

Intramedullary polymer implant with angular stability for minimally invasive repair of pathological fractures

Patients with pathological fractures require quick stabilization for palliative care. This is necessary to achieve prompt pain reduction, early mobilization and simplified care, which in turn leads to improved quality of life.

The technique presented here is a minimally invasive surgical procedure for intramedullary stabilization of tubular bones. After creating a small skin incision, a balloon catheter will be inserted into the opened, reamed intramedullary canal. After proper reduction, the balloon will be filled with a liquid monomer, whereby the balloon will expand to adapt to the intramedullary contour. By applying blue light with a wavelength of 436 nm via a fiber optic cable within the balloon catheter, the monomer will be transformed within about 400 seconds to a hard polymer. After curing of the monomer, the implant can be locked with angular stability in any position and in any alignment. The sole purpose of the balloon is to hold the liquid monomer in position while it is hardening. This monomer compound has been used for many years in dentistry and has been approved for human use in 2008, and explicitly for use on the humerus in 2011. In all cases, a closed reduction will be used. The average procedure time is 41 minutes (33-51).

Until now, three patients (two women and one man) with a mean age of 68.6 years and a pathological fracture of the upper extremities were treated. Two patients had a fractures humerus shaft. They had breast cancer and prostate cancer, respectively. The third patient had a pathological forearm fracture, and the base primary tumor was a mammary carcinoma. The described technique provided quickly a stable fracture repair; physiotherapeutic therapy started on the first post-op day.

The individually customizable implant features high longitudinal and rotational stability. The material is completely radiolucent allowing unobstructed evaluation of the bone. Stability can be increased even further by angular stable insertion of screws.

Pathological fracture

Palliative situation

Intramedullary angular stable implant

Polymer