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VENOUS THROMBOEMBOLISM IN HOSPITALIZED PATIENT WITH HEART FAILURE, DOES HEART FAILURE INCREASE THE RISK OF DVT?

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Abstrak (Indonesia)

Latar Belakang: Trombosis vena dalam (DVT) sering diamati pada pasien dengan gagal jantung kronis (CHF), meningkatkan risiko emboli paru (PE). Evaluasi klinis pasien CHF dengan dugaan PE akut menantang karena penyakit ini berbagi beberapa gejala dan tanda seperti dispnea.

Tujuan: Tujuan dari penelitian ini adalah untuk menganalisis apakah gagal jantung meningkatkan risiko DVT.

Metode: Penelitian ini menggunakan pendekatan kualitatif dengan model studi kasus yang menganalisis dan mengidentifikasi tromboemboli vena pada pasien rumah sakit dengan gagal jantung, apakah gagal jantung meningkatkan risiko DVT?

Hasilnya: DVT (Deep Vein Thrombosis) adalah pembentukan trombus atau gumpalan darah yang sering menyerang vena dalam ekstremitas bawah (seperti betis, vena femoralis dan poplitea) atau vena dalam di daerah panggul, lebih sering pada DVT proksimal daripada distal. Kondisi ini berpotensi berbahaya, menyebabkan morbiditas dan mortalitas yang pada dasarnya dapat menyebabkan penyakit. Ini terjadi di seluruh dunia. Secara umum diagnosis ini digabungkan dalam VTE (Venous Thromboembolism). Pada pasien dengan DVT tanpa PE, tingkat kematian jangka pendek 2-5% dilaporkan. Risiko kekambuhan tinggi, terutama dalam 6 bulan pertama.

Kesimpulan: Dari hasil yang diperoleh kita dapat mengetahui bahwa Pasien simtomatik dengan DVT proksimal dapat hadir dengan nyeri ekstremitas bawah, nyeri betis, dan pembengkakan ekstremitas bawah (Kesieme et al., 2011) Sama dengan kasus ini, Pasien dirawat di rumah sakit

dengan keluhan pembengkakan seluruh tubuh, terutama kaki disertai rasa sakit, kemerahan, merasa hangat beberapa jam sebelum pasien pergi ke rumah sakit.

Kata kunci: penyakit jantung, DVT, bahaya penyakit jantung

Abstract (English)

Background: *Deep vein thrombosis (DVT) is frequently observed in patients with chronic heart failure (CHF), increasing the risk of pulmonary embolism (PE). Clinical evaluation of CHF patients with suspected acute PE is challenging since these diseases share several symptoms and signs such as dyspnea.*

Objective: *The aim of this study was to analyze whether heart failure increases the risk of DVT.*

Method: *This study uses a qualitative approach with a case study model that analyzes and identifies venous thromboembolism in hospital patients with heart failure, does heart failure increase the risk of DVT?*

Result: *DVT (Deep Vein Thrombosis) is the formation of a thrombus or blood clot that often attacks the deep veins of the lower extremities (such as the calf, femoral and popliteal veins) or deep veins in the pelvic area, more frequent in proximal than distal DVT. This condition is potentially dangerous, leading to morbidity and mortality that can essentially lead to disease. This happens all over the world. In general these diagnoses are combined in VTE (Venous Thromboembolism). In patients with DVT without PE, short-term mortality rates of 2–5% were reported. Recurrence risk is high, especially within first 6 months.*

Conclusion: *From the results obtained we can know that Symptomatic patients with proximal DVT may present with lower extremity pain, calf tenderness, and lower extremity swelling (Kesieme et al., 2011) Same with this case, Patient was admitted to the hospital with complaints swelling of the whole body, especially the legs accompanied by pain, redness, feel warmed a few hours before the patient going to hospital.*

Keywords: *heart disease, DVT, danger of heart disease*

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INTRODUCTION

Deep vein thrombosis (DVT) is frequently observed in patients with chronic heart failure (CHF), increasing the risk of pulmonary embolism (PE). Clinical evaluation of CHF patients with suspected acute PE is challenging since these diseases share several symptoms and signs such as dyspnea. Thus, it is intuitive that a correct and fast diagnosis of PE in these patients might be able to significantly change their clinical outcomes. In the present report, we describe a rare case of a patient with CHF and PE due to a huge thrombosis of deep veins and of the right atrium in whom echo evaluation permitted the correct diagnosis and therapy (Mebazaa et al., 2014; Sugraliyev et al., 2020).

