MedCrave
Step into the World of Research

Journal of Anesthesia & Critical Care: Open Access

Case Report

Open Access

CrossMark

Vaccine induced immune thrombocytopenia

Volume 14 Issue 4 - 2022

Fatima Saeed, Geetanjali Gupta, Muhammad Noor
Manchester Royal Infirmary, England

Correspondence: Fatima Saeed, Manchester Royal Infirmary, England, Tel 07375737352, Email fatima.saeed@mft.nhs.uk

Received: August 10, 2022 | **Published:** August 15, 2022

Keywords: COVID-19 vaccine, Immune thrombocytopenia, BNT162b, Steroids

Introduction

The first case of SARS-CoV-2 19 was reported in Wuhan, China in November 2019, The World Health Organization (WHO) declared the SARS-CoV-2 19 a global pandemic on March 11, 2020.[1] since then, scientists worked hard to find a possible cure while a breakthrough cure is still awaited it was realized that the best possible option would be to develop effective vaccines and to roll them out on a war footing. The Pfizer-BioNTech BNT162b2 mRNA COVID-19 vaccine was one of the many successful vaccines developed, it was authorized for emergency use on the 2nd of December 2020 by the UK medicines and health care regulatory authority (MHRA).[2]

Most of the vaccines were proven to be clinically effective against the SARS-CoV-2 19 but some rare side effects have been reported with the RNA based vaccines such as immune mediated vaccine induced thrombotic thrombocytopenia (VITT) and vaccine induced immune thrombocytopenic purpura (ITP) without thrombosis.[3,4] We report a rare case presentation of ITP secondary to the Pfizer vaccine.

Case report

A 36-year-old Caucasian male presented twenty days after the vaccination, to the Manchester Royal Infirmary, Manchester University NHS Foundation Trust, UK, with petechial rash and blood blisters in oral cavity. The rash started 10 days after receiving the third dose (booster) of the Pfizer BNT162b2 mRNA vaccine.

It was a petechial non blanching rash which started on lower limbs and soon spread all over his body. Lower extremities were more involved than any other body part. He denied having any bleeding from any part of the body no headache, no dizziness, no arthralgias or abdominal pain. On examination his vital signs were normal.

Physical examination revealed haemorrhagic blisters in his oral cavity and diffuse petechial rash all over the body that was more pronounced in the legs. Blood tests showed that his white blood cell count and haemoglobin levels were within the reference values, while his platelet count was low (1x10^ 9/L), the immature platelet fraction was elevated to 28.7% (normal range 0.0–6.0 %), there were no blasts in the peripheral blood picture and no abnormality was noted in other biochemical and coagulation tests, as shown in Tables 2-4. The *Helicobacter pylori* stool antigen test was negative. All the immunology and acute viral screen was negative. He had no drinking or smoking habits and had no past medical history of any significance no family history nor recent use of any medications. He was diagnosed with ITP and administered prednisolone 90 mg/body weight (1 mg/kg) after discussion with the haematologist.

He also received two units of Platelet transfusion as his platelets were less than 10x10^9/L.

On day 4 after the start of treatment, the patient's platelet counts gradually improved to 14x10^9/L,

On day 14, the platelet count increased to 41x10^9/L and the dose of prednisolone was reduced to 80mg. Thereafter, the dose of prednisolone was tapered to 70 mg after 21 days, and the patient responded to treatment. Refer Table A below.

Table 1

Day of Admission	Platelets	Steroid Dose
7/1/2022	1	90mg
12/1/2022	14	90 mg
21/01/22	41	80 mg
26/01/22	52	70 mg

Investigations:

CMV DNA Not detected by PCR

VZV DNA Not detected by PCR

EBV DNA Not detected by PCR

Hepatitis B surface antigen not detected

Hepatitis B core antibody not detected

Hepatitis C antibody not detected

HIV 1+2 and P24 antigen not detected

CMV IgG antibody detected: consistent with past infection

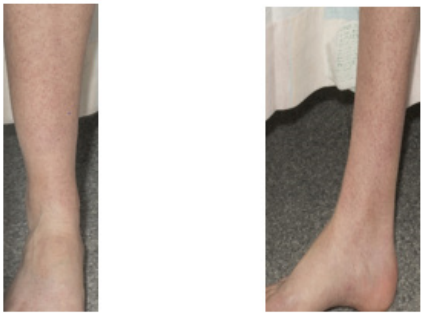

Figure 1

©2022 Saeed et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and build upon your work non-commercially.

