CARDIO ROUNDS NEWSLETTER

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IN THIS ISSUE

Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you "Cardio rounds" which contains latest and interesting news in the field of Cardiology

Association between atherogenic index and all-cause and cardiovascular mortality in incident peritoneal dialysis patients

INTRODUCTION-Chronic kidney disease (CKD) patients have an increased cardiovascular risk, which manifests as coronary artery disease, heart failure, arrhythmias, and sudden cardiac death. Although the incidence and prevalence of cardiovascular events in patients with early CKD stages (CKD stages 1-3) were already significantly greater than in the general population, patients with advanced CKD stages (CKD stages 4-5) were at a significantly greater risk. The major cause of death in this high-risk population was cardiovascular disease rather than end-stage kidney disease (CKD stage 5).[1] The most popular kidney replacement treatments for end-stage kidney disease (ESKD) include renal transplantation and hemodialysis (HD) and peritoneal dialysis (PD). Studies found that PD was linked to a greater risk of cardiovascular and all-cause death than HD. Patients on peritoneal dialysis (PD) were frequently affected by atherosclerosis, the primary cause of cardiovascular disease (CVD). Atherosclerosis Index (AI) was a reliable indicator of atherosclerosis. Its predictive significance for CVD outcomes and overall cause of death in PD patients was yet unknown.[2] Thus, this study aimed to assess the relationship between AI and the mortality from CVD and all causes in patients with PD.

Cardiovascular disease

METHODS-In this cohort analysis, 2682 incident patients receiving continuous ambulatory peritoneal dialysis (CAPD) as their first renal replacement treatment were included. Patients who had completed PD therapy for a minimum of three months and were at least 18 years old were eligible. The patients were followed up until death, kidney transplantation, HD switch, or loss of follow-up. Mortality from all cause and cardiovascular disease were the main and secondary endpoints. The demographic baseline included information on age, sex, diabetes mellitus (DM) presence, primary cause of ESKD, and history of CVD before starting PD. During the first one to three months of PD, clinical and biochemical data were recorded. These included blood pressure, body mass index (BMI), smoking status, medication usage, hemoglobin, blood platelet count, serum albumin, total cholesterol (TC), TG, HDL-C, LDL-C, high-sensitivity C-reactive protein (hs-CRP), and serum total calcium, phosphorus, intact parathyroid hormone (iPTH), and urea clearance index (Kt/V). The Chronic Kidney Disease Epidemiology Collaboration creatinine equation and the estimated glomerular filtration rate (eGFR) were used to determine the baseline residual renal function. PD Adequest software 2.0 (Baxter, Deerfield, IL) was used to determine the total Kt/V. Based on the quartile distribution of AI, four groups were created from the study population: Q1: <2.20, Q2: 2.20 to <2.97, Q3: 2.97 to <4.04, and Q4: ≥4.04). All-cause mortality was assessed and the relationships between AI and CVD were investigated using multivariable Cox models.

RESULTS-The current study showed that during a median follow-up of 35.5 months (interquartile range, 20.9-57.2 months), 800 patients died, with 416 fatalities due to CVD. AI

and negative clinical outcomes were found to have a non-linear association using restricted cubic splines. The odds of all-cause and CVD mortality increased gradually across quartiles (log-rank, p< 0.001) (Figure 1). After adjusting for potential confounders, the highest quartile (Q4) had a substantially higher hazard ratio (HR) for both all-cause mortality (HR 1.54 [95% CI, 1.21-1.96]) and CVD mortality risk (HR 1.78 [95% CI, 1.26-2.52]) than the lowest quartile (Q1). An association between greater AI levels and an increased risk of all-cause and CVD death was found using the crude Cox model analysis. Age and all covariate-adjusted models provided more evidence of this correlation. Comparable outcomes were found when utilizing continuous and categorical AI levels in the analyses. Eight percent (95% CI, 1.03–1.14) and ten percent (95% CI, 1.03–1.18) greater risks of all-cause and CVD mortality were associated with every unit rise in AI.

