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A retrospective observational study analyzing the clinical characteristics and outcomes of Covid-19 positive patients who were operated on emergency basis after presentation with acute complaints in surgery casualty.

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ABSTRACT

Background: Covid-19 has the propensity to result in a wide array of manifestations. Recently, thromboembolic complications of Covid-19 have been denoted in literature. We report 15 cases of Covid-19 positive operated patients with no significant comorbidities who developed 1st time episodes of either; acute limb ischemia or bowel ischemia.

Methods: This is a retrospective observational study analyzing the clinical characteristics and outcomes of Covid-19 positive patients who were operated on emergency basis after presentation with acute complaints in surgery casualty from the duration of JUNE 2020 to JUNE 2021.

Results: Out of 67 patients who came to surgery casualty,after admission,came COVID 19 RTPCR positive and operated on emergency in COVID OT,10 patients were with Acute limb ischaemic symptoms undergoing embolectomy or Amputation for the gangrenous limb.While 5 patients presented with acute abdomen who later were diagnosed to be mesenteric ischaemia and underwent Exploratory laparotomy

with resection of gangrenous bowel segment and either stoma or anastomosis of healthy vascularised segment. None of our patients included had any history of thromboembolism that could justify the presentations.

Conclusions: The thromboembolic complications seen in our cases were devastating and resulted in significant mortality and morbidity. All vessels affected were medium-large vessels. None of our cases had any history of thromboembolic or ischemic events. A high index of suspicion is necessary when evaluating such patients regardless of thromboembolic history**.** Appropriate anticoagulation regimens are essential. Our cases add to the currently increasing severe thromboembolic complications of Covid-19

Keywords: Acute limb ischaemia,mesentericischaemia,SMA,SMV thrombosis, Covid-19.

INTRODUCTION

The world witnessed the emergence of a novel virus that eventually gripped the whole world creating chaos and challenge to the existing healthcare facilities in both developed and undeveloped nations. It was declared a pandemic by the World Health Organization by March 11,2020 [1]. COVID-19 was initially thought to affect only the respiratory system, but other systemic manifestations were reported. There is a plethora of evidence suggesting a hypercoagulable state and prothrombotic tendency in patients suffering from COVID-19[2,3]. Yet the exact pathophysiology, incidence and prevalence have not been precisely described. Klok et al. describes a thrombotic complication incidence of 31%; primarily venous, in ICU patients despite anticoagulation prophylaxis [4]. Lodigiani et al., described a remarkably increased incidence of arterial and venous vessel disease associated with increased mortality rates [5]. Acute mesenteric ischemia (AMI) itself is a fatal disease. In combination

with COVID-19, there is a high mortality.Anticoagulation with heparin has been recommended and associated with decreased mortality rates [7,8]. Similarly to the study we propose, evidence of medium to large vessel thrombotic complications have been reported in patients as young as 33 years old [6]. The aim of our study is to describe the characteristics, course and outcomes of patients who are Covid-19 positive and presenting with unexpected or unexplained arterial and venous vessel disease. This research has been reported in line with the PROCESS criteria [12].

MATERIALS AND METHODS

Out of 67 patients who came to surgery casualty,came COVID 19 RTPCR positive and operated on emergency in COVID OT,we report 15 covid positive cases of ischemic vessel disease in patients aged 34–72 yrs operated in our healthcare services from the 1st June 2020 to 31st May 2021.Important to note that all patients were tested for Covid-19 RTPCR as per strict hospital policies.Patients who were not fit for surgery from anaesthesia point of view or patients who died before Operation are not included in this study. All of our patients received airway and breathing support along with recommended regimens of anticoagulation. Furthermore all patients were tested for coagulopathies by serological testing and were negative with low/clinically insignificant titers. All patients received anticoagulation and were followed with coagulation markers;international normalized ratio (INR) and activated partial thromboplastin time (APTT). None of the patients had any history of previous thromboembolism, malignancy, long-haul travel or prolonged immobilization.Any

patient with a prior history of thromboembolic or was at high risk of thromboembolic disease was not included.

RESULTS

Out of 15 cases reported ranging from 34-72 years,13 were found to be males while 2 were females denoting male preponderance.median age of presentation was 54 years.Youngest case presented was of 34 years age,oldest being 72 years.Of the 15 patients operated,10 were of acute limb ischaemia(ALI) while 5 were of acute mesenteric ischaemia(AMI).4 of them had no comorbities or past medical history whatsoever,while hypertension was the most common comorbidity seen (8) followed by diabetes (5).The AMI patients presented with most commonly abdominal pain while fever,abdominaldistention,obstruction and breathing difficulties being the associated complaints.CECT Abdomen Of the AMI patients showed thrombosis in SMA among 3 of them while 2 of them showed thrombosis in SMV.The ALI patients presented with most commonly gangrenous changes in limb extremities associated with respiratory distress pertaining to COVID 19.All of the AMI underwent resection of the gangrenous bowel,of which 3 of them underwent double barrel stoma and rest 2 underwent anastomosis.Patients were discharged with anticoagulant tablet warfarin and kept on follow up.Of 13 patients on follow up,2 patients with stoma underwent stoma reversal after 3 months of primary surgery .1 patient with below knee amputation had to undergo above knee amputation while indoor.2 patients died post operatively in the hospital one of which underwent stoma and other underwent above knee amputation,both had CT severity score more than 20.

