Comprehensive rehabilitation treatment for pregnant women with Guillain-Barré syndrome – a case report

Zastosowanie kompleksowego leczenia rehabilitacyjnego u kobiety ciężarnej z zespołem Guillain-Barré – opis przypadku

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Key words
Guillain-Barré syndrome, pregnancy, rehabilitation, autoimmunization

Abstract
Guillain-Barré syndrome (GBS) is an acute demyelinating polyradiculopathy and autoimmune condition with a rapid natural course and high disability. Clinical features include areflexia, limb weakness and, uncommonly, sensory loss preceding neuromuscular paralysis involving bulbar, facial and respiratory function with maximum severity of symptoms at 2-4 weeks. The etiology of GBS is not completely understood, however prognosis is usually good with early detection and prompt treatment. In this paper, we present a unique case of comprehensive rehabilitation treatment for a pregnant woman with GBS at the 8th week of pregnancy. On the basis of this case report, we discuss possible and safe rehabilitation treatment for women in the first trimester of pregnancy, with significantly reduced muscle strength, following the stabilisation of vital signs and immunotherapy. The paper describes comprehensive care provided to the pregnant woman with tetraplegia, hyperstesia and dysphagia after the stabilisation of vital signs and immunotherapy, which was continues through to delivery at the 39th week of pregnancy. GBS should be considered in each pregnant woman who complains of muscle weakness, general fatigue, tingling of fingers and difficulty in breathing. To our knowledge, this is one of the first medical reports presenting the possibility of using a comprehensive rehabilitation treatment in a woman in the first trimester of pregnancy with a significant degree of disability.

Słowa kluczowe
Zespół Guillaina-Barrégo, ciąża, rehabilitacja, autoimmunizacja

Abstract
Zespół Guillaina-Barrégo (GBS) jest ośrą poliradiokulopatią demielinizacyjną i chorobą autoimmunologiczną, postępującą szybko, z wystąpieniem wysokiego stopnia niepełnosprawności. Objawy kliniczne obejmują areflexię, osłabienie kończyn i rdzako utrątę krucza, poprzedzającą porażenie nerwowo-mięśniowe, obejmujące porażenie opuszkowe, twarzy i funkcji oddechowych, z maksymalnym nasileniem objawów pomiędzy 2-4 tygodniem. Etiologia GBS nie jest do końca poznaną, jednak rokowanie jest zazwyczaj dobre przy wczesnym wykryciu choroby i wczesnym podjęciu leczenia. W artykule tym przedstawiamy wyjątkowy przypadek kompleksowego leczenia rehabilitacyjnego u ciężarnej kobiety, z GBS ujawnionym w 8 tygodniu ciąży. Na podstawie tego opisu przypadku, omawiamy możliwe i bezpieczne leczenie rehabilitacyjne dla kobiet w pierwszym trymestrze ciąży, ze znacznie zmniejszoną siłę mięśni, następujące po ustabilizowaniu parametrów życiowych i immunoterapii. Artykuł opisuje kompleksową opiekę nad kobietą ciężarną z objawami tetraplegii, hiperstesji i dysfagii, po ustabilizowaniu jej parametrów życiowych, która była kontynuowana aż do czasu porodu w 39-tym tygodniu ciąży. GBS powinno być brane pod uwagę w każdym przypadku, gdy kobieta ciężarna skarży się na osłabienie mięśni, ogólnie osłabienie, mowienie w palcach i ustrudnione oddychanie. Jest to jeden z pierwszych raportów medycznych pokazujących możliwość zastosowania kompleksowego leczenia rehabilitacyjnego u kobiety będącej w pierwszym trymestrze ciąży, ze znaczącym stopniem niepełnosprawności.
INTRODUCTION

