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SURGICAL COMPLICATIONS DUE TO THROMBOEMBOLISM IN COVID-19 PATIENTS- CASE SERIES OF THREE PATIENTS

SRILAKSHMI V[*1], BHOSALE SJ[2] AND WADER UV[3]

1: Junior Resident, Department of Surgery, Krishna Institute of Medical Sciences Deemed To Be University, Karad, Maharashtra (India)

2: Professor, Department of Surgery, Krishna Institute of Medical Sciences Deemed To Be University, Karad, Maharashtra (India)

3: Senior Resident, Department of Surgery, Krishna Institute of Medical Sciences Deemed To Be University, Karad, Maharashtra (India)

***Corresponding Author: Dr. Srilakshmi vemulapalli: E Mail: slvemulapalli@gmail.com**

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ABSTRACT

Background: COVID-19 being a multisystemic disorder, when there is involvement of Cardiovascular and Haematological systems causes thromboembolic events across multiple organs, venous thromboembolism is more commonly seen when compared to peripheral arterial thromboembolic events. COVID-19 has been reported to cause In-situ thrombosis of a healthy, non-atherosclerotic artery, which is otherwise a rare phenomenon. We are discussing three cases that presented as surgical emergencies due thromboembolic events.

INTRODUCTION:

At the end of 2019, a novel coronavirus, named as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), caused an outbreak emerging from the city of Wuhan, China. The outbreak was soon declared to be a global pandemic by WHO. The disease caused by SARS-CoV-2, Coronavirus disease 2019 is a multi-systemic disorder primarily involving respiratory, haematologic and cardiovascular systems. Involvement of Cardiovascular and

Haematological systems causes thromboembolic events across multiple organs, venous thromboembolism is more commonly seen when compared to peripheral arterial thromboembolic events.

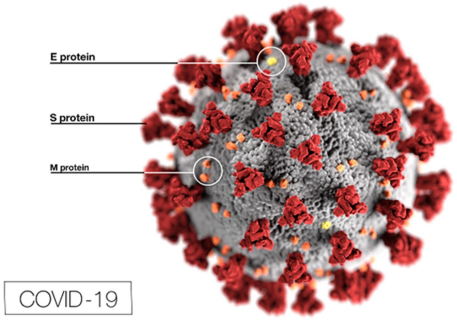

Figure 1. COVID-19 virus structure with different envelope proteins
Source: McIntosh K, Hirsch MS, Bloom A. Coronavirus disease 2019 (COVID-19). UpToDate Hirsch MS Bloom. 2020 Mar;5(1)

The mechanisms of thrombosis in COVID-19 that initially derive from the interaction of SARS-CoV-2 with ACE2, resulting in dysregulation of angiotensin signaling and subsequent inflammation and tissue injury. These pathophysiological mechanisms result in increased signaling by thrombin (proteinase-activated) and purinergic receptors, promoting platelet activation and exerting pathological effects on other cell types (ex. Endothelial cells, epithelial cells, and fibroblasts), leading to further inflammatory injury. Therefore use of anticoagulants, Inhibiting the thrombin and purinergic receptors may have therapeutic effects by blunting platelet-mediated thrombo inflammation and dysfunction in other cell types **[1]**. COVID-19 caused by the SARS-CoV-2 Virus, drives dysregulation of angiotensin signaling, which in turn increases thrombin-mediated and purinergic receptors mediated activation of platelets and increase in inflammation. This thrombo inflammation impacts the Lungs and can also have systemic effects, and lead to peripheral thrombosis. Inhibitors of receptors that derive platelet activation or inhibitors of the coagulation cascade provide opportunities to treat COVID-19 thromboinflammation **[2]**.

Here we report the case of patients that presented as a surgical emergency due to thromboembolic events in different systems due to COVID-19.

Research Site- Krishna Institute of Medical Sciences, Karad, Maharashtra, India.

CASE 1

A 30yrs old female patient presented to the emergency department with % blackish discolouration of the 3rd and 4th toes the right foot and cold clammy foot since 3days. No h/o trauma, fever episodes, upper respiratory tract infection. No travel history or contact with any covid diagnosed patient.

No h/o any comorbidities. No h/o any oral contraceptive intake. o/e the patient was vitally stable, right foot local temperature is cold, no tenderness, DPA and

PTA were not palpable, Colour Doppler was s/o thrombosis causing 100% occlusion of the posterior and anterior tibial arteries . The patient tested COVID-19 RT PCR +, with no lung involvement seen in HRCT, and haematological labs showed elevated TLC with increased lactates. The patient was taken for emergency below knee amputation and during the postoperative period was started on anticoagulants. During the post-op period the patient was started on antiplatelets and LMWH. During the follow-up period the patient had no further complications, with a healthy surgical site.

