Thoracic surgeries for patients affected by COVID-19 in Hospital Kuala Lumpur

Yurkdes Aran Sittampalam, MRCS, Idzman Idros, MBBS, Diong Nguk Chai, MMed(Surg), Benedict Dharmaraj, MMed(Surg), Narendran Balasubbiah, MMed(Surg), Narasimman Sathiamurthy, MMed(Surg)

Thoracic Surgical Unit, Department of General Surgery, Hospital Kuala Lumpur, Kuala Lumpur, Malaysia

SUMMARY

The COVID-19 pandemic caused a worldwide shift in the practice of medicine, and many fields, including surgery had significant institutional changes. There were, for the most part, continuation of services for patients whose conditions could not wait for postponement, for example, malignancies among others, and their surgeries were carried out with attention to detail to personal protective equipment. This resulted in a management dilemma, however, when faced with a patient that needed immediate surgical attention, yet was actively infected with COVID-19, especially when considering the nature of surgery involved aerosol-generating procedures. This article serves to demonstrate the challenges and approach to surgical treatment of patients who presented to our unit requiring thoracic surgery in an urgent situation who were recently infected with COVID-19.

INTRODUCTION

There is no doubt that the COVID-19 pandemic brought a great many changes to the way institutionalised medicine has been practiced. For the most part, it resulted in a generalised cessation of thousands of elective nonemergent procedures across specialties worldwide, leading to a backlog of cases. Having said that, most if not all healthcare facilities continued to provide care for emergency and urgent conditions such as malignancies whereby a delay would have most definitely led to disease progression. In these patients, there have been instances whereby patients who require expedited surgical care were infected with COVID-19, leading to a management dilemma, whether or not their case should be postponed to allow for complete resolution of their sequelae of COVID-19, or whether their case would benefit from early intervention. There are also questions to be raised on what would be the safest method of managing these patients in the operating theatre from an anaesthetic standpoint, and the role of non-intubated thoracic surgery in reducing aerosol generation and transmission to operating theatre personnel.

This case series reflects on the various cases and thoracic pathologies encountered that resulted either as a direct or indirect result of COVID-19 or had their course of management altered in a way that would have been different if not for their infection. All cases discussed in this series were patients that had their surgeries done prior to receiving any form of vaccination against COVID-19 as these patients were encountered prior to worldwide introduction of the vaccine.

CASE REPORT

In preparing this case series, the authors retrospectively reviewed the medical records of all patients diagnosed with COVID-19 who were admitted to the thoracic surgical unit from 10th of March 2021 to the 4th of November 2021. Demographic data and pertinent information were gathered from the medical records and analysed. Hospital protocol during the time-frame mentioned was such that all patients undergoing elective or emergency surgery required an RT-PCR prior to surgery, however, those already diagnosed with COVID-19, where possible, were to have their surgery delayed by at least 4 to 6 weeks (Figure 1). As such, the earliest a patient went through surgery after their diagnosis of COVID-19 was 4 weeks.

A contrast-enhanced computed tomography scan of the thorax was carried out as part of pre-operative disease evaluation for all patients in this case series. For required cases, intraoperative bronchoscopy was done to confirm the position of the double-lumen tube used for lung isolation during surgery.

All personnel present in the operating theatre were required to wear personal protective equipment, specific for their role in the theatre. As a minimum, everyone present were required to wear an N95 mask, splash-resistant isolation gown, head cover, face shield, shoe covers and gloves, and those scrubbing in to operate or assist had an additional layer of sterile gowns and double-layered sterile gowns. Specific areas to don and doff safely were established. Overall, the number of staff in the theatre was kept to a minimum where possible.