DISCUSSION

It appears that patients with COVID-19 fulfil the classic Virchow's triad required for thrombosis.Endothelial injury is the first element of Virchow's triad and has been reported to be caused by direct invasion by SARS-CoV-2 via its binding with angiotensin-converting enzyme 2 receptors expressed on vascular endothelium[9,13]. In addition to this, immune complex-mediated vasculitis has also been postulated as one of the mechanisms behind vascular damage in COVID-19[10]. Both of these in combination can cause endothelial dysfunction and predispose a patient to thrombus formation[14].Hyper coagulopathy, the second element of Virchow's triad, is also seen in this infection secondary to the number of pathological changes in the vascular prothrombotic factors, like elevated fibrinogen and factor VIII, hyper viscosity, neutrophil extracellular traps and circulating prothrombotic microparticles[16]. This hypercoagulability state has been documented via thromboelastography in COVID-19 patients admitted in intensive care units[11,15].Stasis, the final element of Virchow's triad, can be expected in all critically ill patients because of isolation in a confined area, prolonged bed rest, immobilization in the intensive care unit and possible limitations to physiotherapy.Our cases represent further evidence of the propensity for Covid-19 to present with unexpected vessel disease in seemingly healthy patients. These unusual cases should arouse clinical sus picion even in patients who are not predisposed to venous and arterial disease. The striking feature displayed is the thromboembolic propensity despite adequate prophylactic and therapeutic doses of anticoagulation. In our institution; the main Covid-19 hospital in Central India, all of our patients received recommended doses of prophylactic and therapeutic enoxaparin based on existing

recommendations and expert consensus. Our institution found that these cases differ significantly from patients suffering from distal extremity ischemia, confined to the distal phalanx and likely secondary to vasopressor infusions. In Conclusion, despite the limited number of cases, we believe these cases to be significant additions and may aid further research. Presentations such as these are relatively rare. We believe Covid19 plays a vital role in thromboembolic disease and warrants a high index of suspicion regardless of predisposing factors. A registry would need to be set up and further high level studies need to be carried out, to underline the etiology and treatment recommendations. From available data, we have concluded that it is more commonly reported in males, and hypertension is found to be the most common comorbidity along with other metabolic syndromes entities, like obesity and dysglycemia. Most patients with Acute mesenteric ischaemic (80%) underwent laparotomy and bowel resection. A few patients were managed conservatively with anticoagulation and thrombolytics, mostly due to being unfit for surgery.While patients with acute limb ischaemia commonly involves the lower limb (80%),of which (80%) underwent amputation.Majorly patient underwent below Knee amputation of which 20% had to undergo revised above knee amputation.Death was found in patients with high severity score,correlating with superadded morbidity of severity of COVID related complications. True outcome data of Thromboembolic complications in COVID-19 patients is also difficult to report from this review as complete follow-up and the current status of some patients has not been reported.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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TABLE 1 SHOWING SOCIO-DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF THE PATIENTS.

(NOTE-

AGE(years)	31-40	3	
	41-50	4	
	51-60	6	
	61-70	1	
	71-80	1	
SEX		MALE	FEMALE

ALI-ACUTE LIMB ISCHAEMIA

AMI-ACUTE MESENTERIC ISCHAEMIA)

	AMI	4		1	
	ALI	9		1	
COMORBIDITY	ABSENT		4		
	HYPERTENSION		8		
	DIABETES		5		
PRESENTING COMPLAINT	GANGRENE		9		
	CELLULITIS		1		
	ABDOMINAL PAIN		5		
	FEVER		8		
	SHORTNESS OF BREATH		5		
DIAGNOSIS	SMA THROMBOSIS		3		
	SMV THROMBOSIS		2		
	UPPER LIMB PVD		8		
	LOWER LIMB PVD		2		
CT severity score			DEATH		
	1-5		2		
	6-10		1		
	11-15		0		
	16-20		0		
	21-25		2		
TREATMENT	STOMA		3		
	RESECTION AND ANASTMOSIS		2		
	AMPUTATION OF LIMB		ABOVE KNEE	2	
			BELOW KNEE	5	
			BELOW ELBOW	1	
	EMBOLECTOMY		1		
	DEBRIDEMENT		1		

FOLLOW UP		HEALTHY	REVISION	DEATH	LOSS TO FOLLOWUP
	AMI	1	2(stoma reversal)	1	1
	ALI	6	1(BK to AK)	1	2