Table 2

Investigation	Range	Units	7-Jan-22	8-Jan-22
C-REACTIVE PROTEIN	(O - 5.0)	mglL	3	
Renal Profile				
SODIUM	(133 - 146)	mmollL	141	
POTASSIUM	(3.5 - 5.3)	mmollL	4.5	
UREA	(2.5 - 7.8)	mmollL	4.9	
CREATININE	(59-104)	umollL	87	
eGFR - CKD EPI		mUmin/1.73m2	>90	
Hepatic Profile				
ALKALINE	(30 - 130)	UIL	70	
PHOSPHATASE				
ALBUMIN	(34 - 48)	glL	45	
ALANINE	(1 - 50)	lUlL	*53	
TRANSAMINASE				
TOTAL PROTEIN	(60 - 80)	glL	71	
BILIRUBIN	(O - 21)	umollL	*33	
FBC				
WHITE BLOOD CELLS	(4.0 - 11.0)	x109/L	*11.2	
Red Blood Cells	(4.50 - 6.00)	x1012/L	5.01	
HAEMOGLOBIN	(130 - 180)	giL	159	
Haematocrit	(0.400 - 0.520)	Ratio	0.432	
Mean Cell Volume	(80 - 98)	fl	86	
Mean Cell Haemoglobin	(27.0 - 33.0)	pg	31.7	
Mean Cell Haemoglobin	(320 - 365)	glL	*368	
PLATELETS	(150 - 400)	x109/L	1	
Neutrophils	(1.80 - 7.50)	x109/L	7.45	
Lymphocytes	(1.00 - 4.00)	x109/L	2.6	
Monocytes	(0.20 - 1.00)	x109/L	0.94	
Eosinophils	(0.00 - 0.40)	x109/L	0.19	
Basophils	(0.00 - 0.10)	x109/L	0.04	
Reticulocytes	(0.50 - 1.50)	%	1.94	
Absolute Retic	(20 - 80)	x109/L	97	
Reticulocyte Hb	(28.0 - 30.8)	pg	36.4	
Immature platelet fraction	(0.0 - 6.0)	%	42.2	
ENA PROFILE				
SS-A Antibody (serum)	(O - 0.9)	AI		0.5
SS-A52 Antibody{serum)	(O - 0.9)	AI		0.5
SS-A60 Antibody (serum)	(0 - 0.9)	AI		<0.2
SS-B Antibody (serum)	(0 - 0.9)	AI		<0.2
RNP 68 (serum)	(O - 0.9)	AI		<0.2
Anti Sm (serum)	(0 - 0.9)	AI		<0.2
SmRNP Antibody (serum)	(O - 0.9)	AI		<0.2
Ribosomal P (serum)	(0 - 0.9)	AI		<0.2
Chromatin (serum)	(O - 0.9)	AI		<0.2

Copyright: ©2022 Saeed et al.

Table Continued....

Investigation	Range	Units	7-Jan-22	8-Jan-22
Jo-1 (serum)	(O - 0.9)	AI		<0.2
Scl-70 (serum)	(O - 1.6)	AI		<0.2
RheumtdJactor (serum)	(O - 13)	klU/L		<10
Serum free light chains				
Free Kappa (serum)	(3.3 - 19.4)	mglL		6.59
Free Lambda (serum)	(5.71 - 26.3)	mgLL		*5.02
KappalLambda ratio	(0.26 - 1.65)			1.31
IMMUNOGLOBULIN PROFILE				
IgG (serum)	(6.0 - 16.0)	glL		7.16
IgA (serum)	(0.8 - 2.8)	glL		1.33
IgM (serum)	(0.5 - 1.9)	glL		0.78
AntiNuclear Ab (Serum)				
Centromere (serum)	(0 - 0.9)	AI	<0.2	
IgG ds-DNA Ab (serum)	(0 - 9.9)	Iu/mL	<1.0	
tTG IgA Antibody (serum)	(0 -14.9)	kU/L	<0.5	
C4 (serum)	(0.14 - 0.54)	glL	0.3	
C3 (serum)	(0.75 - 1.65)	glL	1.63	
FDP/D-DIMER	(0 - 500)	ng/mL	<190	
Serum Vitamin B12 Assay	(197-771)	nglL		
MPO and PR3 profile				
MPO (serum)	(0 - 0.9)	AI		<0.2
PR3 (serum)	(0 - 0.9)	AI		0.2

