

Managing Vascular Surgery Emergencies and Referrals During the COVID-19 Pandemic at a Tertiary Centre in Oman

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طرق التعامل مع الحالات الطارئة لجراحة الاوعية الدموية أثناء جائحة كوفيد-19 في المستشفى مرجعي في عُمان

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ABSTRACT: Objectives: This study aimed to discuss the different challenges faced while managing emergency vascular surgery cases during the COVID-19 pandemic and how these challenges were overcome. **Methods:** This study details 14 emergency cases that were managed during a period of one month from mid-March to mid-April at Sultan Qaboos University Hospital, Muscat, Oman. The cases included acute limb ischaemia, critical limb ischaemia, type B dissection of the thoracic aorta, thoraco-abdominal aneurysm, critical internal carotid artery stenosis, trauma, infected arteriovenous forearm loop graft and thrombosed arteriovenous fistulas. **Results:** Only one patient was confirmed to have COVID-19. Five were negative for COVID-19 while the remaining eight were not tested. Various strategies on how the vascular surgical team accommodated changes in hospital protocols and nationwide lockdown are discussed in detail. **Conclusions:** With the judicious use of personal protective equipment and consumable surgical and endovascular devices, communication with support services and other hospitals and implementation of triage protocols, it was possible to manage vascular surgery emergencies effectively.

Keywords: COVID-19; Vascular Surgery; Emergencies; Oman.

المخلص: الهدف: هدفت هذه الدراسة لمناقشة التحديات التي واجهها فريق جراحة الاوعية الدموية في التعامل مع الحالات الطارئة لجراحة الاوعية الدموية أثناء جائحة كوفيد 19 وكيف تم التغلب عليها. **المنهجية:** شملت هذه الدراسة 14 حالة طارئة تم التعامل معها خلال منتصف شهر مارس الى ابريل سنة 2020 في مستشفى جامعة السلطان قابوس 'مسقط' سلطنة عمان. تضمنت هذه الحالات حالات الجلطات الحادة في شرايين الاطراف السفلية و حالات نقص تروية الاطراف الحرجة و حالات الانسلاخ الشرياني الاورطي من النوع ب و حالات التمدد الشرياني الاورطي و حالات التضيق الشديد للشريان السباتي و حالات الحوادث و كذلك حالات الالتهابات و تجلط الوصلات الشريانية الوريدية لغسيل الكلى. **النتائج:** يوجد مريض واحد تم تشخيصه على انه مصاب بفيروس كوفيد 19. هناك خمس حالات لم يثبت فيها الاصابة بالفيروس. بينما كانت هناك ثمانية حالات لم يتم اجراء الفحص لها. بينت هذه الدراسة طرق استخدام الاستراتيجيات المختلفة لفريق جراحة الاوعية الدموية للتعامل مع هذه الحالات لتلائم التغيير المصاحب في بروتوكول المستشفى و نظام الاغلاق حسب قرارات اللجنة العليا للتعامل مع فيروس كورونا المستجد في ذلك الوقت. **الخاتمة:** بالاستخدام الصحيح لمعدات السلامة للحماية الشخصية والاجهزة الجراحية و اجهزة جراحة الاوعية الدموية و التواصل الجيد مع المستشفيات الاخرى و تطبيق بروتوكول الفرز وتصنيف الاولويات تم التعامل مع الحالات الطارئة لجراحة الاوعية الدموية بكفاءة أثناء الجائحة.

الكلمات المفتاحية: كوفيد-19؛ جراحة الاوعية الدموية؛ الحالات الطارئة؛ عُمان.

ON THE 24TH OF FEBRUARY 2020 THE FIRST two cases of COVID-19 were confirmed in Oman. In an effort to curtail the spread of the pandemic and 'flatten the curve', the international borders were shut in mid-March for non-residents and a staged lockdown between governorates was enforced from the beginning of April 2020.

All patients presenting to the Sultan Qaboos University Hospital (SQUH), Muscat, Oman, were subject to a questionnaire regarding symptoms suggestive of a COVID-19 infection and polymerase chain reaction testing was done accordingly. This

article discusses how the vascular surgical team effectively managed the vascular emergency referrals during the transition period from a non-COVID-19 time to a time of COVID-19-based restrictions and protocols.

