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*Case Report*

# Guillain-Barré syndrome after microvascular decompression for the treatment of cranial nerve diseases: a case report

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**Abstract:** A case of the Guillain-Barré syndrome (GBS) occurring after microvascular decompression for the treatment of cranial nerve diseases is presented. Although the Guillain-Barré syndrome has been reported after surgical procedures, our case is the first case that can be documented after microvascular decompression surgery in the literature. The exact pathophysiological reasons of the syndrome are still unknown. However, the most acceptable hypothesis for the association between GBS and surgery would be the transient immunosuppressed after surgery, rather than the surgery itself, could increase the risk of infections and also the cause of GBS. Moreover, potentially exogenous infections can induce the onset of GBS. The GBS may be an easily overlooked neurological complication, which may be very rarely encountered after MVD surgery. Some clinical symptoms like four limbs paresis, swallowing difficulties or respiratory failure must alert the surgeons. A CSF analysis and electromyography is necessary.

**Keywords:** Guillain-Barré syndrome, microvascular decompression, cranial nerve diseases

## Introduction

Guillain-Barré syndrome (GBS) is an acute demyelinating, monophasic polyneuropathy based on an autoimmune attack on peripheral nervous system, and it is the most common cause of acute neuromuscular paralysis [1]. The GBS is characterized by acute reflexes paralysis with albuminocytologic dissociation (high levels of protein in the cerebrospinal fluid and normal cell counts), which was described in 1916 firstly [2]. The diagnosis of GBS demands both clinical findings and laboratory ancillary tests, including cerebrospinal fluid (CSF) analysis and electromyography (EMG). GBS has been considered as a post-infectious, immune-mediated procedure. Two thirds of these infections are typically preceded by symptoms of upper respiratory tract infections or intestinal infections [3]. In the literature it has been described as following a viral infection, which produces a characteristic mononuclear cell infiltrate [4]. However, there have been reported of GBS following surgeries without any history of infectious symptoms [5]. Evidence of GBS following surgery is unknown till now. It has rarely been reported in the postoperative period and also without clear previous infection. GBS after microvascular decompression (MVD) for the treatment of cranial nerve diseases is rare, and to the best of our knowledge, our reported case is the first case that can be documented.

## Case report

A 52-year-old man presented with a 7-year history of left-sided facial spasms. Initially, the spasms involved the left lower eyelid. Over time, the duration and frequency of muscular spasms became progressively worse, gradually involving the left corner of the orbicularis oris muscle and entire left side. His past history was negative for diabetes mellitus, alcohol addiction, hypertension, dyslipidemia, asthma and drug allergy. He was not a smoker. He did not give any history of recent trauma. And the patient denied having undergone previous medical therapy for his symptoms.

Neurological examination showed an obvious left HFS. Facial sensation, hearing and other cranial nerve functions were normal. Magnetic resonance imaging (MRI) revealed a small vessel at the REZ of the VIIth and VIIIth cranial nerves in the cerebellopontine angle (CPA). His HBS antigen, HCV antibody and HIV antibody were negative. Chest X ray was normal. The patient had undergone the microvascular decompression.

After suboccipitalretrosigmoidal craniotomy, the CPA is exposed. Subsequently, an inspection of the root exit zone (REZ) of the facial nerve from the brainstem takes place. After microsurgical dissection of the vessel from the facial nerve, a Teflon sponge is placed between the brainstem and vessel, to permanently prevent vascular compression. During the operation, brainstem auditory evoked potentials (BAEPs) for hearing loss and abnormal muscle response (AMR) wave, which is regarded as an exclusive electrophysiological phenomenon of HFS, were closely monitored, which facilitated a complete decompression. Postoperatively, the patient's symptoms were completely resolved.

The patient presented with complaint of inability to walk and with generalized muscular weakness. On examination, he had grade 4/5 weakness of both the upper and lower extremities, but his sensory examination was normal. His K+ was 3.13 mmol/L. At this point he was diagnosed as having a low potassium paralysis. The muscular weakness had not been improved significantly after intravenous potassium supplement, which progressed rapidly on the second day. He presented with grade 1/5 weakness of both the upper and lower extremities without respiration difficulty. After neurology consultation, a clinical diagnosis of GBS was made and confirmed by electromyography. Lumbar puncture was performed and CSF examination was done (pressure normal, appearance: clear, protein 559.5 mg/L, WBC cells $43*10^6$/L, glucose 5.69 mmol/L). Given the standard treatment of a 5-day course of intravenous immunoglobulin. Clinical improvement was slow over the patient's 1-month hospitalization treatment. With 6 months postoperatively rehabilitation, neurological examination revealed minimal improvement. The strength of his proximal upper extremities improved from Grade 1/5 to 3/5. However, his distal upper extremities and lower extremities continued to be Grade 1/5.

## Discussion

It is still unclear whether the postoperative state could increase the risk of GBS onset. The simplest hypothesis for the association between surgery and GBS would be that surgery triggers an immunosuppress reaction, targeting peripheral nerves, as a part of systemic response to the surgical stress. In a retrospective study in University Hospital Basel and University Children's Hospital Basel from January 2005 to December 2010, in 63 patients of GBS, 6 (9.5%) patients had a history of surgery [1]. They found that all of them have a history of surgery within 6 weeks prior to GBS. The research data displayed the incidence of GBS during the first 6-week period after surgery is 13.1 times higher than the normal cases. They thought that there had a very close connection between GBS and surgery. However, N. Yuki believe that surgery itself does not trigger the pathogenetic cascade of GBS [6], according to the review published on the journal of The New England Journal of Medicine (NEJM) [7], given what is already known about the pathogenesis of this disease. Many GBS cases are preceded by symptoms of upper respiratory tract infection or diarrhea, while the most common pathogens are campylobacter jejuni, haemophilusinfluenzae, EB virus, cytomegalovirus, mycoplasma pneumoniae and influenza virus as reported previously [8]. Recently, a case-control study showed that Zika virus infection could cause Guillain-Barré syndrome too [9].

Post surgical GBS canoccur after cardiac, urinary, stomatologic, orthopedic or cranial surgery [10-14]. Yet GBS following MVD surgery has never been reported. The patient we reported is the first case that GBS occur without any preceding infectious episode. Diagnosis of GBS can be difficult in this context. Indeed, MVD is a relatively safe with rare complication of surgery. It is easy to understand that physicians will ignore the diagnosis of GBS. In our case, the first diagnosis was low potassium paralysis when the patient presented with complaint of inability to walk and with generalized muscular weakness.

Although surgery may increase the risk of incidence of GBS, pathophysiological courses are

still unclear. The most acceptable hypothesis for the link between GBS and surgery would be the transient immunosuppressed after surgery, rather than the surgery itself, could increase the risk of infections and also the cause of GBS [6]. Moreover, potentially exogenous infections can induce the onset of GBS. Most of the GBS after surgery recover after standard therapies with intravenous immunoglobulin, but this patient in our case had not completely recovered after 6 months. GBS recovery period either as as short as few weeks or as long as many years.

GBS can follow surgery a few days or weeks. Cranial intervention may trigger GBS. The GBS may be an easily overlooked neurological complication, which may be very rarely encountered after MVD surgery. Some clinical symptoms like four limbs paresis, swallowing difficulties or respiratory failure must alert the surgeons. A CSF analysis and electromyography is necessary.

## Disclosure of conflict of interest

None.

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