

Case Report

Difficult airway management in an ankylosing spondylitis case using video laryngoscope: a case report

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ABSTRACT

Ankylosing spondylitis (AS) known as autoimmune disease with chronic inflammation within vertebral bone, characterized with bamboo spine. AS with cervical and temporomandibular joint involvement can lead to difficult airway. In this report, we present an AS patient with severe ARDS (acute respiratory distress syndrome) due to COVID-19 who was successfully intubated using video laryngoscope. A 37 years old male, came to emergency room in agitated condition, history of AS with cervical spine and temporomandibular joint involvement, history of pulmonary tuberculosis in 2008, and haven't been vaccinated (COVID-19). This patient was diagnosed with severe ARDS due to COVID-19 with GCS 3-1-3, respiratory rate 36 times per minute, maximum peripheral saturation only 90% with Jackson Rees and pCO₂ 103 mmHg. These conditions are indication for endotracheal intubation. With the aid of video laryngoscope, endotracheal intubation was successfully performed. Improvements of peripheral saturation and blood gas analysis were obtained after intubation. This patient was included in the criteria for intubation due to respiratory rate over 30 times per minute and pCO₂ more than 100 mmHg. Based on difficult airway predictor (MOANS, LEMON, RODS and SHORT), this patient was categorized as hard to ventilate and hard to intubate so it is necessary to prepare supraglottic airway device if intubation fails or surgical cricothyrotomy if intubation and supraglottic device fail. In difficult airway conditions, endotracheal intubation is ideally performed without muscle relaxants or awake intubation. The use of video laryngoscope is a recommended procedure in difficult airway management as in AS patient or in head and neck trauma cases. The availability of video laryngoscope in every hospital will maximize airway management in emergency room in Indonesia.

Keywords: AS, COVID-19, Difficult airway, Video laryngoscope

INTRODUCTION

Ankylosing spondylitis (AS) known as autoimmune disease with chronic inflammation within sacroiliac and spine bone, characterized with bamboo spine.^{1,2} Its prevalence usually young adults male patients, especially between 20 to 30 years old. It has strong associated with human leukocyte antigen (HLA-B27) in most of the cases.² Patient with AS usually take anti-inflammatory drugs prescribed by rheumatologists. In late stage, AS patients may have cervical as well as the temporomandibular joint involvement that can lead to the difficult airway.^{1,3}

In this report, we present an AS patient with severe ARDS due to COVID-19 who was successfully intubated using video laryngoscope.

CASE REPORT

A 37-years-old male patient, came to emergency department with decrease of consciousness. The main complaints were shortness of breath preceded with bloody cough for one week estimated. Bloody vomit was also reported since 2 days before admitted. History of pulmonary tuberculosis was reported in 2008 with completed six-month treatment. This patient has history of AS since teenager and same history from his father.

The last time this patient went to rheumatologist and took the anti-inflammatory medication was in 2017. This patient hasn't been vaccinated against COVID-19.

From vital signs we found GCS (Glasgow Coma scale) E3 V1 E3, blood pressure 150/90 mmHg, heart rate 144 times/minute, respiratory rate 36 times/minute, axillary temperature 37.5°C and peripheral oxygen saturation around 80% with 15 liter/minute non-rebreathing oxygen mask.



Figure 1: Patient appearance when admitted into emergency room.

In physical examination we found stiff neck with kyphosis vertebrae appearance (Figure 1). In lung examination we found asymmetrical chest movement, dullness percussion on right lung, reduced right lung's vesicular sound and rhonchi on both lungs.

Blood gas analysis was taken and showed respiratory acidosis and type 1 and 2 respiratory failure, hypoxemia and hypercapnia (Table 1). Other laboratory findings showed leucocytosis with neutrophil domination, hypercoagulation, glucosuria, proteinuria and bacteriuria (Table 2 and 3). RT-PCR (Real time polymerase chain reaction) COVID-19 was performed and gave positive result. Chest x-ray showed right pleural effusion with schwartz sign right lung (Figure 2).

Table 1: Blood gas analysis results.

BGA	Before intubation	Two days after intubation
pH	6.96	7.17
pO ₂	71.0	120.0
PCO ₂	103.0	83.8
HCO ₃ ⁻	23.4	30.8
TCO ₂	27.0	33.0
BE	-8	2
SaO ₂	80	97.0

Table 2: Laboratory tests result.

