MERIT RESEARCH JOURNALS
www.meritresearchjournals.org

Merit Research Journal of Medicine and Medical Sciences (ISSN: 2354-323X) Vol. 7(2) pp. 066-072, February, 2019
Available online http ://www.meritresearchjournals.org/mms/index.htm

DOI: 10.5281/zenodo.2579326

Case Report

The Plasmapheresis in the Treatment of Guillain-Barre´ Syndrome Associated with Primary Enteric Neuropathy, Case Report. Up-Date Data from Literature

Lungu Mihaela[1*] and Sapira Violeta[2]

[1]Assoc. Prof., Head of Neurological Department, Emergency Clinical Hospital Galati, Romania; Faculty of Medicine and Pharmacy, "Dunarea de Jos" University of Galati, Romania

[2]Assist. Prof., Neurological Department, Emergency Clinical Hospital Galati, Romania; Faculty of Medicine and Pharmacy, "Dunarea de Jos" University of Galati, Romania

***Corresponding Author's E-mail: mihaelalungu17@yahoo.com micalungu@gmail.com Phone: +40724365046**

Abstract

The article presents a case with a particular clinical situation that has associated an enteric neuropathy with an evolution of over two months, with a Guillain-Barré syndrome (Landry type), both remitted after plasmapheresis. A 53 year old male patient has been admitted in our Neurological Department with dehydration, syncope and orthostatic hypotention, due to an enteric neuropathie, complicated in 8 days with a Guillain Barré syndrome-GBS. This type of associated diseases is rarely described in the literature, being well known that GBS can be precede with two weeks in advance by a diarrheic episode. In our case, a chronic diarrheic sufferance was involved- an enteric neuropathy. Both types of neurological manifestations had an obvious improvement after plasmapheresis, suggesting an autoimmune process as common etiology.

Keywords: Enteric neuropathy, Guillain-Barré syndrome, plasmapheresis

INTRODUCTION

The article proposes to capture the specialists' attention on a clinical case associated with various neurological affections: an enteric neuropathy which has lasted for two months, associated in evolution with a Guillain-Barré syndrome – Landry type, both cured through plasma-pheresis for polyradiculoneuritis.

The enteric neuropathy can appear either isolated or associated with other neuropathies. It shares an autoimmune mechanism, such as the one observed in the physio-pathological hypothesis of the Guillain-Barré syndrome.

The *Campylobacter Jejunii* infection is also considered to be the common denominator for the Guillain-Barré syndrome and the enteric neuropathy.

The involvement of the autoimmune system in both types of manifestation can explain their favorable evolution after plasmapheresis.

Case Report

A 53 years male patient has been admitted at the Neurology Clinic with syncope and orthostatic hypotension, due to serious dehydration, caused by a chronic diarrhea, over the course of two months.

During all this time, the patient constantly suffered daily 3-4 aqueous stools, without pathological products, which have resulted in 30 kg of weight loss. Moreover, the patient suffered from anxiety and depression, for which the he received medication which inhibit serotonin re-uptake that also had a beneficial effect on the gastric ailment, by reducing the frequency of the diarrheic stools. As an effect of the persistent symptomatology and the progressive aggravation of his general condition, the patient had been repeatedly hospitalized in different units, such as internal medicine, infectious disease and

gastroenterological diseases care units, where they carried out complex and very expensive investigations, which have not been able to offer a conclusive diagnosis.

Among the investigations, we can mention the following, without proving any pathological elements: full colonoscopy with a biopsy of the colic mucosa, thoraco-abdominal and cerebral computer tomography, scans with contrast agents, electrocardiography and cardiac echography, extended stool samples, with repeated testing for *Clostridium Difficile*, copro-parasitological test, celiac disease tests and a pancreatic evaluation.

At the admission in our clinic, the objective medical examination showed an underweight patient, dehydrated, with a severe state of anxiety, with severe orthostatic hypotension – with over 60 mmHg differences of systolic tension between decubitus and standing, with faintness when trying to maintain the standing position, which would have resulted in a syncopal state when trying to extend the standing posture. There have not been any neurological deficiencies since the outbreak, or any changes at the clinical examination of the peripherical nerves.