Table 3

Test	Result	UoM	Ref. Range	Collection Date
Platelets (PLT)	52	x10'9/L	150 - 400	1/26/2022 10:13
Platelets (PLT)	41	x10'9/L	150 - 400	1/21/2022 9:33
Platelets (PLT)	20	xlO'9/L	150 - 400	1/14/2022 8:49
Platelets (PLT)	20	xlO'9/L	150 - 400	1/14/2022 8:49
Platelets (PLT)	14	xlO'9/L	150 - 400	1/12/2022 6:11
Platelets (PLT)	10	x10'9/L	150 - 400	1/11/2022 5:59
Platelets (PLT)	6	x10'9/L	150 - 400	1/10/2022 6:13
Platelets (PLT)	5	xlO'9/L	150 - 400	1/9/2022 5:12
Platelets (PLT)	12	x10'9/L	150 - 400	1/8/2022 3:27
Platelets (PLT)	1	xlO'9/L	150 - 400	1/7/2022 23:10
Platelets (PLT)	1	x10'9/L	150 - 400	07-Jan-202219:19

Table 4

Test	Result	UoM	Ref. Range	Collection Date
Immature platelet fraction (IPF)	11.7	%	0.0 - 6.0	26-Jan-202210:13
Immature platelet fraction (IPF)	15.4	%	0.0 - 6.0	1/21/2022 9:33
Immature platelet fraction (IPF)	25.8	%	0.0 - 6.0	1/14/2022 8:49
Immature platelet fraction (IPF)	25.8	%	0.0 - 6.0	1/14/2022 8:49
Immature platelet fraction (IPF)	33.3	%	0.0 - 6.0	1/12/2022 6:11
Immature platelet fraction (IPF)	39.8	%	0.0 - 6.0	11-Jan-2022 05:59
Immature platelet fraction (IPF)	46.7	%	0.0 - 6.0	1/10/2022 6:13
Immature platelet fraction (IPF)	37.4	%	0.0 - 6.0	1/9/2022 5:12
Immature platelet fraction (IPF)	8.2	%	0.0 - 6.0	OB-Jan-2022 03:27
Immature platelet fraction (IPF)	42.2	%	0.0 - 6.0	07-Jan-202223:10
Immature platelet fraction (IPF)	28.7	%	0.0 - 6.0	07-Jan-202219:19

Citation: Saeed F, Gupta G, Noor M. Vaccine induced immune thrombocytopenia. *J Anesth Crit Care Open Access*. 2022;14(4):139–142. DOI: 10.15406/jaccoa.2022.14.00524

Discussion

ITP also known as immune mediated thrombocytopenic purpura is an autoimmune condition caused by the decrease in the platelet count due to decrease in production as well the destruction of the new platelets in the circulation. The patients with ITP tend can present with epistaxis, hematemesis or intracranial hemorrhage based on the degree of thrombocytopenia or remain asymptomatic and have mild skin manifestations such as petechiae. Most cases of ITP are idiopathic, but some have a history of preceding viral infection. There is also an increased risk of ITP after administration of vaccines like influenza, measles-mumps-rubella (MMR), hepatitis B, human papilloma virus, varicella, and diphtheria-tetanus-pertussis (DPT) vaccines in young adults.[5-7]

Our patient didn't have any history of any recent viral infection or drug use, his blood tests were suggestive of past CMV infection, he remained asymptomatic despite the very low platelet count. The negative D dimer ruled out the possibility of associated thrombosis.

The exact pathogenesis of ITP is unknown but the most likely it is molecular mimicry, due to autoantibodies targeting multiple platelet glycoproteins, leading to macrophage-mediated destruction and the inhibition of platelet production.[8] The platelet antibodies cross react with the platelet antigens, such as GP Ib/IX, GP Ia/IIa and GP VI.[9-11] ITP can be also be caused by the constituents of the vaccine like preservatives, diluents or adjuvants implicated in causing autoimmune/inflammatory syndrome induced by adjuvants (ASIA),[12,13] less is known about this syndrome**.** Another cause for thrombocytopenia maybe sensitization due to previous exposure to the vaccine as was the case with our patient who has had the first dose of the Pfizer vaccine.[14] However, in contrast to developing symptoms within few hours to days as expected the patient reported having symptoms 10 days after the third dose of Pfizer vaccine and he reported no symptoms after the first 2 doses.

