PanAfrican Medical Journal

Open Access

Research

Intravenous immunoglobulin vs plasma exchange in treatment of mechanically ventilated adults with Guillain-Barré syndrome

Boubaker Charra[1], Abdelhamid Hachimi[2,&], Abdellatif Benslama[1], Said Motaouakkil[1]

[1]Medical Intensive Care Unit, Ibn Rochd University Hospital, Casablanca, Morocco, [2]Medical-Surgical Intensive Care Unit, Mohammed VI University Hospital, Faculty of Medicine and Pharmacology,Cadi Ayyad University, Marrakech, Morocco

[&]Corresponding author: Abdelhamid Hachimi, Service de Réanimation Polyvalente, CHU Mohammed VI, Marrakech, Morocco

Key words: Guillain Barré syndrome, intensive care unit, intravenous immunoglobulin, plasma exchange, mechanical ventilation, recovery

Received: 04/06/2013 - Accepted: 03/05/2014 - Published: 09/05/2014

Abstract

Introduction: The aim of the study is to compare efficacy of IvIg versus PE in treatment of mechanically ventilation adults with GBS in intensive care unit. **Methods:** It is a prospective, non randomized study, realized in a medical ICU from 2006 to 2010. We included all patients with GBS who required mechanical ventilation (MV). We defined two groups: group 1 (group treated by IvIg: 0.4 g/kg/day for 5 days) and group 2 (group treated by PE: 4 PE during 10-14 days). We collected demographic characteristics, clinical and therapeutic aspects and outcome. Statistical analysis used: The quantitative variables are expressed on mean ± standard derivation and compared by Student test. The statistic analysis has been based on SPSS for windows. $P < 0.05$ is considered as significant. **Results:** Forty-one patients (21 in group 1 and 20 in group 2) were enrolled. The mean age was 37.4 ± 9.2 years, with a masculine predominance (75.4%). Electromyogram in all patients found acute inflammatory demyelinating polyradiculoneuropathy in 80.5 % of patients. The mean length of hospitalization was 45.3 ± 9.2 days. The length of hospitalization of the IvIg group is less long than PE group ($p = 0.03$). The weaning of the MV was more precocious in IvIg group than PE group ($p = 0.01$). Also, the beginning of motility recuperation was precocious at IvIg group than PE group ($p = 0.04$). **Conclusion:** Our work reveals a meaningful difference for the MV weaning and precocious recovery in IvIg group compared to PE group.

Pan African Medical Journal. 2014; 18:35 doi:10.11604/pamj.2014.18.35.2911

This article is available online at: http://www.panafrican-med-journal.com/content/article/18/35/full/

Introduction

Guillain-Barré syndrome (GBS) is a demyelinating polyradiculoneuropathy with an acute paralysing disorder, typically symmetric and ascending and areflexia. Incidence varies between 0.66 and 1.79 cases per 100 000 persons in general population [1-6]. About pathogenesis, the aetiologies of GBS remain unclear; however, several findings suggest that causes such as an infection of the respiratory or gastrointestinal tract, vaccinations, surgery and pregnancy generate an abnormal immune response which leads to a destruction of myelin sheaths and/or axons [7-9]. The treatment is based on two mainstays: supportive care and immunomodulatory treatment. Supportive care prevents complications such as deep vein thrombosis, digestive bleeding and infections especially and physiotherapy. Both plasma exchange (PE) and intravenous immunoglobulins (IvIg) are the two immunomodulative treatment. Several studies demonstrated that IvIg and PE are efficacious treatment for GBS [10-13]. Our aim is to compare efficacy of IvIg versus PE in treatment of mechanically ventilation adults with GBS in a medical intensive care unit.

