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COVID-19 mortality in a patient with left atrial myxoma

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Abstract

Individuals with comorbid conditions, particularly those with cardiovascular diseases, are at a higher risk of mortality due to COVID-19. Among primary cardiac tumours, atrial myxoma is the most commonly reported, accounting for 85% of all cases. Most tumours occur in the left atrium with an associated embolic phenomenon in 40 to 50% of patients. In this case report, we describe a 35-year-old woman of West African descent who had a left atrial myxoma and was waiting for surgery. She presented with signs and symptoms of biventricular heart failure, and her severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) test results were negative. She deteriorated and died while being optimized medically before cardiac surgery. Postmortem confirmed a left atrial myxoma, myocardial infarction, bacterial endocarditis, congestive cardiac failure, COVID-19 pneumonia, as well as a positive real-time Reverse Transcription Polymerase Chain Reaction (rRT-PCR) SARS-CoV-2 test on lung swabs. Though uncommon, cardiac myxomas may result in mortality if not managed promptly. COVID-19 may complicate the management of patients with atrial myxoma with mortality.

Keywords: left atrial myxoma, COVID-19, myocardial infarction, diffuse alveolar damage, congestive cardiac failure

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) is caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) infection and was declared a public health emergency of international concern by the World Health Organization on January 30, 2020. The majority of recorded deaths have been in individuals with comorbid conditions, with cardiovascular diseases being the most common [1-4]. The term myxoma is the Latin translation of the Greek word 'muxa', which means mucus [5]. Atrial myxoma is the most common primary cardiac tumour. Though they constitute up to 85% of all reported cardiac tumours, they are still a rare clinical entity with a reported incidence of 0.5 – 0.7 per million population [6]. In this case report, we describe a 35-year-old woman of West African descent who had a known left atrial myxoma and was awaiting surgery. She presented with signs and symptoms of congestive heart failure, and her antemortem SARS-CoV-2 test was negative. She deteriorated and died while being optimized medically before cardiac surgery. Postmortem confirmed a left atrial myxoma, myocardial infarction, bacterial endocarditis, congestive cardiac failure, advanced COVID-19 pneumonia, as well as a positive real-time Reverse Transcription Polymerase Chain Reaction (rRT-PCR) SARS-CoV-2 test on lung swabs. The case demonstrates the importance of early surgical intervention to avoid complications

CASE

A 35-year-old woman presented at a private facility with a four-month history of symptoms and signs in keeping with biventricular heart failure. She had no family history of a

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heart condition. A transthoracic echocardiography revealed a left atrial myxoma attached to the inter-atrial septum near the fossa ovalis, causing obstruction in diastole. This resulted in the dilation of the left atrium and right chambers. She had a history of thyroidectomy for toxic multinodular goitre and was on replacement thyroxine and euthyroid at presentation. She also had a two-year history of myomectomy for uterine fibroids. Although she was scheduled for open heart surgery, she had to make arrangements to meet the financial obligations associated

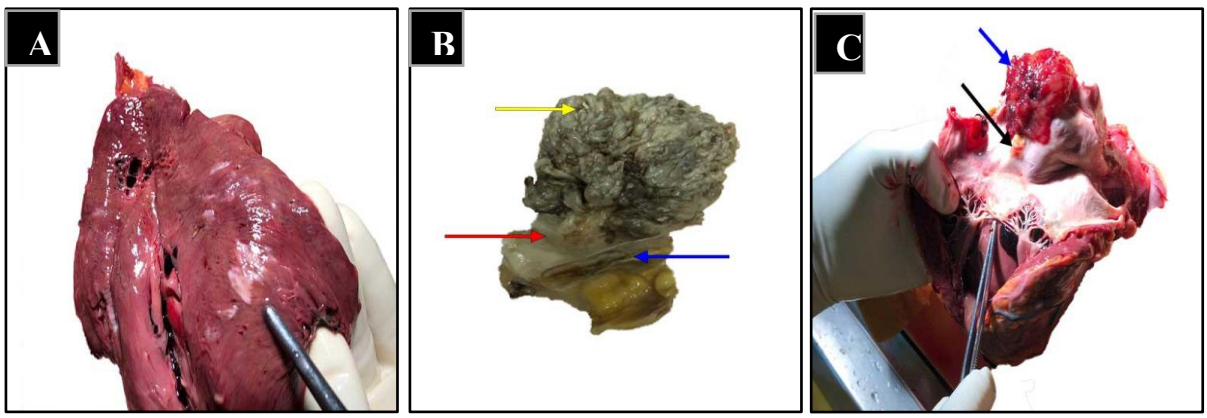

Figure 1: Gross photographs of **A**. Heart muscle showing areas of scarring within the myocardium (infarcts). **B**. Formalin-fixed myxoma (yellow arrow) with it's stalk (red arrow) and it's attachment to heart muscle (blue arrow). **C**. Postmortem appearance of myxoma (blue arrow) with it's stalk (black arrow)

