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**Impact of the coronavirus disease 2019 pandemic on spinal surgery in Singapore**

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## **INTRODUCTION**

China announced a cluster of pneumonia cases in Wuhan, Hubei, China, in December 2019. The condition was subsequently termed coronavirus disease 2019 (COVID-19)<sup>(1)</sup> and spread to 210 countries and territories, infecting more than 2.8 million people, with 198,668 confirmed deaths worldwide as of 28 April 2020. The World Health Organization (WHO) declared COVID-19 to be a pandemic on 11 March 2020.<sup>(2)</sup> Singapore reported its first confirmed case of COVID-19 on 23 January 2020<sup>(3)</sup> and had 14,423 confirmed cases and 14 deaths as of 28 April 2020.<sup>(4)</sup> During this period, it was essential to optimise our spinal surgery practice. We herein share how we adapted our practice in response to the COVID-19 pandemic, to provide some insight into how spinal diseases may be managed during this period.

## **MEASURES IMPLEMENTED IN SINGAPORE**

As Singapore was one of the first few countries outside of China to have reported cases of COVID-19, nationwide measures were put in place early on in the outbreak.<sup>(5)</sup> Initially, cases were largely imported with limited local transmission, restrictions and screening were mainly limited to travellers, and there was minimal disruption to daily lives. There was some success in preventing a surge in infections in the initial period. However, Singapore faced new challenges as the disease spread to other countries around the world. In mid-March 2020, there was a surge in imported cases as Singaporeans, permanent residents and long-term pass holders returned from overseas in the face of global travel bans. Measures were stepped up, and on 22 March 2020, all short-term visitors were banned from entering or transiting in Singapore.<sup>(5)</sup> New clusters of local infection also emerged, in particular a second surge in COVID-19 cases clustered in multiple foreign worker dormitories. In response to increased rates of local transmission, Singapore entered a ‘circuit breaker’ phase on 7 April 2020 that was to last until at least 1 June 2020. Non-essential services and workplaces were closed, strict social distancing

measures were implemented, and people were strongly encouraged to stay at home. Reusable masks were also distributed to the public for compulsory use in public spaces.<sup>(3,6)</sup>

As an acute hospital, our institution has been involved in managing 473 COVID-19 patients, as of 27 April 2020. As such, our orthopaedic practice had to be adapted to implement stepwise measures to meet resource demands and to safeguard healthcare workers in response to the changing climate.

## **MANAGEMENT OF SPINAL PATIENTS DURING THE PANDEMIC**

Our institution's spine service provides an essential service for a number of conditions requiring either emergency or time-sensitive urgent elective surgeries.<sup>(7)</sup> During this outbreak, the department continues to receive patients requiring emergency or urgent spinal surgeries, as well as managing the existing pool of outpatients.

### **Acute spinal emergencies**

Patients with acute spinal emergencies admitted through the emergency department continue to be managed in a timely manner. These include conditions such as metastatic spinal cord compression, cauda equina syndrome, cervical spine injuries without fractures in the elderly, and spinal fractures such as cervical jumped facet fractures and thoracolumbar fracture dislocations. From the time of Singapore's first few cases of COVID-19, from 28 January 2020 to 28 April 2020, 18 emergency spinal surgeries were carried out in our department.

In those patients for whom surgery or an inpatient stay is unavoidable, some precautions are being taken. In response to the high number of imported cases of COVID-19 and growing number of local clusters, a detailed risk history is taken for every patient admitted.<sup>(8,9)</sup> Patients who have a positive travel or contact history, or display upper respiratory tract symptoms are isolated until they have been proven to be COVID-19 negative on two formal swabs.<sup>(10)</sup> As far

as possible without compromising patient care, surgery is delayed until confirmation of both negative swabs. Personal protective equipment (PPE), including but not limited to N95 masks, is also worn while attending to these patients in the interim when test results are pending. For instance, we managed a patient who had recent travel history to Cambodia when he was admitted with bilateral upper limb weakness secondary to central cord syndrome. As a precaution, he was isolated on arrival with compulsory use of an N95 mask by nurses or those attending to him until he was tested to be COVID-19 negative. His surgery was also delayed until both swabs were reported to be clear.

