Severe Guillain-Barré Syndrome in Aged Patients: The Effect of Plasmapheresis

Shu-ichi YAMASHITA, Toshihiko MORINAGA, Kumi MATSUMOTO, Teruo SAKAMOTO,
Nobuo KAKU and Shigeru MATSUKURA*

We report two aged patients with Guillain-Barré syndrome (GBS), in whom the rapid progression necessitated the use of a respirator. The first case, a 72-year-old woman, needed a respirator on the 5th day after onset of illness and the second case, a 74-year-old woman, needed a respirator on the 23rd day. We treated the first patient with plasmapheresis; the second patient underwent plasmapheresis as well as a large dose of intravenous methylprednisolone. Both patients showed remarkable recovery and did not need the respirator from the early stages. It was suggested that plasmapheresis is beneficial for treatment of aged patients with severe GBS, who necessitate the support of a respirator, because it prevents the decline in functional status by shortening the period of hospitalization.
(Internal Medicine 31: 1313–1316, 1992)

Key words: acute inflammatory polyradiculoneuropathy, plasma exchange, respirator

Introduction

Guillain-Barré syndrome (GBS), an acute inflammatory polyradiculoneuropathy, is usually a benign disease and good prognosis of the condition is expected (1). However, aged patients or patients who need the support of a respirator often show poor recovery (2). In particular, aged patients sometimes show decline in functional status because prolonged respiratory support causes the respiratory muscles to become atrophic and long hospitalization makes the muscles and bones atrophic. We applied plasmapheresis to two aged GBS patients who needed respiratory support. They showed marked recovery and become free of respiratory support from an early stage. It can be suggested that plasma exchange has a beneficial effect on the prognosis of aged patients suffering from severe GBS.

Case Reports

Case 1

A 72-year-old woman experienced an uncomfortable sensation in her pharynx on March 28, 1991. Her legs felt weak and she was unable to walk from March 31, when she also experienced dysphagia. She was admitted to the

Intensive Care Unit (ICU) in our hospital on April 1, 1991, due to occurrence of dyspnea.

Her level of consciousness was somnolent. Respiratory rate was 28 per minute. She was noted to breathe shallowly even at rest in bed. Blood pressure was 120/80 mmHg. Pulse rate was regular at 94 beats per minute. Body temperature was 38.2°C. The skin of the perioral region was cyanotic. Coarse crackles were audible on both lower lung fields. Her both eyes showed horizontal nystagmus regardless of their position. Eyes directed toward the right in the fast phase of nystagmus. Motions of tongue and throat were both poor. She had weakness in all four extremities; the lower extremities were more weak. She could not stand or walk. Superficial and deep sensation were decreased in both arms and legs. There were generalized areflexia. Pathological reflex and meningeal irritation were absent.

Laboratory investigation on admission showed the following results: Urinalysis was normal. Hematocrit was 39.5% and erythrocyte sedimentation rate was 30 mm per hour. White cell count was 25,300/ μ l, in which 88% was neutrophils, and platelet count was 204,000/ μ l. Serum electrolytes, liver function, and kidney function were all within their normal ranges. C-reactive protein was 11.2 mg/dl, serum IgG 2320 mg/dl, IgM 187 mg/dl, and

From the Department of Emergency and Critical Care Medicine, Kurume University, School of Medicine, Kurume, and *the Third Department of Internal Medicine, Miyazaki Medical College, Miyazaki

Received for publication January 13, 1992; Accepted for publication September 16, 1992

Reprint requests should be addressed to Dr. Shu-ichi Yamashita, the Department of Emergency and Critical Care Medicine, Kurume University, School of Medicine, 67 Asahimachi, Kurume, Fukuoka 830, Japan

IgA 249 mg/dl. X-ray photograph of the chest revealed pneumonic shadows in lower lung fields on both sides. Cranial CT scan showed normal appearance. Nerve conduction studies done in left median nerve showed distal motor nerve latency (DML) of 3.8 ms, motor nerve conduction velocity (MCV) of 50.4 m/s, and an amplitude of 1 mV. The F wave was not detected. Cerebrospinal fluid (CSF) contained a normal level of protein (42.7 mg/dl), 21 mg/dl of IgG, 1 mg/dl of IgM, and 2 mg/dl of IgA, and no cell was detected.

