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CASE REPORT

Awake Intubation in Patient with Superoanterior Mediastinal Mass and Superior Vena Cava Syndrome (SVCS): A Case Report

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Abstract

Superior vena cava syndrome (SVCS) with airway compression is challenging in anesthesia management. We report the case of a 69-year-old man with a superoanterior mediastinal mass and grade 3 SVCS who underwent Video-Assisted Thoracoscopic Surgery (VATS) with awake intubation using a double lumen tube (DLT) and videolaryngoscope. Awake intubation was chosen as the safest anesthesia technique where patients still breathe spontaneously without experiencing the effects of deep sedation. The combination of 4% lidocaine nebulization, oropharyngeal lidocaine spray, and dexmedetomidine infusion (0.5 µg/kg bolus over 10 minutes followed by 0.3-0.6 µg/kg/hour during surgery) in this patient, successfully maintained spontaneous ventilation without hemodynamic complications. The use of nebulized lidocaine, lidocaine spray, and dexmedetomidine as intubation facilities showed excellent effectiveness by maintaining the patient's spontaneous breathing, increasing the pain threshold, suppressing the nausea-vomiting reflex, and providing comfort in the form of mild sedation during awake intubation. This approach emphasizes the importance of topical anesthesia and selective sedation in high-risk patients with airway difficulties.

Keywords: Awake intubation, mediastinal mass, lidocaine, dexmedetomidine, superior vena cava syndrome.

Abstrak

Sindrom vena cava superior (SVCS) dengan kompresi jalan napas menimbulkan tantangan kompleks dalam manajemen anestesi. Kami melaporkan kasus pria 69 tahun dengan massa mediastinum superoanterior dan SVCS derajat 3 yang menjalani operasi *Video-Assisted Thoracoscopic Surgery* (VATS) dengan intubasi sadar menggunakan *double lumen tube* (DLT) dan videolaringoskop. Intubasi secara sadar dipilih karena teknik anestesi yang paling aman dimana pasien masih bernapas secara spontan tanpa mengalami efek sedasi yang dalam. Kombinasi nebulisasi lidokain 4%, semprotan lidokain orofaring, dan infus dexmedetomidine (0,5 µg/kg bolus selama 10 menit diikuti 0,3-0,6 µg/kg/jam selama operasi) pada pasien ini, berhasil mempertahankan ventilasi spontan tanpa komplikasi hemodinamik. Penggunaan lidokain nebulisasi, lidokain semprot, dan dexmedetomidine sebagai fasilitas intubasi menunjukkan efektivitas yang sangat baik dengan mempertahankan pernapasan spontan pasien, meningkatkan ambang nyeri, menekan refleks mual-muntah, dan memberikan kenyamanan berupa sedasi ringan selama intubasi terjaga. Pendekatan ini menekankan pentingnya anestesi topikal dan sedasi selektif pada pasien berisiko tinggi yang memiliki kesulitan pada jalan napas.

Kata Kunci: Intubasi sadar, massa mediastinum, Lidocaine, Dexmedetomidine, superior vena cava syndrome

Introduction

Superior vena cava syndrome (SVCS) occurs when there is obstruction or occlusion of the superior vena cava.[1] The most common cause of SVCS is 70% malignancy (75% lung cancer, 10-15% Non-Hodgkin's lymphoma). The spread of malignancy may extend to superior or anterior from the mediastinum, causing compression of the superior vena cava to the larynx, trachea, and esophagus.[1] SVCS with obstruction symptoms are very rare at around 0.1% to 3.3%. Clinical symptoms in patients with SVCS may differ depending on location of the obstruction, severity, and speed of the obstruction. Frequent clinical complaints and symptoms are face and neck swelling (60-100%), venous dilation without pulsation in the neck (27-86%), venous dilation in the chest (38-67%), tightness and coughing (23-70%), swelling of the arms (14-75%), hoarseness and snoring (0-20%), fainting or headache (6-13%).[1] The venous congestion that characterizes SVCS can cause substantial edema of the head, neck, and upper airway,

including larynx and pharynx. This edema pushes the airway lumen, which significantly increases the risk of obstruction and makes intubation more difficult.[1,2] Direct tracheal compression, often caused by mediastinal masses, is another critical issue. This is particularly concerning if a computed tomography (CT) scan shows a cross-sectional tracheal area reduced by more than 50%. This compression can lead to dynamic hyperinflation and central airway occlusion, which creates a serious threat to ventilation.[2,3]