There have been case reports of vaccine induced thrombocytopenia after 1-23 days post vaccination with AstraZeneca, Moderna and Pfizer vaccines which responded to steroids (first line treatment) or with concomitant use of IVIG immunoglobulins.[15] Our patient was started on 1mg/kg of prednisolone 90mg once a day, was also transfused 2 mega units of platelets over the first 2 days of admission. His platelet count was 41x10^9/L two weeks post discharge with a gradual taper of oral steroids.

Conclusion

To summarise our patient presented with ITP with a very low platelet count which responded well to steroids. Platelet transfusion probably has no role as our patient did not respond to platelet transfusion. Vaccines have proven to be very effective in controlling the spread of SARS-CoV-2 virus and reducing the morbidity and mortality of those who do get severe infection and require hospitalization. The side effects like these remain very rare as billions of doses of vaccine have already been administered.[16,17] The question however does remain whether the people who develop ITP secondary to the vaccine should be offered further vaccination or not more research is needed to develop a protocol for that.

Acknowledgments

None.

Conflicts of interest

None.

References

1. Medicine and health care products regulatory authority. Summary of Product Characteristics for COVID–19 Vaccine Pfizer/BioNTech. 2021.
2. Adil MT, Rahman R, Whitelaw D, et al. SARS–CoV–2 and the pandemic of COVID–19. *Postgrad Med J.* 2021;97(1144):110–116.
3. Cines DB, Bussel JB. SARS–CoV–2 Vaccine–Induced Immune Thrombotic Thrombocytopenia. *N Engl J Med.* 2021;384(23):2254–2256.
4. Lee E, Cines DB, Gernsheimer T, et al. Thrombocytopenia following Pfizer and Moderna SARS-CoV-2 vaccination. *Am J Hematol.* 2021;96(5):534–537.
5. Rinaldi M, Perricone C, Ortega–Hernandez O, et al. Immune thrombocytopaenic purpura: an autoimmune cross–link between infections and vaccines. *Lupus.* 2014;23(6):554–567.
6. Hamiel U, Kventsel I, Youngster I. Recurrent Immune Thrombocytopenia After Influenza Vaccination: A Case Report. *Pediatrics.* 2016;138(6):1.
7. Mantadakis E, Farmaki E, Thomaidis S, et al. A case of immune thrombocytopenic purpura after influenza vaccination: consequence or coincidence? *J Pediatr Hematol Oncol.* 2010;32(6):e227–e229.
8. Douglas B C, Victor S B. Immune thrombocytopenic purpura. *N Engl J Med.* 2002;346(13):995–1008.
9. Akbik M, Naddeh D, Ashour AA, et al. Severe Immune Thrombocytopenia Following MMR Vaccination with Rapid Recovery: A Case Report and Review of Literature. *Int Med Case Rep J.* 2020;13:697–699.
10. Cecinati V, Principi N, Brescia L, et al. Vaccine administration and the development of immune thrombocytopenic purpura in children. *Hum Vaccin Immunother.* 2013;9(5):1158–1162.
11. Perricone C, Ceccarelli F, Nesher G, et al. Immune thrombocytopenic purpura (ITP) associated with vaccinations: a review of reported cases. *Immunol Res.* 2014;60(2–3):226–235.
12. Nagasaki J, Manabe M, Ido K, et al. Postinfluenza Vaccination Idiopathic Thrombocytopenic Purpura in Three Elderly Patients. *Case Rep Hematol.* 2016;2016:7913092–7913094.
13. Pellegrino P, Clementi E, Radice S. On vaccine's adjuvants and autoimmunity: Current evidence and future perspectives. *Autoimmun Rev.* 2015;14(10):880–888.
14. Kenney B, Stack G. Drug–Induced Thrombocytopenia. *Arch Pathol Lab Med.* 2009;133(2):309–314.
15. Provan D, Arnold DM, Bussel JB, et al. Updated international consensus report on the investigation and management of primary immune thrombocytopenia. *Blood Adv.* 2019;3(22):3780–3817.
16. Denise Grady, Patricia Mazzei. Doctor's Death After COVID Vaccine Is Being Investigated. The New York times 2021.
17. Bhattacharjee S, Banerjee M. Immune Thrombocytopenia Secondary to COVID–19: a Systematic Review. *SN Compr Clin Med.* 2020;2(11):2048–2058.