

Case Report

Seeing the way through – VividTrac in successful intubation of a neonate with VACTERL anomaly: a case report

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ABSTRACT

Airway management in neonates is challenging due to anatomical and physiological factors, and the presence of congenital anomalies such as VACTERL association further increases the risk of difficult intubation. We report a case of a 3-day-old late preterm male neonate weighing 2.8 kg, antenatally diagnosed with anal atresia and associated cardiac and renal anomalies, posted for high pelvic colostomy. Anticipating a difficult airway and perioperative instability, tracheal intubation was performed using the VividTrac video laryngoscope. The device provided an excellent glottic view and enabled successful first-attempt intubation with a 3.0 mm uncuffed endotracheal tube, while maintaining oxygen saturation above 95%. Anaesthesia and intraoperative hemodynamics remained stable, and the neonate was transferred postoperatively to the neonatal intensive care unit for further care. This case highlights the usefulness of VividTrac video laryngoscopy in securing the airway safely and efficiently in neonates with suspected VACTERL anomaly, emphasising its role in reducing anaesthetic complications in high-risk neonatal airways.

Keywords: Airway management, Infant, Newborn, Video laryngoscopy, VACTERL association

INTRODUCTION

Airway management in neonates is inherently challenging due to unique anatomical and physiological characteristics, including a relatively large tongue, anterior larynx, narrow subglottic space, and limited functional residual capacity, which increase the risk of difficult mask ventilation and intubation.¹ These challenges result in higher rates of intubation failure and adverse events compared with older children or adults. Congenital anomalies, such as those seen in VACTERL (vertebral, anal, cardiac, tracheoesophageal, renal, limb anomalies), can further distort airway anatomy and complicate airway control. Multiple airway anomalies in VACTERL association, highlighted the need for careful preoperative airway evaluation and planning.²

Video laryngoscopy is now widely used for neonatal airway management. Recent evidence suggests video laryngoscopy may improve first-attempt tracheal

intubation success and provide better glottic visualisation compared with conventional direct laryngoscopy in infants and neonates.³ Studies have shown that video laryngoscopy is associated with improved procedural outcomes, including favourable glottic views and reduced airway trauma, particularly in difficult airways.^{4,5} Video laryngoscopes also facilitate shared visualisation among the clinical team, which may support teaching and improve coordination during neonatal intubations.⁶

Despite growing evidence supporting video laryngoscopy in neonates, there is limited literature describing its use in neonates with multisystem congenital anomalies such as VACTERL association, particularly using portable devices like VividTrac.

Therefore, we present a case of a 3-day-old neonate with suspected VACTERL association in whom video laryngoscopy using the VividTrac device enabled safe and effective tracheal intubation during surgery.

CASE REPORT

History of presenting illness

A 3-day-old late preterm male neonate with a birth weight of 2.8 kg was admitted for surgical management. The neonate was antenatally diagnosed with anal atresia and had associated multiple cardiac and renal abnormalities,

raising suspicion of VACTERL anomaly. The baby was scheduled for a high pelvic colostomy. No additional clinical complaints were noted at presentation. There was no contributory antenatal infection, maternal illness, drug exposure, or family history of congenital anomalies. The mode of delivery and Apgar scores were not contributory. Apart from the known congenital anomalies, no additional systemic abnormalities were identified at presentation.



Figure 1: VividTrac laryngoscope.

Preoperative investigations

Preoperative complete blood count showed a haemoglobin level of 19 g/dl and a platelet count of 1.42 lakh/mm³. Renal function tests revealed blood urea of 56 mg/dl and serum creatinine of 1.3 mg/dl, and liver function tests were elevated. Coagulation profile showed prolonged prothrombin time and activated partial thromboplastin time, with an international normalised ratio of 3.6. Echocardiography demonstrated a large ventricular septal defect with left-to-right shunt, a large patent ductus arteriosus, moderate pulmonary arterial hypertension, and good biventricular function. Ultrasonography showed severe left hydronephrosis with thinning of the renal cortex

and an undescended testis. A preoperative chest radiograph was obtained.

On examination, the neonate was hemodynamically stable with no respiratory distress. Anal atresia was confirmed on perineal examination. No craniofacial or limb anomalies were noted. A difficult airway was anticipated due to suspected tracheoesophageal and multisystem involvement.

Antenatal imaging identified anal atresia with associated anomalies. The neonate was admitted on day 3 of life for surgery. Preoperative evaluation revealed cardiac and renal abnormalities. Video laryngoscopy-assisted tracheal

intubation was performed, followed by postoperative ventilatory support in the neonatal intensive care unit.