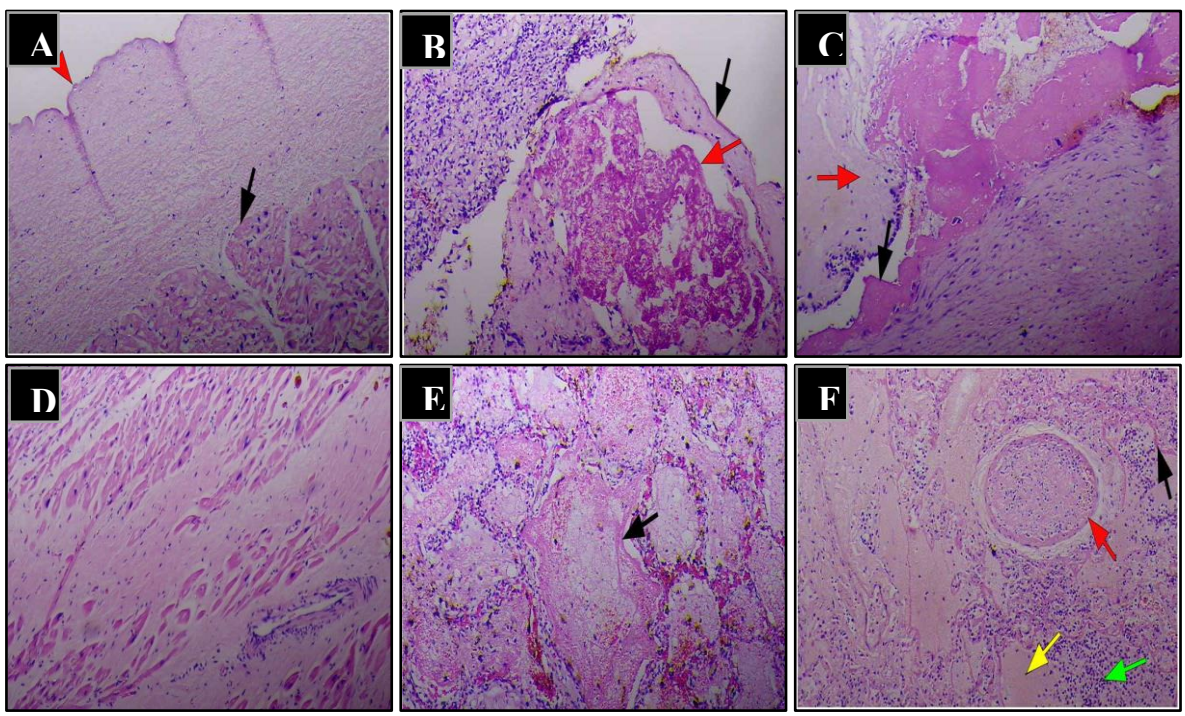

Figure 2. Haematoxylin and Eosin staining (X100) of **A**. Myxoma (red arrow) and it's point of attachment to the heart muscle (black arrow). **B**. Myxoma (black arrow) with an infected thrombus within it's vessel (red arrow). **C**. Myxoma (red arrow) and hyalin membrane-like material on it's surface (black arrow). **D**. Infarcted area showing loss of myocytes and replacement by fibrous tissue. **E**. Lung tissue showing diffuse alveolar damage with hyaline membrane deposition (black arrow). **F**. Section of the lung showing a thrombus within a pulmonary arteriole (red arrow), alveolar edema (yellow arrow), hyaline membrane (black arrow), and intra-alveolar neutrophilic collection (green arrow)

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with the procedure. She presented late, four months after the diagnosis, for surgery due to lack of funds and with difficulty in breathing, bilateral pedal swelling, and abdominal distension. She was admitted for optimization of therapy and workup for surgery. A chest X-ray revealed severe pulmonary oedema with bilateral patchy opacities. Unfortunately, her condition deteriorated with respiratory failure and she died a week after admission with a provisional diagnosis of biventricular failure secondary to atrial myxoma. She tested negative for SARS-CoV-2 using nasopharyngeal swabs. At postmortem, she had a distended abdomen, and pale conjunctiva, was not jaundiced, and had bipedal pitting oedema up to the knee level. She was cyanosed centrally and had no pigmented skin lesions. There was a Pfannenstiel scar on the lower abdomen, as well as an anterior transverse scar on the lower neck. Internal examination showed patchy, consolidated, heavy lungs bilaterally (right, 720 g; left, 680 g) with fibrinous pleural exudates on both lungs. The heart was enlarged and weighed 550 g with dilatation of all chambers except the left ventricle. There was right ventricular hypertrophy of 5 mm. There were patchy areas of scarring of the myocardium, the largest was 18 mm across the posterior wall of the left ventricle (Figure 1A). A pedunculated, yellow-brown, papillary friable tumour with a gelatinous consistency and lobulated surface measuring 45 x 30 mm was attached to the anterior wall of the left atrium by a 6 mm short stalk 12 mm above the annulus of the anterior leaflet of the mitral valve in the region of the fossa ovalis (Figures 1B and C). The valves appeared grossly normal with no obvious vegetation. The coronary arteries showed only mild atherosclerosis without critical occlusion.