The paraclinical evaluation showed a slight anemia and hypopotassemia and an increase in protein C values. Viral markers for hepatic viruses, hemocultures for the aerobic or anaerobic flora and fungi, occult bleeding, tumor markers for the digestive tract and prostate, collagenase tests all returned negative results.

The intestinal transit for the thin intestine- Pansdorf has not detected changes of the esophagus, of the stomach, of the duodenum and of the ileum, scans with the contrast that reached the middle of the transvers colon in one hour and 30 minutes. The pulmonary and the abdominal echography were also within the normal limits, and the colic mucosa biopsy has been non-specific.

The examinations for collagenase, Lyme borreliosis, HIV, syphilis, extended stool samples for Campylobacter, Salmonella, Shigella, E Coli, Yersinia, Aeromonas shigelloides, Plesimonas (which came out negative the first time) have been retaken. The anti-HU and anti-NMDA receptor of acetylcholine, anti-enterocyte, anti-transglutaminase antibodies were absent. The porphyria tests were negative, the pancreatic ensiles and the B12 vitamin was within the limits. The test for glucose tolerance, the glycosylate hemoglobin and the basic blood sugar levels were normal.

Given the slight improvement of the transit disorder after sertraline, plasmatic serotonin was administered and it resulted in low serum level: 23,4 µg/L (normal values 80-400 µg/L).

The genetic determinism tests were not available, but in the patient's family history there are no significant affections.

As for the apudoma suspicion, some gastrinic dosages were done, which turned out normal. The plasmatic cortisol was within normal limits, as well as the stool calprotectin. The digestion sample has revealed the existence of frequent digested muscular fibers, rare partially digested fibers and neutral fat and, least often, starch.

Considering the chronical unresponsive diarrhea and the complex medical investigations that have not revealed the etiology, the diagnosis of enteric neuropathy was established.

A treatment of electrolyte / fluid rebalancing, rehydration, symptomatic treatment for diarrhea has been applied, which did not influence the frequency and or aspect of stool.

After 8 days of hospitalization, the patient started to manifest distal paresthesia in the inferior limbs, with an ascendant walk and the involvement of the upper limbs, followed by an initial crural motor deficit, then by a brachial one, and finally tetraplegia with MRC 0/5. The osteo-tendon reflexes have disappeared, and radicular pains and finally deglutition disorders have appeared.

The suggestive clinic picture for the Guillain-Barré syndrome – GBS, associated with the enteric neuropathy syndrome, with the alteration of the general condition, has imposed the patient's transfer in Intensive Care. During the 3rd day of GBS evolution, we made an examination of the cerebrospinal liquid CSF, which revealed a slight albumin-cytological dissociation. The electro-neurophysiological examination has confirmed the chronic condition multi-radicular-neurotic suffering.

Given the progressive alteration of the general condition, on the 4th day from GBS's onset, the plasmapheresis sessions have begun, with a medium volume of processed blood of 21,47 liters per session. In total, 5 sessions have been made, one session every other day.

After the beginning of the plasmapheresis, it has been noted two significant elements: the GBS obvious clinical improvement, with an MRC 4/5 at the lower limbs and 5/5 at the upper limbs, with the disappearance of the swallowing disorders, along with the total disappearance of the diarrheic stool and the appearance of a normal transit, with one stool with normal color and consistency.

Within the next days, the general condition has continued to improve, which has allowed the beginning of the neuromotor recover treatment; the alimentary diet for colitis has been maintained, and the transit disorder has disappeared.

The patient remained in neurological and gastroenterological hospitalization, he started to gain weight and, currently, he is independent from the motor point of view.

DISCUSSIONS

The update of the medical information

The enteric neuropathy, known as gastrointestinal dys-

motility, autonomic ganglionopathy (Elkan et al., 2018) or dis-ganglionitis of the enteric neurotic system (Savidge, 2016), is a clinic entity included in the group of under-diagnosticated autonomic neuropathy (Goldstein et al., 2016), caused by different elements, which involves complex paraclinical evaluations and a differential diagnosis, sometimes difficult to be realized.

The autonomic neuropathy implies a nervous affection, parasympathetic, sympathetic or of both elements of the vegetative system; it can be hereditary or acquired. It can appear isolated or in association with other types of neuropathy, and the autonomic dysfunction can be sub-clinical or clinical, sometimes with a severe symptomatology, severe disability or even death.

From the physio-pathological point of view, several theories on the intestinal affection have appeared in the enteric neuropathy.

