

# Severe anaemia and subcapital femur fracture in a patient with Left Ventricular Assist Device Heart Mate II: the cardiologist's management of this rare patient

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The use of Left Ventricular Assist Devices (LVADs) has increased over the last decade because of the lack of healthy donor hearts. In this report we describe for the first time a patient with an LVAD Heart Mate II (HM II) implanted 6 months before admission, who initially suffered from severe anaemia and later on underwent a successful bipolar hip replacement owing to subcapital fracture of the right femur. The patient was managed successfully by a team approach, which included a cardiologist, anaesthesiologist, orthopaedic surgeon, and LVAD technician.

**Keywords** Left Ventricular Assist Device Heart Mate II • Severe anaemia • Femur fracture

## Introduction

Left Ventricular Assist Devices (LVADs) are increasingly used in patients suffering from end-stage heart failure (HF) who remain symptomatic despite optimal medical treatment. The Randomized Evaluation of Mechanical Assistance for the Treatment of Congestive Heart Failure (REMATCH) trial showed that LVAD patients have improved their quality of life when compared with those treated with optimal medical treatment and better survival (52% vs. 25% in the medically treated group) at 1 year.<sup>1</sup> As the long-term use of implantable devices grows, general surgical and non-surgical problems are becoming more common in this particular pool of patients. In this case report we describe our experience with one such patient.

## Case report

A 59-year-old (weight 68 kg, height 165 cm) male patient with LVAD Heart Mate II (HM II) implanted 6 months ago as destination

therapy, presented with severe anaemia of unknown origin. Later, when recovering from anaemia, the patient suffered a subcapital fracture of the right femur because of syncope after an episode of sustained ventricular tachycardia (VT) that was successfully converted by his implantable cardioverter defibrillator (ICD). The patient had a medical history of anterior myocardial infarction in 1998, percutaneous coronary intervention to the left anterior descending artery in 2002, and an ICD implanted in 2007. The patient had exhibited New York Heart Association class III symptoms since 2005 and had deteriorated during the last year with many episodes of acute decompensation requiring inotropic support.

After LVAD implantation, the patient's symptoms of dyspnoea and fatigue improved, and he required only routine follow-up visits to the outpatient HF clinic for clinical and laboratory evaluation. At the last visit, he reported feelings of slight dizziness and weakness. Clinical examination was quite normal. Heart rate was 90 b.p.m., but blood pressure could not be measured owing to non-pulsatile mechanical support.

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Laboratory tests revealed haemoglobin (Hb) 3 g/dL, haematocrit (Ht) 13%, WBC 9440/ $\mu$ L, serum urea 67 mg%, serum creatinine 1.4 mg%, and N-terminal pro-brain natriuretic peptide 550 pg/mL. The patient was admitted to the intensive cardiac care unit and his antithrombotic regimen [including acetylsalicylate (ASA) and coumarin] was discontinued. In order to avoid thrombo-embolic events, intravenous (i.v.) unfractionated heparin was initiated, with a target activated partial thromboplastin time of 50 s, taking into consideration the fact that the incidence of thrombo-embolism ranges between 10% and 30% in this pool of patients.<sup>2</sup>

The patient was transfused and endoscopy of the upper gastrointestinal tract revealed disseminated haemorrhagic gastritis as the cause of his severe anaemia owing to the combination of ASA and coumarin he was receiving for anticoagulation. After stabilization of Ht and Hb, i.v. heparin was replaced by low molecular-weight heparin (LMWH, enoxaparin 1 mg/kg b.i.d.), with close monitoring of anti-Xa.

Later on when mobilization was started, the patient suffered from a subcapital fracture of the right femur (Figure 1). The patient underwent surgery 3 days after the event when anticoagulant parameters had been optimized. LMWH was stopped on the day of the operation, an arterial line in the left radial artery, and a right jugular venous catheter were used for haemodynamic monitoring. The arterial pressure recorded by invasive monitoring was 85/60 mmHg (mean 68 mmHg) and heart rate of 75 b.p.m. Before inducing general anaesthesia, the patient received colloid solution (2000 mL Voluven), which increased his blood pressure to 120/80 mmHg and uneventful tracheal intubation was realized. The orthopaedic surgeon performed a bipolar hip replacement.<sup>3</sup>

The patient started anticoagulation with LMWH 12 h after surgery and restarted his HF medication. Gradual initiation of oral coumarin was achieved on the third post-operative day, after removal of the hip drain, with a target international normalized ratio of 2.0–2.5. ICD interrogation was successful before hospital discharge.

## Discussion

The syndrome of HF is a leading cause of death in developed countries.<sup>5</sup> End-stage HF with associated long-term hospitalizations



**Figure 1** X-ray showing subcapital fracture of the right femur.

is a devastating reality, which has become more common in recent years because of the paucity of donor hearts and the decreasing number of heart transplantations. However, mechanical unloading of the heart combined with appropriate drug treatment can prevent and even reverse LV remodelling; thus, nowadays it is becoming a common approach to therapy in these patients.<sup>4</sup>

The peri-operative management of a patient with an LVAD requires a team approach on a 24 h basis. The cardiac-surgeon, cardiologist, nephrologist, anaesthesiologist, skilled nurses, and LVAD technician must all collaborate to achieve a successful outcome in the early post-operative period. Close follow-up of these patients is essential to facilitate early detection of any potential problems.

It is of interest that the presented patient was admitted to the hospital with a Hb of 3 g/dL and Ht of 13%, but hardly had any symptoms, apart from some mild dizziness and fatigue. To our knowledge, this is the first case reported in the literature of an ambulatory patient with LVAD implantation who could tolerate extremely severe anaemia owing to gastrointestinal bleeding, with no problems from the device or his circulatory status. Of note, while the anaemia was improved by bleeding control and several blood pack transfusions, the patient had an additional traumatic experience because of a subcapital femoral fracture.

HF is a major risk for osteoporosis and consequently orthopaedic fracture;<sup>6</sup> however, no evidence exists about the effects of LVADs on bone metabolism in HF patients in general. In our patient, the orthopaedic operation and the post-operative period were uneventful, the patient gradually recovered and was discharged from the hospital in a good condition.

However, the critical question is how should we manage such a patient who needs anti-coagulation treatment for the rest of his life but who suffered a previously severe gastro-intestinal bleeding. Although clinical experience is limited, we followed common practice by discontinuing oral anticoagulants and antiplatelet agents before surgery and starting with i.v. unfractionated heparin.

Usually, oral anticoagulation is started at the earliest post-operative time in order to avoid serious thrombo-embolic events, which can occur in 10–30% of cases. In our case, LMWH was initiated 12 h post-operatively, while oral anticoagulation was started when the hip drain had been removed.

## Conclusion

Long-term survival of patients receiving LVADs may be complicated by a series of extra-cardiac diseases, many of which could require surgical intervention. Non-cardiac surgery in this pool of patients is no longer a myth.<sup>7</sup> Acquired knowledge and the exchange of personal experience will further improve the prognosis and final outcome in this cohort of patients who may well tolerate various co-morbidities such as severe anaemia or extra-cardiac surgery.

**Conflict of interest:** none declared.

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