Guillain-Barré Syndrome (GBS) is an acute demyelinating polyradiculopathy due to inflammation of the peripheral nerves and nerve roots, which usually causes severe motor deficits (symmetrical ascending paralysis), autonomic dysfunction and/or respiratory failure. The etiology of GBS is not completely understood but is believed to have an autoimmune-related cause, with the majority of cases triggered by infection stimulating the production of anti-ganglioside antibodies. Approximately 70% of GBS cases occur between 1 and 3 weeks after an acute infection. The organisms thought to be involved are Campylobacter jejuni, Mycoplasma pneumoniae, Hae-mophilus influenzae, cytomegalovirus, Epstein-Barr virus and influenza. Clinical features include areflexia (absent reflexes), limb weakness and, uncommonly, sensory loss proceeding neuromuscular paralysis involving bulbar, facial and respiratory function with maximum severity of the symptoms at 2-4 weeks. Nerve conduction tests and electromyography can be useful in determining the type of nerve injury and the extent of denervation, thus suggesting the prognosis. Electrophysiological criteria for GBS include increased latency or absence of the F wave, decreased nerve conduction velocity and conduction block. Albuminocytological dissociation in the cerebrospinal fluid is a pathomorphological criterion. The typical GBS finding of increased protein concentration in the cerebrospinal fluid, while the cell count is normal or does not exceed 50/mm³, is present in 80% of patients. Serological tests can support the diagnosis. GD1a antiganglioside antibodies are typically found in the axonal variant, while GQ1b are typical for Miller-Fisher syndrome or GBS with ophthalmoplegia. GBS diagnosis is primarily clinical, especially as at early stages of the disease cerebrospinal fluid and neurophysiological test results may be normal. At that stage, additional tests are mostly useful for differentiation. Differential diagnosis for GBS should consider the following: metabolic neuropathies (porphyric polyneuropathy, diabetic lumbosacral plexopathy, hypophosphatemia, hypokalemia, hypermagnesemia), periodic paralyses (familial, Andersen-Tawil syndrome, acquired — secondary to hypo- or hyperkalemia), and inflammatory neuropathies (chronic inflammatory demyelinating polyradiculoneuropathy, multifocal motor neuropathy), as well as infection (e.g. diphtheria, Lyme disease, brucellosis, poliomyelitis, West Nile virus, HIV, Zika virus), toxicity (organic solvents, heavy metals, neurotoxic seafood poisoning), vasculitic neuropathies (secondary to systemic lupus erythematosus, rheumatoid arthritis, polyanerteritis nodosa), sarcoidosis and paraneoplastic syndromes. GBS may also accompany some neoplasms (lung cancer, Hodgkin lymphoma, lymphomas, myelomas). In the acute phase of GBS, patients should be hospitalised, with access to an intensive care unit and immune therapy including plasma exchange or intravenous immunoglobulin (i.v. IG) therapy, which seems to shorten the recovery time, although its effectiveness remains limited.

GBS in pregnancy is rare, with an estimated incidence between 1.2 and 1.9 cases per 100,000 people annually, and it carries high maternal risk. Risk of GBS in pregnancy increases in the third trimester and in the first 2 weeks after delivery. The management of GBS in pregnancy is similar to that in the non-pregnant population and includes i.v. IG, plasmapheresis, and ventilator support when required. Immunomodulation with plasmapheresis and i.v. IG has been found to improve treatment outcomes with full recovery in about 70% of cases. Ventilatory support is required in 25-30% of GBS patients, but respiratory problems may be worse in pregnancy because of diaphragmatic splinting and significantly increased risk of premature birth. GBS should be considered in any pregnant patient complaining of muscle weakness, general malaise, tingling of the fingers and respiratory difficulty.

In this paper we describe a unique case of a pregnant woman with GBS. To the best of our knowledge, it is one of the first reports presenting the possibility of using comprehensive rehabilitation treatment in a pregnant woman during the first trimester of pregnancy with faccida tetraplegia, dysphagia and sensory hyperesthesia due to GBS, after stabilisation of vital signs at an intensive care unit continuing through to spontaneous delivery in the 39th week of gravidity.

CASE REPORT

An 18-year-old pregnant woman in the 18th gestational week (GW) was transferred from the Intensive Care Unit (ICU), after stabilisation of vital signs, to the Neurorehabilitation Ward for comprehensive rehabilitation treatment, with the following diagnosis: Status post acute respiratory failure. GBS. Dysphagia secondary to the disease. Arterial hypertension. Sinus tachycardia. Tetrapiresis. Status post temporary tracheostomy. Status post pneumonia and urinary tract infection. At the ICU, the patient underwent analgesedation, mechanical ventilation, 26 plasmaphereses, treatment with enoxaparin sodium (Clexane), parenteral and subsequently enteral nutrition, antibiotic treatment and symptom management. The patient’s hypertension and tachycardia were treated with verapamil (Isotin) and methyldopa (Dopegyt). The patient was also administered Quetiapine (Ketrel) 25 mg nightly and a sedative (Estazolam 2 mg nightly) for agitation. A review of the medical history showed that the patient was first admitted to the Neurology Ward at GW 8 due to muscle weakness and inability to walk unassisted, persisting for several days. Tests performed at the ward showed increased protein concentration in the cerebrospinal fluid and impaired neuromuscular conduction in the form of axonal neuropathy with episodes of acute demyelination. Due to the progressive general weakness, signs of dysphagia and respiratory distress, the patient was transferred to the ICU with the following diagnosis: GBS-type polyradiculoneuritis with progressive deep tetraparesis.
Status post-acute respiratory failure. Dysphagia secondary to the disease.