Treatment and course: Immediately after admission on April 1, 1991, she was intubated with an intratracheal tube and her breathing was assisted by a respirator. She became completely quadriplegic on April 3. Sensory impairment also progressed and her arms and legs became numb. Plasmapheresis, started on April 5, was carried out using the single membrane filtration method with frozen fresh human plasma as the replacement fluid. A total of 3,000 ml of replacement fluid was exchanged

each day for three successive days. On April 7, her CSF contained 70 mg/dl of protein but no cell was present. The DML was gradually extended, while the MCV became slower (Fig. 1). These appearances may be due to the fact that the observation was carried out before laboratory and electrophysiological data typical of GBS appeared (1). On the other hand, the tidal volume (TV) and vital capacity (VC) were improved by 18 days after plasmapheresis (Fig. 2). Pneumonia was resolved by antibiotic treatment. Eighteen days after the completion of plasmapheresis, she no longer needed the respirator and was discharged from the ICU.

Case 2

A 74-year-old woman was admitted to another hospital on March 12, 1991, because of weakness of all four extremities. She became unable to stand and walk, and her finger movements became poor on the second day of admission. She also experienced numbness of the tongue and swallowing difficulties. Her CSF showed albuminocytologic dissociation on March 29, 1991. She was admitted to our ICU on April 4, 1991, due to occurrence of dyspnea. Her level of consciousness was stuporous. Respiratory rate was 16 per minute. She breathed shallowly. Blood pressure was 120/70 mmHg. Pulse rate was regular at 110 beats per minute. Body temperature was 36.7°C. The skin was not cyanotic. She had bilateral incomplete abducence palsy of the eyes. Motions of tongue and pharynx were poor. She was close to complete quadriplegia. Superficial and deep sensation were decreased in her arms and legs. There were generalized areflexia. Pathological reflex and meningeal irritation were absent.

Laboratory investigation on admission showed the following results: All tests of urinalysis, stool examination and complete blood count showed normal values. Serum electrolytes, liver function, and kidney function were all within the normal ranges. C-reactive protein level was 4.97 mg/dl, serum IgG 858 mg/dl, IgM 129 mg/dl, and IgA 256 mg/dl. X-ray photograph of the chest showed pneumonia shadow in the right lower lung field. Cranial CT scan showed normal appearance. Nerve conduction studies done in the right median nerve showed DML of 6.4 ms and the amplitude of 0.5 mV. The MCV study showed occurrence of conduction block between her right wrist and elbow. The F wave was not detected. CSF contained 86.0 mg/dl of protein, 17 mg/dl of IgG, 2 mg/dl of IgM, and 4 mg/dl of IgA, but no cell was present.

Treatment and course: As with case 1, she required respiratory assistance when she was admitted to our ICU. We started intravenous methylprednisolone (MP) therapy on April 4, 1991. Methylprednisolone was given at a dose of 1 g per day for three consecutive days. We also started plasmapheresis on April 5. Plasmapheresis was carried out in a similar manner. With these therapies,

Fig. 1. Change in distal latency (○) and MCV (●) of the case 1 were examined before and after plasmapheresis (↓). Patient was admitted on April 1. Plasmapheresis was started on April 5 and performed in three consecutive days by exchanging 3,000 ml of the frozen fresh human plasma per day.

Distal latency: distal motor nerve latency, MCV: motor nerve conduction velocity.

Fig. 2. Change in tidal volume (○) and vital capacity (●) of the case 1 were determined by spirometry before and after plasmapheresis (↓).

DML was gradually shortened and the conduction block disappeared. The MCV remained as low as 28.4 m/s on April 16, but it was increased to 30.2 m/s by April 23 (Fig. 3). On the other hand, both TV and VC were improved rapidly after the start of plasmapheresis (Fig. 4). Pneumonia was resolved by antibiotic therapy. Twenty-five days after the completion of plasmapheresis, she did not need the respirator and she was discharged from the ICU.

Discussion

Controlled studies on a large scale have shown that plasmapheresis is significantly beneficial as a treatment of GBS (3–5), although controversial opinions have been raised (6, 7). Methylprednisolone pulse therapy combined with plasmapheresis has also been indicated to show a favorable outcome (8). The etiology of GBS remains unclarified. However, increased levels of anti-

bodies against peripheral nerve myelin, and immune complexes were found in the serum of GBS patients (9–11). Harrison et al (12) and Saida et al (13) reported that an intraneural injection of sera obtained from GBS patients induced demyelination in rat sciatic nerves. These studies suggest that plasmapheresis may be useful in the treatment of GBS. Plasmapheresis was also shown to prevent secondary axonal degeneration of demyelinated peripheral nerves (14). Bezwoda et al (3) reported that the mean value of hospitalization periods of patients treated with plasmapheresis was as short as 27 days, whereas it was 80 days for patients without such treatment. Plasmapheresis is thus beneficial in that it shortens the hospitalization period.