Deep venous thrombosis (DVT) is frequently observed in patients with chronic heart failure (CHF), ranging from 1% to 59%. This variability might be due to the different sensitivity of diagnostic criteria in reports: those hospitals, in which the screening for DVT is more accurate, are likely to find more cases of DVT and pulmonary embolism (PE). Myocardial infarction and heart failure increase the risk of PE. (Darze et al., 2007) Conversely, patients with DVT have an increased risk of developing myocardial infarction and stroke. Thus, a correct and fast diagnosis of PE in these patients plays a pivotal role to change their clinical outcomes.

DVT accounts for 2/3 of cases of venous thromboembolism in which 80% of cases of DVT are proximal DVT. The incidence of DVT has been reported to be 70-140/100,000 per year, whereas 25-50% of patients with first-episode DVT have no predisposing factors. (Mazzolai et al., 2018) About two-thirds present with DVT of the limbs and one-third with PE. Half of the people with PE have no signs and symptoms of DVT at first. 1-10% of patients with venous thrombosis are fatal, especially in the elderly or patients with severe diseases such as cancer. The incidence of this thrombosis increases exponentially with age. In children the incidence is 1 per 100,000 per year, in young adults, the incidence is 1 per 10,000, in middle age it is 1 per 1000, in the elderly, it is 1%, and 10% in very old patients. The recurrence of this thrombosis is 3 – 10% per year. (Bevis & Smith, 2016) DVT occurs significantly and poses a challenge to healthcare professionals worldwide. The prevalence of DVT is reported to be 100 per 100,000 people per year, although the incidence increases with age. 4 The incidence of deep vein thrombosis (DVT) in the United States is more than 1 per 1000 and there are 200,000 new cases each year. Of the total incidence of deep vein thrombosis, about 60% acquired pulmonary embolism with a risk of death of about 30% within 30 days (Kakkos et al., n.d.; Stone et al., 2017).

Heart failure (HF) is an increasingly prevalent condition, with an estimated 6 million patients with HF in the United States(E. J. Benjamin et al., 2018) About one-half of incident HF hospitalizations are characterized as HF with reduced ejection fraction (HFrEF) and the other one-half as HF with preserved ejection fraction (HFpEF). HF is characterized by a prothrombotic state, which not only increases the risk for cardioembolic events and ischemic stroke but also increases the risk for deep venous thrombosis (DVT) and pulmonary embolism (PE), which together constitute venous thromboembolism (VTE). The lifetime risk for VTE is 8% (D. Benjamin, 2017).

About one-half of incident VTE events are considered “provoked” (Cushman et al., 2004), with VTE incidence in patients with acute decompensated HF ranging from 4% to 26% in retrospective analyses. Several clinical trials have demonstrated that the risk for VTE in patients with HF hospitalization can be reduced with anticoagulation (Cohen et al., 2006), which is supported by the American College of Chest Physicians (Kahn et al., 2012) and the American Society of Hematology (Schünemann et al., 2018) guidelines advocating prophylaxis in acutely ill patients with HF. However, prophylactic anticoagulation is currently not recommended beyond hospital discharge.

RESEARCH METHOD

This study uses a qualitative approach with a case study model that analyzes and identifies venous thromboembolism in hospital patients with heart failure, does heart failure increase the risk of DVT?

RESULT AND DISCUSSION

A 56-year-old male patient, domiciled in Tambon Baru, North Aceh, the patient was brought from PIM Hospital and admitted to the emergency department of Cut Meutia hospital at 1.30 pm on April 16th, 2022. The patient was admitted to the hospitalwith complaints swelling of the whole body, especially the legs accompanied by pain, redness, feel warm. Patient complaints of dyspnea are felt suddenly when the patient duringactivities dan working, The patient works as a truck driver and has a habit of sitting more than 12 hours a day. The patient also complains of getting tired easily when doing light physical activities such as climbing 10 stairs, walk to the bathroom, and walking at a distance of approximately 100 meters and the patient complains of dyspnea when sleeping at night. The dyspnea decreases when the patient sleeps using 2/3 pillows. The patient also complained of occasional cough, nausea, and throw up. The patient has a history of Hyperlipidemia.

The patient belongs to the lower middle-class economy and the patient's diet is not good because the patient does not regularly eat three times a day and patients like to consume fatty foods and instant noodles.

