# Minimally invasive plate osteosynthesis using systems with angular stability in complex fractures of the distal femur. Fashion or real advantages? Regenerative medicine as an option for bone regeneration

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## Introduction

Complex distal femoral fractures represent a challenge for orthopaedic surgeons. The disadvantages of classic surgery led to the development of new surgical techniques (minimally invasive plate osteosynthesis - MIPO and transarticular approach and retrograde plate osteosynthesis - TARPO) and new implants with angular stability (internal fixators).

## Aims

The purpose of this study is to present the preliminary results in treating the distal femoral fractures with plates with angular stability and to exhibit the advantages and differences between these efficient systems.

## Material and methods

The study included 22 fractures (4 type A2, 7 type A3, 6 type C2, and 5 type C3 AO). There were 2 periprosthetic knee fractures. The study included 4 open fractures: 2 - grade I, 1 grade II, and 1 grade IIIA (Gustilo). The authors used a Less Invasive Stabilization System (LISS) in 10 cases, Locked Compression Plate (LCP) with combi-holes in 6 cases, and plates with polyaxial stability in 6 cases. For extraarticular fractures, the plates were inserted through a minimally antero-lateral incision beneath the vastus lateralis (by means of an aiming device), after indirect, closed fracture reduction of the metaphysis and shaft area (MIPO technique). For articular fractures we have first performed a lateral parapatellar arthrotomy and reconstruction of the articular block (TARPO technique). Newer polyaxial locked plates were used in difficult type C3 distal femoral fractures due to some freedom in angulation of screws, prior to final screw plate sitting.

## Results and discussions

All fractures less one (with bone loss which required bone grafting after three months) healed within a mean time of 13 weeks (with no infections, implant breakage or secondary displacement),

These plates with angular stability represent the ideal treatment in difficult fractures with short distal fragment, osteoporotic fractures, fractures above knee

arthroplasties and some open fractures. The key to success for internal fixators are: correct/incorrect indications, the usage of the appropriate plates, proper fracture reduction before plate insertion and screw drilling, avoidance of the eccentric plates placement, full-weight bearing allowed when callus is seen in serial postoperative radiographs. The authors prefer the LCP system and a newer polyaxial locked plate due to their advantages of screw pathway adjustment.

## Conclusions

Close cooperation between orthopaedic surgeon, biomechanics specialist and the departments of cell biology and pathology, will contribute to the development of the ideal internal fixator and will sustain the future experimental investigations in order to elucidate the dynamic and coherent process of callus formation with these biological plates and techniques.

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