Guillain-Barre Syndrome after Appendectomy: A Case Report

Von Edward S. Salcedo, MD,[1] Marissa Ong, MD,[2]

Abstract

Background: Guillain-Barre syndrome (GBS) is an acute monophasic paralyzing illness that typically occurs after gastroenteritis and respiratory tract infection. Antecedent surgical procedures are less recognized trigger of GBS.

Objectives: This paper aims to report a case of demyelinating variety of GBS that developed after appendectomy.

Methods: This is a case of a 39-year-old Filipino male who was admitted due to acute appendicitis. He developed lower extremity weakness 4 days after appendectomy. His motor deficit initially presented distally from lower extremities, which advanced to the trunk, upper extremities, and muscles of speech and deglutition. Paresthesia of the fingers and toes and distal areflexia on both lower extremities were also elicited.

Results: Diagnosis was done clinically. Nerve conduction study showed demyelinating variant, uncommon for a post traumatic GBS. Supportive care was rendered which resulted in complete recovery.

Conclusion: Surgery is a known but less identified cause of GBS. Although rare, we should consider GBS in patients presenting with ascending or progressive weakness after recent surgery because its early identification renders immediate and appropriate treatment.

Keywords: Guillain-Barre Syndrome, Acute Inflammatory Demyelinating Polyneuropathy, AIDP, Appendectomy

Introduction

Guillain-Barre syndrome (GBS) is an acute onset, monophasic, immune-mediated disorder of the peripheral nervous system. There are identified etiologies linked to GBS. Most commonly, antecedent upper respiratory or intestinal infections precede GBS in 2/3 of cases.[1] The most identified agents are *Campylobacter jejuni*, Epstein–Barr virus, Cytomegalovirus, *Mycoplasma pneumoniae* and Influenza virus.[2] The relationship between GBS and surgery has been investigated. A nationwide study done in France including more than 8,000 cases, GBS was moderately associated with recent surgery even in procedures with no identified infection.[3] As previously stated, GBS is typically caused by an autoimmune attack on peripheral nerves, but the mechanisms by which surgery may increase the risk of GBS remain unclear. Very few literatures linking GBS and surgery are reported in Asia. Here, we report a case of demyelinating variety of GBS in a 39-year-old man four days after appendectomy.

Case Presentation

This is a case of a 39-year-old male initially admitted at a tertiary general hospital as a case of acute appendicitis. On history taking, he denied past or concurrent diseases, vices, or heredofamilial illnesses. He had no recent vaccinations, infection or trauma.

He underwent emergency appendectomy under epidural anesthesia using 0.5% bupivacaine in 8% dextrose and morphine. The surgery lasted 50 minutes. Histopathologic findings were compatible with acute suppurative appendicitis. No immediate post-surgical complications were noted.

Four days after surgery he started to experience bilateral leg weakness. Paraplegia and paresthesia of the fingers and toes, and distal areflexia on both lower extremities were elicited. There were no accompanying symptoms

[1] Department of Neurosciences, East Avenue Medical Center, Quezon City, Philippines
[2] Research Consultant, East Avenue Medical Center, Department of Neurosciences, East Avenue Medical Center, Quezon City, Philippines
Corresponding author: Von Edward S. Salcedo, MD
email: vonsalcedo@gmail.com

Table I. Cerebrospinal fluid analysis

Color: Colorless	Opening pressure: 15 cm H_20
RBCs: 0 x 10^6/L	Closing pressure: 13 cm H_20
WBCs: 5 x 10^6/L (all lymphocytes)	Volume: 1.8 cc
Total cell count: 5 x 10^6/L	Transparency: Slightly cloudy
	Normal Range (SI Units)
Glucose, RBS (serum): 7.31 mmol/L	
Total protein (serum): 64 g/L	62 – 83g/L
Glucose (CSF): 3.39 mmol/L	2.22 – 3.89mmol/L
Protein (CSF): 460 mg/L	150 – 450mg/L

such as facial weakness or numbness, and visual disturbances, with the rest of the physical and neurologic examinations being unremarkable. Initial laboratory work-up excluded sepsis on complete blood count, or electrolyte imbalance in serum chemistry.

In the subsequent two weeks, the weakness involved the arms and truncal muscles, then followed by symptoms of dysarthria, dysphagia and urinary incontinence. No respiratory distress was noted. Cerebrospinal fluid analysis, with normal opening pressure on lumbar tap, showed cytoalbuminologic dissociation *(Table I)*. Electromyogram and nerve conduction velocity (EMG-NCV) showed findings of absent sensory potentials of the median, ulnar, sural and superficial peroneal nerves; abnormal motor conduction, reduced motor amplitudes with absence of F-wave latencies and tibial H-reflexes suggesting demyelination compatible with GBS (*Table II*).

On the 3rd week, the symptoms reached clinical plateau. Supportive care was rendered instead of immunotherapy due to resource constraints.

On the 4th week, he showed improvement of symptoms with physical therapy. He was able to do self-care such as eat, dress and reposition himself on bed. At this time, he was able to stand and attempt ambulation via baby steps with support.