CBC	Results	Electrolyte	Results	Liver	Results	Renal	Results
HGB	15.09	Na	147.10	SGOT	31.14	BUN	11
HCT	49.9	K	4.54	SGPT	19.28	Creatinine	1.076
WBC	30.54	Cl	107.30				
PLT	430			Glucose	265	D-Dimer	3030
				Alb	4.5	Lactate	1.17

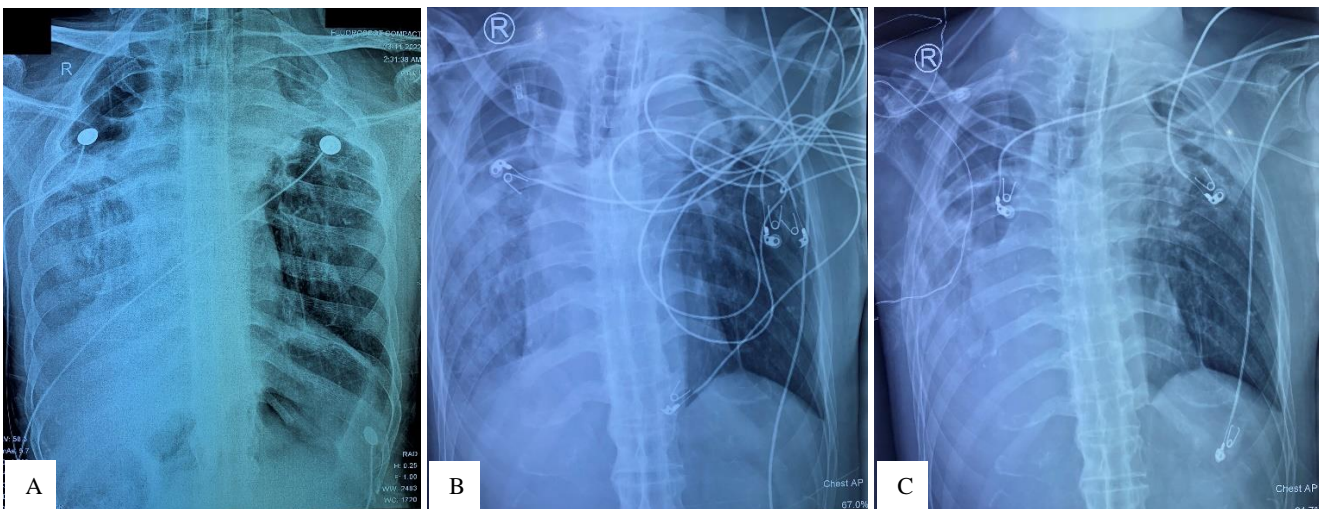


Figure 2 (A-C): Serial chest X-ray in emergency room, 2 days after admitted to isolation ICU and 4 days after admitted.

Working diagnosis for this-patients were sepsis, severe ARDS due to COVID-19 with hypercoagulation state, respiratory acidosis with type 1 and 2 respiratory failure, and type 2 diabetes mellitus.

Table 3: Urinalysis result.

Urinalysis	Results
Glucose	+2
Bilirubin	Negative
Ketones	Negative
Density	>1.030
pH	6.0
Protein	+2
Urobilinogen	Negative
Nitrite	Negative
Erythrocyte	5-10/ hpf
Leucocyte	2-5/ hpf
Epithelial	1-3/ hpf
Colour	Yellow
Cast	Negative
Bacteria	+1

Due to failure of non-invasive oxygenation using Jackson Rees (maximum peripheral saturation was 90%) we decided to intubate this patient and estimated the predictors of difficult airway management in this patient (Table 4-7).

Table 4: Predictors for difficult bag mask ventilation (MOANS).

Variables	Results
Mask seal	✓ Bushy beard
Obesity, obstruction	–
Age (Years)	–
No teeth	–
Sleep apnea, stiff lung	✓ Stiff lung, ARDS

Table 5: Predictors for difficult laryngoscopy and intubation (LEMON).

Variables	Results
Look externally	✓ Agitated patient
Evaluate	✓ Mouth opening <3 fingers
Mallampati score	✓ ≥3
Obesity, obstruction	✓ Poor glottic view
Neck mobility	✓ AS

Table 6: Predictors for difficult extraglottic device (RODS).

Variables	Results
Restricted mouth opening	✓
Obstruction	–
Disrupted or distorted airway	✓
Stiff lung, cervical spine	✓

Table 7: Predictors for difficult cricothyrotomy (SHORT).