Anesthetic management of patients with airway obstruction requires comprehensive perioperative preparation. However, there is no relevant guidelines for the anesthestic management of patients undergoing mediastinal mass surgery. It is highly recommended to avoid the use of general anesthesia, especially the use of muscle relaxants and maintain spontaneous ventilation during intubation, to be able perform a gradual induction and avoid deep sedation.[3] Awake intubation using video laryngoscope or fiber optics is likely the safest airway management technique for patients with mediastinal mass and superior vena cava syndrome as the patient is still breathing spontaneously without feel the effects of deep sedation from general anesthesia. It is the most reversible technique, can be aborted at any time, and can be performed in pediatric patients.[4] During awake intubation, several facilities are necessary to facilitate smooth intubation, including continuous high-flow oxygen, topical analgesics, and sedation. The use of lidocaine and dexmedetomidine as facilities in awake intubation is highly recommended because it makes patients feel no pain and feel relaxed during intubation.[7,8,9]

We report a case of a 69-year-old man who developed spontaneous fluidopneumothorax, secondary to a right lung apex bronchoplegeal fistula due to a right lung mass suspected of malignancy with lobulated thickening of the medial supraclavicular dextra and superoanterior mediastinum suspected of lymphadenopathy with grade 3 superior vena cava syndrome who had undergone decortication surgery using Video-Assisted Thoracoscopic Surgery (VATS). This report aims to documenting an awake intubation strategy using a videolaryngoscope in an SVCS patient with airway compression >50%, as well as analysing the effectiveness of a combination of nebulized lidocaine and dexmedetomidine. This case provides new insights into alternatives to fibreoptic bronchoscopy in resource-limited settings.

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Case Report

A 69-year-old man in a conscious condition came to the Emergency Department (ED) complained of progressive shortness of breath for 6 months (with Modified Medical Research Council scale 4) accompanied by productive cough and episodes of hemoptysis. In the last 2 weeks, dysphonia and dysphagia were present. The dyspnea getting worse since 2 days before he came to hospital. History of active smoking since adolescence, consuming 2 packs of cigarettes a day (for +/- 50 years), last smoked 1 month ago before complaints of tightness appeared.

On physical examination with body weight 38 kg, height 165 cm. Examination of the respiratory system obtained a respiratory rate with 18-22 times per minute, asymmetrical chest movement, 32 Fr chest tube with Water Sealed Drainage (WSD) was attached on the right chest wall, decrease breath sounds at intercostal space 2 until 6 on right lung, rales at lung baseline, wheezing is absent, peripheral oxygen saturation 94-95% with nasal cannula 4 liters per minute, sabrazes test maximum duration for 7 seconds. In the anterior chest wall there are dilatation of peripheral veins and swelling on the right and left upper arms (see

Figure 1). Cardiovascular system examination obtained blood pressure 130/80 mmHg, heart rate 75 times per minute, regular, normal heart sounds, regular rhythm, no murmur, no gallop, and pamberton sign was positive.

Figure 1. The patient's clinical condition with dilated blood vessels in the patient's chest and swelling in both forearms.

Laboratory examination on complete blood test, hemostasis function, renal function, liver function, and electrolytes were within normal limits. Blood gas analysis with the result, pH 7.34, pCO2 of 68 mmHg, pO2 90.00 mmHg, Beecf 11.0 mmol/L, HCO3 36.9 mmol/L, and SO2c 96% with a nasal cannula of 4 liters per minute. The patient performed spirometry test with the results of FEV1 = 1.000 ml / 46.81%, FVC = 1.610 ml / 52.90%, FEV1 / FVC = 62.11%, with the conclusion: moderate to severe restriction with severe obstruction. The CT scan of the thorax with contrast was conducted and found a heterogeneous solid mass with necrotic and calcified components in the posterior segment of the superior lobe of the right lung attached to the right superior aspect visceral pleura and attached to and obstructed the superior segmental bronchus and caused superior lobe segmental atelectasis, pulmonary malignant mass; Multiple conglomerated nodules with necrotic components in the right colli region extending to the thoracic outlet to the left right superoanterior mediastinum-media (right dominant) and the mass destroys the sternum, right pulmonary venous artery, and attaches to the SVC, pericardium and left right main bronchus, multiple solid masses in the right and left lobes of the liver, suggesting a metastatic process (according to AJCC 9th for Lung T2aN3M1b), fibrosis in the apical segment of the superior lobe of the right lung and the apicoposterior segment of the superior lobe of the left lung, paraseptal emphysema in the right and left lungs, multiple bullae in the superior lobe of the left right lung, right pneumothorax, right pleural effusion with compressive atelectasis around it, ascites, cervicothoracalis spondylosis, anterior compression of costovertebrae Th 6, a chest tube with the proximal tip projecting at the level of the right first costae (see Figure 2).

