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COVID-19 Mediating the Development of Pheochromocytoma: A Case Report

Dr. Shahzeb Saeed[1], Dr. Muhammad Hamza Khan[2], Dr. Shanza Faridi[3], Dr. Menahil Saeed[4]
[1, 2, 3, 4]*Army medical college, Army medical college, Army medical college, Islamic international medical college*

Abstract: Background: COVID-19 has affected many people around the globe and is known for its effect on the lungs in the human body. However studies have shown the association of COVID-19 and its effect on other organs of the human body. Pheochromocytoma is a neuroendocrine tumor caused by the mutation in the genes and causes overproduction of catecholeamines in the human body resulting in hypertension, headache, elevated sweating, anxiety and panic attacks. Studies have determined that COVID-19 causes adrenal dysfunction but limited data is available to determine the direct relationship of COVID and pheochromocytoma.

Case presentation: The current study is based on the report of a 30 year old female patient who was admitted in the hospital for the symptoms of hypertension, dyspnea, and severe headache. The patient was also having panic attacks prior to the admission in the hospital.

Conclusion: The patient was diagnosed with pheochromocytoma and COVID-19. The patient showed the symptoms of activated inflammatory immune response in the adrenal gland which resulted in overproduction of catecholeamines caused by COVID and highlights the association of COVID and pheochromocytoma

Keywords: COVID-19, Pheochromocytoma, public awareness, neuroendocrine tumor, adrenal gland

I. INTRODUCTION

COVID-19 is the fast spreading viral disease that instigated in the end of 2019 and is caused by SARS-COV-2 virus. The deadly virus affected the whole world causing severe symptoms to the people all around the globe. The virus has caused the mild lung infections leading up to the severe respiratory diseases that has caused people their lives [6]. Although the virus is said to be associated with the lung diseases but the recent studies have found the virus to be associated with other organs of the human body as well [7]. As reported by Akbas and Akbas in the study [1] that COVID-19 has affected the adrenal reserves of the human body and has also affected the use of glucorticoid in the humans. In the cases of severe infections in human by COVID-19 the virus also instigate the condition of shock in human body. The condition of shock also creates the hindrance in the release of catecholamines and often the supplementations of catecholamines are needed for the COVID-19 patients. Although the virus is associated with the respiratory syndrome but it also has subsequent structural changes to the adrenaline gland. A study by Siejka and Barabutis [2] identified the structural changes in adrenaline glands and concluded that COVID-19 is also associated with adrenaline insufficiency and is causing insufficiency in humans diagnosed with the virus.

Pheochromocytoma is the neuroendocrine tumor which is cause by the mutation of one of the different genes and is grown by the chromaffin cells present in the adrenaline glands. These cells are associated with the production of hormones i.e. epinephrine and norepinephrine. The tumor in the chromaffin cells produce the excessive amount of epinephrine and norepinephrine which causes the high blood pressure in the patients following by severe headaches and sweating [8]. Individuals developing pheochromocytoma also deals with panic attacks due to the elevation of the catecholamines in the body. The patients with pheochromocytoma also have the symptoms of cardiovascular complications such as, myocardial infarction, toxic cardiomyopathy, pulmonary edema or ischemic heart diseases [9]. Not many researches have been conducted to identify the association of COVID-19 with pheochromocytoma, but the above mentioned studies have shown the significant impact of COVID-19 on adrenaline gland causing adrenal insufficiency, hypocortisolism etc. However there is extensive amount of literature present on the cases of pheochromocytoma that highlights its causes, symptoms and treatments [3].

The current case report aims to identify if COVID-19 is the mediating factor in the development of pheochromocytoma. The current case report present the case of the female patient with the symptoms of high blood pressure along with the symptoms of ischemic infarctions and also having panic attacks. The patient was admitted in the hospital during the COVID-19 pandemic and also showed the symptoms of dyspnea indicating the presence of COVID-19 virus.

