Case Report

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Anaesthesia Section

Anaesthetic Management of a Patient with Guillain-Barré Syndrome undergoing Proximal Humerus Fracture Surgery: A Case Report

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ABSTRACT

Guillain-Barré Syndrome (GBS) is an autoimmune disorder which can present in acute and chronic forms. It is an inflammatory demyelinating polyneuropathy. These patients pose potential perioperative risks of autonomic dysfunction and respiratory muscle weakness. The current case report shows a 66-year-old female with a history of a fall at home eight days prior to surgery, diagnosed with a right-sided proximal humerus fracture. The patient was a diagnosed case of GBS and hypertension since five years. For GBS, she had a history of Intensive Care Unit (ICU) admission for both upper and lower limb muscle weakness and breathlessness. She recovered with treatment of Intravenous Immunoglobulin (IVIg) and oxygen therapy. The weakness improved gradually over time but did not fully recover. The patient continued to have weakness in both lower and upper limbs prior to surgery. The patient underwent Joshi's External Stabilising System (JESS) fixation surgery for the right proximal humerus fracture. Ultrasound-guided (USG) interscalene and superficial cervical plexus block were performed in view of pre-existing muscle weakness and to reduce the requirement of postoperative ventilator support. The intraoperative course was uneventful. The patient's sensory and motor power returned to the same prior to surgery after the block's effects subsided.

Keywords: Autoimmune disorder, Interscalene block, Polyneuropathy

CASE REPORT

A 66-year-old female came with complaints of pain over right shoulder following a slip and fall at home eight days prior to surgery. There was no history of head, chest, or abdominal trauma. The patient was diagnosed with a right-sided proximal humerus fracture for which closed reduction internal fixation was planned. The patient had hypertension which was diagnosed five years back, controlled with tablet Cilnidipine 10 mg once a day. She was diagnosed with GBS five years ago, experiencing bilateral tingling sensations followed by weakness in all four limbs. She also developed breathlessness, requiring ICU admission and oxygen support for 16 days. She received IVIg for five days, following which her weakness improved. Since then, she has been taking Pregabalin 50 mg once daily.

General examination revealed that the patient was afebrile, with a pulse rate of 90 beats per minute, blood pressure of 130/86 mmHg, and SpO_2 of 99% on room air. The rest of the general examination revealed normal findings. Systemic examination showed normal cardiovascular system and no murmurs. Lower zone air entry was diminished in the respiratory system, with no additional sounds detected. The chest X-ray of the patient suggested bilateral minimal costophrenic angle blunting and radiopaque shadows at the lower zones [Table/Fig-1]. The abdomen was soft, non tender, and non distended.

[Table/Fig-1]: Chest X-ray of the patient suggestive of bilateral minimal costophrenic angle blunting and radiopaque shadows at lower zones.

The patient was conscious and oriented. The present neurological status revealed a Glasgow Coma Scale of E4 M5 V6, with pupils bilaterally reacting to light. Power in the right upper limb could not be tested due to the fracture, but the patient was able to move the left upper limb with a full range of motion against gravity with moderate resistance, i.e., 4/5. Power in both lower limbs showed active movements with full range of motion against gravity with moderate resistance, i.e., 4/5. Sensory grading was normal in all four limbs. The patient relied on support while walking and performing daily activities. Increased micturition frequency, urine dribbling, and unchanged bowel habits accompanied disease progression. Airway assessment revealed a short neck and Mallampati classification 2. All routine investigations were within normal limits.

The surgery was planned under USG Interscalene Block (ISB) and superficial cervical plexus block. The patient was explained about the block and requirement of postoperative ventilatory support due to the presence of co-morbidities and the nature of the disease. In the operation theatre, standard monitors were attached. The patient was placed in a supine position with the head turned towards the left-side and the chin corresponding to midclavicular line on the left-side. A pillow was placed under the shoulder for better exposure.

The high-frequency linear probe of the SonoSite machine was put on the cricoid cartilage at the C6 level. The trachea, thyroid gland, carotid artery, internal jugular vein, sternocleidomastoid muscle, anterior scalene muscle, and middle scalene muscle were identified using the probe. The round anechoic nerve roots of the brachial plexus were identified in the groove between the anterior scalene and middle scalene muscles, displaying the typical "traffic signal" sign [1]. Injection of bupivacaine 0.5% 6 mL and injection adrenalised lignocaine 2% 6 mL was injected after negative aspiration.

