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Treating patella fractures with a locking patella plate – first clinical results

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KEYWORDS

Locking patella plate
Patella fracture
Osteosynthesis
Clinical outcome
Activities of daily living

ABSTRACT

The standard treatment for patella fractures is tension band wiring. However, with tension band wiring anatomical reduction and rigid fixation can be challenging and the clinical outcome after patella fracture is often not satisfying. The purpose of this prospective clinical observation was to evaluate the clinical outcome in patients with patella fractures treated with an angular stable patella plate. Between 2011 and 2015 a total of 67 patients were treated with an angular stable patella plate. Outcome in these patients was evaluated by the Knee Outcome Survey Activities of Daily Living Scale (KOS-ADL) and range of motion of the knee joint was assessed. Complete follow up was obtained for 35 patients. In these patients, we found one implant-related complication. None of the patients reported any deficits in extension capabilities. The flexion was on average 127° (SD 21°). The patients classified the function of their knee in daily life on average with 77% (SD 24%) in comparison to their function before the trauma. Only kneeling or squatting was a problem in some patients. In conclusion, angular stable patella plating appears to be a promising alternative treatment for patella fractures. The patella plate provides increased mechanical stability for fracture fixation which appeared to result in a reduction of complications and improvement of functional outcome compared to tension band wiring. Especially patients with a multi-part or comminuted fracture or with osteoporotic bone are likely to benefit from the stability provided by the plate and the locking screws.

Introduction

The patella is the largest sesamoid bone in the human body. It increases the effectiveness of the quadriceps muscle and enables flexion of the knee which requires substantial forces in load bearing situations like squatting or kneeling [1–3]. Patella fractures are not unusual accounting for 0.5% to 1.5% of all skeletal injuries [4]. Due to the functional importance of the patella, a patella fracture requires accurate reduction and rigid fixation. Only stable fracture types without or with a minimal dislocation can be treated non-operatively. Dislocations of more than 2 mm and comminuted fractures are considered as strong indications for an operative treatment [3,5].

Tension band wiring has been the standard treatment of patella fractures for a long time. The principle of tension band wiring is the transformation of tension into pressure forces to achieve dynamic interfragmentary compression. However, under cyclic loading particularly in knee extension fragmentary compression is neutralized and the fracture might gap [6]. In addition, tension band wiring often leads to loosening of the wires, dislocation of the fracture and failure of the osteosynthesis resulting in knee stiffness and post-traumatic osteoarthritis [4,7,8]. Transverse patella fractures have recently been treated with interfragmentary screw fixation. Another possibility is the combination of screw fixation and a wire looped over the screws. Although these techniques grant a stable osteosynthesis, the anatomical reduction of the fracture may be demanding and the outcome often is poor, especially in comminuted fractures. Thirty to fifty percent reported residual pain and 15–30% reduced function [3]. Therefore, complications like knee stiffness and post-traumatic osteoarthritis remain a problem after patella fractures [3,7].

An alternative approach avoiding some of these complications is the application of bone plating for patella fractures [9]. Plating of the patella became feasible with the development of the locked plating technique. In 2006, Matejcic et al. evaluated a basket plate in the treatment of comminuted fractures of the distal pole of the patella and showed good results [10]. Recently, biomechanical studies have demonstrated the feasibility of using locked plating for the fixation of certain types of patella fractures with or without the additional use of cable wires [11,12]. In biomechanical tests Wurm et al. showed a more stable fixation of patella fractures when using a locking patella plate in comparison to tension band wiring [13].

The purpose of this prospective clinical observation was to evaluate the clinical outcome in patients with patella fractures treated with an angular stable patella plate.

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Methods

For this observational study consecutive patients with fractures of the patella were recruited at our institution. Inclusion criteria were: patients with dislocated fracture of the patella with indication for operative treatment aged between 16 and 80 years. Exclusion criteria were: simple, non-dislocated fracture of the patella with indication for conservative treatment, multiple injuries at the fractured leg, severe brain injury, poliomyelitis.

The locking patella plate (Arthrex, Munich, Germany) is available in two different specifications: the Arrowplate and the Starplate (Fig. 1). Both plates are anatomically shaped and provide unidirectional angular-stability as well as suture holes for the fixation of soft tissue to the plate. The Arrowplate is primarily indicated for simple two- or three-part fractures whereas more comminuted fractures can be stabilized with the Starplate (Fig. 2).

Fig. 1. Angular stable plates (Arrowplate (left), Starplate (right)) for the fixation of patella fractures (Arthrex, Munich, Germany).

For the surgical procedure (Fig. 3) patients were positioned supine. A longitudinal anterior skin incision was performed, starting just proximal to the superior pole of the patella, ending at the insertion of the patella tendon. After surgical preparation an arthrotomy was performed for flushing out the hemarthros and for digital palpation of the retropatellar joint surface. Then the patella was reduced anatomically using reduction forceps. If required, the fracture was first stabilized using a cannulated lag screw (ASNIS, Stryker Trauma, Selzach, CH). Then the patella plate was placed at the front of the patella and fixed with unicortical locking screws. The number of screws depended on the fracture pattern and comminution. Adequate reduction and fixation were contolled by fluoroscopy before the wound was closed. Postoperatively, knee was locked in extension using a leg brace. Patients were mobilized by weight bearing as tolerated with unrestricted range-of-motion exercises starting at week 2.