Methods

It is a prospective, monocentric non randomized study, realized in a medical ICU in Ibn Rochd university hospital of Casablanca which is a tertiary referring medical centre, during 5 years. We included all patients with GBS who required mechanical ventilation (MV). The diagnosis was according to clinical criteria [9]. We defined two groups: group 1 (group treated by IvIg: 0.4 g/kg/day during five days) and group 2 (group treated by PE: 4 PE during 10-14 days). The choice of treatment depends on the economic level of the patient and the presence or not of a contraindication to any of the treatments. We recorded data age, sex, origin of the patient, the reason for admission in ICU, results of CSF study, the mean length of hospitalization, duration of ventilation, the onset of motor recovery, complications and specific treatments including plasmapheresis, and IvIg. We also registered the findings of electrophysiological studies. The median interval between onset of neuropathy and performance of the electrophysiological study was 7.5 days. All patients were ventilated using endotracheal mechanical ventilation then tracheotomised within the first week of hospitalization. Patients were intubated if they had SpO_2 less than 90 % in room air requiring increasing FiO_2, or showed clinical symptoms of CO_2 retention. When patients were able to trigger spontaneous breathing, they were changed to a pressure-support spontaneous ventilation mode. Pressure support was gradually decreased to 10 cmH_2O. If secretions were manageable with good airway reflexes, a daily spontaneous breathing trial (SBT) was performed using a T-piece for 12 to 24 hours. Patients were extubated if SBT was successful. SBT was declared successful if there was no increased work of breathing or apnea, symptoms of hypercapnia, tachycardia and if SpO_2 remained well compared to pre-SBT value. The quantitative variables are expressed on mean ± standard derivation and compared with Student tes. The statistic analysis has been based on SPSS 10.0 for windows. $P < 0.05$ is considered as significant.

Results

Between January 2006 and December 2010, 41 patients were enrolled, 21 in group 1 (IvIg group) and 20 in group 2 (PE group). No medical history was found in all patients. The mean age was 37.4 ± 9.2 years, with a masculine predominance (75.4%). There was a statistically insignificant age between the two groups, 35.4 ± 8.4 years for IvIg group versus 39.3 ± 5.2 years for PE group. Symptoms preceding the onset of GBS were fatigue in all patients, gastro-intestinal infections in 13 (32 %) patients and nasopharyngitis in 21 (51.2 %). The main initial sign was limb weakness followed by muscle pain in all patients and paresthesia in 20 (49 %) patients. The mean time from the onset to the maximum of illness in all patients was 8.3 ± 4.2 days. There was no involvement of the cranial nerves in all patients. Autonomic dysfunction was reported in 20 (49 %) during hospitalisation such hypotension-hypertension and/or bradycardia and/or excessive sweating. The reason for admission in the ICU was respiratory impairment. Twenty eight patients were admitted from the emergency department, 13 patients were transferred from the department of neurology. Lumbar puncture was performed on all patients; the mean of CSF protein was elevated (0.95 ± 0.1 g/l) in 29% of patients without CSF cell change. Based on electrophysiological findings, in 33 (80.5 %) patients had acute inflammatory demyelinating polyradiculoneuropathy (AIDP) and acute motor axonal neuropathy (AMAN) in 8 (19.5 %) patients. The mean length of hospitalization was 45.3 ± 9.2 days (range 30 to 118 days). The ICU stay was significantly shorter ($p=0.03$) in the IvIg group than PE group. Patients receiving IvIg were early weaned of MV ($p=0.01$) compared to those receiving PE with a statistical significance. Also, the beginning of motility recuperation was significantly precocious ($p=0.04$) in IvIg group than PE group (**Table 1**). Both groups had no significant complications due to treatment.