DISCUSSION

The increased number of ventilated patients with COVID-19 in critical care units have led to several pulmonary complications that require thoracic surgical intervention, and this may be a direct consequence of the pathophysiology of the infection itself, for example, non-iatrogenic pneumotohoraces and mediastinal emphysema.[1] However some of these conditions develop as a consequence of

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Corresponding Author: Yurkdes Aran Sittampalam
Email: yurkdes@gmail.com

Table I: Summary of cases

	Diagnosis	Length of time from diagnosis of COçID-19 to surgery	Category of COVID-19	Surgery	Type of Anaesthesia used	Oxygen support preoperatively	Oxygen support post-operatively removed	Days requiring Oxygen support	Days spent in ICU post-operatively	Days from surgery until chest	Days from Surgery to Discharge	Status on day of discharge
Patient 1	Left empyema thoracis with CRE bacteraemia	12 weeks	CAT 5	Left thoracotomy and decortication	General Anaesthesia, intubated	Intubated	Nasal Prong	1 day on Nasal Prong then room air till discharge	None	5 days	9 days	Alive
Patient 2	Right lung necrotising pneumonia	4 weeks	CAT4	Right Uniportal vats and lower lobectomy	General Anaesthesia, intubated	Nasal Prong	Face Mask	1 day on Face Mask Oxygen support, then 1 day of Nasal Prong then room air till discharge	None	5 days	1 week	Alive
Patient 3	right upper lobe necrotising pneumonia secondary to invasive klebsiella syndrome	6 weeks	CAT 5	Right thoracotomy and upper lobectomy	General Anaesthesia, intubated	Intubated	Intubated	1 week of ventilation	1 week	N/A	1 week	Died
Patient 4	Tracheal Stenosis	20 weeks	CAT 5	Tracheal Resection and Reconstruction	General Anaesthesia, intubated	Intubated	Nasal Prong	3 days on Nasal Prong then room air until discharge	1 day of PACU care before being discharged to the ward well	3 days	5 days	Alive
Patient 5	Tracheobronchial stenosis	8 weeks	CAT 5	Bronchoscopy and dilatation	General Anaesthesia, intubated	Intubated	Intubated	1 week of ventilation	1 week	N/A	1 week	Died
Patient 6	Middle Mediastinal Mass	16 weeks	Cat 2	Left Posterolateral Thoracotomy and excision.	General Anaesthesia, intubated	Room Air	Nasal Prong	1 day on Nasal Prong then room air till discharge	None	3 days	5 days	Alive
Patient 7	Mediastinal NSGCT with right paraspinal lesion	8 weeks	CAT 2	Right Uniportal vats and excision of paraspinal nodule converted to thoracotomy and excision of mediastinal mass	General Anaesthesia, intubated	Room Air	Nasal Prong	1 day on Nasal Prong then room air till discharge	None	3 days	1 week	Alive

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Table I: Summary of cases

	Diagnosis	Length of time from diagnosis of COçID-19 to surgery	Category of COVID-19	Surgery	Type of Anaesthesia used	Oxygen support preoperatively	Oxygen support post-operatively removed	Days requiring Oxygen support	Days spent in ICU post-operatively	Days from surgery until chest	Days from Surgery to Discharge	Status on day of discharge
Patient 8	Thymoma	28 weeks	CAT 5	Left Uniportal VATS and Thymectomy	General Anaesthesia, intubated	Nasal Prong	Nasal Prong	1 day on Nasal Nasal Prong then room air till discharge	None	4 days	5 days	Alive
Patient 9	Right pneumothorax with mediastinal shift secondary to covid pneumonia	5 weeks	Cat 4	Right Uniportal NiVATS, bullectomy and pleurodesis	General Ançesthesia, High Flow mask	HFM	Nasal Prong	1 day on Nasal Prong then room air till discharge	None	3 days	3 days	Alive
Patient 10	2nd-10th rib fracture with mild haemothorax post-trauma	5 weeks	CAT 2	Left NiVATS washout	General Anaesthesia, High Flow mask	Nasal Prong	Nasal Prong	5 days on Nasal Prong then room air till discharge	None	4 days	3 days	Alive

