ISOLS/MSTS ABSTRACT N. 10761

A new radiotrasparent minimally invasive system to stabilize bone metastatic lesions in the upper limb.

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Background Patients with bone metastases are increasing in number because of a better survival and more efficient oncological treatments. Surgery in bone metastases is indicated for cases of impending and pathological fractures in long bone and pelvic girdle metastases. The cost impact in the different National Health Systems is becoming a real issue. [1,2] Elderly people are frequently affected and their comorbidities require a quick and minimally invasive treatment. From a biomechanical point of view, bones in the upper limb need to be stabilized mainly for torsional forces because direct and bending loads are less relevant. [3] IlluminOss Photodynamic Bone Stabilization System (IlluminOss Medical GmbH, Germany) is a percutaneous, patient specific, fracture stabilization system. This procedure incorporates the use of a thin polyethylene terephthalate (Dacron) walled balloon that is inserted into the intramedullary canal, and then infused with a liquid monomer, conforming to the shape of the patients specific anatomy. The monomer filled balloon is then cured in-situ using a fiber optic light source resulting in a stable and radiotrasparent implant.

Questions/Purposes Is it possible to internally stabilize long bones in the upper limb with a minimally invasive technique? Does it guarantee torsional stability? Is it a cost effective procedure?

Patients and Methods We treated 7 patients with IlluminOss Photodynamic Bone Stabilization System for bone metastases in the upper limb. Mean age was 57,7 years (range 35 - 77). The primary tumour was: hemangioendothelioma, multiple myeloma (2), lung adenocarcinoma (2), prostate adenocarcinoma, and invasive ductal breast carcinoma. The lesion was in the humerus (6 cases) and in the radius (1). The mean expected survival before surgery was lower than 1 year. The ASA grade risk was 4. Complication rate (fracture stability, symptomatic non-union/instability) and pain control were evaluated. Costs and surgical times were compared to common nails and plating systems.

Results One complication occurred: an intraoperative displaced fracture in a distal humeral lesion that required an internal fixation with plate and screws. Pain control was achieved within one week postoperative (VAS< 3). No other complications were observed and particularly no symptomatic instability at fracture site (follow up range 4-10 months). The cost of IlluminOss system is comparable to common plating systems and less than most commonly used intramedullary nails. The surgical time is competitive with an average of 60 minutes (including 15 minutes time of polymerization).

Conclusions IlluminOss is a reliable system to stabilize pathological fractures and lytic lesions in the upper limb. No intramedullary devices are to date available for the radial and ulnar shaft. IlluminOss system is radiotrasparent and allows placement of locking screws anywhere along the length of the implant. Even if it is a good solution for diaphyseal bone, meta-epiphyseal lesions are at high fracture risk with this technique and often require an additional stabilization with plate and screws. Biomechanical studies on torsional resistance are on going. Currently the reaming of the canal before implanting the IlluminOss system is mandatory but further developments to avoid this passage in order to execute it in the radiologic room under local anesthesia are under experimentation. Complication rate, surgical time and costs make IlluminOss system one of the options in the surgical management of the diaphyseal metastases of the upper limb. Long term results are desirable to consider the present technique for common trauma patients or better prognosis oncology patients.

References

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