Discussion

Our results suggest that IvIg is more benefit for our patients than PE. For the IvIg group, the ICU stay was shorter, weaned earlier of MV and the beginning of motility recuperation was precocious than PE group. According to two reviews published in the Cochrane library 2012, patients treated within two weeks from onset with IvIg had recovery as much as PE [14]; and compared to the symptomatic care alone, patients treated by PE had a good evolution [15]. However, some studies suggest that patients had IvIg treatment had more improvement than those had PE. Indeed, Kuwabara [16] and Van der Meché [12] showed that IvIg group had a significant fast evolution than PE group. Contrary, El-Bayoumi et al, in an infant population, found that the PE group had a significant shorter MV duration compared to IvIg group [17]. Finally, no significant difference between the two treatments showed by others authors [18-21]. Furthermore, other therapeutic options are under research such adapted IvIg dosage, complement inhibitors, selective immunoadsorption and FC fragment of IvIg [22].

Conclusion

Although the results of the literature are not conclusive, our work of which the most important slant is the absence of randomization, reveals that there is a meaningful difference for the MV weaning and a precocious recovery in IvIg group compared to the PE group. These encouraging results would merit to be confirmed by controlled and randomized works.

Competing interests

The authors declare no competing interest.

Authors' contributions

All authors have contributed to and read the article, and have given permission for their names to be included as co-authors.

Tables

Table 1: comparison of IvIg and PE groups regarding length of stay, beginning of motility recuperation and weaning of mechanical ventilation

References

1. Cheng Q, Wang DS, Jiang GX, Han H, Zhang Y, Wang WZ, Fredrikson S. Distinct pattern of age-specific incidence of Guillain-Barré syndrome in Harbin, China. J Neurol. 2002 Jan; 249 (1): 25-32. **PubMed** | **Google Scholar**

2. Chiò A, Cocito D, Leone M, Giordana MT, Mora G, Mutani R, and the Piemonte and Valle d'Aosta Register for Guillain-Barré Syndrome. Guillain-Barré syndrome: A prospective, population-based incidence and outcome survey. Neurology. 2003; 60(7): 1146-1150. **PubMed** | **Google Scholar**

3. Rees JH, Thompson RD, Smeeton NC, Hughes RAC. Epidemiological study of Guillain-Barré syndrome in south east England. J Neurol Neurosurg Psychiatry. 1998; 64(1): 74-77. **PubMed** | **Google Scholar**

4. Cheng Q, Jiang GX, Fredrikson S, Link H, De Pedro-Cuesta J. Incidence of Guillain-Barré syndrome in Sweden 1996. Eur J Neurol. 2000 Jan; 7(1): 11-16. **PubMed** | **Google Scholar**

5. McLean M, Duclos P, Jacob P, Humphreys P. Incidence of Guillain-Barré syndrome in Ontario and Quebec, 1983-1989, using hospital service databases. Epidemiology. 1994 Jul; 5(4): 443-448. **PubMed** | **Google Scholar**

6. Alshekhlee A, Hussain Z, Sultan B, Katirji B. Guillain-Barré syndrome, Incidence and mortality rates in US hospitals. Neurology. 2008; 70(18): 1608-1613. **PubMed** | **Google Scholar**

7. Meyer zu Horste G, Hartung HP, Kieseier BC. From bench to bedside-experimental rationale for immune-specific therapies in the inflamed peripheral nerve. Nat Clin Pract Neurol. 2007; 3: 198-211. **PubMed** | **Google Scholar**

8. Haber P, DeStefano F, Angulo F, Iskander J, Shadomy S, Weintraub E, et al. Guillain-Barré syndrome following influenza vaccination. JAMA. 2004; 292(20): 2478-2481. **PubMed** | **Google Scholar**

9. Van Doorn PA, Ruts L, Jacobs BC. Clinical features, pathogenesis, and treatment of Guillain-Barré syndrome. Lancet Neurol. 2008; 7(10): 939-950. **PubMed** | **Google Scholar**

10. Guillain-Barré Syndrome Study Group. Plasmapheresis and acute Guillain-Barré syndrome. Neurology. 1985;35(8):1096-1104. **PubMed** | **Google Scholar**