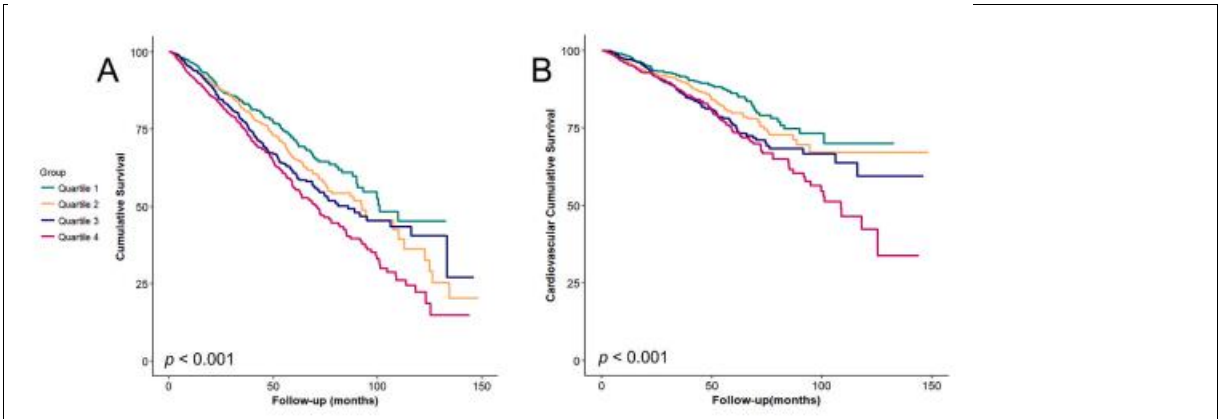

Figure 1. Total survival in patients with AI-classified profiles. All-cause mortality (A) and cardiovascular mortality (B) cumulative mortality curves plotted on the basis of quartiles of AI. The development of AI increased the risk of death. Quartile 1: AI <2.20, Quartile 2: AI 2.20 to <2.97, Quartile 3: AI 2.97 to <4.04, and Quartile 4: AI ≥4.04

DISCUSSION-This study evaluated how well AI predicted overall and cardiovascular disease mortality in patients with PD. After adjusting for potential confounding variables, the study found that higher AI was independently linked to both all-cause and CVD mortality risks. Furthermore, the study identified the AI's turning moments for predicting death risk. AI projected increased risks of CVD and all-cause mortality below saturation values.[1] According to Xia W et al., AI can be used to predict a patient's prognosis throughout PD treatment.[3]

CONCLUSION-This study concluded that higher AI indicated adverse results for PD patients. Additionally, AI showed J-shaped correlations with death from CVD and all causes.

Atherogenic Index (AI) could be a useful indicator for estimating peritoneal dialysis (PD) patients' mortality risk.

REFERENCES

1. Jankowski J, Floege J, Fliser D, Böhm M, Marx N. Cardiovascular disease in chronic kidney disease: pathophysiological insights and therapeutic options. Circulation. 2021 Mar 16;143(11):1157-72.

2. Deng J, Tang X, Tang R, Chen J, Guo H, Zhou Q, Zhan X, Long H, Peng F, Wang X, Wen Y. Atherogenic index predicts all-cause and cardiovascular mortality in incident peritoneal dialysis patients. Atherosclerosis. 2023 Nov 18;387:117389.

3. Xia W, Yao X, Chen Y, Lin J, Vielhauer V, Hu H. Elevated TG/HDL-C and non-HDL-C/HDL-C ratios predict mortality in peritoneal dialysis patients. BMC Nephrol. 2020 Aug 3;21(1):324.

Relationship between coronary collaterals and myocardial salvage determined by Serial Cardiac Magnetic Resonance Imaging in post acute myocardial

INTRODUCTION-Coronary collaterals provide an alternate source of blood supply to the heart, reducing myocardial ischemia in the event of flow-limiting stenosis or obstruction. In acute and stable coronary artery disease, angiographically visible collaterals have been linked to decreased infarct size, better left ventricular function and a lower risk of future unfavourable cardiac events. In ST-segment elevated myocardial infarction (STEMI) patients having successful primary percutaneous coronary intervention (PCI), well-developed collaterals to the infarct-related artery (IRA) minimize myocardial infarct size and enhance myocardial salvage.[1] Patients with coronary artery disease have been found to have reduced mortality rates when using coronary collateral flow in angiography. However, the underlying mechanism importance was limited. Thus, this study aimed to investigate the significant coronary collateral flow linked to more salvaged myocardium and a decreased risk of heart failure in individuals suffering from acute myocardial infection (AMI).[2]

METHODS-In this retrospective analysis, a total of 36 patients (81% men, mean age 56 ± 9 years) were included. According to standard clinical practice, all patients had primary PCI. Aspirin, unfractionated heparin, and P2Y12 inhibitors were given to all patients. Patients with their first AMI who had a percutaneous coronary intervention within 24 hours of symptom onset were visually characterized by giving a Cohen-Rentrop Score (CRS) ranging from 0 (no collaterals) to 3 (full retrograde filling of the occluded artery). Based on the lack of antegrade flow and the change in flow following PCI, the infarct-related artery and culprit lesion were identified. The TIMI classification of perfusion was used to assess the antegrade flow: grade 0, no perfusion; grade 1, penetration without perfusion; grade 2, partial perfusion; and grade 3, complete perfusion. The intraclass correlation value suggested that the CRS evaluation was reproducible between two observers (ICC=0.872, $p<0.001$). After myocardial infarction, cardiac magnetic resonance imaging was performed on all patients within 3–5 days and again after 12 weeks of PCI. Based on the CRS, student's t-test was used to compare patients who presented only with STEMI, had TIMI flow prior to PCI 0-3, and had a culprit lesion in the right coronary artery.