The enteric ganglionitis can be primary or secondary.

In the primary forms, an incriminated mechanism is represented by the apparition of the autoantibodies against acetylcholine receptors from the ganglions of the digestive tract (Elkan et al., 2018), with the apparition of the achalasia and of the chronical intestinal pseudo-obstructions.

The effects of the disturbance of the filamin A-x linked gene are the impairment of the intestinal smooth musculature layers, that become abnormal, and an abnormal neurotic migration at intestinal level (Jenkins et al., 2018). The degeneration or the loss of the enteric neurons will cause the impairment of the structure and of the function of the entire enteric system (De Giorgio et al., 2004; Jenkins et al., 2018).

The implication of the ACTG gene, which encodes the enteric actin gamma 2 protein can cause significant muscular contractility disorders (Gfroerer and Rolle, 2015).

The intestinal bacteriological charge plays an important role, because the intestinal bacterial flora releases neurotransmitters which can cause the enteric neuropathy, and the imbalances of the intestinal flora can lead to the alteration of the enteric neurotransmission.

The microbiota, as a complex symbiotic ecosystem, composed of bacteria, viruses, fungus, protozoa and archaea, is influenced by the immune and genetic background of the host, and by the age, these factors being able to modify the functionality of the enteric neurotic system. On top of these are the epigenetic changes and the expression manner of the genes, without modifying DNA. In this way, the microbiota will change the polarization of the primary intrinsic neurons from the intestine, a mechanism that involves also the neurons sensitive to calbindin.

The modulation of the tryptofan-hydroxylase-1 gene expression, which plays a role in the restriction of the transformation of tryptophan from aliments into serotonin, can cause the activation of the fatty acids with short chain, of the antioxidants vitamin E based and the biliary acids (Elkan et al., 2018).

The secondary enteric splinting can present various etiologies: paraneoplastic, infectious or caused by neurological affections. At intestinal level, it will be produced an infiltrator composed of inflammatory and immune cells, having as consequence the dysfunction of the intestinal neurons, even with their degeneration, and, finally, the loss of part of these neurons (Matera et al., 2016; Pelizzo et al., 2018; Suzuki et al., 2017).

The diabetes mellitus, which can cause various forms of neuropathy in 60-70% from the patients, can induce other forms of vegetative neuropathy and gastroparesis.

The Systemic Lupus Erythematosus induces gastrointestinal disorders in 50% of the cases, including enteropathy with the loss of proteins and pancreatitis, with a mechanism of impairment of the intestinal smooth musculature (Jin et al., 2015; Li et al., 2017). In rheumatoid arthritis, LES and other connectivities, the autoantibodies against ganglionic receptors of acetylcholine can be present (Mukaino et al., 2018).

Among the neurological diseases in which cases of enteric neuropathy can co-exist, through the autonomic neurotic system disfunction, we can name: spinocerebellar ataxia, myotonic dystrophy with eosinophilic plexitis and infiltration of the colonic musculature (Halter et al., 2015; Pelizzo et al., 2018), mitochondrial neuro-gastrointestinal encephalopathy MNGIE - with dominant autosomal transmission, through mutations of timidinfosforilasa, which affects the mitochondrial DNA.

The Fabry x-linked disease, with intracellular build-up of globotriaosylceramide GL, can evolve with diarrheic stools.

Sometimes secondary to a multiple myeloma, the amyloidosis induces digestive disorders that can lead to diagnosis errors.

The Coxsackie virus, the echovirus and the measles virus are viruses that can cause enteric neuropathy.

The *Campylobacter Jejunii* can be found as a common etiological supposition for Guillain-Barré syndrome and enteric neuropathy.

The HIV infection is localized in the glial cells from the intestines, can cause inflammation followed by lesions of the enteric neurons, with chronic diarrhea. In this case, the Trans-Activator of Transcription –TAT- protein plays an important role, that mediate the neuronal lesions. Another contributor is the alteration of the Na^+ channels and of the generation of action potential. TAT increases the cytokine secretion, with the enhancement of the inflammation and of oxidative processes and, finally, apoptosis. This virus also affects the macrophages and the lymphocytes from the intestines, and the enterocyte impairment causes malabsorption (Galligan, 2015 ; Hizarcioglu-Gulsen et al., 2014).

