

Deep dorsal penile vein thrombosis in a patient with Covid-19 Infection: A rare complication and the first reported case

Seyed Morteza Bagheri¹ and Zhale Tabrizi¹

¹Iran University of Medical Sciences

September 25, 2021

Abstract

Covid-19 infection may have extrapulmonary manifestations such as blood hypercoagulability that may causes thrombosis in both arterial and venous system. Deep dorsal penile vein thrombosis is very rare and the most common cause is coagulation disorders. It causes penile pain especially during erection and it is diagnosed by ultrasound.

Introduction

Venous thrombosis of the penis is often related to thrombosis of the superficial veins (Mondor disease), that has been well reported in the literature in the last decades. (1) While Thrombosis of the deep dorsal penile vein has been rarely reported. (2) These two conditions have different treatments, for example Mondor disease can be resolved spontaneously or after treating by anti-inflammatory or anti-coagulant drugs. But thrombosis of the deep veins can have serious complications such as ischemia and priapism, so it needs to be treated with anti-coagulants. so It is important to distinguish these two conditions from each other. (3) (4)

Although COVID-19 is almost well known for causing respiratory symptoms, it can also causes many extrapulmonary manifestations, such as thrombotic complications, mostly pulmonary embolism and deep venous thrombosis. (5, 6)

In this paper, we reported a unique and the first reported case of deep dorsal penile vein thrombosis following Covid-19 infection.

Case presentation

A 41-year-old married man with penile pain extending to the perineal and inguinal region that got worsen on erection referred by an urologist for sonographic evaluation of penis and testes. The pain started 3 days before he went to the urology clinic, following his first full erection for intercourse, after his positive Covid-19 PCR Test.

He didn't have any other urologic symptoms such as discharge, hematuria or dysuria. He denied any trauma to the penis, previous pelvic surgery and history of recent immobilization. The patient reported positive nasopharyngeal swab test for Covid-19 Three weeks ago. He had mild symptoms of Covid-19 infection including muscle pain, fever, cough and fatigue. He had received conservative treatment and had not taken any anticoagulants, antivirals and corticosteroids. His medical history didn't show any significant underlying disease and any risk factor for cardiovascular disease. He also didn't have history of previous deep vein thrombosis. In physical examination of the penis and testes no pathologic finding was detected such as skin changes, discoloration, edema, tenderness or palpable nodularity.

Ultrasound evaluation showed thrombosis of deep dorsal penile vein while the superficial dorsal penile vein, Iliac veins and inferior vena cava were intact. (Fig1, 2, 3)

Laboratory tests revealed increased D-dimer level, normal levels of anti-thrombin III,protein S,Protein C,anticardiolipin antibodies and normal count of platelets and WBCs.Also Tests were negative for antinuclear antibodies, antiphospholipid-IgG and lupus anticoagulant.

Immediately after sonographic diagnose of deep dorsal penile vein thrombosis,Rivaroxaban 15mg twice a day was started for the patient.

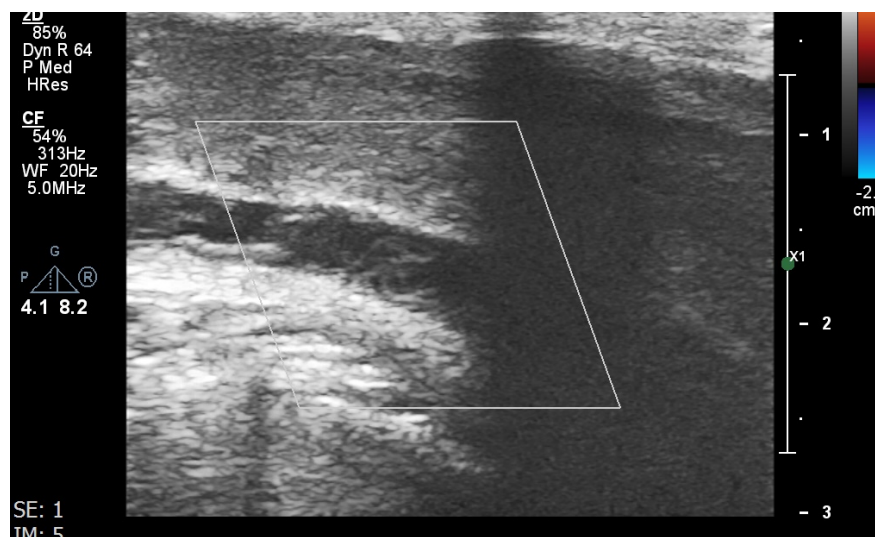


FIG1:Ultrasound evaluation of the deep dorsal penile vein shows no flow in the vein.Also the vein is dilated and contains echogenic thrombosis from the middle part of the penis extending to the root of the penis at posterior of the pubic symphysis.The thombosis is not extended to the superior of the urogenital diaphragm..Above findings are in favor of subacute thrombosis of the deep dorsal penile vein.

