



AIRWAY MANAGEMENT IN PATIENT WITH CERVICAL SPINE INJURY WITH GARDNER- WELLS TONGS IN-SITU FOR CERVICAL TRACTION POSTED FOR ANTERIOR CERVICAL DISCECTOMY AND FUSION (ACDF) - A CASE SERIES

Dr Supriya Kar^{1*}, Dr Ankita Das², Dr Sapna Das³

^{1*} Assistant professor, Department of Anesthesiology, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha Email: drory1989@gmail.com Phone: 8895509370

² Assistant professor, KIIT University Email: A.das09@yahoo.in

³ Assistant Professor, Department of Anesthesiology, Kalinga Institute of Medical Sciences, Bhubaneswar Email: dr.sapnadas88@gmail.com Phone: 9078826164

***Corresponding Author:** Dr Supriya Kar

* Assistant Professor, Department of Anesthesiology, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha Email: drory1989@gmail.com Phone: 8895509370

ABSTRACT

Airway management in patients with cervical spine injuries poses significant challenges, particularly when cervical stabilization is maintained using Gardner-Wells tongs. These devices provide axial skeletal traction to align and immobilize the cervical spine, minimizing the risk of further spinal cord injury in unstable cervical pathologies [1]. However, such immobilization severely restricts cervical mobility and engages head end of the patient complicating tracheal intubation and increasing the risk of neurologic deterioration during airway manipulation [2,3].

The primary objective in such cases is to preserve spinal cord integrity through manual inline stabilization (MILS), while ensuring a secure and effective airway. Fiberoptic/ambuscope intubation is frequently considered the gold standard in these scenarios due to minimal cervical movement [4,5]. We present a case series of six patients with cervical spine injuries requiring anterior cervical discectomy and fusion (ACDF) who were immobilized with Gardner-Wells tongs at the time of surgery. All patients underwent successful endotracheal intubation using a flexible fiberoptic/ambuscope scope introduced from the right lateral side. Prior to intubation, the anterior cervical collar was removed and the cervical spine was manually stabilized using MILS from torso side. No neurologic deterioration or airway complications were observed perioperatively.

This series supports the feasibility and safety of lateral fiberoptic/ambuscope intubation in patients with rigid cervical traction using Gardner-Wells tongs, provided that meticulous technique and manual stabilization are employed. These findings highlight the importance of multidisciplinary coordination between anesthesiologists and spine surgeons in managing high-risk cervical spine cases.

INTRODUCTION

Cervical spine injuries, particularly at upper levels require meticulous airway management because even minimal neck movement can trigger neurological decline [2,3]. Gardner- Wells tongs furnish axial skeletal traction that stabilises the fracture but lock the head-neck unit, precluding standard

laryngoscopy from the head end [1]. Severe pain and limited patient cooperation compound the challenge [4]. In our series, a definitive airway was secured after induction with a flexible fibre-optic/ambuscope bronchoscope advanced from the right side of the patient. The anterior cervical collar was briefly removed and manual in-line stabilisation (MILS) applied from the torso side to maintain spinal alignment during intubation [5]. This lateral approach minimised rotational forces and preserved cervical stability throughout airway instrumentation.

CASE DESCRIPTION

Case I

A 58- year- old man (body mass index 26 kg m^{-2}) with a history of well- controlled hypertension on calcium- channel blockers presented with an unstable C4–C5 burst fracture following a 4- metre fall from a rooftop. Neurologically he was intact but complained of severe neck pain. Cervical stabilization had been achieved pre- operatively with a Philadelphia collar and Gardner–Wells tongs applying 5 kg of axial traction, rendering the head- end inaccessible for routine laryngoscopy. Patient was in excruciating pain and asked for any procedure with complete pain relief. It was definitely not a case of awake fibre-optic/ambuscope guided intubation as cooperation was not there from patient side. Sedation might not totally negate coughing which we wanted to avoid any possible cervical spine movement.

Pre- operative work- up included complete blood counts, renal and liver profiles, serum electrolytes, ECG, chest radiograph and 2- D echocardiography; all results were within normal limits. Awake fibre-optic/ambuscope intubation was not possible given his severe pain, we elected to perform post-induction fibre-optic/ambuscope intubation from the right lateral position while maintaining manual in- line stabilization (MILS).