Other entities involved in the apparition of a symptomatology specific to the enteric neuropathy include: the infiltration with eosinophils of mesenteric

ganglions, the mesenteric ischemia, sclerodermia, the irradiation enteritis (with cases of intestinal insufficiency), the intestinal parasitosis, the syndrome of common immunodeficiency through mutation of the protooncogene RET: R114H, presented at patients with Hirschsprung disease and at the ones with intestinal pseudo-obstruction, in cases where no other causes are revealed.

The Lyme disease can present lympho-plasmocytic infiltrators in the autonomic ganglions. Through the autoimmune destruction of the center neurotic system and of the vegetative system, the Chagas disease can associate gastrointestinal symptoms.

Botulism can present cholinergic neuropathy

Other autoimmune mechanisms are involved in the apparition of the autonomic neuropathy in the celiac disease, at 50% of adults. The neuropathy is unresponsive to the gluten free diet.

The Guillain-Barré syndrome or the inflammatory acute demyelinating polyneuropathy can be associated with autonomic disfunctions that increase mortality. The autoantibodies can be directed against the gangliosides: anti GM_1. There can be inflammatory phenomena with edema in the autonomic ganglions and destructions of the cells belonging to the peripheral ganglions. It is possible to depict the chromatolysis, infiltrators with mononuclear and Nageotte nodes in the ganglion.

The paraneoplastic autonomic neuropathy may occur at 23% of the patients with anti-Hu antibodies and results from autoimmune destruction of autonomic postganglionic and myenteric neurons. A variant is an enteric neuropathy with antibodies directed against myenteric plexus (anti-enteric neuronal antibodies). Other parasympathetic autonomic syndromes may have autoantibodies against neuronal cytoplasmic proteins of the collapsin response-mediator family (CRMP-5) and against Purkinje cell cytoplasm (PCA-2) or against the ionic channels.

The metastatic infiltration of the ganglions from the celiac plexus, with the branches of the mesenteric arteries encompassed, associated with the peritoneal carcinomatosis, can cause chronic diarrhea, rogue to the treatment, that can provoke the death of the patients with neoplastic diseases, e.g. ovarian carcinoma.

Not least, the symptomatology of an enteric neuropathy can be induced in an iatrogenic way, as a side effect of the antipsychotic, antidepressant, anxiolytic (Elkan et al., 2018; Goldstein et al., 2016). medication, and of the cytostatic medication: paclitaxel, vincristine, cisplatin, carboplatin etc.

The common clinical picture of the enteric neuropathy includes the inexplicable diarrhea, the abdominal pains, vomiting, weight loss, child grow disorder, affective disorders, endocrinopathies, possible systemic signs of the basis affection. Long term diarrhea is rogue to treatment, possible intolerance to carbohydrates and food allergies (Hizarcioglu-Gulsen et al., 2014).

Finally, it comes down to the intestinal pseudo-obstruction, 1/3 from the adult patients need parental nutrition and become cachectic, that can lead to an increased death risk.

The diagnosis of an enteric neuropathy implies a correct medical history, but it can also imply complex paraclinical investigations, in order to have a positive and differential diagnosis, among which we can name the usual blood tests, the test for connective tissue disorders, the endocrinological tests for hyperthyroidism or the existence of apudoma, the biopsy of enteral mucosa, the colonoscopy, the abdominal CAT scan, the calprotectin dosage (Galligan, 2015), the stool samples in extensor – including for fungus (the MALDI-TOF method), the fecal clearance of antitrypsin alpha-1 (Li et al., 2017) for digestive determination in lupus. It is, also, possible to be necessary dosages of the pancreatic enzymes, of the serotonin, norepinephrine, the electrophysiological examination for the simultaneous impairment of the peripheral nerves (e.g. in the mitochondrial neuro-gastrointestinal encephalopathy syndrome MNGIE, the determinations done at the median and peroneal nerves showed the stabilization of the latent belonging to the wave I and of the sensitive neurotic and motor conduction speed after the stem transplant at these patients (Halter et al., 2015). In other situations, there are necessary some special genetic tests, the examination of the cerebrospinal liquid CSF (changes of albuminuria, CSF-enolase, the presence of pleiocytosis in HIV etc.), the skin or nerve biopsy, radioisotope study of intestinal motility.