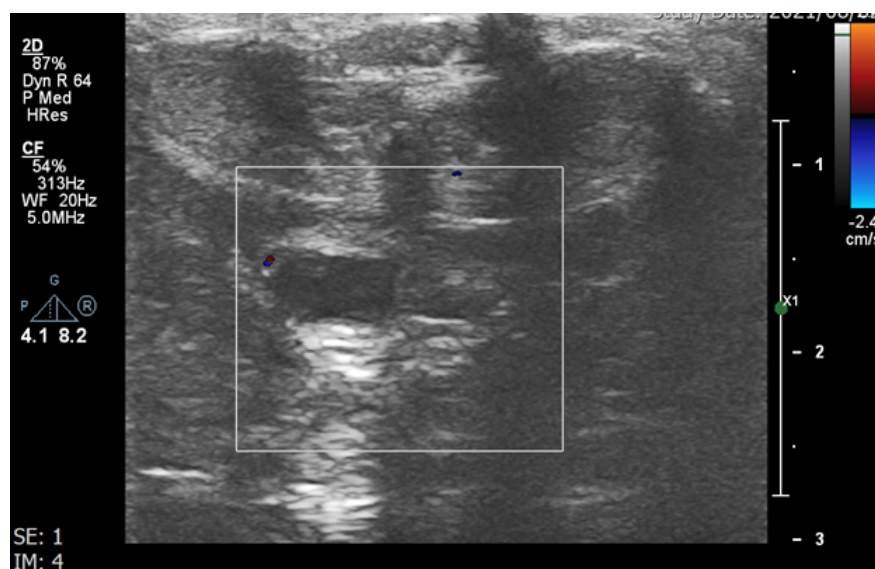


FIG2:Ultrasound evaluation of deep dorsal penile vein(Arrow) shows no color in the vein.The vein contains echogenic thrombosis. White Stars:Normal right and left corpus cavernosum.Black star:Normal corpus spongiosum.

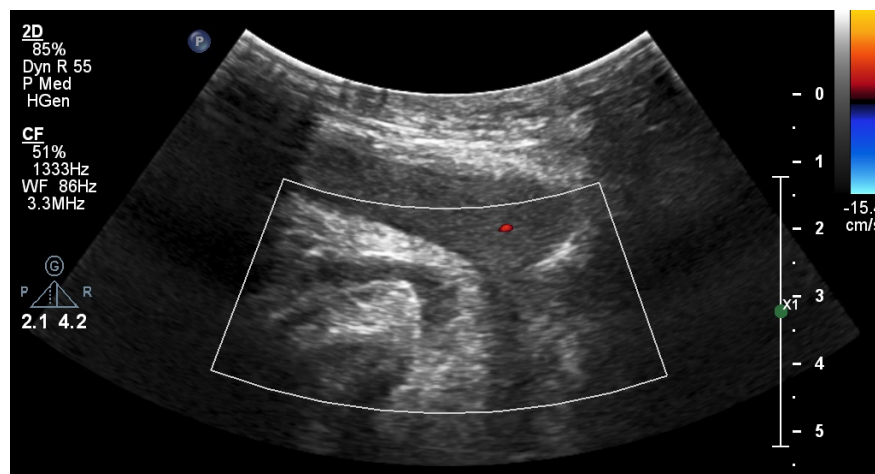


FIG3: Ultrasound evaluation of the deep dorsal penile vein (Arrow) shows no flow in the vein.star: corpus spongiosum..

DISCUSSION

The coronavirus is mostly known to cause pulmonary disease such as pneumonia or acute respiratory distress syndrome, however, during the course of this pandemic, it exhibits some extrapulmonary manifestations including hematologic, neurologic, cardiovascular, gastrointestinal and renal manifestations (7-11). This pathology may be due to extracellular proliferation of the Covid-19 virus and the induction of immunopathological reactions, as it has been reported previously for other zoonotic coronaviruses in the literature (12).