In the operating theatre the patient was positioned supine with the traction frame undisturbed. Standard ASA monitors were applied and two 18- gauge peripheral intravenous lines secured. Pre-oxygenation was verified by bag excursion and a capnogram while a right- sided facemask seal was held. Intravenous pre- medication comprised glycopyrrolate 0.2 mg, midazolam 1 mg, fentanyl 100 μg . Anaesthesia was induced with propofol 100 mg; once mask ventilation was reconfirmed by two-person bag mask ventilation technique with one person ensuring adequate mask seal from right side and the assistant bagging, Rocuronium facilitated paralysis.

Fibreoptic/ambuscope was inserted from the right corner of the mouth as the anesthetist was right-handed. With continuous MILS applied from the torso side, the glottis and tracheal rings were visualised and an 8.0 mm cuffed endotracheal tube railroaded into position; carinal view confirmed placement. The tube was secured at 22 cm and bilateral breath sounds plus capnography affirmed ventilation. A nasogastric tube was inserted uneventfully. A backup to perform emergency tracheostomy was in place in case we failed to intubate the patient. [Figure 1]

Anterior cervical discectomy and fusion proceeded for two hours without haemodynamic instability. Post- operatively the patient was transferred ventilated to the intensive care unit for elective mechanical ventilation. He remained stable, was gradually weaned and successfully extubated on postoperative day 3 without new neurological deficits.

Case II

A 37- year- old woman with an isolated C4–C5 fracture after a fall, otherwise healthy, underwent anterior cervical discectomy and fusion. Airway management mirrored Case I: post- induction fibre-optic/ambuscope intubation from the right corner of the mouth with manual in- line stabilisation after temporary collar removal. Surgery lasted 1 hour 45 minutes without haemodynamic instability. She was transferred intubated to the ICU for overnight observation and extubated uneventfully the following morning, remaining neurologically intact.

Case III

A 39-year-old man, free of comorbidities, sustained a C3–C4 fracture in a road-traffic collision. The identical lateral fibre-optic/ambuscope intubation technique was employed to maintain cervical alignment. The ACDF procedure was completed in 2 hours 15 minutes. Post-operative care included elective ventilation in the ICU; the patient was extubated the next evening with stable vital signs and no new neurological deficits.

Case IV

A 30-year female, with no associated comorbidities, had at #c4-c5 due to fall from a construction building. Appropriate above-mentioned technique was applied for planned anterior cervical discectomy and fusion procedure. The surgery was of 100 mins duration with no haemodynamic instability. Patient was transferred to ICU with tube in situ and extubated next day with stable vitals.

Case V

A 22-year male, with smoking history had a #at c3-c4 due to road traffic accident. This very agitated patient did not allow for any procedure without analgesia. After discussing and taking consent, we went for similar post induction lateral side fibre-optic/ambuscope guided intubation. He had 2 episodes of hypotension (mean arterial blood pressure <65mmg) in intra operative period which was managed with ephedrine 6mg in each episode. He was shifted to ICU for observation with tube in situ. Next day with stable haemodynamic he was extubated.

Case VI

A 65-year male with history of controlled hypertension and controlled diabetes had #c3-c4 due to fall from rooftop during night. He was on tablet amlodipine 5mg and oral hypoglycemic agent metformin 500 mg. Preoperative investigation were all within normal limits. This patient though initially agreed for spray as you go technique. But the moment we asked to open mouth for 10% spray of lignocaine for posterior pharyngeal wall he denied to proceed further and became anxious. So, we abandoned the procedure and went ahead with previous plan i.e, intubation after induction and intubated the patient. with similar lateral approach from right side. He had 1 episode of tachycardia with heart rate >120, 10 mins after induction. It was managed by additional bolus of injection fentanyl 25mcg iv. Surgery went for 2 hours 5 mins. Blood glucose (capillary blood glucose-120 mmhg) monitored along with other monitors. Pt was ventilated under controlled mechanical ventilation in ICU post operatively. He was extubated after 24 hours with stable haemodynamics.