Methods

For the purpose of this study, only emergency cases referred to the vascular surgical team at SQUH between the period of 17th of March to 16th of April 2020 were included. A total of 14 emergency

Table 1: Details of emergency surgeries and referrals at Sultan Qaboos University Hospital from mid-March to mid-April 2020

Emergency presentation	Characteristic					PCR COVID-19 testing results	Diagnosis/Management
	Age in years	Gender	IHR	Comorbidity	COVID-19 status symptom		
Acute limb ischaemia	77	F	No	DM, HTN and DLP	Cough for two weeks and no fever	Negative	- Femoral embolectomy
	43	M	No	ESRD, DM and HTN	Sepsis and CXR suspect	Negative	- Popliteal and tibial embolectomy
	28	F	No	Sickle cell disease	Sepsis and CXR suspect	Negative	- Rutherford grade 3 bilateral hand and forefeet - On maximum inotropic support - Given anticoagulation medication
	95	F	No	DM, HTN and CHF	Shortness of breath and CXR suspect	Negative	- Cold forefoot and pain - PTA pulse ++ - CTA - PTA is only run off - BMT
	43	M	No	Trisomy 21	Shortness of breath and fever	Negative	- Brachial embolectomy
Critical limb ischaemia	59	M	Yes	DM, HTN, CKD Stage 1, non-healing left foot wound and rest pain	Asymptomatic	Not done	- Diabetic foot - SFA + PTA angioplasty - Telephonic follow-up
	69	F	No	CKD Stage 4, DM, HTN and gangrenous second and third toes	Asymptomatic	Not done	- SFA angioplasty + stenting and PTA angioplasty - Amputation of gangrenous toes
Type B dissection	65	F	No	HTN, DM and chest and back pain	Asymptomatic	Not done	- No mal-perfusion - Medical management for blood pressure control in the cardiac ICU - Outpatient follow-up
Thoraco-abdominal aneurysm	96	F	No	Anaemia, DM, HTN and history of falling	Sepsis	Not done	- Poor functional status - BMT
Critical ICA stenosis	75	F	Yes	Stroke, DM and HTN	Asymptomatic	Not done	- Telephonic consult - Right hemiparesis - Left ICA 75% stenosis on Duplex - BMT and CTA
Trauma	22	M	No	Open fracture of tibia and fractured pelvis and femur	Asymptomatic	Not done	- Left internal iliac artery embolisation - Ex-fix femur and tibia
Infected AV forearm loop graft	74	F	No	ESRD on dialysis, DM and HTN	Sepsis and CXR suspect	Negative	- Graft explanted
Thrombosed AV fistula	54	F	Yes	ESRD on dialysis	Shortness of breath, fever, cough and required NIV	Positive	- Dialysed via a Quinton line at the local hospital
	52	M	No	ESRD, DM and HTN	Asymptomatic	Not done	- Thrombosed AV fistula with cellulitis in arm - Catheter directed thrombolysis and IV antibiotics

IHR = interhospital referral; PCR = polymerase chain reaction; F = female; DM = diabetes mellitus; HTN = hypertension; DLP = dyslipidaemia; M = male; ESRD = end stage renal disease; CXR = chest x-ray; CHF = congestive heart failure; PTA = posterior tibial artery; CTA = computed tomography angiography; CKD = chronic kidney disease; SFA = superficial femoral artery; ICU = intensive care unit; BMT = best medical therapy; ICA = internal carotid artery; AV = arteriovenous; NIV = non-invasive ventilation; IV = intravenous.

surgeries and referrals were included [Table 1]. The usual case volume before the pandemic was around 40–50 patients per month for elective surgical and endovascular procedures.

Ethical approval was obtained from the institutional Research Ethics Committee (MREC #2143)

Results

Of the 14 cases, one was confirmed to be positive for COVID-19, requiring respiratory support with non-invasive ventilation. Five patients tested negative, one of whom was being managed as a potentially positive COVID-19 case until the second test revealed a negative result. The remaining eight cases did not meet the criteria set for COVID-19 testing.