11. French Cooperative Group on Plasma Exchanges and Guillain-Barré syndrome. Efficiency of plasma exchange of plasma exchange in Guillain-Barré syndrome: role of replacement fluid. Ann Neurol. 1987; 22(6):753-761. **PubMed** | **Google Scholar**

12. Van der Meché FGA, Schmitz PIM, the Dutch Guillain-Barré Study Group. A randomized trial comparing intravenous immune globulin and plasma exchange in Guillain-Barré syndrome. N Engl J Med. 1992;326(17):1123-1129. **PubMed** | **Google Scholar**

13. Plasma Exchange/Sandglobulin Guillain-Barré Syndrome Trial Group. Randomized trial of plasma exchange, intravenous immunoglobulin, and combined treatments in Guillain-Barré syndrome. Lancet. 1997;349(9047):225-230. **PubMed** | **Google Scholar**

14. Hughes RA, Swan AV, van Doorn PA. Intravenous immunoglobulin for Guillain-Barré syndrome. Cochrane Database Syst Rev. 2012 Jul 11;7:CD002063. **PubMed** | **Google Scholar**

15. Raphaël JC, Chevret S, Hughes RAC, Annane D. Plasma exchange for Guillain-Barré syndrome. Cochrane Database Syst Rev. 2012 Jul 11;7:CD001798. **PubMed** | **Google Scholar**

16. Kuwabara S, Mori M, Ogawara K, Hattori T, Oda S, Koga M et al. Intravenous immunoglobulin therapy for Guillain-Barré syndrome with IgG anti-GM1 antibody. Muscle Nerve. 2001; 24(1): 54-58. **PubMed** | **Google Scholar**

17. El-Bayoumi MA, El-Refaey AM, Abdelkader AM, El-Assmy MMA, Alwakeel AA, El-Tahan HM. Comparison of intravenous immunoglobulin and plasma exchange in treatment of mechanically ventilated children with Guillain Barré syndrome: a randomized study. Crit Care. 2011 Jul 11;15(4):R164. **Google Scholar**

18. Bril V, Ilse WK, Pearce R, Dhanani A, Sutton D, Kong K. Pilot trial of immunoglobulin versus plasma exchange in patients with Guillain-Barré syndrome. Neurology. 1996; 46 (1):100-103.. **PubMed** | **Google Scholar**

19. PSGBS Study Group. Randomised trial of plasma exchange, intravenous immunoglobulin, and combined treatments in Guillain-Barré syndrome. Lancet. 1997;349(9047):225-230. **PubMed** | **Google Scholar**

20. Diener HC, Haupt WF, Kloss TM, Rosenow F, Philipp T, Koeppen S, et al. A preliminary, randomized, multicenter study comparing intravenous immunoglobulin, plasma exchange, and immune absorption in Guillain-Barré syndrome. European Neurology. 2001;46(2):107-109. **PubMed** | **Google Scholar**

21. Nomura K, Hamaguchi K, Hosokawa T, Hattori T, Satou T, Mannen T, et al. A randomized controlled trial comparing intravenous immunoglobulin and plasmapheresis in Guillain-Barré syndrome. Neurological Therapeutics. 2001; 18(1):69-81. **PubMed** | **Google Scholar**

22. Walgaard C, Jacobs BC, Van Doorn PA. Emerging drugs for Guillain-Barré syndrome; Expert Opin. Emerging Drugs. 2011 16(1):105-120. **PubMed** | **Google Scholar**

Table 1: comparison of IvIg and PE groups regarding length of stay, beginning of motility recuperation and weaning of mechanical ventilation

	Group 1 (IvIg)	**Group 2 (PE)**	**p**
Length of stay in ICU (days)	38.2 ± 7.6	52.4 ± 5.3	0.03
Beginning of motility recuperation (days)	10.43	18.74	0.04
Weaning of mechanical ventilation (days)	18.72	38.52	0.01

IvIg: intravenous immunoglobulin ; **PE:** plasma exchange