Physicalexaminationbeforetreatmentwasobtainedthepatientlooked, weakness and breathless, BP: 110/80 mmHg, HR: 92x/m, RR: 28x/m, T: 38,0^{O}C, SpO2: 99%. For generalist status get upper extremity : Oedema (-/-), cyanosis (-/-), lower extremity : Oedema (+/+) erythema (+/+), cyanosis (-/-) homan sign(+/+).

The result of the laboratory on April, 16st 2022, there were D-Dimer 5700, the hemoglobin with 13.04g/dl, leucocyte with 9.07 ribs/uL, thrombocyte with 204 ribs/uL, electrolyte with Na 133 mmol/L, K 3.6mmol/L, Cl 125 mmol/L, and Ca 0,32 mmol/L, and then the result of the laboratory on April, 22rd 2022, there was haemoglobin with 8.64g/dl, leucocyte with 13.90 ribs/uL, thrombocyte with 356 ribs/uL and blood glucose with 256 mg/dl.

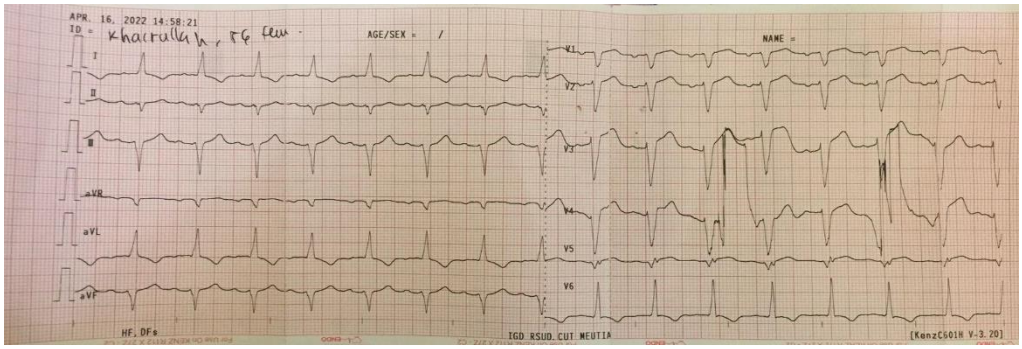

Figure 1. ECG Findings

The electrocardiogram examination showed that sinus rhythm beats with rate 94 bpm, AXIS: LAD, Poor R wave progression, Q pathologic lead II, III, avF and V1, V2, V3, and V4, also T inversion in lead I, AVL, and v6.

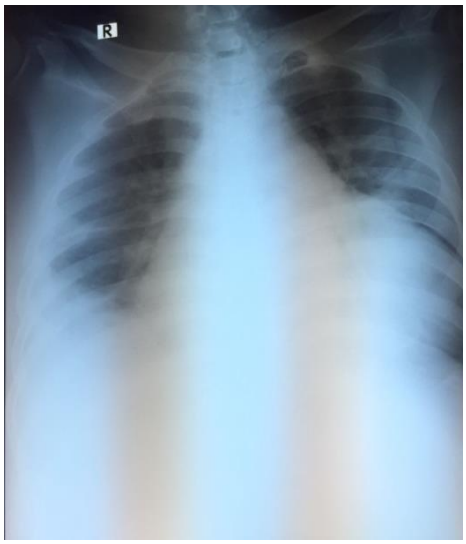

Figure 2. X-Ray Findings

COR

- CTR >50%
- Aortic segment was normal
- Pulmonary was not prominent
- Flat heart waist
- The apex of the heart is shifted laterocaudally
- Normal vascular pattern

Result

- Cardiomegaly

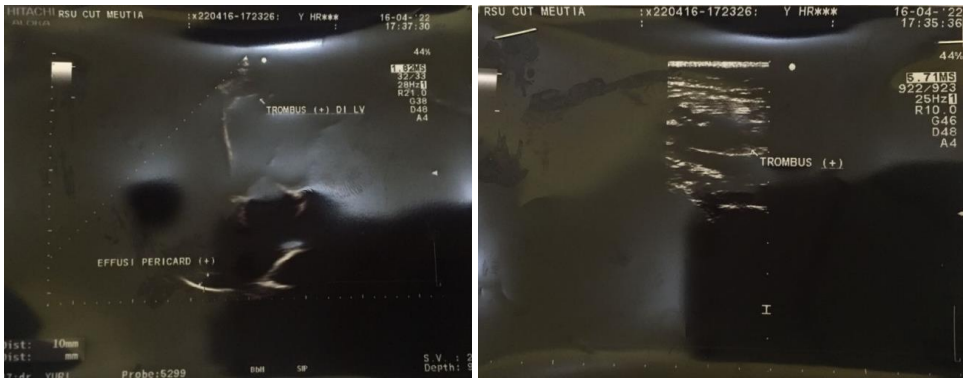

Figure 3. Echocardiography Findings

Echocardiography examination showed EF 40%, LV dilatation, Tape 18, Efusi pericardial (+), and Thrombus (+) in LV.