For the paraneoplastic syndromes it is necessary to detect the anti-HU antibodiesof the myenteric anti-plexus antibodies (cytoplasmic anti-proteins antibodies). It can be necessary to take other tests for borreliosis, the B_{12} vitamin levels, glucose tolerance tests, the determination of autoantibodies against ganglionic receptors of acetylcholine, porphyria tests, determinations for HIV and syphilis, antacid pancreatic antibodies, IgG and IgA anti-enterocyte, IgG and IgA anti-gliadin antibodies, IgG and IgA anti-endomysium antibodies, as well as the celiac tests.

The enteric neuropathy complications include hydro-electric imbalances, endocrine disorders, mental retardation in children, uremia, sepsis, multiorgan insufficiency, supra-infection of the catheters for parental nutrition (Choi et al., 2016)– after a medium period of 2,9 years usage (Choi et al., 2016), with mucorvelutinosus (Gfroerer and Rolle, 2015) or dermacoccus barathri (Takahashi et al., 2015).

The treatment for the enteric neuropathy is complex, including the calculation of the non-protein energy received from parental nutrition.

Erythromycin can be useful in gastroparesis, with a

role of agonist of motilin receptor. It is envisaged the reduce of the excessive bacteria colonization of the intestine, to avoid the sepsis and to regain the normal population of the intestine. The treatment for the Hirschsprung disease is the resection of the a gangliosides portion, the stem cells and the intestine transplant being currently being under study (Ceulemans et al., 2015).

The parental nutrition and the palliative caring of these patients imply pluri-disciplinary teams.

The treatment implies diet changes, with repeated and quantitative reduced meals, increased liquid addition.

The intravenous immunoglobin (e.g. octagam) can neutralize the circulating myelin antibodies through anti-idiotypic antibodies (Dalakas, 2004); down regulates proinflammatory cytokines, including INF-gamma; blocks Fc receptors on macrophages; suppresses inducer T and B cells and augments suppressor T cells; blocks complement cascade; promotes remyelination; may increase CSF IgG (10%).

The Guillain-Barré GBS syndrome is an acute inflammatory demyelinating polyneuropathy (AIDP) typified by rapid ascending weakness, with paralysis, evolving over days to one to four weeks. Paralysis is usually followed by a brief plateau period and then improvement usually taking place over six to twelve months. Sometimes, recovery can continue for up to two years, and occasionally, for 5-7 years (Guillain Barre Syndrome, 2012).

GBS is the major cause of acute neuromuscular paralysis with annual incidence of 1,3-2 per 100.000 throughout the world.

It is a clinical syndrome whose pathology substrate may be acute demyelinating multi-radiculoneuropathy (AIDP) or acute axonal motor or motor and sensory axonal neuropathy (Hughes and Rees, 1997).

Weakness is accompanied or predated by a variety of sensation changes, as tingling of the fingers and feet and pain in the back or proximal limbs. Paralysis can affect the muscles of respiration, 1/3 patients requiring mechanical ventilation. Cardiac arrhythmias can occur and even be life threatening.

Pathogenesis: approximately 2/3 of GBS are preceded by an infection or diarrhea. Exposure to Campylobacter jejunii –the same agent that can be incriminated in the enteric neuropathy- a bacterium found in the chicken gut as well as in their droppings has been implicated as an etiology.

GBS is an autoimmune disorder, the nerve's myelin and sometimes the axon is attacked and injured.

The evaluation of the motor deficit is done with the Medical Research Council Scale-MRC.

The laboratory evaluation includes a standard compilation of tests: chest-ray, electrocardiograms, the determination of thyroids hormones, of glycosylate hemoglobin HbA1c, urinary tests for porphyria, blood electrolyte panel, borreliosis tests. In the cerebrospinal liquid CSF there is cyto-albumin dissociation, within 10 days of onset of disorder. Patient with HIV or Lyme disease may have an elevated number of cells in CSF. Nerve conduction velocity-electromyography testing shows slow or blocked nerve conduction and delayed F waves from nerve root demyelination, decreased amplitude of compound muscle action potential and prolonged distal latencies. Spirometry measurements, vital capacity, oxygen saturation determinations are necessary.

Erasmus GBS Prognosis Score EGOS helps to predict the like hood of recovery at 6 months.