Variables	Results
Surgery or the other airway obstruction	–
Hematoma (includes infection and abscess)	–
Obesity	–
Radiation distortion (and other deformity)	–
Tumor	–

Based on predictors difficult airway management, this patient was categorized as hard to ventilate, hard to intubate and hard to give extraglottic/supraglottic device. Cricothyrotomy may be done if endotracheal intubation failed.



Figure 3: Patient appearance post intubated and admitted to isolation intensive care unit.

Endotracheal intubation in this patient was successfully performed using McGRATH™ MAC video laryngoscope with premedication fentanyl 50mcg, propofol 50mg and atracurium 25 mg.

Synchronized controlled mechanical ventilation (SCMV) mode was chosen with settings as rate 16 times per minute, tidal volume 350 ml, IE ratio 1:2, PEEP 8 mmHg, flow trigger 2.0 L and FiO₂ 90%. Maintenance drugs was given include midazolam 2 mg/hour, fentanyl 25 mcg/hour and atracurium 20 mg/hour.

After successfully intubated, patient's vital signs became near normal, GCS E1 V_T M1 under sedation, blood pressure around 110/70 mmHg, heart rate around 120 times/minute, respiratory rate 16 times/minute on ventilator and peripheral saturation 97-98% on ventilator. Later, this patient was admitted into isolation intensive care unit (Figure 3).

This patient was treated with antiviral, antibiotics, anticoagulant, corticosteroid, proton-pump inhibitor, nebulizer, other symptomatic treatment. BGA 2 days after intubation showed improvement. Although there was improvement in BGA result, there was no clinical improvement in this patient and this patient passed away in 8th day hospitalized.

DISCUSSION

AS is an inflammatory disease on vertebral bone that in severe case may affect cervical bone and temporomandibular joint and cause difficult airway management. In this patient we found neck and temporomandibular joint stiffness that cause difficulty in airway management.^{1,3} Unfortunately there was no evidence that support this patient has AS, only based on patient's wife history taking and patient appearance.

Patient who hasn't been vaccinated against COVID-19 has higher risk to develop severe ARDS with higher mortality rate. Based on American college of rheumatology patient with inflammatory rheumatic diseases include AS has no absolute contraindications and should be prioritized to get vaccination.⁴ In this patient, we have been reported that he was afraid to get vaccinated due to his disease history.

There is no absolute cut off indicators for intubation, but if peripheral saturation can't be maintained above 80% with non-invasive ventilation, respiratory rate above 30 times per minute, or CO₂ partial pressure above 100 mmHg has strong correlation with intubation.⁵ In this patient we found respiratory rate above 30 times per minute and pCO₂ above 100 mmHg, and intubation was the right choice.

Predictors for difficult airway management should be assessed before treating patient with special cases such as AS. Using the criteria like MOANS, LEMON, RODS

and SHORT may help us prepare the devices/methods that suitable to manage patient's airway and prepare the alternative method.⁶⁻⁹ Based on LEMON criteria, AS is an indication for using video laryngoscope and it was a right choice to intubate the patient using video laryngoscope.

A randomized controlled trial study in South Korea reported that intubation time was reported decrease when using video laryngoscope than direct laryngoscope in unexperienced doctors.¹⁰ But a cohort study in 2022 reported that patient with category hard to ventilate and hard to intubate with LEMON score >4 has higher failure risk in first attempt intubation.¹¹ In this patient, endotracheal intubation was successfully performed after second attempt with limited laryngeal view Cormack-Lehane class 3.

In condition that difficult airway has been predicted, awake tracheal intubation is a safer and more effective choice. This method is safer due to reduce the risk of hypoxia and hypoventilation if intubation fail. It is indicated for patients with head and neck pathology such as reduced mouth opening and limited neck extension. Awake intubation usually perform without sedation or minimal use of sedation. Topical sedation is a better choice for awake intubation.¹² In this patient we gave sedation in lower dosage and we gave muscle relaxant that should not be given before intubation due to risk of hypoxia and hypoventilation if the intubation failed. There was no topical analgesia present at that moment.

CONCLUSION

Video laryngoscope was an important modality in difficult airway management in special cases such as AS patient with limited neck movement or in head and neck trauma cases. Availability of video laryngoscope in every hospital may improve management on airway-breathing emergency cases and increase confidence doing intubation for unexperienced doctors. Awake intubation training program should be given to practitioners especially who work in emergency department.

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