DISCUSSION

Managing the airway in patients who undergo anterior cervical discectomy and fusion (ACDF) while Gardner- Wells tongs remain in situ is uniquely difficult. The traction frame immobilises the head–neck unit and removes the head- end working space, so any unintended motion risks exacerbating cord injury [1,2]. Conventional practice involves removing traction before intubation; however, listhesis or gross malalignment may mandate continuous axial load for safe reduction, necessitating alternative strategies.

Flexible fibre-optic/ambuscope intubation (FOI) remains the gold standard because it provides direct airway visualisation with negligible cervical displacement [3]. In our series, a right- lateral FOI approach, coupled with manual in- line stabilisation (MILS), allowed tube placement without interrupting traction.

Manual In-Line Stabilisation (MILS) is a technique used to minimize cervical spine movement during airway management, especially intubation, in trauma patients with potential spinal injuries. In Manual In-Line Stabilisation (MILS), the assistant positions themselves at the head of the patient or on the side of the patient and places their hands firmly on both sides of the patient's head, specifically gripping the mastoid processes. The head is carefully held in a neutral position neither flexed nor

extended to maintain spinal alignment. Throughout the procedure, no traction or rotational movement is applied. [6]

Our point for going with induced fibre-optic/ambuscope guided intubation was basically due to the fact that even with sedation and spray as you go technique we couldn't have been 100% sure that coughing won't happen. And any prick was obviously avoided which could have been used for airway blocks due to severe pain and non-cooperation of patients despite appropriate counselling and consent.

Two- person bag-mask ventilation with one person ensuring adequate mask seal and the assistant bagging around the tongs while avoiding excessive chin lift or jaw thrust. This combination aligns with American Society of Anesthesiologists difficult- airway guidelines, which prioritise techniques that preserve spinal alignment in cervical trauma [3].

Awake FOI is ideal, but severe pain, anxiety, or haemodynamic instability may preclude patient cooperation. Modern video-laryngoscopes can provide an alternative; they offer superior glottic views with less neck extension than direct laryngoscopy, albeit still requiring limited head- end access and a neutral sniffing position [4]. When video-laryngoscopy is chosen, it should be executed under deep anaesthesia with MILS in place, and a rescue plan—such as a supraglottic airway or surgical airway—must be immediately available.

Meticulous team coordination is essential. Continuous dialogue between anaesthesiology and spinal surgery teams ensures any needed traction adjustments occur only when the airway is secure. Even small degrees of neck extension requested to optimise the anterior surgical field should be anticipated and accommodated by stabilising the endotracheal tube and re- verifying breath sounds and capnography.

Ultimately, a structured airway algorithm that emphasises minimal cervical motion, appropriate use of FOI, MILS, and two- person ventilation can achieve neurological safety and surgical efficiency in this high- risk population.

In case of failure in all above cases we were ready with back up tracheostomy plan and second generation supra glottic airways (PROSEAL LMA).

LIMITATIONS OF OUR EXPERIENCE

A notable limitation in our case series is the small sample size, which restricts the generalizability of our findings. Additionally, we report on a single institution's experience, so the feasibility of these techniques may differ in institutions with varying levels of expertise, availability of advanced airway equipment, or differing clinical pathways. Although we found awake fibre-optic/ambuscope intubation effective in these patients, the success of this approach is dependent on both patient-specific and practitioner-specific factors, such as the patient's anatomy, tolerance to awake techniques, and the anesthesiologist's skill in fibre-optic/ambuscope airway management.

CONCLUSION

This case series highlights the intricate challenges of securing the airway in patients with unstable cervical spines immobilised by Gardner- Wells tongs. Optimal results demanded meticulous pre-operative preparation, comprehensive familiarity with contemporary airway strategies, and seamless cooperation among anaesthesiologists, surgeons, and nursing staff. Our protocol—integrating awake fibre-optic/ambuscope intubation, rigid manual in- line stabilisation, and individualized analgesia—demonstrated that safe, effective endotracheal access is feasible without compromising cervical alignment or patient comfort. These findings advocate for adopting a structured, multidisciplinary approach whenever rigid cervical traction precludes conventional airway manoeuvres, and they provide a reproducible framework for managing similarly constrained airway scenarios in future practice.

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Figure 1: Fibreoptic/ambuscope oral intubation with operator in right lateral side with MILS with Gardner-Wells tongs in-situ