INTRODUCTION

The basic principles of an internal fixation procedure using a conventional plate and screw system (compression method) are direct, anatomical reduction and stable internal fixation of the fracture. Wide exposure of the bone is usually necessary to gain access to and provide good visibility of the fracture zone to allow reduction and plate fixation to be performed. This procedure requires pre-contouring of the plate to match the anatomy of the bone. The screws are tightened to fix the plate onto the bone, which then compresses the plate onto the bone. The actual stability results from the friction between the plate and the bone.

Anatomical reduction of the fracture was the goal of conventional plating technique, but over time a technique for bridging plate osteosynthesis has been developed for multifragmentary shaft fractures that, thanks to a reduction of vascular damage to the bone, permits healing with callus formation, as seen after locked nailing. Since the damage to the soft tissues and the blood supply is less extensive, more rapid fracture healing can be achieved.

[Wagner M., 2003]

Conventional plate and screw osteosynthesis has proved to be very successful fixation. However, implant loosening is common in osteoporotic bone, due to screw toggling, whereas implant breakage can occur as a result of delayed healing or poor surgical technique.

Additionally, nonlocked plated and screws can :

1) *be inadequate in achieving fixation in osteopenic and pathologic bone,*
2) *lead to necrosis induced bone loss, which is a potential nidus for infection,*
3) *result in stress shielding, which weakens bone and increases the potential for refracture after device removal,*
4) *create an environment where lack of stability is conducive to delayed or non-union.*

[Kenneth A. Egol, et al 2004]

The clinical need for the development of locked plates arose from the failure of standard plate and screw constructs to meet the demands of minimally invasive and indirect bridging fixation, as well as failure of compression plating techniques to provide an environment favorable to secondary bone healing.

The newly developed, so-called locked internal fixators (e.g. PC-fix and Less Invasive Stabilization System LISS) consists of plate and screws systems where the screws are locked in the plate. This locking minimizes the compressive forces exerted by the plate on the bone.

*The development of the locked internal fixator method has been based on scientific insights into bone biology especially with reference to its blood supply. The basic locked internal fixation technique aims at flexible elastic fixation to initiate spontaneous healing, including its induction of callus formation. [**Wagner M., 2003**]*

LCP system has been developed to address the problems of loosening in osteoporotic bone using conventional plate and screw osteosynthesis. This system provides angular stability through the use of locking screws and allows the exploitation of different biomechanical principles, which should be carefully considered in each case.

The LCP system consists of a range of shaped plates with various numbers of especially designed combination holes. The unique design of these combination holes allows the system to be used both as a conventional compression plate and as a locked internal fixator; it also allows internal fixation with a combination of conventional and locking head screws. This particularly valuable in cases of epimetaphyseal fractures. This system therefore has a broad range of potential indications, including compression fixation of simple fractures and bridging of comminuted fractures.

[Gautier E., Sommer C., 2003]