Furthermore, N95 masks are to be worn when operating on patients with upper respiratory tract symptoms or those whose surgery cannot be delayed until two negative swabs have been obtained due to their clinical condition. Patients in this category are frequently admitted due to acute trauma, in which case the thoracic computed tomography carried out as part of the trauma workup would also be screened for any radiological features of infection.<sup>(11,12)</sup>

### **Scheduled elective surgeries**

Patients who require elective spinal surgery are categorised as follows: Tier 1 – urgent electives, such as deteriorating neurology due to intradural tumours, thoracic myelopathy, etc; Tier 2 – time-sensitive electives such as stable cervical myelopathy; and Tier 3 – deformity or degenerative cases.

Following the initial wave of COVID-19 in Singapore of both imported and locally transmitted cases, our department responded quickly by postponing surgeries in the Tier 3 category to a later date. However, with a second surge in cases, more stringent measures were put into place by the end of March, and surgeries were also deferred for patients in the Tier 2 category. In total, 21 elective spinal cases, consisting of patients from both categories,

scheduled up to the end of April 2020 have been postponed. This constituted 54% of our elective workload for the time period in which these measures were taking effect.

By delaying selected elective surgeries, we are able to continue operating on and caring for patients requiring more urgent care in a timely manner. Postoperatively, discharge for these patients is also expedited to minimise hospital stays. This is achieved by transferring patients to a non-acute rehabilitation hospital or by facilitating discharge home.<sup>(7)</sup>

There have also been changes in operating theatre workflow. Only the anaesthetists and anaesthesia nurses who are involved in each case are to be present in the theatre during intubation or extubation of the patient, and full PPE is to be worn. This staggered entry to the theatre minimises the number of staff at risk of exposure to aerosols or droplets.<sup>(9,13)</sup>

### **Outpatient clinic visits**

In the outpatient setting, adjustments have also been made in response to the growing number of cases in Singapore. In conjunction with delaying Tier 2 and 3 elective surgeries, and minimising travel out of the home where possible during the ‘circuit breaker’ period, all non-urgent referrals or follow-up cases, such as back pain with no neurological symptoms, were postponed to a later date.<sup>(7)</sup>

With these measures in place, we have yet to encounter a case where a patient was tested to be COVID-19 positive after surgery that was carried out without proper precautions.

### **DISCUSSION**

Since the advent of COVID-19 in Singapore, our overall surgical load has dropped by 26% compared to the same time period in 2019. In this ever-changing pandemic situation, it is imperative that we are able to adapt our clinical practices to continue providing optimum care to patients who most require it. Our measures are applied in conjunction with other precautions

put in place on a wider basis. Effective reallocation of resources by deferring surgeries in Tiers 2 and 3 helps to preserve beds in intensive care and the high dependency unit. It also helps to reduce the use of essential drugs required in intensive care, to help mitigate the impact of a potential increase in demand or supply disruption as the pandemic progresses. In our orthopaedic department, teams have been split to help enforce social distancing within the service, and as a safeguard to keep the service running in the event of an infection within the department.<sup>(9)</sup> On a hospital-wide level, non-critical outpatient imaging has been deferred, and imaging more judiciously applied for inpatients. At the outbreak of the pandemic, we did not have a definite planned response to ensure that critical services were able to continue, but we were able to very quickly formulate and adapt protocols to deal with the rapidly changing circumstances. Effective nationwide efforts in limiting the outbreak have also helped in giving us sufficient time to develop a response plan.<sup>(14)</sup>

## **CONCLUSION**

Spine services frequently fall into the grey zone. While spinal emergencies have a clear priority for surgery, electively scheduled spine surgery patients have to be managed in a time-sensitive fashion, as prolonged delay to treatment can lead to irreversible neurological injury. As such, it is of paramount importance that we manage our resources such that critical services such as the spine surgical service are able to continue.

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