A USG-guided superficial cervical plexus block was given with the needle placed beneath sternocleidomastoid muscle. About 5 mL of adrenalised lignocaine 2% was injected after negative aspiration. USG-guided diaphragmatic excursions were not visualised as clinically patient's respiratory rate was normal clinically. No diaphragmatic breathing or breathlessness was observed during the intraoperative course. Oxygen saturation remained at 100 percent throughout the surgery. No sedation was administered as the patient remained cooperative throughout the procedure. The surgery was uneventful. Cumulative blood loss. The patient remained haemodynamically stable throughout the procedure and shifted to the postoperative recovery area. The analgesic action remained for eight hours. Complete sensation was regained by the patient seven hours after the surgery, and motor power returned to the previous after four hours postsurgery.

DISCUSSION

The GBS is an acute demyelinating sensory motor polyneuropathy. The incidence has been reported as 0.75 to 2 cases per 100,000 persons per year [2]. These patients usually have a history of upper respiratory tract infection or gastroenteritis 1 to 3 weeks prior to the onset of the disease [3]. Weakness initiates in the extremities and may advance to involve trunk, facial, and respiratory muscles, leading to severe respiratory muscle paralysis. Sensory symptoms, cranial nerve deficits, and autonomic system dysfunction may also be present. The disease is marked by progressive limb weakness and areflexia.

It has been observed that almost one-third of patients require ventilatory support for respiratory paralysis, with about a 10% mortality rate. Immunoglobulin therapy and plasmapheresis have significant change in the course of the illness [2]. In a recent study by Tran DQ et al., various diaphragmatic-sparing blocks and their effects on hemidiaphragmatic palsy were described [4]. Diaphragmatic-sparing blocks like the Supraclavicular Block (SCB) may miss nerves such as the suprascapular and axillary nerves originating from C5-C6 roots. The supraclavicular nerve, a branch of the cervical plexus, is not blocked by the SCB. This limits the using of SCB for proximal humerus surgeries [4-6].

The Upper Trunk Block (UTB) achieves surgical anaesthesia and analgesia similar to Interscalene Block (ISB) with a 5% hemidiaphragmatic palsy rate. Further studies are required to determine if a low volume can provide surgical anaesthesia with a 0% hemidiaphragmatic palsy rate. The Anterior Suprascapular Nerve Block (SSNB) (10-15 mL local anesthetic) provides similar analgesia to ISB. However, a low-volume dose can cause 20% Hemidiaphragmatic Paralysis (HDP). Further study required whether it can provide similar surgical anaesthesia like ISB [4]. The Costoclavicular Block (CCB), a combinaed infraclavicular nerve block and SSNB, provides similar analgesia to ISB with a lesser chance of HDP but can provide similar anaesthesia need further evaluation [4]. Low-volume ultrasound-guided blocks have been utilised to restrict drug spread toward the anterior scalene and phrenic nerve, thus minimising phrenic nerve involvement [7].

Another report shows successfully conducting the popliteal and femoral nerve blocks in a patient undergoing ankle fracture surgery [8].

Patients with GBS may receive either regional or general anaesthesia, as no particular technique has been proven to be superior to the other [9]. Hebl JR et al., reviewed 139 patients with a history of Central Nervous System (CNS) disorders who received neuraxial anaesthesia or analgesia from 1988 to 2000. They concluded that adverse outcomes following regional anaesthesia in patients with CNS problems are less common than previously believed. After finding no cases of new or worsening neurological symptoms, they suggested that regional anaesthesia should not be completely contraindicated in such patients [10].

However, one report described the worsening of GBS after epidural anaesthesia [11]. Another report indicated the occurrence of GBS two weeks post-bilateral total hip arthroplasty with combined spinal and epidural anaesthesia [12]. In a rare case, a 58-year-old man developed quadriplegia and respiratory failure six days after undergoing surgery for multiple fractures. The patient had no prior respiratory or gastroenteritis symptoms within four weeks. The report noted GBS post-multiple fracture surgery, speculating immune system aberrance [13]. For general anaesthesia in GBS patients, succinylcholine should be avoided because of its risk of hyperkalemia [14]. Non depolarising muscle relaxants should be administered with caution, as they may result in prolonged neuromuscular block and the need for postoperative mechanical ventilation [15].

CONCLUSION(S)

GBS is associated with a high-risk of mortality due to its progressive nature, requiring meticulous management and an individualised approach. This approach would be based on the patient's neurological status, respiratory parameters, and haemodynamic status. In this case, giving general anaesthesia would have posed a risk for postoperative ventilator support or delayed recovery. Using low-volume drugs in ultrasound-guided nerve blocks serves the purpose of surgery with a reduced risk of diaphragmatic palsy and provides a better outcome for the patient.

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