Coagulopathy as a part of the systemic inflammatory response syndrome is a prevalent feature of COVID-19 infection. Roughly 20% to 50% of hospitalized patients with COVID-19 infection have abnormal coagulation tests (elevated D-dimer, prolonged PT, prolonged clotting time, thrombocytopenia and low fibrinogen levels) which can cause thrombosis and microvascular occlusion, due to endothelial dysfunction, cytokine storm, hypoxia and immobilization (13-19). Increased D-dimer leads to consumption of natural coagulation inhibitors that can cause vascular thrombosis (20).

Venous drainage of the penis is performed through the following pathways: 1) The superficial dorsal venous system, which is responsible for draining the skin and soft subcutaneous tissue, which is eventually drained into the external pudendal vein that is anatomically linked to the long saphenous vein at the groin and 2) The deep dorsal venous system, which is responsible for draining of the glans, corpus spongiosum and the distal two thirds of corpora cavernosa, and is eventually drained into the prostatic and perivesical venous system (4, 21).

The pathogenesis of thrombophlebitis is the well-known Virchow triad which was introduced in 1845: 1) Endothelial vascular wall damage, 2) venous stasis and 3) changes in blood components (22).

The cause of thrombosis in the penis is mostly thrombosis of superficial venous system, which is known as Mondor disease. But deep vein thrombosis has been reported very rarely in the literature (4).

The etiology of Mondor disease is unknown, but some etiologies listed below are reported in the previous studies: sexual activity, infection, penis injection, direct trauma, cancer, and a deficit of antithrombin III, Protein C and S and previous surgical hernia repair (3). Patients with Mondor disease are usually asymptomatic but some of them may have penile pain, erythema of the penis or palpable superficial thrombosed vein. Overall, Mondor disease is self-limiting and just needs conservative treatments, and in most cases it will not have any complications (2). As mentioned before, deep dorsal penile vein thrombosis is very rare compared to the superficial vein thrombosis and the most common cause of spontaneous dorsal deep vein thrombosis is coagulation disorders without inflammatory processes. Since this vein is a part of deep venous

system,thrombosis of deep dorsal penile vein can increase the risk of pulmonary embolism leading to significant increase in mortality and morbidity.(23, 24)So investigation for other sites of thrombosis and starting appropriate treatment is nessecary.(24, 25)

Searching the literature showed no previously published similar case of deep dorsal penile vein thrombosis following Covid-19 infection and our patient is the first reported case.Only superficial dorsal penile vein thrombosis are reported previously.(19, 25) (By Eren MT et al and Levine ML et al).

The association between deep dorsal penile vein thrombosis and COVID-19 infection has not been well clarified in the literature.

In this particular case, the treatment started with Rivaroxaban15 mg twice a day for 21 days.Days after this treatment,,the patient's symptoms were relatively reduced.

Conclusion:

Covid-19 infection can cause coagulopathy due to cytokine release and immunopathological reactions.In some hospitalized patient it can cause pulmonary embolism or DVT,but in non hospitalized patients can cause small deep vein thrombosis.So it is important for clinicians to investigate the risk of thrombosis in Covid-19 patients especially those with risk factors or previous deep venous thrombosis.It is necessary to do further researchs and realize if it is necessary to add prophylactic anticoagulant to treatment regimen of Covid-19 patients who are not hospitalized or not.

Patient consent: Written informed consent for publication was obtained from the patient.

conflicts of Interests: The Authors declare that there are no competing interests.

References:

