion.[4] Unfortunately, radiographs in adults (even when they are used in a standardised fashion)[5] and even CT scans, typically do not show evidence of fracture union for ten or more weeks. Thus assessing the rate of healing is especially difficult in the first two to three months post-fracture.

Over the past few years, a number of prospective trials have examined the best way to treat various fractures.[6-11] However, even when fracture repair proceeds uneventfully, the considerable morbidity the patient experiences may be underestimated and it is often several years before full function has returned.[12] If fracture repair does not progress smoothly and a nonunion (or even delayed union) develops, the morbidity is substantially greater and often associated with severe financial hardship for the patient and a large burden for the healthcare system.[13] Nonunions are often multifactorial[14] and their rates vary but are typically 5% for fractures of the clavicle and tibia, but rise to nearly 10% of fractures in working age adults.[15] The treatment of established nonunions is often complex both surgically[16-19] and biologically.[20,21] Preventing patients getting to this advanced state would therefore be attractive both from the patient and society's perspective. Yet, the FDA definition of nonunion being a fracture that is ununited at nine months,[22] subjects patients to prolonged suffering and waiting until nine months to diagnose a nonunion should be considered a failure of modern fracture treatment. Other definitions include a failure to heal within the expected time and a lack of progression of fracture healing on sequential radiographs, but as this again relies on a radiographic technique, it only brings the time to diagnosis of nonunion down by a few months.

The current long period before we diagnose nonunion is a consequence of our inability to monitor healing in the first few months in this forgotten phase. There is therefore a desperate need for tools, such as that proposed by Kienast et al,[23] that can determine in the first few months if a fracture is progressing to a nonunion. If such tools were available, it would transform, the care of fracture patients and the first two months would become a vital stage of assessment and no longer the forgotten phase of fracture repair.

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doi: 10.1302/2046-3758.610.BJR-2017-0301

Bone Joint Res 2017;6:610–611.

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Funding Statement
- None declared

Author Contribution
- A. H. R. W. Simpson: Writing the paper

Conflicts of Interest Statement
- None declared