He followed up on the 12th week (90 days) since onset of symptoms at the out-patient department. He was seen ambulating independently, and deemed to have complete recovery.

Discussion

GBS is a common cause of acquired flaccid paralysis world-wide. It is regarded as post infectious autoimmunity disease where respiratory and intestinal infections are the most common precedent etiology.[1] Although a range of infectious factors, such as *Campylobacter jejuni*, Epstein–Barr virus, Cytomegalovirus, *Mycoplasma pneumoniae,* and Influenza virus are associated with this syndrome.[2] GBS has also been reported to be triggered by non-infectious factors such as vaccination (influenza, rabies, and meningococcal vaccines), autoimmune diseases (SLE, ulcerative colitis, Graves' disease, and rheumatoid arthritis), immunosuppression (lymphoma, following both bone marrow and solid organ transplantation, and chemotherapy), trauma, and surgery.[4,5]

In a 10 year- retrospective review by Nagarajan et al. in Mayo Clinic, USA, surgical procedures antedated GBS in 15% of patients, which was unexpectedly high. In this study, the main types of surgeries preceding GBS were gastrointestinal, cardiac, and orthopedic surgery under general anesthesia. The median duration from the surgery or procedure to the onset of GBS symptoms was 19 days (IQR 11-38). The factors that were associated with GBS after a surgery or procedure were age (median age of 63 years old), malignancy, or preexisting autoimmune disorder.[6]

Another more recent six-year, prospective epidemiologic study in France showed that GBS was moderately associated with any type of recent surgery and was more strongly associated with bone and digestive organ surgery. The median duration from the surgery or procedure to the onset of GBS symptoms was 11 days (IQR 6-22). Here, the factors that increased risk of post-surgery GBS were recent gastroenteritis and respiratory tract infection, and also increased duration of the procedure lasting more than 120 minutes. No significant heterogeneity for the association between GBS and surgery was observed by age group.[3]

The case discussed here is a case of acute debilitating polyneuropathy post-surgery. Common causes of acute limb weakness were considered as differential diagnoses. Electrolyte imbalance and critical illness poly-neuropathy (CIP) were ruled out due to normal serum electrolytes level during serial monitoring and absence of evidence of sepsis or systemic inflammatory response syndrome during limb weakness on postoperative days. Corticosteroid-induced myopathy was ruled out as the patient had no steroid use prior and during hospitalization.

GBS is a clinically diagnosed disorder. Above patient was diagnosed based on the clinical criteria of progressive weakness in legs and areflexia (or decreased tendon reflexes) in weak limbs.

In our patient, the onset of lower extremity weakness and paresthesia was 4 days, relatively earlier than those presented in the larger studies done in USA and France.[3,6] However, there are case reports which show varying short onset of GBS symptoms occurring on days 4, 7, 9, and 11 following surgeries.[7]

The only strong risk our patient had prior to developing GBS is the kind of surgery performed which is appendectomy, a digestive organ surgery. The other predisposition for developing GBS after surgery such as recent gastroenteritis and respiratory tract infection, use of general anesthesia, long duration of surgery, malignancy, or preexisting autoimmune disorder, and recent vaccination were not present in our patient's medical history.[3,6]

The requirement for establishing a temporal relationship between a traumatic event and subsequent neuropathy is that the neuropathic symptoms must start within 30

Table 2: Electromyogram- Nerve conduction study report

Nerve Conduction Velocity Studies (Upper Extremities)

Left Median Nerve		Right Median Nerve	
SAP (index to wrist)	No Response	SAP (index to wrist)	No Response
SAP (wrist to elbow)	17.0uV 0.0m/sec	SAP (wrist to elbow)	6.0uV 0.0m/sec
MCV	41.0m/sec	MCV	45.0m/sec
Distal latency	5.9ms	Distal latency	4.4ms
CMAP (wrist)	4.3mV	CMAP (wrist)	6.8mV
CMAP (elbow)	3.6mV	CMAP (elbow)	5.8mV
F-wave to APB	37.0ms	F-wave to APB	34.8ms
Left Ulnar Nerve		**Right Ulnar Nerve**	
SAP (5th digit to wrist)	No Response	SAP (5th digit to wrist)	No Response
MCV (wrist to elbow)	43.0m/sec	MCV (wrist to elbow)	23.0m/sec
MCV (elbow to above elbow)	13.0m/sec	MCV (elbow to above elbow)	26.0m/sec
Distal latency	4.4ms	Distal latency	4.3ms
CMAP (wrist)	4.1mV	CMAP (wrist)	4.6mV
CMAP (elbow)	0.5mV	CMAP (elbow)	0.2mV
CMAP (above elbow)	0.7mV	CMAP (above elbow)	0.1mV
F-wave to ADM	No clear F-wave	F-wave to ADM	No clear F-wave
Left Radial Nerve		**Right Radial Nerve**	
SAP (forearm)	14.0uV 5.0m/sec	SAP (forearm)	3.0uV 5.0m/sec