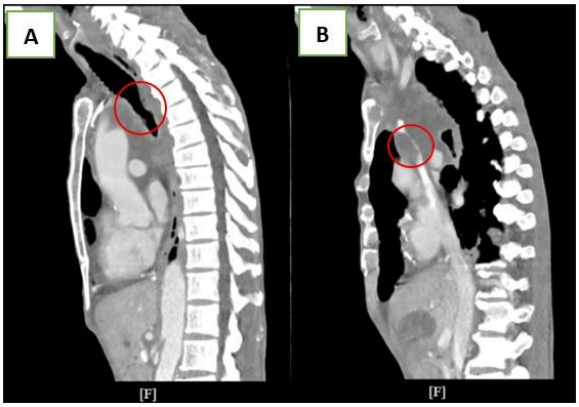

Figure 2. A computerized tomography scan of the thorax with contrast. In Figure A, the red circle shows stricture of the trachea by the mediastinum mass, while Figure B shows stricture of the superior vena cava by the mediastinum mass.

The patient then concluded with ASA III physical status and will be performing awake intubation with a video laryngoscope using the left double lumen tube (DLT). On the day of surgery, when in admission room, the patient was inserted an arterial line, premedication with dexamethasone 10 mg and diphenhydramine 10 mg intravenously, and nebulized with 4 mL of 4% lidocaine solution. In the operating room, the patient was given dexmedetomidine 0.5

mcg/kg (19 mcg) in 10 minutes, then continued 0.3 - 0.6 mcg/kg/hour for the duration of surgery. Preoxygenation was performed with 4 lpm O2 for 5 minutes with nasal cannul, then the patient was given lidocaine spray about 10 sprays (100 mg) on posterior wall of the oropharynx and uvula, after that continue preoxygenation for 5 minutes. After the patient feel numb and thickness of the mouth and throat, intubation was performed with a videolaryngoscope and insertion a 35 Fr left DLT, confirming the location of the DLT with auscultation, CO_2 was detected, and then attempting one-lung ventilation (OLV). The patient then given 100 mcg of fentanyl, 20 mg of rocuronium, and a maintenance dose of dexmedetomidine and surgery was started.

During the operation, the patient received additional muscle relaxants and dexmedetomidine continued. Hemodynamics during surgery was found to be stable with systole blood pressure 95-130 mmHg, diastole 55-85 mmHg, heart rate 60-88 beats per minute, oxygen saturation 94-96% with fraction 60% (see Figure 3). Postoperatively the patient was not extubated and was sent to the ICU for further treatment. There is no follow-up was done on this patient after treatment in the ICU.