In view of anal atresia with associated cardiac and renal anomalies, a diagnosis of suspected VACTERL association was considered, while isolated anorectal malformations and other syndromic causes were considered less likely.



Figure 3: Chest X-ray of the neonate.

Anaesthetic management and airway intervention

Standard ASA monitoring was instituted. Anaesthesia was induced using fentanyl and propofol, with muscle relaxation achieved using succinylcholine and atracurium. Tracheal intubation was performed using a VividTrac video laryngoscope connected to a mobile phone via a USB cable. The device was inserted gently, providing an excellent glottic view. A 3.0 mm uncuffed endotracheal tube was guided through the integrated channel, and successful intubation was achieved on the first attempt, with SpO₂ maintained above 95% throughout the procedure. Tube position was confirmed by bilateral chest auscultation and capnography. Anaesthesia was maintained with sevoflurane. The neonate was hand-ventilated at a respiratory rate of 50 breaths per minute with an approximate tidal volume of 30 ml. Normothermia was maintained using a warm operating room, external warming devices, and warmed intravenous fluids. Hemodynamic parameters remained stable throughout the procedure.

Anaesthetic challenges faced

The anaesthetic management was challenging due to a high risk of aspiration related to a suspected tracheoesophageal fistula, along with an anticipated

difficult airway secondary to abnormal tracheoesophageal anatomy. Hemodynamic instability was a concern because of the presence of a large ventricular septal defect. The neonate was also at increased risk of hypothermia due to prematurity. Associated renal anomalies necessitated judicious fluid management and careful adjustment of drug dosing.

Outcome

Postoperatively, the neonate was shifted to the neonatal intensive care unit and connected to a ventilator for management. The use of VividTrac facilitated successful airway management in this neonate with suspected VACTERL anomaly.

The immediate postoperative course in the neonatal intensive care unit was stable, with no reported airway-related or hemodynamic complications during early postoperative monitoring.

DISCUSSION

Neonatal airway management is uniquely challenging because of anatomical and physiological factors such as a large tongue, anteriorly placed larynx, narrow subglottic region, and limited oxygen reserve, all of which predispose to rapid desaturation during airway manipulation. These challenges are amplified in neonates with congenital anomalies, where airway distortion and associated systemic involvement increase the risk of failed intubation and perioperative complications. Previous studies have shown that neonates experience higher rates of difficult intubation and airway-related adverse events compared with older children, highlighting the careful planning and appropriate airway device selection.^{7,8}

VACTERL association involves multiple organ systems, and airway management may be complicated by tracheoesophageal anomalies, cardiac defects, and renal abnormalities. Cardiac lesions such as ventricular septal defect and patent ductus arteriosus can predispose to peri-intubation hemodynamic instability, while prematurity increases the risk of hypothermia and hypoxemia.² Neonates with complex congenital anomalies require individualised anaesthetic strategies with particular focus on airway security, thermoregulation, and cardiorespiratory stability.^{9,10}

Compared with direct laryngoscopy, video laryngoscopes provide improved glottic visualisation and allow successful intubation even in anticipated difficult airways. Studies in neonates and infants have showed higher first-attempt success rates and better laryngeal views with video laryngoscopy, particularly in challenging airway scenarios.^{11,12} The ability to visualise the airway on an external screen also facilitates coordinated team performance and reduces repeated instrumentation of the airway.

In the present case, the use of the VividTrac video laryngoscope assisted excellent glottic visualisation and successful first-attempt intubation while maintaining oxygen saturation above 95%. This aligns with existing evidence supporting the role of video laryngoscopy in minimising hypoxemia and airway trauma in high-risk neonates. The case strengthens that advanced airway devices can be particularly beneficial in neonates with VACTERL association, where anatomical complexity and physiological vulnerability demand safe and efficient airway control.^{13,14}

This report is limited by its single-case design, which precludes generalisation of outcomes, and long-term airway or neurodevelopmental follow-up was not available.

CONCLUSION

The VividTrac extremely affordable channelled video laryngoscope facilitated successful airway management in this neonate with suspected VACTERL association and anticipated difficult airway. It provided a clear glottic view and enabled successful first-attempt tracheal intubation while maintaining adequate oxygenation. In neonates with congenital anomalies and potentially difficult airways, video laryngoscopy may be a useful adjunct to conventional airway management by improving visualization and potentially reducing repeated intubation attempts. However, the experience from a single case cannot establish the superiority or routine applicability of VividTrac in this population. Further studies are required to evaluate its effectiveness, safety, and role in neonatal difficult-airway management.

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