

# Difficult Central Venous Cannulation under Laryngeal Mask Airway Anesthesia in Adolescent

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## INTRODUCTION

Invention of laryngeal mask airway (LMA) has revolutionized modern anesthesia practice. LMA use is now diversified and has gained acceptance in operating room, rapid response team and pre-hospital patient care giver.<sup>1</sup> LMA anesthesia is practiced almost in every surgical procedure including the head and neck surgeries.<sup>2</sup> LMA has been used in surgeries in which central venous cannulation (CVC) has to be performed through internal jugular veins (IJV). The right-sided IJV is preferred over left IJV due to wider lumen and slightly superficial layout.<sup>3</sup> The literature suggests to cannulate right IJV under LMA anesthesia at lower insertion point thereby minimizing accidental puncture of common carotid artery (CCA).<sup>4</sup> Although, studies have also proven the LMA insertion instigated the overlapping of IJV over CCA and distortion of anatomical landmarks.<sup>5</sup> We present a case of difficult right sided IJV access under LMA anesthesia, which triggered the surgical morbidity like prolonged surgical duration and excessive blood loss.

## CASE REPORT

A 15-years old child, weighing 40 kilograms was scheduled for Permacath insertion for planned Hematopoietic stem

## ABSTRACT

We report a case of difficult central venous cannulation under general anesthesia with laryngeal mask airway in a young female child. Our case demonstrated a difficulty in surgically finding the right internal jugular vein due to neck veins displacements by laryngeal mask airway, which caused morbidity such as prolonged surgical duration and excessive blood loss. Once the laryngeal mask airway was replaced with endotracheal tube, the internal jugular vein appeared on surface and procedure was successfully completed in a few minutes. Such difficulties warrant an alternate approach in airway management in order to prevent major adverse effects.

## KEY WORDS

*Central venous cannulation, LMA, Anesthesia, Pediatric, Internal jugular vein*

cell transplantation (HSCT). She was diagnosed Hodgkin's lymphoma 4 years back and was treated initially with chemotherapy and achieved remarkable remission. On follow up, she was found to have relapse of disease and she was planned for a second cycle of chemotherapy along with HSCT. The patient's medical history was insignificant except for Hodgkin's lymphoma, for which she was on low dose oral prednisolone. On examination, patient's neck was unremarkable for deformity, mass swelling and lymphadenopathy. She was adequately hydrated; her hemoglobin was 10.1 g kg<sup>-1</sup> and a hematocrit of 31.7%. She had no known history of allergy to drugs and food. She consented to general anesthesia for Permacath insertion. Before induction of anesthesia, patient's recorded blood pressure (BP) was 90/58 mm Hg, heart rate was 90 bpm, peripheral oxygen saturation was 98% and temperature was 36.6°C. Cefazolin 1 g was administered intravenously (IV) in the operating room 30 minutes before the start of procedure without any adverse effects. After placement of routine monitors and pre-oxygenation, general anesthesia was induced with propofol 2 mg kg<sup>-1</sup> and nalbuphine 0.1 mg kg<sup>-1</sup>. Once the LMA insertion criteria was fulfilled, size 3 LMA was inserted in first attempt and LMA placement

position was confirmed for airway obstruction, coordinated chest movement, smooth bag mask ventilation and appearance of end-tidal carbon dioxide. The patient was allowed to breathe spontaneously with a mixture of O<sub>2</sub> and Air at 50:50 and isoflurane titrated to an end tidal MAC between 1.2 and 1.3. LMA cuff pressure was monitored (Cuff manometer made by PORTEX, Germany) and ensured below 60 cm H<sub>2</sub>O. The surgical team positioned patient in supine, head rotated at 15-degree and 15 cm of circular pillow was kept inside the right scapula. Prior to surgery, patient screened for right IJV by ultrasound for insertion of Permacath. After 90 minutes of surgery, anesthesiologist noticed surgical team was facing difficulty to localize right IJV. The LMA induced neck anatomy distortion was suspected and surgery was hold. The LMA cuff pressure was initially reduced, then after, LMA was replaced with size 7 endotracheal intubation (ETT) and spontaneous ventilation mode switched to controlled mode. The ETT placement was confirmed by chest auscultation and appearance of end-tidal carbon dioxide and the cuff pressure was adjusted between 20-30 cm H<sub>2</sub>O. Surgeon was allowed to resume surgery. Immediately after replacement of airway device (LMA to ETT), IJV became prominent and it was easily cannulated, guide wire was smoothly inserted and permacath was successfully placed. Surgery was noticeably finished within 30 minutes after ETT placement. Patient completely recovered from neuromuscular blockade and trachea was extubated after she fulfilled the extubation criteria. She was shifted to postanesthesia care unit with stable hemodynamics (BP 95/64 mm Hg, heart rate 98 bpm and SPO<sub>2</sub> 98%). Total surgical duration was 2 hours and blood loss was about 250 milliliters.