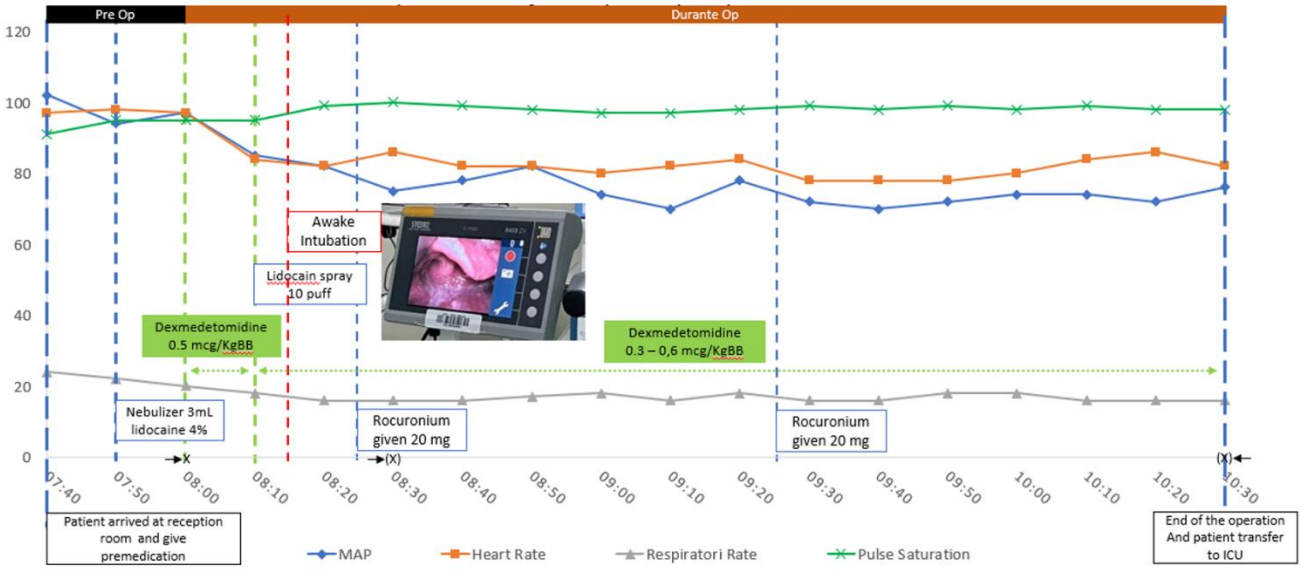

Figure 3. Haemodynamic profile pre operation and during operation.

Discussion

Awake intubation is an important technique when managing patients with mediastinal mass, especially those causing significant airway compression. It helps prevent airway collapse during induction of general anesthesia.[3,4] This approach allows to maintain spontaneous ventilation and minimizes the risk of scenarios when the patient cannot be intubated or cannot be ventilated. Intubation while conscious effectively reduces this substantial risk by maintaining spontaneous ventilation throughout the procedure. It also allows the patient to position themselves, often in an upright or semi-upright position, to optimize airflow to the lungs and patient comfort. The ability to maintain this optimal position is particularly important for SVCS patients who cannot tolerate the supine position without experiencing severe symptoms.[4,5]

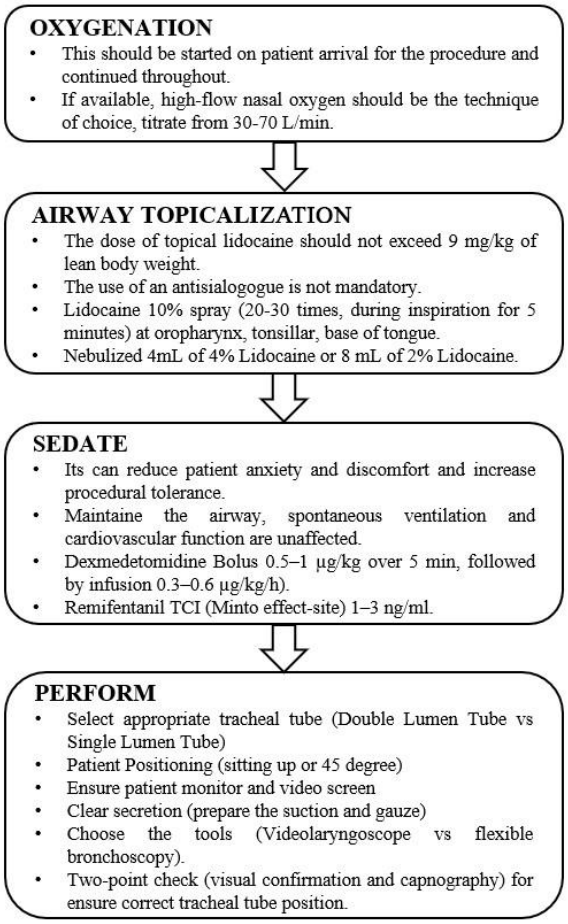

Figure 4. Awake tracheal intubation (ATI) from Difficult Airway Society (DAS)[7].

Laryngoscopy using video cameras is gaining popularity in the management of difficult airways. Awake intubation using video laryngoscopy has several benefits compared to fibreoptic bronchoscopy. Video laryngoscopy is easy to use, quick to set up and provides clear results, and the time required for intubation is faster than fibreoptic bronchoscopy for less experienced operators. However, the use of video laryngoscopes is mostly only in patients who can still open their mouths and patients can still be oriented very well when awake intubation is performed.[5,6] In this case, awake intubation technique was performed because the patient had a mediastinal mass with superior vena cava syndrome due to suspected advanced lung cancer. On physical examination, the patient could still open his mouth wide with mallampati III, so it was decided to use video laryngoscopy. In this report, intubation was done by using a left DLT because the patient will undergo VATS decortication, and there is a possibility of bleeding that can enter the bronchial lumen. DLT is the best tool for absolute indications for lung separation to protect the lung from contamination, establishment of airway continuity and can facilitate the surgeon when requesting one-lung ventilation.[7] However, DLT installation requires adequate time and skills compared to single lumen endotracheal tubes. In addition, determining the proper size for DLT is more difficult than single lumen and other complications that can occur when installing DLT such as damage to the vocal cords and tracheal cuff.[7]