At admission to the Neurorehabilitation Ward, the patient was conscious and verbally responsive. Tachycardia up to 116 BPM. BP: 110/80. The patient was bedridden, unable to sit up unaided and unable to use a wheelchair. Clinical examination showed tetraparesis with muscle strength graded at 0-1 on the Lovett scale; stretch reflexes were bilaterally absent and the plantars were flexor on both sides. At admission, the patient weighed 46.5 kg, 170 cm tall (BMI 16). Other findings included dysphagia, emotional lability and aversion to food. At the Ward, bedside kinesitherapy was initially introduced, 4-5 times daily, 10-15 min of exercise were tiring and painful for the patient, who reported pain indicating hyperalgesia. The duration of exercise was gradually increased.

After three weeks, improved exercise tolerance and partial recovery of muscle strength (first in the upper limbs, subsequently the trunk and lower limbs) were observed, and therefore the following interventions were introduced: passive verticalisation, assisted isometric and balance exercises while seated, neuromuscular re-education methods (PNF and NDT-Bobath) — first at bedside, and after three more weeks, in an individual therapy room, up to a total duration of 120 min/day in three sessions. Additionally, occupational therapy was used, including manual skill practice (writing, unassisted eating, unassisted dressing) and social therapy.

Due to the observed psychological deficits (anxiety, apprehensiveness, lack of cooperativeness, aversion to food, over-sensitivity), supportive therapy was provided by a psychologist to assist the patient in managing stress, accepting her condition and pregnancy, and undertaking new tasks — regaining independence and learning to care for a child.

Speech therapy was initiated immediately after admission to the ward, due to the patient’s dysphagia. This involved controlled swallowing exercises, gradual introduction of foods of different texture and thickness, swallowing exercises assisted by a speech therapist and subsequently by a nurse, coughing and oral muscle exercises, facial massage. When the dysphagic symptoms subsided (after 6 weeks at the ward), as no speech production deficits were present, speech therapy was discontinued.

Throughout the patient’s stay at the ward, we systematically monitored her serum chemistry, CBC and urinalysis results. These were within normal ranges during the 16 weeks of rehabilitation. Respiratory test results were also within the normal limits. During her stay at the Rehabilitation Ward, the patient had regular (monthly) follow-ups at the Pregnancy Clinic, where ultrasound examinations were performed, showing normal development of the foetus.

### Table 1

<table>
<thead>
<tr>
<th>Week of rehabilitation</th>
<th>Physiotherapy interventions and effects</th>
<th>FIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Partial verticalisation within the bed (sitting up on the bed with lower limbs down), functional exercises on the bed, rotation on the bed, shifting to half-seated position.</td>
<td>10-22</td>
</tr>
<tr>
<td>2</td>
<td>Patient transferred to a wheelchair; transfer training, stabilisation in seated position with the back supported and the lower limbs down; passive verticalisation using a tilt table (up to 40 degrees).</td>
<td>26-39</td>
</tr>
<tr>
<td>3</td>
<td>Passive verticalisation continued. Work on improving limb muscle strength and transfer skills.</td>
<td>48</td>
</tr>
<tr>
<td>4-5</td>
<td>Transfer exercises continued; attempts at active verticalisation; learning to use a wheelchair.</td>
<td>60</td>
</tr>
<tr>
<td>6-7</td>
<td>Active verticalisation, attempts at walking using guardrails/high walker; work on improving upper limb function, fine motor skills and self-care; unassisted use of a wheelchair.</td>
<td>74</td>
</tr>
<tr>
<td>8-9</td>
<td>Assisted walking using a two-wheeled walking frame.</td>
<td>89</td>
</tr>
<tr>
<td>10</td>
<td>Assisted walking using a walking stick; work on improving balance during sitting and walking, improving coordination and graphomotor skills.</td>
<td>94</td>
</tr>
<tr>
<td>11</td>
<td>Walking held by one hand, assisted walking on stairs, high step walking; continued practice of self-care activities: washing, combing, dressing.</td>
<td>106</td>
</tr>
<tr>
<td>12</td>
<td>Unassisted walking on level ground under supervision.</td>
<td>110</td>
</tr>
<tr>
<td>13-14</td>
<td>Work on improving endurance and walking pattern; unassisted walking on level ground and on stairs under supervision.</td>
<td>115-117</td>
</tr>
<tr>
<td>15</td>
<td>Functional practice using an infant simulator doll; work on improving motor coordination and balance when standing and walking.</td>
<td>119</td>
</tr>
<tr>
<td>16</td>
<td>Achieving improved range of active motion and muscle strength in the affected limbs, improved balance and motor coordination and improved function (including infant handling and care). The patient is capable of getting around unassisted and without orthopaedic equipment. The patient is discharged from the ward as planned and transferred to the Gynaecology and Maternity Ward.</td>
<td>124</td>
</tr>
</tbody>
</table>
When the patient became capable of full active joint movement (after 10 weeks of rehabilitation), further active exercises were introduced with gradually increasing resistance to improve muscle strength. During the first 4 weeks of unassisted sitting training, impaired coordination and trunk stabilisation was observed.

