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EDITORIAL

Focus on non-union of fractures

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Non-unions of fractures remain a clinical problem at various anatomic locations, such as the tibia, the humerus, or the scaphoid. The reasons for osseous non-unions are on the one hand a vascular hypoperfusion not allowing regular fracture healing—the so-called atrophic non-union. On the other hand, mechanical instability seems to be the other main reason for missing osseous bridging of a fracture—the so-called hypertrophic non-union. In addition, numerous endocrinological, nutritional or medicament side effects and others might contribute to delayed bone healing [1, 2]. Actually, non-union is defined, if a bone has not healed within 6–8 months after a fracture or bone defect.

While the diagnosis of a non-union is well-defined by a regular X-ray or CT scan, the individual underlying mechanisms are not always clear. The Non-Union Scoring System is one of the possible definitions, which consider various parameters and reasons for the lack of healing. The selection of the appropriate therapy is even more demanding in many situations, as the success rate is still limited. Increasing stability in hypertrophic non-unions leads in many cases to a final callus formation and bony healing. However, in atrophic non-unions, the standard of bone grafting, refreshing of the fracture zone and stabilization does not always lead to complete healing. Thus, new diagnostic and therapeutic strategies are warranted.

In a survey, Özkan et al. [3] evaluated the definitions, underlying reasons and clinical practice and the need for guidelines among trauma and orthopedic surgeons. In fact, the authors found a broad spectrum of diagnostic and treatment understanding. They believe that the introduction of international guidelines and clear definitions could help to treat non-unions of long bones. This survey and further studies are presented in this focus on issue related to non-unions.

Van Basten Batenburg el al. [4] present an interobserver study of the Non-Union Scoring System. This scoring system is depicted in this paper as well and they found it to be reliable and valid. For the treatment of bone defects in particular in atrophic non-unions, but also in bone defects, harvesting of cancellous bone graft is the most important procedure. New procedures like the reamer–irrigator–aspirator system allow the harvesting of the bone from the femur canal and suggest, that the bone quality is similar to the iliac crest, but in a much higher quantity [5, 6]. Metsemakers et al. [7] describe their results applying the RIA system, which was successful in every second with bone defects in the current issue. Further options, such as stem cell therapy are currently studied in first clinical studies [8].

Monitoring of bone healing by laboratory parameters has often been discussed and suggested, however, those systemic parameters have not been routinely introduced for the detection of non-unions. In the study of Kumar et al. [9], they investigated in a prospective manner biochemical markers of bone metabolism and found that bone formation markers revealed lower levels in non-unions, while resorption markers were rather similar as in normal healing. They suggest the use of these markers in addition to clinical and radiological parameters to predict delayed union.

Thus, non-union of fractures or bone defects is a clinical relevant issue that is currently addressed in clinical, experimental and laboratory research. Further understanding of the mechanisms and new diagnostic and therapeutic procedures will lead to a reduction of non-unions and better treatment options in the near future.

Compliance with ethical standards

Conflict of interest The author declares that he has no conflict of interest.

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