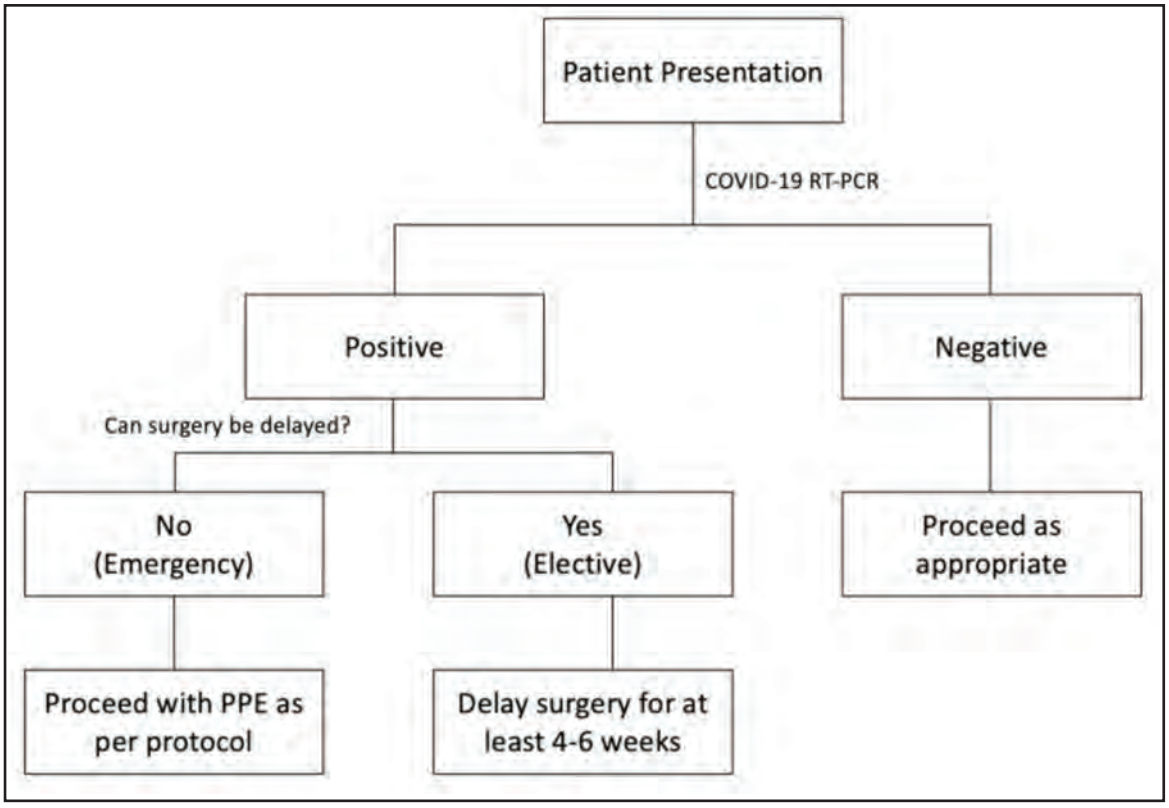

Fig. 1: Flow of patient management

management required, for example, the patients discussed in our series who developed tracheal stenosis due to prolonged ventilation.

Most of the cases operated on were for infective thoracic pathologies, such as empyema thoracic and necrotising pneumonia, and three of them had demonstrated improvements in ventilatory support and were successfully weaned off assisted oxygen support soon after surgery. They also demonstrated improvements in their overall functional status post-operatively. The average time requiring chest tube drainage was within 3–7 days. Anticipated outcomes of these patients that are infected, as with any severe viral pneumonia, tends to follow the course of developing complications such as complex pleural effusions emphysema or pneumothoraces.[2] Pleural effusions that are not amenable for thoracostomy drainage or those that have progressed to empyema thoraces require formal surgical drainage such as decortication or washout, and the treatment can involve aerosol-generating procedures that carry risks to the operating team.[3] Our patients in this subgroup had surgeries done within 4–12 weeks of COVID-19 diagnosis. The earliest of the batch required surgery due to necrotising pneumonia and had a safely underwent a video-assisted lobectomy that led to the resolution of his symptoms and discharge.