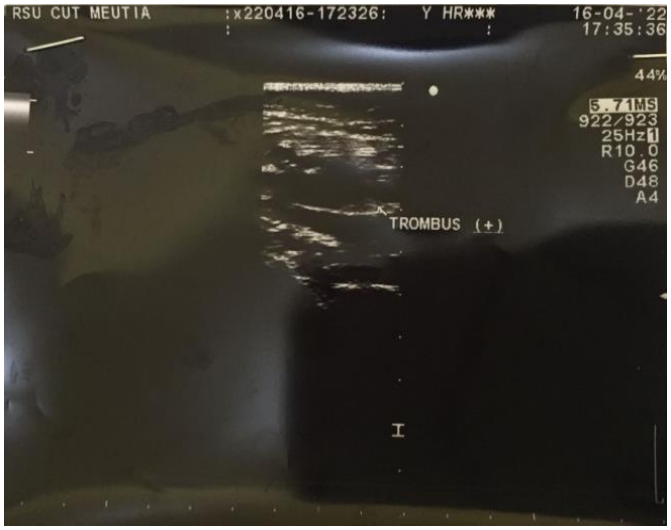

Figure 4. USG Doppler Findings

A. Femoralis Dextra & Sinistra: Triphasic wave, Plaque atherosclerosis (-)
V. Femoralis Dextra & Sinistra: Triphasic wave, Plaque atherosclerosis (-)
A. Poplitea Dextra & Sinistra: Triphasic wave, Plaque atherosclerosis (-)
V. Femoralis Dextra & Sinistra : Insufficiency valve (+), CUS (+), thrombus (+)

The patient was given treatment at Cut Meutia General Hospital. We administrate O2 2-4 LPM, three-way, injection of furosemide amp/8h, injection of Arixtra amp/24h, nylon 1 flash. Spironolacton 1x50 mg, CPG 1x75 mg, KSR 2x600 mg, and lansoprazole 1x30 mg.

DISCUSSION

DVT (Deep Vein Thrombosis) is the formation of a thrombus or blood clot that often attacks the deep veins of the lower extremities (such as the calf, femoral and popliteal veins) or deep veins in the pelvic area, more frequent in proximal than distal DVT. This condition is potentially dangerous, leading to morbidity and mortality that can essentially lead to disease. This happens all over the world. In general, these diagnoses are combined in VTE (Venous Thromboembolism). In patients with DVT without PE, short-term mortality rates of 2–5% were reported. Recurrence risk is high, especially within the first 6 months. The Virchow triad of venous stasis, endothelial damage, and inflammation represent the main underlying pathology for the development of VTE. The major risk factors for VTE include recent hospitalization, surgery, malignancy, obesity, immobility, advanced age, hormone use, and inherited thrombophilia (Cushman, 2007).

Patients with lower extremity DVT often do not present with erythema, pain, warmth, swelling, or tenderness. Symptomatic patients with proximal DVT may present with lower extremity pain, calf tenderness, and lower extremity swelling (Kesieme et al., 2011) Same with this case, **the Patient was admitted to the hospital with complaints of swelling of the whole body, especially the legs accompanied by pain, redness, feel warmed a few hours before the patient going to the hospital. Patient complaints of dyspnea are felt suddenly when the patient during activities dan working. The patient works as a truck driver and has a habit of sitting more than 12 hours a day.**

The patient also complains of getting tired easily when doing light physical activities such as climbing 10 stairs, walking to the bathroom, and walking at a distance of approximately 100 meters and the patient complains of dyspnea when sleeping at night. The dyspnea decreases when the patient sleeps using 2/3 pillows.

The patient also complained of an occasional cough, nausea, and throw up. The patient has a history of Hyperlipidemia. On physical examination, before treatment was obtained the patient looked, weak and breathless, BP: 110/80 mmHg, HR: 92 bpm, RR: 28x/m, T: 38,0ºC, SpO2: 99%.