Guillain-Barré syndrome is considered to be a benign disease which shows a good prognosis (1). However, Loffel et al (15) reported that 2–6% of the patients died during the acute phase, and only 57% of the patients were completely cured. The present two cases were aged patients who needed the support of a respirator. McKhann et al (2) indicated that a good prognosis could not be expected with older age patients regardless of the type of treatment applied. They (2) also reported that cases which require respiratory support, classified as Grade 5 according to Hughes (16), show a poor outcome. McKhann et al (2) also suggested that patients who reached Grades 3 to 5 within 7 days of the onset of illness show a poor prognosis, regardless of the grade reached. However, as indicated in the present first case who reached Grade 5 within 7 days of the onset of illness, the application of plasmapheresis seems to facilitate a good prognosis in the aged patient needing a respirator. This is consistent with the report by McKhann et al (2) that aged patients treated with plasmapheresis show better recovery than those without such a treatment, indicating that plasmapheresis is an effective treatment for acute and severe GBS appearing at an older age. Although the precise relationship between age and severity of the illness has not been clarified, the poor axonal outgrowth and regeneration and the less effective remyelination, observed in aged individuals, may be involved (17, 18). Moreover, long respiratory support is likely to induce atrophy of the respiratory muscles and the long hospitalization period typically induces atrophy of striated muscles and bones, to a more severe extent than in young patients. These factors may explain why aged patients show greater residual deficits. These facts indicate that shortening the hospitalization period might bring greater benefits to aged patients compared to young patients.

In the present two cases, plasmapheresis was effective for the recovery from GBS; TV and VC were both restored in an early phase of treatment (Figs. 2 and 4). Cases 1 and 2 became free from a respirator on 18th and 25th day, respectively, after completion of plasmapheresis. Although our ICU unit treats patients only

Fig. 3. Change in distal latency (○) and MCV (●) of the case 2 were examined before and after plasmapheresis (↓). Zero m/s of MCV means the presence of conduction block. Patient was admitted on April 4. Intravenous MP therapy (1 g/day) was started on April 4 and was continued in consecutive three days. Plasmapheresis was started on April 5 and performed for three consecutive days, exchanging 3,000 ml of the frozen fresh human plasma each day.

Distal latency: distal motor nerve latency, MCV: motor nerve conduction velocity, MP: methylprednisolone.

Fig. 4. Change in tidal volume (○) and vital capacity (●) of the case 2 were determined by spirometry before and after plasmapheresis (↓).

in the acute phase and the ultimate outcome was not assessed in detail, early removal of the respirator is likely to bring good prognosis to patients. The DML and MCV of case 1 were both normal when she was admitted to ICU (Fig. 1). The DML gradually extended and the MCV became slightly slower. On the 17th day after application of plasmapheresis, the DML stopped its prolongation and the MCV tended to be restored. On the other hand, Case 2 showed prolonged DML and conduction block when she was admitted to our ICU (Fig. 3). The DML showed a tendency of shortening on the 6th day and conduction block disappeared on the 12th day after application of plasmapheresis. These results may be explained if plasmapheresis is effective to both prevent and recover from demyelination of peripheral nerves. Electrophysiological studies thus indicate that plasmapheresis is effective for severe GBS in aged patients. Mendell et al (7) pointed out the possibility that the administration of prednisolone might have adverse effects on recovery from GBS when patients are treated with plasmapheresis. However as shown in the present report, both case 1 and 2 recovered well from the illness, despite the fact that the former received only plasmapheresis while the latter received both plasmapheresis and MP. The present cases suggest that MP may not have an adverse effect on patients who are treated with plasmapheresis.

Although GBS usually shows a benign course of illness, we thus recommend that severe GBS in aged patients is treated with plasmapheresis, which is likely to be effective in preventing the secondary axonal degeneration (14), in expediting recovery from illness (2), and in shortening the period of hospitalization (3).

Acknowledgment: We thank Miss Akemi Futamata of the Department of Emergency and Critical Care Medicine, Kurume University, School of Medicine for her skillful assistance.

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