There was moderate serous ascites. The liver was enlarged at 1780 g with features in keeping with chronic passive congestion. Within the genitourinary system, the uterus measured 80 x 50 x 25 mm and showed a few intramural fibroids, with the largest measuring 15 mm in diameter. The myometrium was thickened and show tiny empty cystic spaces. There was a polypoid mass 15 x 10 mm in the endometrial cavity attached to the fundus of the uterus. The thyroid gland was absent. The other organ systems were unremarkable. Evaluation of the tumour showed polygonal to stellate-shaped cells in a vascular myxoid stroma (Figure 2A). There were thrombi on the surface of the tumour as well as within its vessels. An area of vegetation was evident within the thrombus (Figure 2B). Additionally, it was observed that a hyaline membrane-like material was deposited on the surface of the tumour. In the myocardium, a loss of myocytes with replacement by fibrous tissue was noticed in the infarcted area (Figure 2D). Histopathological examination of the lungs showed mixed acute and chronic inflammatory cells with associated exudates, haemorrhages, oedema, diffuse alveolar damage, hyaline membranes and microthrombi diffusely distributed but in a patchy configuration within the lungs. There were foci of interstitial fibrosis (Figures 2E and F). The uterus revealed leiomyomas as well as adenomyosis. A sample of bronchopulmonary tissue obtained during autopsy tested positive for the SARS-CoV-2 virus. The significant pathological findings discovered during the autopsy were infective endocarditis, COVID-19 pneumonia with superimposed bacterial infection, congestive heart failure, and a left atrial myxoma

DISCUSSION

The prevalence of primary cardiac tumours is approximately 0.02% (200 tumours per million autopsies). About 75% of primary tumours are benign, and 50% of benign tumours are myxomas, resulting in 75 cases of myxoma per million autopsies [6]. Myxomas are either sporadic or familial and have been reported in patients aged 3 to 83 years [7]. According to the literature, the mean age for sporadic cases is 56 years, while familial cases tend to have a mean age of onset of 25 years [7-9]. A vast majority of myxomas occur sporadically (95%), involving the left atrium and tend to be more common in women [6-9]. Our patient was 35 years, female, and the tumour was in the left atrium. The familial cases represent 5% of myxomas and commonly affect younger patients with equal sex distribution [7]. Approximately 20% of familial patients have associated conditions such as adrenocortical nodular hyperplasia, pituitary tumours, Sertoli cell tumours of the testes, multiple myxoid breast fibroadenomas, cutaneous myomas, and facial or labial pigmented spots (such as lentiginosis periorificial, café-au-lait spots, blue nevi). These conditions often are described as Carney complex [7]. Atrial myxomas generally arise from the interatrial septum at the border of the fossa ovalis similar to our case but can originate anywhere within the atrium, including the appendage, cardiac valves, pulmonary artery and vein, and vena cava [10].

Grossly, most tumours are pedunculated with a short, broad base. Sessile forms are unusual. One-third of the myxomas are villous or papillary and are gelatinous, fragile and prone to fragmentation and embolization. This is the feature exhibited in our case. Our case had a stalk length of 6mm, making it mobile during diastole thereby obstructing the mitral valve in diastole. Histologically, myxomas are composed of polygonal-shaped cells and capillary channels within an acid mucopolysaccharide matrix [11]. The cells appear singularly or in small clusters throughout the matrix, and mitoses are rare. The matrix also contains smooth muscle cells, reticulocytes, collagen, elastin fibres, and a few blood cells. Cysts, areas of haemorrhage, and foci of extramedullary hematopoiesis are present throughout the matrix. Our case was found to have polygonal to stellate-shaped cells in a vascular myxoid stroma with thrombi on the surface of the tumour as well as within its vessels and an area of vegetation was evident within the thrombus. Pathological findings typically seen in the lungs in patients with COVID-19 include severe oedema, congestion, haemorrhages, the proliferation of pneumocytes, scattered multinucleated giant cells and diffuse alveolar damage with