CASE 2

A 54 yrs old male patient who was admitted in hospital for 30days and received treatment for COVID-19 which included anti-platelets and LMWH presented 1 month after discharge with % discolouration of the right foot associate with swelling and pain in the lower limb. o/e peripheral pulses from the popliteal artery , ATA, PTA and DPA were not palpable. No h/o comorbidities. Colour doppler s/o complete thrombosis extending from popliteal artery to the DPA. The repeat COVID-19 RT PCR test was negative, HRCT was s/o Post infectional changes. The patient was taken for emergency above knee amputation. Post-op period the patient required prolonged intensive care unit stay due pulmonary involvement. In the follow-up period the patient had persistent respiratory symptoms but the surgical site was healthy **[4-6]**.

CASE 3

A 64 yrs old male patient presented to the emergency department with % severe abdominal pain- associated with vomiting episodes, and dark black coloured stools since 3days with gradual increase in intensity with time. The patient had h/o Fever episodes, with shortness of breath, and cough for 10days. CT abdomen was s/o ischemic bowel. Patient tested +ve for COVID-19 RTPCR and HRCT s/o > 40% lung involvement. The patient was taken up for emergency laparotomy- intraoperative finding showed ischemic small bowel extending from jejunum 20cm from D-J junction to the Ileum 15cm from the I-C junction, with multiple thrombus in the ileal and jejunal arteries. The patient underwent resection- anastomosis. And required prolonged Intensive care unit stay before discharge. The follow-up period the patient was tolerating oral feed, but with persistent respiratory symptoms **[5-8]**.

DISCUSSION

The studies suggest an increased incidence of arterial thromboembolic events, much

higher than the general population and even higher than hospitalised cancer patients.

There is an increase in morbidity and mortality observed in COVID-19 infected patients associated with occurrence of thromboembolic events in arteries. Compared to the patients that develop arterial thromboembolic events in COVID-19 +ve patients, who have a higher risk profile of cardiovascular disease seen in COVID-19 negative patients that develop arterial thromboembolism.

The Pathophysiology of thromboembolic events associated with COVID-19 infection is triggered by its hyper-inflammatory response which ultimately leads to the development of thromboembolic events, Via various mechanisms leading to hyper-coagulable state characterised by increased activation of platelets and neutrophils, increased fibrin degradation products, D-dimer, fibrinogen, increased coagulation factor activity, decreased antithrombin levels **[10-13]**. There is also direct viral infection of endothelial cells via the ACE-2 receptor. The contribution of all the mechanisms leads to the formation of thromboembolic events in healthy vessels in COVID-19 infected patients.

The three cases discussed above have varied age groups and consist of patients of both the genders with no history of any cardiovascular risk factors. The Presenting complaints in the first case was due to the thromboembolic event rather than any other symptoms s/o COVID-19 infection **[9]**. The Second case discussed despite the use of anticoagulants and anti-platelet prophylactic doses developed peripheral vascular disease and had to go for surgical intervention on emergency basis. The last case presented with abdominal thrombus complications with high morbidity to the patient.

Many previous clinical studies suggested the occurrence of arterial thromboembolic events in low- risk patients despite the aggressive use of thromboprophylaxis, as observed in the above case series.

In the young adults due to presence of healthy arteries with no to minimal pathology, become more prone for the development of symptoms in an acute thromboembolic events, whereas elderly population due to presence of previous vascular pathology like atherosclerosis, develop collaterals therefore better tolerate acute thrombosis. In the younger adults, due to the strong inflammatory reaction there is an hyper-inflammatory response seen in COVID-19 infection.

CONCLUSION

COVID-19 being a multi-systemic disorder with involvement of Cardiovascular systems and Hematologic systems. In Spite of the widespread use of prophylactic anticoagulants, COVID-19+ patients are at high risk for developing arterial thrombosis, with increased morbidity and mortality.

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REFERENCES

[1] Topcu AC, Ozturk-Altunyurt G, Akman D, Batirel A, Demirhan R. Acute Limb Ischemia in Hospitalized COVID-19 Patients, Annals of Vascular Surgery, 2021.

[2] Sriram K, Insel PA. Inflammation and thrombosis in COVID-19 pathophysiology: Proteinase-activated and purinergic receptors as drivers and candidate therapeutic targets, Physiological Reviews, 101(2), 2021, 545-67.

