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Editorial

Absolute and relative stabilities for fracture fixation: the concept revisited

The concept of absolute and relative stabilities is well known in the orthopaedic trauma scenario. Absolute stability means anatomic reduction and interfragmentary compression with absence of fracture micromotion under physiological load. Relative stability means functional reduction (correction of alignment, rotation and length) in addition to motion control of the fractured fragments under physiological load [1–3]. The bone healing will differ according to the stability given to the fracture. Fixation with absolute stability heals primarily without callus, and the relative stability heals with callus formation.

Classically, the articular fractures and simple shaft fractures of the upper extremity were treated with absolute stability, whereas relative stability was indicated in shaft fractures of the lower extremity, with intramedullary nailing and metaphyseal or diaphyseal multifragmentary fractures with either nail or plate.

With the development of fracture fixation methods (minimally invasive osteosynthesis) and implants (locking plates), some fractures started to be treated in a different manner, not following the above principles, and showing high healing rates and good functional results. We aim to introduce a new concept of stability fixation, the "absolutive stability".

One of the examples is the articular fracture of the distal radius. With the advent of the volar locking plate, the articular fracture is reduced and fixed without any kind of interfragmentary compression of the articular fragments. The same situation occurs in the multifragmented fracture of the distal humerus, where the articular fragments are fixed not with lag screws, but with locking screws from the parallel plates.

In this scenario, the fracture is reduced with contact but not compressed with the lag screw, so it does not fulfil the requirements for absolute stability. On the other hand, fixation with the locking screws provides enough rigidity to allow bone healing without callus formation. If we try to classify this fixation according to the biomechanical principle, it's neither an absolute stability nor a relative stability. This is what we are proposing as the absolutive stability.

An example of the absolutive stability in the shaft area is the simple fracture of the distal tibia treated with a bridge locking plate. Bridging simple shaft fractures was against the principles, but it can work if the fracture is reduced with bone contact and the working length of the locking plate is short, meaning a more rigid fixation. Many articles have shown that fractures treated this way form a small callus. The reason for that is the stability given to the fracture is not a relative stability where a callus formation is expected. Rather, it is the mixture of absolute stability below the plate where the fracture is rigidly fixed (no callus formation) and a relative stability on the opposite side with some callus formation.

Most of the minimally invasive plate osteosyntheses of the metadiaphyseal fractures can be explained by the absolutive stability. They need a reduction with bone contact, and to achieve this, many different types of forceps, reduction clamps or plates were designed to assist the reduction [4,5]. Without the reduction with contact, the fixation usually fails because it increases the strain in the fracture site preventing the osteon from crossing the fracture line.

More recently, mini plates have started to be used as reduction tools. Anatomical reduction with provisional fracture fixation using mini plates also combines characteristics of absolute and relative stabilities. Mini plates are currently used not only for small bone fragment fixation in complex articular or metaphyseal fractures, but also for provisional reduction in diaphyseal fractures prior to a stronger construction [6].

Although the concept of stabilities for fracture fixation is applied worldwide, we recommend redefining this paradigm by including absolutive stability, the new terminology that combines absolute and relative stabilities.

For complex articular fractures, we advocate using absolutive nomenclature when anatomical reduction is achieved and interfragmentary compression is absent. As micromotion is allowed, we suggest this concept be expanded to extra-articular fractures treated with anatomical reduction without interfragmentary compression.

As techniques for fracture fixation have improved, complication rates have correspondingly diminished. Similarly, by introducing absolutive stability to the nomenclature, we believe the accuracy of information in scientific publications will improve.

Conflict of interest

The authors declare that there is no conflict of interest concerning the contents of this manuscript.

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