Treatment: the effect of plasma exchange and intravenous immune globulins IVIg has been established in the treatment of GBS. In an effort to improve the muscle weakness, neurologists may be tempted to apply plasma exchange or IVIg at an earlier stage of disease. But it has been stated that the patients who are treated early in the course of their disease may be at risk for relapse (Hughes et al., 2006a).

No significant differences were found between patients with GBS treated with plasma exchange and those treated with IVIg (Visser et al., 1999).

Some studies consider that the simultaneous administration of both kinds of treatment is not positive (Hughes et al., 2003).

Plasma exchange carried out over a 10-day period may aid in removing autoantibodies, immune complexes and cytotoxic constituents from serum and has shown to decrease recovery time by 50% (Visser et al., 1998).

IVIg treatment is easier to implement and potentially safer than plasma exchange and there may be a choice of availability and convenience.

Some clinicians prefer to try plasma exchange firs, and if this does not provide patient improvement then they go to IVIg. There are no randomized controlled trial that is allowed to decide the best plan.

Other possible treatments modulating the immune system include complement inhibitors such as eculizumab (Misawa et al., 2018).

CONCLUSIONS

The case presents a particular clinical situation in which a primary enteric neuropathy, with an unsteady evolution of over two months, has been complicated with the acute installation of an ascendant Landry multi-radiculo-neurotic sensitive-motor, with severe manifestation.

This type of association is rarely described in the literature. It is well known that GBS can be preceded, with two weeks in advance, by a diarrheic episode of short term, but in our case, it involved a chronic diarrheic sufferance, qualified in the symptomatology of a primary enteric neuropathy.

As a common etiology, both types of affections involve Campylobacter jejunii infection, which has been excluded

in the present case.

The obvious improvement after plasmapheresis of these two types of manifestations suggests an autoimmune process as a common etiology.

The enteric neuropathy is a clinical life threatening entity and the paraclinical evaluations to establish its etiology and the differential diagnosis are extremely complex and expensive.

The association of the two types of affections can present a major death risk for the patient.

Taking into consideration the patient's low levels of serotonin, it can be considered the existence of a simultaneous change of the tryptofan-hydroxylase-1 gene, with a role in changing the tryptophan from food into serotonin, but it was impossible to do the genetic determinations.

Ethical approval

This article does not contain any studies with human participants performed by any of the autors.

Financial disclosure: none.

Grant information

This article did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Informed consent

The patient's informal approval has been obtained and recorded in the chart.

Author contributions

All the authors have equal contributions in this presentation.

ACKNOWLEDGEMENTS

Thanks for providing language help and for proof reading the article.

REFERENCES

Ceulemans LJ, Monbaliu D, De Roover A, Detry O et.al (2015). Belgian multicenter experience with intestinal transplantation. Transpl Int. 28(12):1362-70.

Choi SJ, Lee KJ, Choi JS, Yang HR et.al. (2016). Poor prognostic factor in a patient with parenteral nutrition-dependent pediatric intestinal failure. Pediatr Gastroenterol Hepato lNutr. Mar; 19(10:44-53.

Dalakas MC (2004). The use of intravenous immunoglobulin in the treatment of autoimmune neuromuscular diseases: evidence-based indications and safety profile. Pharmacol Ther. Jun. 102(3): 177-93. Medline.

De Giorgio R, Guerrini S, Barbara G, Stanghellini V (2004). Inflammatory neuropathies of the enteric nervous system. Gastroenterology, 126(7): 1872-83.

Elkan EM, Banu EA, Nechita A, Mutica M, Baciu G, Zlati M, Campean M, Lungu M (2018). Enteric neuropathy. Neurology and Child and Teenager Psychiatry Magasin. March vol.24, n. 1:19-39.

Galligan JJ (2015). HIV, opiates and enteric neuron dysfunction. Neurogastroenterol Motil, 27(4):449-454.

Gfroerer S, Rolle U (2015). Pediatric intestinal motility disorders. World J Gastroenterol, Sep.7; 21(33): 9683-9687.

Goldstein AM, Thapar N, Karunaratne TB, De Giorgio R (2016). Clinical aspects of neurointestinal disease: Pathophysiology, diagnosis and treatment. Dev. Biol. 417(2):217-28.

Guillain Barre Syndrome (2012). An Acute Care Guide for Medical Professionals. GBS/CIDP Foundation International, Edition:1-8.