[3] De Roquetaillade C, Chousterman BG, Tomasoni D, Zeitouni M, Houdart E, Guedon A, *et al*., Unusual arterial thrombotic events in Covid-19 patients, International Journal of Cardiology, 323, 2021, 281-4.

[4] Gorbalenya AE, Baker SC, Baric RS, de Groot RJ, Drosten C, Gulyaeva AA *et al*., Coronaviridae Study Group of the International Committee on Taxonomy of Viruses, The species severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2, Nat, Microbiol, 5(4), 2020, 536-44.

[5] Doğanay F, Elkonca F, Seyhan AU, Yılmaz E, Batırel A, Ak R, Shock index as a predictor of mortality among the Covid-19 patients, The American journal of emergency medicine, 40, 2021, 106-9.

[6] Rey JR, Caro-Codón J, Pineda DP, Merino JL, Iniesta ÁM, López-Sendón JL, Arterial thrombotic complications in hospitalized patients with COVID-19, Revista Espanola. De Cardiologia (English Ed.), 73(9), 2020, 769.

[7] Cucinotta D, Vanelli M, WHO declares COVID-19 a pandemic. Acta Bio Medica: Atenei Parmensis, 91(1), 2020, 157.

[8] Roberts CM, Levi M, McKee M, Schilling R, Lim WS, Grocott MP,

COVID-19: a complex multisystem disorder. British Journal of Anaesthesia, 125(3), 2020, 238-42.

[9] Cheruiyot I, Kipkorir V, Ngure B, Misiani M, Munguti J, Ogeng'o J, Arterial thrombosis in coronavirus disease 2019 patients: a rapid systematic review, Annals of vascular surgery, 70, 2021, 273-81.

[10] Bilaloglu S, Aphinyanaphongs Y, Jones S, Iturrate E, Hochman J, Berger JS, Thrombosis in hospitalized patients with COVID-19 in a New York City health system, Jama, 324(8), 2020, 799-801.

[11] Björck M, Earnshaw JJ, Acosta S, Gonçalves FB, Cochennec F, Debus ES *et al*., European Society For Vascular Surgery (ESVS) Clinical Practice Guidelines on the Management of Acute Limb Ischaemia-Translation to Portuguese, Angiologia e Cirurgia Vascular, 16(4), 2020, 200-58.

[12] Topcu AC, Ariturk C, Yilmaz E, Acute limb ischemia in a COVID-19 patient, Thrombosis Update, 2, 2021, 1100031.

[13] Perini P, Nabulsi B, Massoni CB, Azzarone M, Freyrie A, Acute limb ischaemia in two young, non-atherosclerotic patients with COVID-19, The Lancet, 395(10236), 2020, 1546.

[14] Gomez-Arbelaez D, Ibarra-Sanchez G, Garcia-Gutierrez A, Comanges-Yeboles A, Ansuategui-Vicente M, Gonzalez-Fajardo JA, COVID-19-related aortic thrombosis: a report of four cases, Annals of vascular surgery, 67, 2020, 10-3.

[15] Rutherford RB, Baker JD, Ernst C, Johnston KW, Porter JM, Ahn S et al., Recommended standards for reports dealing with lower extremity ischemia: revised version, Journal of vascular surgery, 26(3), 1997, 517-38.

[16] Etkin Y, Conway AM, Silpe J, Qato K, Carroccio A, Manvar-Singh P *et al*., Acute arterial thromboembolism in patients with COVID-19 in the New York City area, Annals of vascular surgery, 70, 2021, 290-4.

[17] Malas MB, Naazie IN, Elsayed N, Mathlouthi A, Marmor R, Clary B, Thromboembolism risk of COVID-19 is high and associated with a higher risk of mortality: A systematic review and meta-

analysis, E clinical Medicine, 29, 2020, 100639.

[18] Howard DP, Banerjee A, Fairhead JF, Hands L, Silver LE, Rothwell PM. Population-based study of incidence, risk factors, outcome, and prognosis of ischemic peripheral arterial events: implications for prevention, Circulation, 132(19), 2015, 1805-15.

[19] Bellosta R, Luzzani L, Natalini G, Pegorer MA, Attisani L, Cossu LG *et al.*, Acute limb ischemia in patients with COVID-19 pneumonia, Journal of vascular surgery, 72(6), 2020, 1864-72.

[20] Khorana AA, Francis CW, Culakova E, Fisher RI, Kuderer NM, Lyman GH, Thromboembolism in hospitalized neutropenic cancer patients, J Clin Oncol, 24(3), 2006, 20484-90.