Case Report

Supracondylar femur fracture repair using IlluminOss in a patient with Osteogenesis Imperfecta type 4

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1. Introduction

The IlluminOss system consists of a light-activated polymer within an inflatable balloon catheter and is used as an intramedullary implant in the treatment of fractures. The IlluminOss system is a minimal invasive surgical technique and is approved in 2009 for treatment of non-to low-weight bearing bones. Its use has been described in patients with osteoporotic bone, but not in patients with Osteogenesis Imperfecta.

2. Patient history and diagnosis

A case study is presented of a 59-year old female with Osteogenesis Imperfecta type 4, who suffered a low energy fall resulting in multiple fractures. Ancillary findings showed the patient had rheumatoid arthritis, epilepsy and morbid obesity. Due to her comorbidities she is wheelchair bound for over 20 years.

At presentation, X-rays showed an open supracondylar femur fracture right-sided (Fig. 1), proximal humeral fracture also right-sided and a proximal combined tibial and fibular fracture left- and right-sided and an acetabular fracture right-sided. Computed tomography (CT) could not be performed, because of her morbid obesity.

3. Treatment

Initial treatment consisted of closed reduction and plaster cast to treat the supracondylar femur fracture, because she was inoperable due to cardiac and pulmonary instability. Unfortunately this conservative treatment was not sufficient while the fracture remained dislocated and caused severe pain. Therefore open reduction and internal fixation using an IlluminOss implant was planned by the time that the patient was stabilized. The proximal humeral fracture was treated with thorax fixation and the combined tibial and fibular fractures were treated conservatively with plaster cast immobilization.

4. Procedure

General anesthesia was administered prior to incision. A lateral

incision was made at the fracture dislocation site in the femur. Reposition was performed using K-wire fixation. Two balloon catheters were introduced in the intramedullary canal, one from medial and one from lateral. A biocompatible monomer was then infused into the balloon to fit to the patients intramedullary canal. The light source was used to activate the monomer. The implant now provides longitudinal strength and rotational stability. X-rays showed the right position of the implant (Fig. 2) Post-operatively the femur was immobilized during 6 weeks using a long leg splint.

5. Discussion

Osteogenesis imperfecta is an inherited connective tissue disorder and is caused by a quantitative or qualitative defect in collagen synthesis, which causes bone fragility. Research to describe fracture treatment in osteogenesis imperfecta has rarely been published. Antoniazzi et al¹ stated that, despite high complication rates, intramedullary surgery has proven to be the most successful method for correcting fractures of long bones in patients with OI.

Studies describing the treatment of osteoporotic fractures are more common. Operative treatment is the option of first choice to maintain or restore distal femoral alignment and thereby preserve knee function (Jahangir et al² March/April 2010), but surgical repair in osteoporotic long bone fractures is difficult and standard fracture repair techniques are limited due to diminished bone density and therefore inadequate anchoring of screws and implant.³ Furthermore, obese patients in particular are at high risk for healing complications as infections and non-unions.⁴ Considering the described literature, a minimal invasive, intramedullary surgical approach was preferred in our patient, because of the poor bone quality and to prevent wound infections.

Over the past decades attempts have been made to overcome difficulties with surgical repair of osteoporotic long bone fractures. A recently developed technique is the IlluminOss implant, which offers a minimal invasive percutaneous intramedullary technique to stabilize fractures. This technique has been described for upper and lower extremity fractures with excellent clinical results.⁵ Despite these excellent clinical results, research has to be interpreted carefully, because independent studies regarding the IlluminOss implant are rarely

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Fig. 1. In patient history after Xrays showed an supracondylar femur fracture right sided.

Fig. 2. In procedure after: x-rays showed the right position of the implant.

Fig. 3. In follow-up after The x-ray showed the femoral fracture with illuminoss implant.

available.

6. Follow-up

At follow-up, 6 months after surgery, the patient's condition had improved in terms of pain. The X-ray showed the femoral fracture with IlluminOss implant (Fig. 3). The femur fragments were unfortunately dislocated but there were signs of consolidation of the fracture as well. Since the patient had no pain and was bedridden, no further therapy was advised.

7. Conclusion

According to this case-report, the IlluminOss implant should not be

the treatment option of choice in fixating a lower-extremity fracture in low-weightbearing patients with Osteogenesis Imperfecta.

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