

Locking implants: polyaxial systems

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The information about poly-axial locking systems in veterinary medicine is rather scarce. The poly-axial system, applied via plate osteosynthesis, combines the advocated advantages of «conventional locking system» with the possibility of angulating the screws in relation to the plate, hence getting possible screw placement adjacent to articular surfaces, fractures (fissure) lines or other implants. Divergent or convergent locked screws further improve the pull out resistance of the entire construct, an interesting feature particularly in osteoporotic patients (it was already an advantage of locking screws versus non-locking screws). This feature has reduced the risk of subsidence in fractures of the metaphyseal areas. Yet, in a recent study, an insertion angle of 10° with the «PAX» system (Securos) affected negatively the push-out forces in comparison to 5 and 0°. Similarly, in uncomplicated fractures of the distal fibula or proximal humeral fractures in the elderly man, the polyaxial-locking plating did not reveal any advantage on the non-locking plating or non polyaxial implants respectively. In another very recent study, there was an average decrease of approximately 0.4 Nm screw-plate interface strength for every 1° increase in screw insertion angle. It is unknown if these differences are clinically relevant in actual fracture constructs. *As a matter of fact, the mechanical properties of an optimal construct, preventing failure of the montage but in the same time promoting bone healing is unknown!!* In the treatment of displaced proximal humerus fracture, again in man, eventhough the combination of angular stability with the possibility of variable polyaxial screw direction was regarded as a good concept for reduction and fixation, a significant lower rate of complications or better clinical outcome could not be found. Regarding the recommended number of screws, the conclusion seems to be the same as for conventional locking plates: the rate of implant complications increases with the number of screws used. The strength of polyaxial locking interfaces and mechanism of failure proved to be different among plates produced by different companies: highest bending moment was obtained at an insertion angle of 0 to 5° versus 10 to 15°, in function of the manufacturer.

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