CLINICAL REPORT

Simultaneous bilateral femoral neck fractures secondary to epileptic seizures: Treatment by bilateral total hip arthroplasty

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Epilepsy; Fracture; Bilateral femoral neck fracture; Seizures; Ceramic bearing surfaces

Summary
Simultaneous bilateral femoral neck fracture following an epileptic seizure attack are rare. Open reduction and internal fixation remains the most used therapeutic option. Arthroplasty, carrying a high risk of dislocation is less often recommended. We report the favourable evolution of a 49-year-old man who benefited from a single stage bilateral total hip arthroplasty operation for his simultaneous bilateral, femoral neck fractures secondary to a generalized seizure. This nonconsensual choice, in this case, was justified on multiple grounds: surgical care delay longer than 48 hours, substantial bone displacement, borderline bone quality, adequate antiepileptic treatment efficacy and tolerance. A ceramic-on-ceramic bearing surfaces couple, a large-diameter head and a cementless implantation design together should be able to provide an acceptable longevity in a young and active patient.

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Introduction

Generalized seizures may be complicated by dislocations and/or proximal fractures of the limbs. These lesions may be consecutive to muscle contractions during tonic-clonic seizures [1–9] or electrical shocks [10]. Hypocalcemic convulsions [11] or cerebrovascular accidents [12] may similarly evoke such lesions. Bilateral femoral neck fractures, occurring simultaneously in epileptic patients, have been described in the literature [1,2,4,5]. Osteosynthesis is the preferential therapeutic choice of surgeons. Total Hip Arthroplasty (THA) in such indication carries an elevated risk of instability when the neurological terrain is taken into account. We report the case of a 49-year-old man treated by bilateral THA in one stage procedure to treat bilateral and simultaneous neck fractures of the femur after epileptic seizure. This clinical fact motivated us to discuss and explain the reasons for this nonconsensual therapeutic choice.

Observation

A man of 49 years, with a history of idiopathic epilepsy, was admitted to our department, for neck fractures of both femurs. The patient was carried to our hospital by...
his entourage, two days after tonic-clonic seizure. He remained bedridden at home since the seizure. He presented idiopathic epilepsy known since 5 years, and was treated by Gabapentine (Neurontin®). Since 5 years, no secondary treatment effects appeared, and no new seizure occurred. The accident was encountered in the context of antiepileptic treatment interruption. During admission, clinical examination permitted the identification of the two lower limb deformations in external adduction-rotation. No difference in limb length was noted, the lesions being bilateral. Biological tests, particularly for calcemia, were normal. Antero-Posterior (AP) radiography of the pelvis showed neck fractures of both femurs with type IV displacement according to the Garden classification (Fig. 1). A diagnostic delay exceeding 48 hours and displacement evoked a high risk of vascular necrosis of the femoral heads. We decided to perform bilateral THA in a single operation (Fig. 2). We chose cementless prostheses, coupled with ceramic-on-ceramic bearing, with 32 mm diameter heads by a posterolateral approach (Aura II™ stem, Eternity™ cup, Biomet, Valence, France). Anatomo-pathological examination of the parts did not show bone structure anomalies, and biological tests disclosed no abnormal phosphocalcic metabolism. The patient resumed Gabapentine treatment with good compliance. At last 12-month follow-up, he did not present new comitial seizure. His Merle d’Aubigné (PMA) hip rating was 17 on the right and left, and his Parker score was 9.

Discussion

Twenty cases of bilateral femur neck fractures after convulsive seizure have been reported in the literature since 1970 [13]. Most often, they are secondary seizures (cerebral metastases or eclampsia, which are metabolic or iatrogenic, due to electroconvulsive therapy) but more infrequently primary epileptic seizures. The mechanism of these lesions was discussed by Pearson and Hargadon in 1962 [9], then by Remec and Evarts in 1983 [8]. According to these authors, violent contraction of the periarticular muscles, and particularly the pelvic-trochanteric muscles during the seizure, is the principle cause of these fractures. Cases of concomitant, associated fractures, especially at the level of the proximal humerus [2,7,10,13] and acetabulum [13,14], can be found in the literature.

The high risk of aseptic osteonecrosis of the femoral heads compelled us to perform bilateral hip arthroplasty in a single operation, despite the elevated threat of prosthetic dislocation. The influence of THA dislocations on femoral neck fractures is, in fact, more significant than that observed in arthroplasties for osteoarthritis [15]. The risk is increased in the event of iterative, repeated comitial seizure. The young age of our patient (49 years) and his active lifestyle led us to choose a ceramic-on-ceramic bearing type that has a longer lifespan without osteolysis or wear [16] than a more stable dual mobility cup that has a higher risk of aseptic unsealing in young patients [17]. The choice of a cementless cup and stem follows the same principle of longevity. In this case, diameter size of 32 mm allowed better behavior with respect to prosthetic dislocation, compared to a smaller diameter.

Many studies have emphasized that the risk of fracture in epileptic patients has increased by two- to six-fold [18]. Moreover, it has been shown that certain antiepileptics augment bone turnover, reducing bone mineral density which elevates the risk of fracture [19]. Pack [20] recommends vitamin D and calcium supplementation as well as control of bone mineral density in patients taking a particularly long course of antiepileptic treatment, especially if they present other bone pathologies. This physiological bone aspect is an additional unfavorable argument against the osteosynthesis of femur neck fractures with major displacement in treated epileptic patients. Bone histology in our patient was normal, although bone densitometry (DEXA) was not investigated.

Conclusion

The major vascular risk of aseptic femoral head necrosis is a determining factor in the choice of total arthroplasty for femoral neck fractures, even if the patient is epileptic and young. The choice of implant may thus have an influence on
the bearing with a weaker coefficient of wear, cementless, and a large-diameter femoral head.

**Conflicts of interest**

None.

**References**