Transfer training involved learning to transfer to a wheelchair unassisted, and subsequently, locomotion exercises, i.e., learning to walk using equipment (high walkers, guardrails, walking frames, etc.). The implemented stages of physiotherapy are described in Table 1.

Additionally, physical therapy was administered, including dry classic massage (from admission to the ward) and infrared lamp (Solux lamp with a red filter) treatments for shoulder and knee joints (also from time of admission) due to the pain reported by the patient and the positive impact of the treatments on exercises performed (as perceived subjectively by the patient). When the patient became capable of maintaining balance while seated in a wheelchair, more interventions were used including contrast bath therapy and later whirlpool treatments for the upper limbs (in the next month), whirlpool treatments for the lower limbs (from week 10), and vibration massage (using an Aquavibron machine) of the feet and calves. All physical treatments were well-tolerated by the patient and were not contraindicated for pregnant women.

During rehabilitation at the ward, one significant problem was posed by the patients’ poor nutritional status and low body mass (weight before illness was 58 kg). Therefore, an energy-rich (i.e., high-protein and high-carbohydrate) diet was provided, with gradually increasing caloric content to increase body mass; additionally, the increased protein supply was indicated as the patient’s total protein levels were at the lower end of the normal range (protein loss from plasmapheresis). The diet was planned by a dietician in cooperation with a gynecologist and a general practitioner, considering the course of the pregnancy and the exercise intensity. At GW 24, the patient’s BMI was 17, and her weight increased steadily in the following weeks, up to 60 kg at GW 38.

At GW 39, the patient spontaneously delivered a healthy child at the local Gynaecological Unit. The newborn received an Abgar score of 10 and weighted 3,330g/50cm. The patient and her child were discharged from the hospital after 1 week. During the check-up visit, we learned that the woman provided care for the child at home.

**DISCUSSION**

Our study is one of the first on implementing rehabilitative treatment in pregnant GBS women (subtype AIDP) during the first trimester of pregnancy. Recent studies point to the need to provide comprehensive care for patients with GBS, taking into account the severe effects of pregnancy on mood (anxiety, depression) compared to the negative impact of GBS on mood (anxiety, depression) compared with the normative population, and the adverse impact on Quality of Life. Long-term management of psychological sequelae impacting participation is very important. Dysphagia should be treated by a speech therapist and nurse. Kinesiotherapy should be performed systematically, and the load should be increased gradually, as stimuli used in exercises may result in muscular pain.

Pregnant women with GBS have rarely been studied. One of the first studies on rehabilitation in such cases was presented by Wada et al.,13 the authors of a case study on a 20-week pregnant woman with GBS, reporting weakness of lower and upper limbs, but still capable of standing up unassisted (baseline FIM score was 31). Our case shows the rehabilitation of a GBS woman during the first trimester of pregnancy with facia tetraplegia and dysphagia (FIM score 10). This group of patients should be treated by an interdisciplinary rehabilitation team in cooperation with a neurologist and gynaecologist, taking general health condition, physical performance and the neurological deficits of the patients into account. Nevertheless, regular gynaecological examinations are very important.

Previous studies show that psychosocial performance does not correlate with the severity of impairment in GBS, but may be explained by poor conditioning and fatigue. In our case, we observed anxiety, hyperesthesia and depressive symptoms. Khan et al.17 outlined the negative impact of GBS on mood (anxiety, depression) compared with the normative population, and the adverse impact on Quality of Life. Long-term management of psychological sequelae impacting participation is very important. Dysphagia should be treated by a speech therapist and nurse. Kinesiotherapy should be performed systematically, and the load should be increased gradually, as stimuli used in exercises may result in muscular pain.
As the patient’s condition improves, the comprehensive therapy advances over subsequent stages, progressing up to walking re-education (initially using orthopaedic aids, and ultimately – unassisted) including climbing and descending stairs, until functional capabilities for daily living activities are restored as fully as possible. One significant issue is the order in which rehabilitation interventions are introduced, as the loss of muscle strength in the trunk, including the abdominal wall and the pelvic floor, must be taken into consideration. Hence, the importance of slow and gradual increase in the frequency and intensity of exercise, including verticalisation, guided by gynaecological assessment of the patient. The management of pregnant patients with GBS should be systematic and should include concurrent impairments in the patient’s psychological or speech-related functions. This patient-group requires comprehensive care from all members of the healthcare team.

This study is one of the first works on comprehensive rehabilitation treatment in GBS pregnant women during the first trimester of gravidity and on providing support and treatment for this group of patients.

Conflict of interests
The authors declare no conflict of interest. The authors do not remain in any financial or personal relationships that would unjustly affect their actions associated with the publication of the manuscript. Any possible relationships of the authors with the parties interested in the publication of the manuscript are revealed in the text of the article. The manuscript has not been published in or submitted to any other journal.

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