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hyaline membrane formation. Others include the proliferation of fibroblasts with interstitial fibrosis and microthrombi [1,2,16]. Obstruction of blood flow in the heart is the most common acute presentation [11,12]. The nature of these symptoms is determined by the chamber affected and the size of the tumour. In the left atrium, they mimic mitral valve disease especially mitral stenosis but the dyspnea they produce may be positional [12]. Occasionally, large myxomas may interfere with mitral leaflet closure and produce mitral regurgitation. Rarely, large left atrial myxomas may present with acute obstruction of the mitral valve [11]. Our patient presented with symptoms of left and right heart failure. This may be due to long-standing left heart failure that resulted in right-sided heart failure. The intracardiac obstruction from the tumour is likely to have set off the left heart failure that eventually resulted in right-sided heart failure. Systemic embolization is the second most common mode of presentation for about 30 to 40% of patients with myxoma [13]. The majority of myxomas are left-sided consequently and 50% of embolic episodes affect the central nervous system owing to both intracranial and extracranial vascular obstruction [13]. The old left myocardial infarct in our patient suggests that she had a thromboembolism that involved the coronary vessels. This is consistent with the left-sided location of her tumour.

Infection arising in a myxoma is a rare complication and produces a clinical picture of infectious endocarditis. Several bacterial pathogens and fungi have been isolated from these presentations [14-15]. The vegetation observed histologically on the thrombus (Figure 2B) indicated bacterial endocarditis. The role of endothelins in the formation of thrombi in patients with COVID-19 has been postulated [16]. It is thus not surprising that a thrombus was formed on the myxoma. Complications of left atrial myxoma include congestive cardiac failure, sudden death, cardiac arrhythmias, infection, embolization, rupture and myocardial infarction. Our patient had congestive cardiac failure, bacterial endocarditis and myocardial infarction. The outcome of COVID-19 testing is dependent on the sample type and accuracy of sampling. Nasopharyngeal samples are less sensitive as compared to bronchopulmonary samples [16]. Postmortem lung parenchymal swabs for the rRT-PCR SARS-CoV-2 test was positive despite the negative antemortem test. This observation is consistent with published literature [16]. Our patient had chronic inflammatory cells with associated exudates, haemorrhages, oedema, diffuse alveolar damage, hyaline membranes, and microthrombi diffusely distributed but in a patchy configuration.

The patient exhibited symptoms consistent with congestive heart failure, including generalized oedema, dilation of both atria and the right ventricle, right ventricular hypertrophy, and chronic passive congestion of the liver. There was no evidence of the myocardial infarction affecting the left ventricular size as it was not dilated and though myocardial infarction can cause sudden death, it is not likely it contributed to the heart failure. The vegetation was restricted only to the myxoma and none of the heart valves was involved making infective endocarditis unlikely as the direct cause of death. Endometrial polyp and adenomyosis did not contribute to the death of this patient. The gross and histologic findings of the lungs in addition to a positive SARS-CoV-2 test are consistent with published literature on COVID-19 pneumonia, making COVID-19 with superimposed bacterial infection the most likely direct cause of death [1,2,16]. Even though the chest x-ray revealed bilateral patchy opacities suggestive of bacterial bronchopneumonia, the underlying viral disease was missed due to the negative nasopharyngeal SARS-CoV-2 test. Our patient could have survived if surgical intervention was timely [17]. The presence of endocarditis in addition to the congestive cardiac failure made her prognosis worse.

Conclusion

Left atrial myxomas are uncommon and may lead to death if left untreated. Diagnosis of myxoma should warrant surgical intervention as soon as possible to prevent heart failure and sudden death. Patients with cardiac conditions have a high likelihood of complications from COVID-19. In this era of the COVID-19 pandemic, perioperative patients need to be protected and routinely screened for SARS-CoV-2.

DECLARATIONS

Ethical considerations

Ethical clearance with reference number 37MH-IRB IPN/MAST/402/2020 was received from the Institutional Review Board of the 37 Military Hospital. Written informed consent was obtained from the next-of-kin of the deceased for the publication of the patient's information and images.

Consent to publish

All authors agreed to the content of the final paper.

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Competing Interests

No potential conflict of interest was reported by the authors.

Author contributions

SAA and KA were involved in the conception, design, analysis, and interpretation of the study data. LE, FH, KA-B, RF contributed to pathological diagnosis. LE, FH, KA, KA-B, RF, PKA helped to draft and review the manuscript.

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Availability of data

All relevant information is provided in the manuscript. The published information is available from the corresponding author upon a reasonable request.

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