

Clinical case / Cas clinique

# Rehabilitation of a hemiplegic patient with cardiac assistive device

## *Rééducation d'un patient hémiplégique porteur d'une assistance ventriculaire gauche*

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### Abstract

**Introduction.** – Possible admission to a PRM unit of a hemiplegic patient equipped with a left ventricular assistance device (LVAD) may constitute a cause for concern. We are reporting our observation on the subject.

**Observation.** – A 30-year-old hemiplegic patient presented with left hemiparesis secondary to a right middle cerebral artery (MCA) ischemic stroke having occurred during cardiopulmonary arrest. Persistence of major left ventricle dysfunction necessitated installation on 8 November 2011 of a mono-ventricular HEART-MATE II assistive device. Possible later recourse to cardiac transplantation would depend on clinical development. When admitted to a PRM unit on 18 January 2012, the patient presented with left hemiparesis and cognitive disorders. Virtually all members of the attendant medical and paramedical team were given instruction on the functioning of electrical power assistance systems. In spite of the complexity of the logistics, and notwithstanding the difficulty of managing potentially worrisome medical problems, multidisciplinary rehabilitation efforts were successful. The patient's improved condition led to the decision to undertake heart transplantation, which was carried out on 27 October 2012.

**Discussion and conclusion.** – This observation illustrates the undeniable role of PRM in decision-making and, more generally, in the opportunities that may arise in sensitive and challenging situations.

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**Keywords:** Hemiparesis; Ventricular assistance; Multidisciplinary rehabilitation; Heart transplant

### Résumé

**Introduction.** – L'éventualité d'admettre un patient hémiplégique porteur d'une assistance ventriculaire gauche embarquée en service de MPR peut inquiéter. Nous en rapportons l'observation.

**Observation.** – Un patient âgé de 30 ans présentait une hémiplégie gauche secondaire à un infarctus sylvien droit survenu au décours d'un arrêt cardiorespiratoire. En raison de la persistance d'une dysfonction majeure du ventricule gauche, l'implantation d'une assistance mono-ventriculaire gauche de type HEART-MATE II a été effectuée le 8 novembre 2011. L'éventuel accès à une greffe cardiaque était suspendu à l'évolution. À son admission en MPR le 18 janvier 2012 le patient présente une hémiparésie gauche et des troubles cognitifs. L'essentiel de l'équipe médicale et paramédicale a été formé au fonctionnement de l'assistance à alimentation électrique. Malgré l'aspect logistique, la complexité dans la gestion des problèmes médicaux et l'inquiétude initiale que cela a pu susciter au sein de l'équipe, une rééducation multidisciplinaire a pu être menée à bien. L'évolution de l'état du patient a contribué à la décision d'une greffe cardiaque et celle-ci a eu lieu le 27 octobre 2012.

**Discussion et conclusion.** – Cette observation illustre la place indiscutable de la MPR dans des prises de décisions et dans les chances qui peuvent être offertes dans certaines situations délicates.

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**Mots clés :** Hémiparésie ; Assistance ventriculaire ; Rééducation pluridisciplinaire ; Greffe cardiaque

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## 1. English version

### 1.1. Introduction

Ventricular assistance is a form of therapy that is currently widely used as a means of mitigating cardiac insufficiency, whether it be temporary, prior to a heart transplant, or permanent. To date, approximately 10,000 left ventricular assistance devices (LVAD) have been installed in the world taken as a whole, including 1000 in France and 82 in Europe in 2011.

We are reporting here on our observation of a hemiplegic patient equipped with this type of apparatus. Possible later recourse to cardiac transplantation would depend on clinical development. Hospital objectives consequently consisted not only in his recovering maximal autonomy, but also in his acquiring eligibility for a heart transplant.