Halter JP, Michael W, Schupbach M, Mandel H et.al. (2015). Allogenetic haematopoietic stem cell transplantation for mitochondrial neuro-gastro-intestinal-encephalomyopathy. Brain.; 138(10):2847-2858.

Hizarcioglu-Gulsen H, Saltik-Temizel IN, Demir H, Gurakan F et.al. (2014). Intractable diarrhea of infancy: 10 years of experience. J Pediatr Gastroenterol Nutr. Nov;59(5): 571-6.

Hughes RA, Rees JH (1997). Clinical and epidemiologic features of Barre syndrome. J Infect Dis. Dec. 176 Suppl 2: s92-8. Medline

Hughes RA, Wijdicks EF, Barohn R, Benson E, Cornblath DR, Hahn AF et.al (2003). Practice parameter: immunotherapy for Guillain-Barré syndrome: report of the Quality Standards Subcommitee of the American Academy of Neurology. Neurology. Sep 23. 61(6):736-40. Medline.

Hughes RAC, Raphael JC, Swan AV, van Doorn PA (2006a). Intravenous immunoglobuline for Guillain-Barre syndrome. Cochrane Database Syst Rev CD002063.

Jenkins ZA, Macharg A, Chang CY, van Kogelenberg Met.col (2018). Differential regulation of two FLNA transcripts explains some of phenotypic heterogeneity in the loss-of-function filaminopathies. Hum Mutat.; 39(1):103-113.

Jin P, Ji X, Zhi H, Song X et.al (2015). A review of 42 cases of intestinal pseudo-obstruction in patients with systemic lupus erythematosus based on cases reports. Hum Immunol. 76(9): 695-700.

Kumar M, Jantausch B, Torres C, Campos J (2018). Central Line-Associated Mucorvelutinosus Bloodstream Infection in an Immunocompetent Pediatric Patient. J. Pediatric Infect Dis Soc. 7(2)e55-e57

Li Z, Xu D, Wang Y et.al. (2017). Gastrointestinal system involvement in systemic lupus erythematosus. Lupus.;26(11):1127-1138.

Matera I, Rusmini M, Guo Y, Lerone M (2016). Variants of the $ACTG_2$ gene correlate with degree of severity and presence of megacystis in chronic intestinal pseudo-obstruction. Eur J Hum Genet. 24(8):1211-1215.

Misawa S, Kuwabara S, Sato Y et.al (2018). Safety and efficacy of eculizumab in Guillain Barre syndrome: a multicentre, double-blind, randomized phase 2 trial. Lancet Neurol. Apr.20. Medline.

Mukaino A, Minami H, Isomoto H, Hamamoto H et.al. (2018). Anti-ganglionic AchR antibodies in Japanese patients with motility disorders. J.Gastroenterol. 15-22

Pelizzo G, Calcaterra V, Villanacci V, Mura GB et. al. (2018). Myotonic dystrophy type 1 and pseudo-obstruction in a child with smooth muscle actin deficiency and eosinophilic myenteric plexitis. Turk J Gastroenterol., Mar; 29(2): 226-229.

Savidge TC (2016). Epigenetic Regulation of Enteric Neurotransmission by Gut Bacteria. Front Cell Neurosci.; 9:503.

Suzuki J, Iwata M, Moriyoshi H, Nishida S et. al. (2017). Familial Pernicious Chronic Intestinal Pseudo-obstruction with a Mitochondrial DNA A3243G Mutation. Intern Med., 56(9): 1089-1093.

Takahashi N, Shinjoh M, Tomita H, Fujino A et. al. (2015). Catheter-related blood stream infection caused by Dermacoccusbarathri,

representing the first case of Dermacoccus infection in humans. J Infect Chemother. Aug; 21(8):613-6.

Visser LH, Schmitz P, Meulstee J, van Doorn PA, van der Meche FG (1999). Prognostic factors of Guillain Barre syndrome after intravenous immunoglobulin or plasma exchange. Dutch Guillain Barre Study Group. Neurology. Aug.11, 53(3):598-604. Medline.

Visser LH, van der Meche, Meulstee J, van Doorn PA and The Dutch Study Group (1998). Risk factors for treatment related clinical fluctuations in Guillain Barre syndrome. J Neurol Neurosurg Psychiatry; 64: 242-244.