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II. CASE PRESENTATION

A 30 year old female was admitted to the Combined Military Hospital in Rawalpindi. The patient was presented with the symptoms of dyspnea and ischemic heart infarctions. The patient also complained about high blood pressure and panic attacks. On the time of admission, the systolic and diastolic blood pressure of the patient were assessed and the blood pressure of the patient was 170/110. The blood pressure reading indicated that patient had high blood pressure at the time of admission. The patient had no prior history of hospitalisation. At the time of admission patient also had symptoms of flu and shortness of breath and patient was also complaining about the severe headache. Immediate PCR test was conducted on the patient which identified that patient is COVID positive. Because of the symptoms of dyspnea and hypertension, electrocardiogram (ECG) was also performed on the patient. The ECG results found that the patient had positive serum troponin and about 40% of the ejection fraction (EF). The thickness in the muscles of ventricular wall were also found in the patient. CT scan was also performed on the patient. All the ECG and CT scan results contributed towards the representation of ischemic infarction. The patient was then being treated for the COVID symptoms as well as ischemic infarction. After the diagnosis was made, patient was then given the anti-biotics, anticoagulants and anti-viral therapy for the treatment of ischemic infarction and COVID-19. However no signs of recovery were observed in the patient, the medications were discontinued because they were causing haemorrhagic changes. The condition of the patient started worsening after the treatment and low mobility in the limbs was observed. The patient was also having difficulty with speaking. After the appearance of these symptoms, patient was suspected with the phechromoytoma. To confirm these symptoms, urinary sample of the patient was taken and the results indicated high levels of metanephrine and normetanephrie. After considering all the signs, symptoms and the test results, the patient was diagnosed with multiple endocrine neoplasia type 2.

III. DISCUSSION

COVID-19 has affected many individuals around the world and is caused by the caused by severe acute respiratory syndrome corona virus 2 (SARS-COV-2). Although the virus has common symptoms of flu and directly affect the lungs but recent studies have shown that the virus can affect other organs as well [10]. The studies have shown association of COVID-19 with adrenal glands dysfunctions as it causes the inflammation and also cause the gene mutation [11]. However very limited studies have conducted that identify the direct relationship of COVID-19 with pheochromocytoma [3]. A study was performed by Naghshineh and colleagues [3] to assess the association between COVID-19 and pheochromocytoma. The authors worked on the case study of a 32 year old Iranian man who was diagnosed with pheochromocytoma along with COVID-19. The authors highlighted that the COVID-19 causes the inflammation in the various parts of the body and is not just restricted to the inflammation of the lungs. In the case of this 32 year old Iranian man, the results also shown the inflammation on the adrenaline gland. The study reported by Arnett [4] highlighted the inflammatory responses of COVID -19 in the different organs of the body. This indicates that COVID-19 causes the inflammation in different organs of human body and in the case of Iranian male, the patient was also diagnosed with the inflammation in the adrenal glands causing the tumor i.e. phechromocytoma. In the current presented case of the 30 year old female, she was also diagnosed with pheochromocytoma and COVID-19. Until the diagnosis were made for pheochromocytoma, the patient was treated with the anti-viral medications for COVID-19 and was also given the anti-coagulants which showed no signs of recovery. Prior to the diagnosis of the COVID-19 the patient did not show any symptoms of phechromocytoma as well. But after the diagnosis and the treatment, the symptoms started to become visible showing the signs of inflammation in the adrenal glands. A study conducted by Mederos and colleagues [5] highlighted that the inflammatory response of the human immune system contributes towards the development of pheochromocytoma. In the current case, the COVID-19 also triggered the inflammatory immune response in the female patient which might be the cause of pheochromocytoma. In addition, the cardiovascular problems i.e. ischemic heart infarctions, cardiomyopathy, angina pectoris are also considered to be associated with the pheochromocytoma. In this case, the patient was also diagnosed with ischemic heart infarction causing the low mobility of the lower limbs in the girls.

IV. CONCLUSIONS

The presented case study showed the prominent symptoms of COVID-19 i.e. dyspnea and the patient also showed the symptoms of panic attacks and hypertension. After performing several tests the author made the diagnosis of pheochromocytoma. Although there are not many studies available that highlights the direct relationship of COVID-19 and pheochromocytoma but certain studies identified the association of COVID-19 with adrenal gland dysfunctionality due to the activated inflammatory immune response which is caused by COVID. The current case did not show any specific symptoms of pheochromocytoma, and after the clinical diagnosis, the authors concluded that COVID-19 can be the mediating cause in the development of pheochromocytoma in the patient as it activated the inflammatory immune response in the patient which causes the inflammation of the adrenal gland resulting in the overproduction of catecholeamines i.e. epinephrine and norepinephrine.