### 1.2. Observation

On 9 October 2011 Mr. G., 30, single, a night watchman, suffered refractory cardiopulmonary arrest (no flow: 0 minute; low flow: 60 minutes) due to anterior myocardial infarction. He received an angioplasty with installation of a metallic stent on the anterior interventricular artery (AIA) and two stents on the right coronary artery. Left ventricular ejection fraction (LVEF) was lower than 20%. On cessation of sedation, left hemiplegia caused by right middle cerebral artery infarct was discovered. Tracheotomy was necessary. Persistent major dysfunction of the left ventricle led to installation on 8 November 2011 of a left mono-ventricular HEART-MATE II assistive device (LVAD). In order to function, the apparatus had to receive a permanent power supply originating in either two batteries or the local electrical grid. When admitted to a PRM unit on 18 January 2012, it was essentially for the following reasons that Mr. G. had not been selected as a heart transplant candidate: He presented with predominantly brachiofacial left hemiparesis, generalized hypoesthesia of the left hemicorpus, temporo-spatial disorientation, psychomotor retardation, attentional and memory disorders, dysexecutive syndrome and left visuospatial neglect. He was using a tracheostomy tube and receiving mixed texture oral nutrition, and did not suffer from bladder or bowel dysfunction. Supervised walking was possible. On admission, his functional independence measure (FIM) was 57/126.

During meetings with a representative of the LVAD manufacturer, virtually all members of the medical and paramedical team, including members of the night shift, were given instructions on the functioning of the electrically powered LVAD and on the manipulations through which power could be transferred from the electrical grid to batteries. Nurses were entrusted with responsibility for this series of gestures, which were necessary in view of rehabilitation and ambulation. Information sheets and lists of precautions to take were placed in the patient's room, as were the phone numbers to be dialed in case of emergency. Prior to the admission of Mr. G., the medical staff had been instructed on how to proceed with the power transfer.

In spite of the logistical complexity (transfer of power to the batteries in the morning and back to the grid at the end of the day), and notwithstanding the initial worries of the teams, they managed to adapt to an unusual situation, and their multidisciplinary rehabilitation efforts were successful. No complication was related to the apparatus, but an infection of the abdominal orifice constituting the cable entry point was discovered in the context of a persistent infectious syndrome and necessitated surgical drainage as well as use of vacuum assisted closure (VAC) for 3 weeks. Only on 11 May 2012 was the tracheostomy tube withdrawn on account of granuloma necessitating first local, and then surgical treatment.

Mr. G. benefited from rehabilitation consisting in physiotherapy, occupational therapy and speech therapy according to the methods usually applied for a patient recovering from a stroke. While he did not carry out a full-scale and structured cardiac retraining program similar to the one that was recently described in other patients equipped with a LVAD [1], effort retraining was nevertheless progressively given in accordance with his degree of tolerance. In conjunction with the cardiologist and given the fact that blood pressure and pulse rate were not reliable indicators, perception of tolerance was based on the occurrence of sweating. In his physiotherapy sessions, Mr. G. engaged in articulation flexing and motor skill recovery; he also counteracted spasticity and gradually readapted himself to effort through use of a cyclometer for his lower limbs and a cycle ergometer; he also ambulated on different surfaces and, towards the end of his hospital stay, walked with steadily increasing velocity on a treadmill. On arrival at the PRM unit his walking perimeter had been limited to 25 m; prior to the heart transplant, it had become unlimited. Since it remained possible that there would be no transplant, technical support had been drawn up and tested with the aim of rendering the patient autonomous with regard to the manipulations needed to transfer LVAD power supply to the batteries. However, this type of assistance had to be given up, partially on account of the non-functionality of his paralyzed upper limb, and partially due to the persistence of a number of neuropsychological disorders associating slight slackening of the pace, difficulty remaining attentive during complex tasks, working memory disorder and some degree of visuospatial neglect.

Even though they were not major, the preceding neuropsychological disorders did not allow Mr. G. to achieve autonomy in manipulation and management of his ventricular assistance apparatus. On the other hand, autonomy in walking and in the basic activities of daily life was reacquired. On 1 October 2012, his FIM stood at 109/126. A return home was nonetheless totally impractical as long as the patient was carrying a LVAD, of which the use would have necessitated permanent human assistance on account of his neuropsychological disorders. With this in mind, the satisfactory medical condition of the patient, his age and his wishes represented arguments in favor of his eligibility for a heart transplant, which at that point constituted the one means of enabling him to regain actual autonomy. And so, on 27 October 2012, Mr. G. received a heart transplant. The aftermath of the surgery was marked by acute

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