1. Griger D, Angelo T, Grisier D. Penile Mondor's disease in a 22-year-old man. *Journal of Osteopathic Medicine*. 2001;101(4):235-7.
2. Shen HL, Liu SP, Wang SM, Tsay W, Hsieh JT. Elevated plasma factor VIII coagulant activity presenting with thrombophlebitis of the deep dorsal vein of the penis. *International journal of urology*. 2007;14(7):663-4.
3. Al-Mwalad M, Loertzer H, Wicht A, Fornara P. Subcutaneous penile vein thrombosis (Penile Mondor's Disease): pathogenesis, diagnosis, and therapy. *Urology*. 2006;67(3):586-8.
4. Calanca L, Alatri A, Schaller M-D, Sermier A, Mazzolai L. Deep vein thrombosis of the penis: an unusual but severe complication of prostatic abscess. *Vasa*. 2013;42(3):214-7.
5. Gupta A, Madhavan MV, Sehgal K, Nair N, Mahajan S, Sehrawat TS, et al. Extrapulmonary manifestations of COVID-19. *Nature medicine*. 2020;26(7):1017-32.
6. Giuliano AFM, Vulpi M, Passerini F, Vavallo A, Belfiore A, Forte S, et al. SARS-CoV-2 Infection as a Determining Factor to the Precipitation of Ischemic Priapism in a Young Patient with Asymptomatic COVID-19. *Case Reports in Urology*. 2021;2021.
7. Guan W-j, Ni Z-y, Hu Y, Liang W-h, Ou C-q, He J-x, et al. Clinical characteristics of coronavirus disease 2019 in China. *New England journal of medicine*. 2020;382(18):1708-20.
8. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The lancet*. 2020;395(10229):1054-62.
9. Zhou P, Yang X-L, Wang X-G, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *nature*. 2020;579(7798):270-3.
10. Wu C, Chen X, Cai Y, Xia Ja, Zhou X, Xu S, et al. Risk Factors Associated With Acute Respiratory Distress Syndrome and Death in Patients With Coronavirus Disease 2019 Pneumonia in Wuhan, China. *JAMA Internal Medicine*. 2020;180(7):934-43.

11. Shi S, Qin M, Shen B, Cai Y, Liu T, Yang F, et al. Association of Cardiac Injury With Mortality in Hospitalized Patients With COVID-19 in Wuhan, China. *JAMA Cardiology*. 2020;5(7):802-10.
12. Holmes KV. SARS coronavirus: a new challenge for prevention and therapy. *The Journal of clinical investigation*. 2003;111(11):1605-9.
13. Barrett CD, Moore HB, Yaffe MB, Moore EE. ISTH interim guidance on recognition and management of coagulopathy in COVID-19: a comment. *J Thromb Haemost*. 2020;18(8):2060-3.
14. Connors JM, Levy JH. Thromboinflammation and the hypercoagulability of COVID-19. *J Thromb Haemost*. 2020;18(7):1559-61.
15. Barriteau CM, Bochev P, Lindholm PF, Hartman K, Sumugod R, Ramsey G. Blood transfusion utilization in hospitalized COVID-19 patients. *Transfusion*. 2020;60(9):1919-23.
16. Tang N, Bai H, Chen X, Gong J, Li D, Sun Z. Anticoagulant treatment is associated with decreased mortality in severe coronavirus disease 2019 patients with coagulopathy. *Journal of thrombosis and haemostasis*. 2020;18(5):1094-9.
17. Wang J, Hajizadeh N, Moore EE, McIntyre RC, Moore PK, Veress LA, et al. Tissue plasminogen activator (tPA) treatment for COVID-19 associated acute respiratory distress syndrome (ARDS): a case series. *Journal of thrombosis and haemostasis*. 2020;18(7):1752-5.
18. Lee SG, Fralick M, Sholzberg M. Coagulopathy associated with COVID-19. *CMAJ*. 2020;192(21):E583-E.
19. Eren MT, Özveri H, Kurtoglu H. Penile Mondor's in a Covid-19 patient on prophylactic anti-thrombosis with rivaroxaban: a case report. *African Journal of Urology*. 2021;27(1):1-4.
20. Levi M, Thachil J, Iba T, Levy JH. Coagulation abnormalities and thrombosis in patients with COVID-19. *The Lancet Haematology*. 2020;7(6):e438-e40.
21. Bird V, Krasnokutsky S, Zhou H-s, Jarrahy R, Khan SA. Traumatic thrombophlebitis of the superficial dorsal vein of the penis: an occupational hazard. *The American journal of emergency medicine*. 1997;15(1):67-9.
22. Mammen EF. Pathogenesis of venous thrombosis. *Chest*. 1992;102(6):640S-4S.
23. SCHMIDT BA, SCHWARZ T, SCHELLONG SM. Spontaneous thrombosis of the deep dorsal penile vein in a patient with thrombophilia. *The Journal of urology*. 2000;164(5):1649-.
24. Sanson B-J, Lijmer JG, Mac Gillavry MR, Turkstra F, Prins MH, Büller HR, et al. Comparison of a clinical probability estimate and two clinical models in patients with suspected pulmonary embolism. *Thrombosis and haemostasis*. 2000;83(02):199-203.
25. Levine MN Prevention of thrombotic disorders in cancer patients undergoing chemotherapy. *Thrombosis and haemostasis*. 1997;78(07):133-6.

Data availability statement

Data sharing not applicable – no new data generated Data sharing is not applicable to this article as no new data were created or analyzed in this study.