Follow up assessment was performed at least 7 months after the index surgery. Patients were evaluated by the Knee Outcome Survey Activities of Daily Living Scale (KOS-ADL). The KOS-ADL is a reliable, valid, and responsive instrument for the assessment of functional limitations at the knee joint [14], and can easily be answered by patients on their own. Additionally the range of motion of the knee joint in flexion was assessed during patient visits or by questionnaire. A descriptive analysis describing the outcome was performed using Excel (Microsoft, Redmond, WA, US).

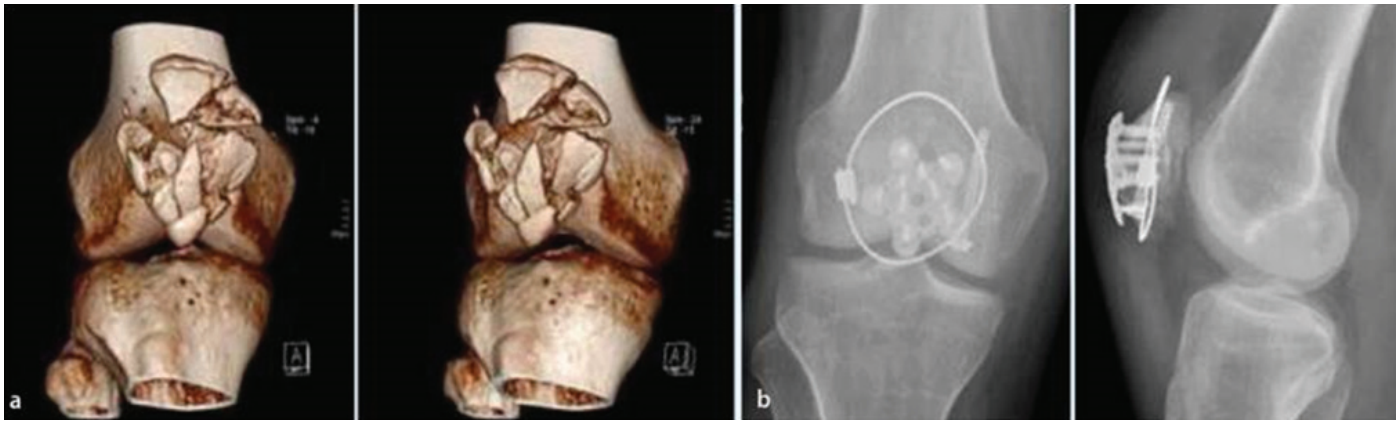

Fig. 2. Comminuted fracture of the patella in a 49-year-old male after a rollerblade accident. Treatment was performed with a Starplate, and additional screw and cerclage.

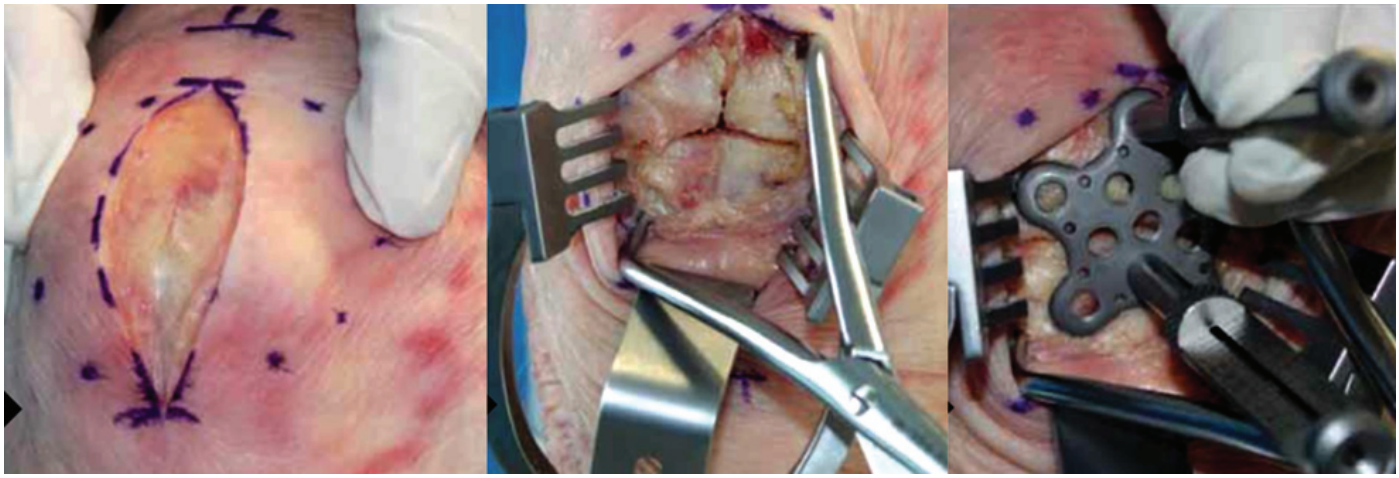

Fig 3. operative technique: A medial anterior incision is performed from just proximal to the superior pole of the patella ending at the insertion of the patella tendon. Then the patella is reducted anatomically using a reduction forceps. The patella plate is placed at the front of the patella and fixed with unicortical locking screws.