Discussion

SQUH is one of two centres in Oman with endovascular and vascular surgical services in the capital city of Muscat. Elective surgical procedures were stopped from the 15th of March 2020, with priority given to patients with malignancies and emergency cases. For example, two patients were scheduled for elective aneurysm repairs (a thoracic endovascular aortic repair and a fenestrated endovascular aortic repair) were postponed as they were in the geriatric age group with multiple comorbidities, until such a time that the pandemic was deemed to be under control. Interventional procedures (cardiac and interventional radiology) were carried out in the hybrid catheterisation laboratory.

SQUH like other hospitals around the globe, experienced a shortage in personal protective equipment (PPE). Healthcare professionals underwent a series of training sessions in donning, doffing and care of PPE. If the COVID-19 test results were expected within one hour and a patient was likely to need intervention, assessment was performed by the consultant on call, thereby reducing the use of PPE.

Anaesthetists, radiologists, technicians, nurses and porters were willing to expedite results of investigations, perform medical imaging and transfer the suspected COVID-19 patients in order to minimise exposure time despite intentional and planned reduction in staffing. This reduction was periodically assessed by the administration to ensure that patient care wasn't affected.

Inpatient transfers were limited between hospitals by facilitating visit(s) by the consultant vascular surgeons to hospitals, within the governorate of Muscat. For patients requiring a transfer, they were permitted

to cross the police check-points establishing during lockdown with a referral letter from their primary hospital. Telemedicine was put to good use between doctors in the periphery who sought the opinion of the surgical team at SQUH.

Despite the above systems being in place, one of the included patients with a diabetic foot that required dressings preferred to remain as an inpatient to avoid travel between governorates. However, there were also patients with concerns who were encouraged to visit the clinic but preferred to delay their visit due to the fear of contracting the virus in hospital.

In order to reduce the inter-hospital referrals, telephonic consultation was utilised to communicate with doctors in peripheral hospitals and with patients. There were four to five consultations per day which mainly involved patients with arteriovenous fistula-related concerns, critical limb ischaemia and diabetic foot infections.

Blood is an important resource that became scarce during the COVID-19 pandemic. Donors were reluctant to go to the blood donation centres for fear of contracting the virus. In a patient who presented with trauma massive a blood transfusion was required; the relatives of the patient had to be actively encouraged to donate blood and re-assured that precautions were in place to minimise person-to-person contact.

Disposable hardware for endovascular procedures that are normally shipped from abroad were limited due to the initial closure of air- and seaports. There was discussion about reuse of endovascular hardware. These were put in abeyance until standard operating procedures and ethical approvals were in place. Meanwhile, cases that required endovascular interventions were kept on-hold unless emergent. The result was postponement of all elective vascular cases that included aortic aneurysms, thoracic outlet syndrome, varicose veins, arteriovenous fistula creation and fistulogram/fistuloplasty.

Triage protocols, as suggested by the Society of Vascular Surgery (SVS) and the National Health Service (NHS), have been helpful to SQUH in triaging patient care.^{1,2} The impact of the COVID-19 pandemic on the vascular surgery service at SQUH is comparable to that on other surgical specialties at SQUH and elsewhere.³

Conclusion

During the COVID pandemic, challenges faced in managing vascular surgical cases and referrals were overcome effectively at SQUH. These included the judicious use of PPE, better communication in the midst of limited support service staff and reducing

inter-hospital transfer of in-patients. Protocols such as those published by the SVS and the NHS have helped the surgical team of SQUH triage its patients better.

CONFLICT OF INTEREST

The author declares no conflicts of interest.

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References

1. Society of Vascular Surgery. Vascular Surgery Triage by Tier Class. From: <https://vascular.org/news-advocacy/covid-19-resources> Accessed: Aug 2020.
2. American College of Surgeons. COVID-19 Guidelines for Triage of Vascular Surgery Patients. From: <https://www.facs.org/covid-19/clinical-guidance/elective-case/vascular-surgery> Accessed: Aug 2020.
3. Hemingway JF, Singh N, Starnes BW. Emerging practice patterns in vascular surgery during the COVID-19 pandemic. *J Vasc Surg* 2020; 72:396–402. <https://doi.org/10.1016/j.jvs.2020.04.492>.