Nerve Conduction Velocity Studies (Lower Extremities)

Left Sural Nerve		Right Sural Nerve	
SAP	No Response	SAP	No Response
Left Common Peroneal Nerve		**Right Common Peroneal Nerve**	
SAP	No Response	SAP	No Response
MCV (ankle to knee)	26.0m/sec	MCV (ankle to knee)	28.0m/sec
MCV (knee to above knee)	13.0m/sec	MCV (knee to above knee)	?
Distal latency	5.0ms	Distal latency	4.7ms
CMAP (ankle)	0.7mV	CMAP (ankle)	1.6mV
CMAP (knee)	0.3mV	CMAP (knee)	0.2mV
CMAP (above knee)	0.2mV	CMAP (above knee)	No Response

Electromyography Report

Muscles	Insertional Activity	Spontaneous Activity			Motor Unit Potentials
		FIBS	FASC	PSW	
Left Medial Gastrocnemius	Normal	-	-	-	Reduced recruitment pattern.
Left Rectus Femoris	Normal	-	-	-	Reduced recruitment pattern.
Left Deltoid	Normal	-	-	-	Reduced recruitment pattern.
Left First Dorsal Interosseous	Normal	-	-	-	Reduced recruitment pattern.

Findings:

- Sensory potentials of the median, ulnar, sural and superficial peroneal nerves are absent.
- Motor conduction is also abnormal. Most of the motor amplitudes are reduced with partial to total conduction block and temporal dispersion. Motor velocities are severely slowed and distal latencies are mostly prolonged.
- F-wave latencies are prolonged to absent and tibial H-reflex responses are absent.
- Needle EMG showed mostly reduced recruitment. No denervation potentials seen.

Conclusion:

This is an abnormal EMG-NCV study showing evidence for a severe bilateral diffuse polyneuropathy. Findings are mainly demyelinating in nature. These findings may be compatible with Guillain Barre Syndrome in the right clinically scenario.

days of the trauma.[5] Nerve conduction studies (NCS) can help to support the diagnosis, and also to discriminate between GBS variants such as axonal and demyelinating subtypes, and could relate to prognosis.[8]

There has been no definite and clear pathophysiology explaining postoperative GBS yet. The traumatic event presumably triggers transient immunosuppression due to nerve damage associated with procedures.[6] Macrophage infiltration leading to inflammation into the nerve was seen in the histology of patients developing polyneuritis after surgery.[10] Two immunologic processes have been hypothesized: 1.) T-cells act against the antigen on nerve surface causing inflammatory mediator release, and 2.) humorally-mediated antibodies bind to epitopes on the nerve surface by complement activation.[11,12] However a body of evidence has emerged that the disorder is mainly a humorally-mediated, rather than T-cell-mediated disorder, at least in the progressive phase of nerve injury,[8] Immune reactions directed against epitopes in Schwann cell surface membrane or myelin can cause acute inflammatory demyelinating neuropathy (AIDP), while against epitopes contained in the axonal membrane cause the acute axonal forms of GBS: acute motor axonal neuropathy (AMAN) and acute motor and sensory axonal neuropathy (AMSAN).[13]

An alternative explanation proposes that there is transient immunosuppression during surgery with activation of the neuroendocrine access. Immunosuppression may promote subclinical infections, which in turn by either mimicry or cross-reactive antibodies causes symptomatic GBS.[9]

In a study conducted by Li et al., all patients exhibited an axonal rather than a demyelinating form of neuropathy.[5] In other reports which reviewed the electrophysiological feature of post-traumatic GBS, it was also found that after trauma, the axonal subtype of GBS is more common than the demyelinating subtype.[9]

In our patient, the features of acute inflammatory demyelinating polyneuropathy (AIDP) as seen in nerve conduction study was not consistent with the literatures stated above. Due to its rarity, we are left to the understanding that post-surgical AIDP may be due to peripheral nerve changes consisting of varying degrees of perivascular edema, accumulations of mononuclear cells, and paranodal and less commonly, segmental demyelination, often multifocal with some predilection for the nerve roots, sites of entrapment, and distal ends.[14]

In general, AIDP form had a rate of recovery comparable to that of the AMAN form, however prognosis may still differ among regions.[15] The median time to regain the ability to walk independently was 63 days (IQR 28–186) in Europe/Americas and 39 days (IQR 17–94) in Asia. The proportion of patients who regained the ability to walk independently after 12 months follow-up was 83% in Europe/Americas, and 91% in Asia.[15] Our patient who showed complete recovery after 90 days is within the time frame of recovery as stated in the international data.

Conclusion

Surgery is a known but less identified cause of GBS. Digestive organ surgery such as appendectomy is a risk factor for GBS after surgery. Acute inflammatory demyelinating polyneuropathy (AIDP) variant of post-surgery GBS is uncommon, and its pathogenesis is not well understood. Although rare, we should consider GBS in patients presenting with ascending or progressive weakness after recent surgery because its early identification helps physicians foresee its prognosis, start immediate therapy, and render appropriate healthcare referrals.

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