Anaesthetic management of a patient with Lown Ganong Levine syndrome—a case report

Lt Col MK Sharma*, Col S Misra*

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INTRODUCTION

Lown Ganong Levine (LGL) syndrome is a rare short PR interval pre-excitation cardiac conduction abnormality, characterised by episodes of palpitation, giddiness, paroxysmal tachycardia, and electrocardiograph (ECG) findings. It bears an increased risk of pre- and postoperative dysrhythmias, malignant hyperthermia, and cardiac arrest. Pre-operative management of such patients is challenging for an anaesthesiologist. The key to successful management is in avoiding precipitating factors, vigilant pre-operative monitoring of dysrhythmias, and prevention and aggressive management of complications on occurrence.

CASE REPORT

A 42-year-old female patient with right subcostal pain, frequent past episodes of palpitations and giddiness, was scheduled for open cholecystectomy. She was moderately built, weighing 65 Kg, effort tolerance was 3–4 Km on levelled ground. Baseline heart rate (HR) was 72 beats/minute; blood pressure was 134/88 mmHg. Airway assessment revealed Mallampatti class II with normal neck and jaw movements.

Laboratory findings were: haemoglobin 12.1 g/dL, serum sodium 138 mEq/L, serum potassium 4.3 mEq/L. Total bilirubin 0.8 mg/dL, SGOT 22 U/L, SGPT 28 U/L. She was euthyroid; ECG revealed regular rhythm with inverted P waves, short PR interval, absent delta waves with normal QRS morphology (Figure 1). Diagnosed as a case of LGL syndrome and put on tab atenolol 50 mg OD. Total intra-venous anaesthesia (TIVA) using propofol through manually controlled infusion (MCI) technique with epidural for postoperative analgesia was planned.

In the operating room, monitoring was initiated through ECG, pulse oximetry (SpO₂), and non-invasive blood pressure (NIBP). An 18G epidural catheter was secured at L2–L3.

She was pre-medicated with 1 mg midazolam i.v. and pre-oxygenated with 100% Oxygen for 3 minutes. Induction was done using Fentanyl 100 µg and propofol 130 mg i.v. Vecuronium 6.0 mg i.v. bolus was administered and trachea intubated orally using 8.5 mm PVC cuffed endotracheal tube. Anaesthesia was maintained by a three-step propofol infusion technique as proposed by Prys-Roberts and colleagues.¹ Lungs were ventilated using 50% oxygen-air mixture in closed circuit, maintaining an end-tidal carbondioxide between 28 and 32 mmHg. Maintenance fluid was Lactated Ringers solution administered as per calculation for the patient.

Non-invasive blood pressure, heart rate, and SpO₂ were recorded intermittently following induction, intubation and thereafter at 5-minute interval along with continuous ECG monitoring. Intra-operative events including dysrhythmias were recorded. Surgery continued for 2 hours with stable haemodynamic parameters, except one paroxysm of supra-ventricular tachycardia (SVT) which was promptly reverted to sinus rhythm by right-hand side carotid sinus massage. Intra-operatively, HR varied between 72 and 89 beats/minute with a mean arterial pressure of 60–70 mmHg and SpO₂ at 100%. Towards the end of surgery, propofol infusion was discontinued and neuromuscular blockade reversed by administering glycopyrrolate 10 µg/Kg and neostigmine 50 µg/Kg i.v. Ventilation was supported with 100% oxygen. On return of effective spontaneous breathing efforts and airway reflexes, trachea was extubated. Postoperatively

Figure 1 Diagrammatic illustration of various forms of atrio-ventricular conduction associated with the presence of an anomalous pathway.

*Classified Specialist, *Senior Advisor (Anaesthesiology), MH, Meerut Cantt.

Correspondence: Lt Col MK Sharma, Classified Specialist (Anaesthesiology), Military Hospital Meerut Cantt.
E-mail: manoj.congo@gmail.com

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Figure 2 Preoperative ECG of the Lown Ganong Levine syndrome patient.

she remained asymptomatic and was discharged on eighth postoperative day.

DISCUSSION

Pre-excitation syndrome is a short PR interval ECG abnormality in which ventricles of the heart become depolarized too early leading to premature contractions, causing arrhythmias. LGL syndrome is one such rare type of short PR interval abnormality described in 1952. It is condition in which electrical impulses from sinus node take an alternate bypass tract known as James fibres (arise in atria, bypass the bundle of His and join into the lower part of the AV node). It does not end in or activate the myocardium directly leading to the absence of delta waves and facilitates reciprocal return of impulse to atria, which may initiate a reciprocating tachyarrhythmia.²

ECG criteria for diagnosing LGL Syndrome are:

- Normal/inverted P wave
- Short PR interval ($< .10$ seconds)
- Absence of delta wave
- Normal QRS complex morphology and duration

Lown Ganong Levine syndrome patients are prone to attacks of paroxysmal tachycardia specially supraventricular; however, occasional episodes of atrial fibrillation are usually of short duration and rarely sustained.³ Although a short PR interval may be a normal variant, it has been noted to be associated with clinical conditions like hypertrophic cardiomyopathy, Ebstein's anomaly, tricuspid atresia, corrected transposition of great vessels, mitral valve prolapse, Duchenne muscular dystrophy,

Pompe's disease, and Fabry's disease. It is also observed in cardiac electrophysiological disorders like AV junctional rhythms, ectopic atrial rhythms, and pre-excitation syndromes.⁴

Anaesthetic problems include various tachyarrhythmias, malignant hyperthermia, and fatal cardiac outcomes. In order to avoid these unpleasant outcomes we planned to administer total intravenous anaesthesia using propofol through manually controlled infusion technique supplemented with epidural for postoperative analgesia.

Total intra-venous anaesthesia is a technique of general anaesthesia using a combination of agents given solely by intravenous route in the absence of all inhalational agents including nitrous oxide.⁵

Various types of TIVA drug delivery systems in use are the MCI and TCI (target controlled infusion) systems. Since the TCI system was not available in our institution, we decided to follow the MCI system of propofol delivery through simple syringe pumps. In the MCI regimen, the anaesthesiologist administers the required bolus dose, followed by a stepped infusion of the anaesthetic agent which is manually adjusted at set time intervals. We utilized the propofol regimen outlined by Prys-Roberts and colleagues, which consisted of a bolus dose of 1 mg/Kg, followed by an infusion of 10 mg/Kg/hour for 10 minutes, reducing to 8 mg/Kg/hour for another 10 minutes, followed by a maintenance infusion of 0.6 mg/Kg/hour thereafter till the end of surgery. This regimen is designed to achieve a blood propofol concentration of $3 \mu\text{g/mL}$.¹ Various case reports have suggested the usefulness of propofol in the termination of SVT and prevention of malignant hyperthermia in human beings;⁶ therefore, propofol was the choice with fentanyl in our technique.

There is paucity of published reports on anaesthetic management of patients with LGL syndrome undergoing major upper abdominal surgery. According to the experience gained, we suggest that TIVA with propofol through MCI regimen along with other short acting agents may be a good anaesthetic choice for such patients even in peripheral hospitals when general anaesthesia is required for major upper abdominal surgical procedures.

CONCLUSION

Adequate pre-operative preparation, appropriate selection of anaesthetic agents and technique, vigilant intra-operative monitoring, avoiding factors that can trigger tachyarrhythmias, malignant hyperthermia, and cardiac arrest along with good postoperative pain relief measures would go a long way in successfully managing these group of patients even in peripheral hospitals not equipped with sophisticated equipments.

CONFLICTS OF INTEREST

None.

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