In our series, of the 10 patients operated on, there were 2 mortalities, which were patients with tracheobronchial stenosis and necrotising pneumonia, respectively. The patient with tracheobronchial stenosis had developed multilevel stenosis and was moribund on referral and had been ventilated for almost 2 months prior to referral with high ventilatory requirements. She was planned for reconstructive surgery for her tracheobronchial stenosis; however, her family had refused major surgery. The patient with necrotising pneumonia was brought in for surgery 6 weeks after his COVID-19 diagnosis, at which point he was deemed a suitable candidate to prevent him from deleterious effects of his COVID-19 on overall recovery. He however continued to deteriorate despite adequate surgical drainage and debridement as a result of septic shock and multiorgan involvement including his kidneys and liver. He, however, did not demonstrate worsening of his ventilatory support prior to his deterioration.

Three patients had thoracic tumours (mediastinal tumours) and had their surgeries carried out within 2 weeks of their diagnosis. Two of the patients were retrospectively known to have COVID-19 in the past prior to the diagnosis of their tumours and as a result were deemed to be in the safe-operative period. One patient in our series was diagnosed with a mediastinal non-seminomatous germ cell tumour just before he was diagnosed with the virus, hence his surgery was delayed for 8 weeks until he was fit and surgery was deemed safe to proceed. All of them were weaned off oxygen support post-operatively and were discharged well within a week of surgery.

Video-assisted Thoracoscopic surgery (VATS) for lung resections has more or less become the gold standard approach, and non-intubated VATS is also gaining traction for several thoracic procedures, adding to the avoidance of

morbidity associated with endotracheal intubation and barotrauma from mechanical ventilation among other factors.[4,5] An obvious advantage of non-intubated VATS pertinent to the COVID-19 era is the avoidance of aerosol generation with non-airway manipulation.[4] As discussed, we performed several VATS procedures safely including two patients who had non-intubated video-assisted thoracoscopic surgeries with satisfactory outcomes, with most patients only requiring nasal canula oxygen therapy between 1 and 5 days post-surgery.

The average length of time from surgery to discharge was 5.5 days for the patients in our series, which is comparable to that of the pre-covid era. The oxygen requirement post-operatively did not impact significantly on decisions pertaining to their discharge. When comparing data from the pre-COVID era and data from our series, the overall mortality and morbidity rate was comparable. Part of the management dilemma of these patients that require surgery with a background diagnosis of either having active COVID-19 infection or being recently infected with COVID-19 is that there are no clear guidelines to aid surgical decisions aside from recommendations that surgery should be delayed up to 4–6 weeks post resolution of symptoms.[3] In our series, the earliest that we operated on was 4 weeks, which is in keeping with current recommendations, and that was for a patient with necrotising pneumonia who would have progressed to septicaemia if his surgery was delayed further. However, sufficient high-volume data to delineate specific post-operative considerations in patients with active COVID-19 undergoing surgery is lacking. Furthermore, the above-mentioned data were collected during the early stages of the implementation of the national vaccination program, as such none of the patients discussed in the case series were vaccinated prior to their infection. Current guidelines for vaccination and surgery indicate that while emergency surgery should not be delayed for vaccination against COVID-19, elective surgery is advised to be delayed for 2 weeks after at least the first dose of the vaccine to allow a greater degree of immunological protection.[6]

CONCLUSION

The management of patients with thoracic surgical pathologies with a background of COVID-19 is complex and requires multi-disciplinary care to achieve safe patient outcomes. Minimally invasive thoracic surgery and even non-intubated minimally invasive surgery in the form of video-assisted thoracoscopic surgeries for these patients are however a safe option and can be undertaken in high volume centres with experienced thoracic surgeons. More worldwide publications and data are required to help shape guidelines that can be universally adapted to help in management moving forward.

INFORMED CONSENT

The patients reported in this case series gave written informed consent to publish this article.

CONFLICT OF INTEREST

None.

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