## DISCUSSION

Hematopoietic stem cell transplantation (HSCT) and chemotherapy are considered the cornerstones for treatment of Hodgkin's Lymphoma.<sup>6</sup> HSCT requires a central venous cannulation (CVC), however the chemotherapy can be instituted via a peripheral venous access. Patient's

chemotherapy induced vascular reaction is variable from phlebitis to venous thrombosis, nevertheless the peripheral inserted venous cannulation (PICC line) has overcome these challenges though it has own limitations. CVC is an ideal route for prolong chemotherapy and HSCT treatment.<sup>7</sup> Permacath insertion thorough CVC in pediatric (adolescent) patients requires general anesthesia to alleviate anxiety, pain and patient's mobility to minimize the procedural complications. General anesthesia can be accomplished with endotracheal intubation and laryngeal mask airway. LMA anesthesia has been practiced for CVC placement through IJV, though the cases are reported for LMA induced changes in IJV diameter and its position relative to CCA.<sup>4</sup> Various recommendations are advised to overcome the LMA insertion and its cuff inflation related distortion of anatomical land marks such as the use of fixed landmarks over mobile ones, a 15-degree head rotation, considering medial deviation of central landmarks with ProSeal LMA placement and the use of ultrasonography to access IJV.<sup>4,8</sup> In our case the suggested recommendations were appropriately followed, initially our experienced (performed more than 100 times) operating surgeon encountered difficulty to visualize IJV with ultrasound, later the collateral vein was assumed IJV and it was punctured but there was failure to pass the guide wire and it caused prolonged surgical duration and blood loss. Nevertheless, the replacement of airway device (LMA to ETT), the IJV became prominent and it was easily punctured, the procedure was finished with relative ease in few minutes without the further blood loss.

Laryngeal Mask Airway is an acceptable method for CVC placement via internal jugular vein route, although it is known to cause the distortion of neck anatomy. Once the LMA challenge operative field by leading to unexplained procedural duration and questionable blood loss, the anesthesiologist could consider replacement of LMA with endotracheal tube in pediatric patients to alleviate iatrogenic deformity.

## REFERENCES

1. Murray MJ, Vermeulen MJ, Morrison LJ, Waite T. Evaluation of prehospital insertion of the laryngeal mask airway by primary care paramedics with only classroom mannequin training. *CJEM*. 2002; 4: 338-43.
2. Bangera A. Anaesthesia for adenotonsillectomy: An update. *IJA*. 2017; 61: 103-9.
3. Bannon MP, Heller SF, Rivera M. Anatomic considerations for central venous cannulation. *Risk management and healthcare policy* 2011; 4:27-39.
4. Liu HQ, Li XB, Zhang YS, Li J. Effect of laryngeal mask airway placement on the optimal site and success rate of venipuncture via the right internal jugular vein. *Int J Clin Exp Med*. 2015; 8: 13179-86.
5. Kim WH, Gwak MS, Choi SJ, Song SH, Kim MH. Optimal head rotation and puncture site for internal jugular vein cannulation after laryngeal mask airway insertion. *Singapore Med J*. 2015; 56: 472-8.
6. Czyż J, Group ObotPLR, Dziadziuszko R, Group Obot PLR, Knopińska-Postuszuy W, Group Obot PLR, et al. Outcome and prognostic factors in advanced Hodgkin's disease treated with high-dose chemotherapy and autologous stem cell transplantation: a study of 341 patients. *Ann Oncol*. 2004; 15: 1222-30.
7. Wingard JR, Hsu J, Hiemenz JW. Hematopoietic stem cell transplantation: an overview of infection risks and epidemiology. *Infect Dis Clin North Am*. 2010; 24: 257-72.
8. Tseng KY, Tsai CJ, Wu SH, Lu DV, Hsu HT, Lu IC, et al. Accuracy of the central landmark for catheterization of the right internal jugular vein after placement of the ProSeal laryngeal mask airway. *Acta anaesthesiol Taiwan*. 2009; 47: 118-22.