The first step in diagnosing DVT is to assess the pretest probability using the Wells Score. If the score is ≤ 1 (DVT unlikely) and ≥ 2 (DVT likely). (Mazzolai et al., 2018b) **For general status, the patient's lower extremities were found: Edema (+/+), erythema (+/+), and Homan's sign (+/+). Using the Wells Score, local tenderness was found along the distribution of the deep venous system (+1), swelling of the whole leg (+1), and pitting edema limited to the symptomatic leg (+1). So the result Wells Score for this patient is 3, which means the possibility of DVT.**

In this case on laboratory examination in April, 16rd 2022, there were D-Dimer 5700 ng/L, which means that the D-Dimer level increased than the normal value. D-dimer is a fibrin degeneration product that is useful for detecting abnormal blood clot formation or the presence of thrombotic events (indirect) and for detecting clot lysis or fibrinolytic processes (direct). The higher the D-dimer result, the stronger the suspicion of thrombus formation and breakdown in the body. Normal D-dimer levels can be used to rule out the differential diagnosis of a blood clotting disorder as the cause of the clinical symptoms (Kakkos et al., n.d.).

The first electrocardiogram showed that sinus rhythm beats with rate 94 bpm, AXIS: LAD, poor R wave progression, Q pathologic in II, III, avF and V1, V2, V3, V4 also T inversion in lead I, aVL, and V6. The conclusion is sinus rhythm inferoanteroseptal old myocardial infarct with LV strain. Inferior old myocardial infarction is associated with a decrease in blood supply to the inferior wall of the heart. The inferior myocardium receives vascular supply via the right coronary artery (RCA) (Bansal et al., 2021). While the anterior wall and septal are supplied by the branch of the left anterior descending (LAD) artery.

X-ray examination showed the presence of cardiomegaly. The apex of the heart is shifted later-caudally with a CTR of more than 50%. Cardiomegaly occurs when the heart muscle pumps blood harder than usual, causing a thickening of the heart muscle, so the heart becomes larger in size. Coronary artery disease including myocardial infarction and ischemia is the most common causes of cardiomegaly. Also, the enlargement of the heart both in the form of dilatation or hypertrophy leads to a spectrum of clinical heart failure syndrome (Amin & Siddiqui, 2021).

An echocardiography examination showed that the result of fractional ejection (EF) was 40% and there was an LV dilatation, which indicated this patient had congestive heart failure (CHF). Heart failure to reduce ejection fraction occurs when the left ventricular ejection fraction is 40% or less and is accompanied by progressive left ventricular dilatation and adverse cardiac remodeling (Murphy et al., 2020). **Pericardial effusion** that showed in the result occurs from the blood accumulation and excess fluid in the pericardial cavity (located between the parietal and visceral pericardium). Pericardial effusion can be attributed to several etiologies, the known cause from this report were congestive heart failure (Albugami et al., 2020).

Doppler ultrasound examination showed insufficiency valve (+), CUS (+), and thrombus (+) from femoral extra & Sinistra venous. Venous ultrasound is the standard imaging test for patients suspected of having lower extremity deep venous thrombosis (DVT). Ultrasound is appropriate for patients with a likely pretest probability of DVT, an unlikely pretest probability of DVT with a positive D-dimer, and those in whom the pretest probability was not assessed.

The patient was treated by giving an injection of Arixtra (fondaparinux) once daily. The initial and standard pharmacological approach for in patients with DVT started with parenteral anticoagulants and usually involves achieving a therapeutic dose of UFH

or LMWH, or with fondaparinux. Using direct oral anticoagulants (DOACs) was suggest over vitamin K antagonists (VKAs) but this recommendation may not apply to certain subgroups of patients, such as those with renal insufficiency (creatinine clearance <30 mL/min), moderate to severe liver disease, antiphospholipid syndrome. The therapeutic management can be divided into 3 phases: 1) initial management, which occurs from the time of diagnosis through the first 3 weeks of therapy (5-21days); 2) primary treatment, which is a time-limited phase that typically runs for a minimum of 3 months; and 3) secondary prevention, which begins after completion of the primary treatment phase and extends for a prolonged, usually indefinite, period of time (Ortel et al., 2020). The goal of therapy for DVT is to prevent the extension of thrombus, acute pulmonary embolism, recurrence of thrombosis, and the development of late complications such as pulmonary hypertension and post-thrombotic syndromes (Kesieme et al., 2011; Wang et al., 2016).

CONCLUSION

From the results obtained we can know that Symptomatic patients with proximal DVT may present with lower extremity pain, calf tenderness, and lower extremity swelling Same with this case, Patient was admitted to the hospital with complaints swelling of the whole body, especially the legs accompanied by pain, redness, feel warmed a few hours before the patient going to hospital.

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