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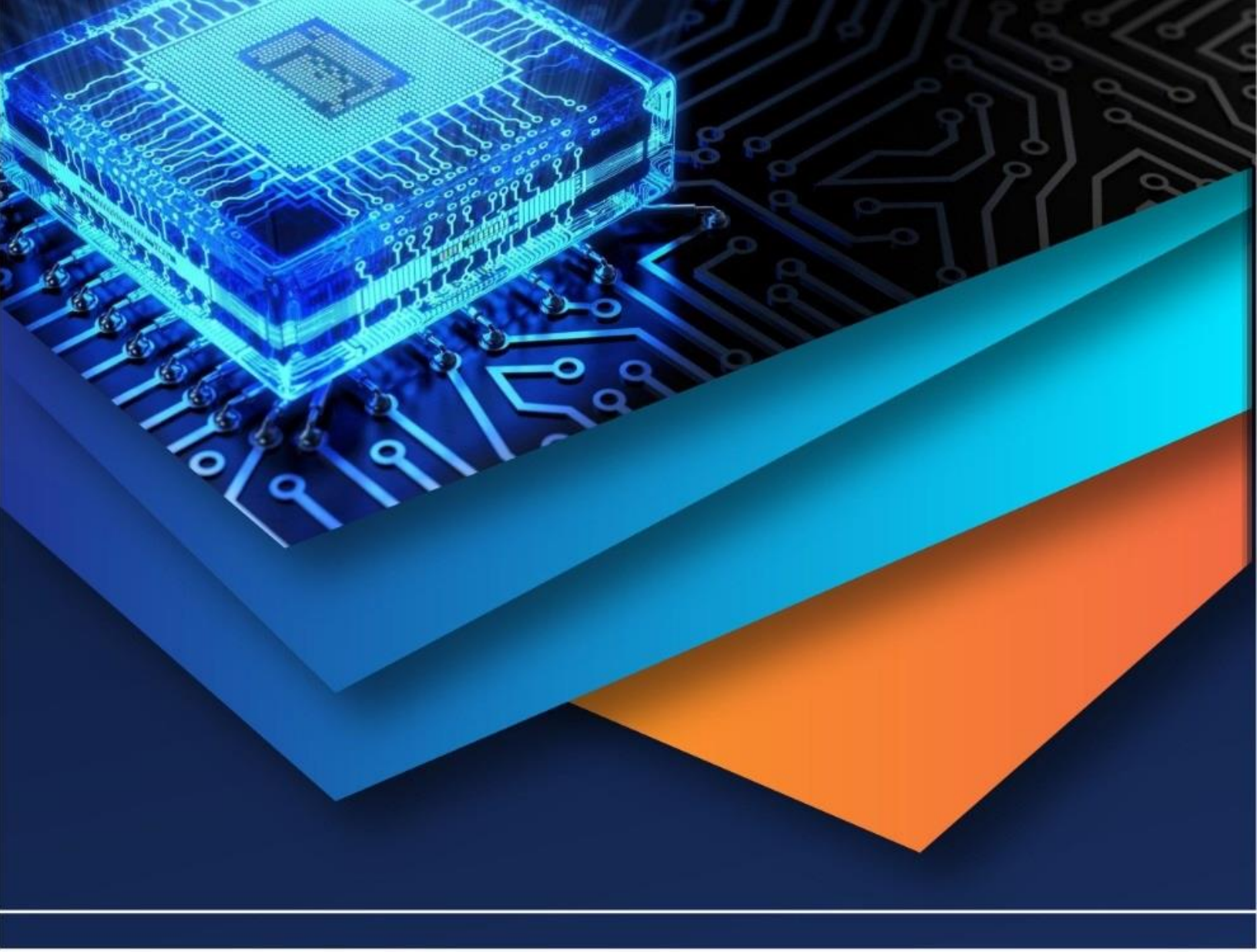
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