According to the Difficult Airway Society (DAS), there are four basic things to remember in the management of awake intubation, such as oxygenation, airway topicalization, sedate, and perform (see Figure 4).[7] In this patient, we provided oxygenation through a nasal cannula of 4 liters per minute from the ward until intubation. The intubation facilities used in this case were 4% lidocaine nebulized, lidocaine sprayed into the oropharynx, and dexmedetomidine. A study by Dede, et al. (2025) showed 4% lidocaine nebulization has significant benefits in achieving adequate airway anesthesia, which has been shown to improve patient comfort during endotracheal intubation using a conventional laryngoscope. In a randomized trial study by Chenxi Li, et al. (2025), they said 2% atomized lidocaine with a particle size of 9-10 µm, gives comfortable to the patient during awake intubation by reducing cough reactions, less nebulization time, and reducing vomiting reactions. The main benefit of lidocaine in awake intubation is its profound ability to optimize patient comfort and encourage cooperation. Local anesthetic to the airway is highly recommended to achieve this condition, as it significantly reduces discomfort during the procedure. When combined with light sedation, lidocaine helps relieve patient distress without compromising consciousness or vital respiratory function. Nebulized lidocaine has been observed to improve patient comfort during intubation procedures.[6,8] The higher

patient satisfaction that results with this technique is a testament to its effectiveness in making a potentially traumatic experience more tolerable. An important benefit of lidocaine is its efficacy in suppressing airway reflexes, particularly the cough and gag reflexes, which are critical for safe intubation. Lidocaine inhibits neuronal excitability of sensory nerves, including airway C-fibers and rapidly adapting receptors, which provides a direct pharmacological mechanism for cough suppression.[6,8] Another advantage of nebulization is its ability to deliver local anesthesia directly to the lower airway, reducing systemic absorption and associated risks, thus making intubation procedures safer and more accessible.[9]

For this patient, dexmedetomidine is administered at 0.5 mcg/kg (19 mcg) within 10 minutes, followed by 0.3-0.6 mcg/kg/hour for the duration of surgery. A study by Olix, et al. (2023) showed that dexmedetomidine was highly effective in maintaining spontaneous breathing in consciously intubated patients with SVCS. Although dexmedetomidine is effective in maintaining spontaneous ventilation, the risk of bradycardia, hypotension, and arrhythmias (15-20% of patients) needs to be anticipated. In this case, a low dose (0.5 µg/kg) was chosen due to cardiac comorbidities. Results are in line with the study of Pratas et al. (2022) who reported similar success with a dose of 0.7 µg/kg/min in tracheal compression patients. A very important benefit in the use of dexmedetomidine is its ability to provide sedation, anxiolysis and analgesia without causing clinically significant respiratory depression. Dexmedetomidine has sympatholytic characteristics that help attenuate the hemodynamic stress response (e.g., hypertension and tachycardia) often associated with intubation and extubation.

This generally contributes to stable hemodynamics, although sometimes transient hypertension or hypotension and bradycardia may occur.[13] It can also reduce salivary and tracheobronchial secretions, which improves visualization for the intubating physician and reduces the risk of aspiration.[13] It is very important to maintain spontaneous breathing which is the basic concept in conscious intubation, especially in patients with a difficult airway including masses in the mediastinum.[14] Dexmedetomidine induces a state of conscious sedation in which patients are calm but easily awakened, allowing them to remain cooperative and follow commands during the procedure. This condition significantly increases patient comfort and tolerance, which is crucial for the successful implementation of conscious intubation.[13,14, 15]

In conclusion, the successful management of this case highlights the critical importance of awake intubation with preserved spontaneous ventilation in patients with SVCS and airway compression. The strategic use of topical airway anesthesia via nebulized and sprayed lidocaine combined with dexmedetomidine sedation provides a safe, effective, and hemodynamically stable approach to securing the airway. This technique minimizes the risks associated with deep sedation or muscle relaxation in compromised airways and underscores the value of tailored anesthesia strategies in high-risk thoracic surgery cases.

Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient have given his consent for his images and other clinical information to be reported in the journal. The patient understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflict of Interest

The authors declare no conflict of interest, financial or otherwise.

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