RESULTS-This study showed the culprit lesion was exclusively discovered in the right coronary artery in patients with CRS 2-3, however, it was primarily discovered in the left anterior descending artery in the group with inadequate collateralization. Patients with CRS 2-3 had notably reduced infarct sizes at baseline and week 12. The I/R edema in the CRS 0–1 and CRS 2-3 groups was comparable. Significantly greater MSI was also correlated with appropriate collateral flow. In CRS 2-3 compared to CRS 0-1, there was a statistically significant decrease in infarct size from baseline to 12 weeks. All patients experienced a substantial decrease in infarct size (−4.3%, CI −5.9 to −2.6%, p < 0.001). Additionally, the left ventricular ejection fraction of both groups improved early after AMI (Figure 1), but the recovery was higher in CRS 2-3 patients than in CRS 0-1 patients (+8 ± 5% vs. +3 ± 5%, p = 0.015). In patients with CRS 2-3, NT-proBNP dropped in 12 weeks significantly more (−616 pg/mL [213–1547] vs. −384 pg/mL [231–709], p = 0.313). There were not significant variations between the two groups in terms of the clinical parameters used to classify the severity of heart failure (NYHA) or the clinical score for angina severity (CCS). A substantial correlation was observed between CRS 2-3 and a reduced final infarct size, even following the inclusion of patients with a TIMI flow ≥ 2 (p = 0.013). Likewise, after excluding patients who presented with non-ST elevation myocardial infarction, a statistically significant correlation (p < 0.001) was found between CRS 2-3 and a smaller final infarct size. A sensitivity analysis was carried out including patients (CRS 0–1 n = 5; CRS 2–3 n = 8) with a culprit lesion exclusively in the right coronary artery in order to account for the unequal distribution of infarct location. The results demonstrated a strong association between CRS 2–3 and smaller final infarct size (p = 0.052).

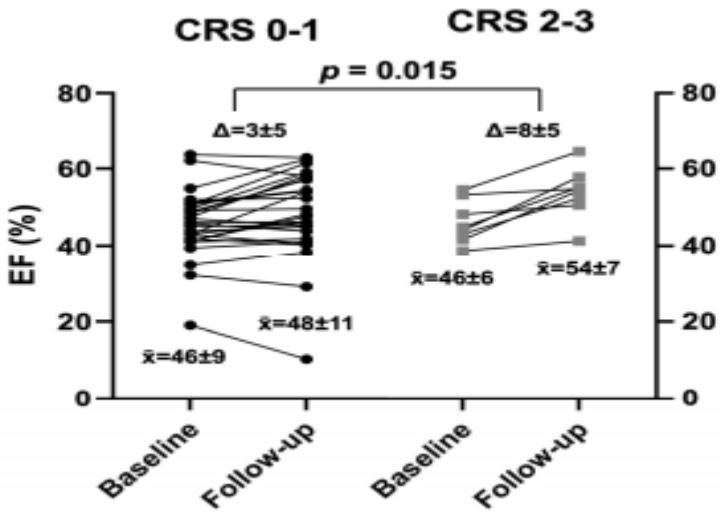

Figure 1. Baseline and follow-up left ventricular ejection fraction based on Cohen Rentrop Score (CRS 0–1: black: CRS 2–3: grey). Δ: change

DISCUSSION-The current study findings showed collateral circulation has a cardio-protective effect on myocardial salvage following acute myocardial infarction. Similar to this, Kim E et al. showed a positive effect of early collateral blood flow in individuals suffering from ST-segment elevation myocardial infarction.[3]

CONCLUSION-The current study concluded that relevant collateral flow to the infarct-related artery was linked to a reduced final infarct size at 12 weeks in patients who had their first AMI. This finding translated into a higher improvement in systolic left ventricular function.

Relevant collateral flow to the infarct-related artery was linked to a reduced final infarct size at 12 weeks in patients who had their first AMI.

REFERENCES

1. Elias J, Hoebers LP, van Dongen IM, Claessen BE, Henriques JP. Impact of collateral circulation on survival in ST-segment elevation myocardial infarction patients undergoing primary percutaneous coronary intervention with a concomitant chronic total occlusion. Cardiovascular Interventions. 2017 May 8;10(9):906-14.

2. Pec J, Buchner S, Wester M, Debl K, Hamer OW, Poschenrieder F, Maier LS, Arzt M, Stadler S. Association of Coronary Collaterals and Myocardial Salvage Measured by Serial Cardiac Magnetic Resonance Imaging after Acute Myocardial Infarction. Journal of Cardiovascular Development and Disease. 2023 Nov 24;10(12):473.

3. Kim EK, Choi JH, Song YB, Hahn JY, Chang SA, Park SJ, Lee SC, Choi SH, Choe YH, Park SW, Gwon HC. A protective role of early collateral blood flow in patients with ST-segment elevation myocardial infarction. American Heart Journal. 2016 Jan 1;171(1):56-63.

Correlation between blood pressure (BP) control and long-term major adverse cardiovascular and cerebrovascular event (MACCE)

INTRODUCTION-The term "obstructive sleep apnea" (OSA) refers to the episodes of hypopnea or apnea that result in a partial or total obstruction of the airways. On the other side, an increase in systemic arterial blood pressure above a specific threshold was known as hypertension. Numerous pathophysiological variables, including gender, obesity, an unhealthy lifestyle, poor sleep quality, the renin-angiotensin system, and enhanced fluid distribution, were shared by both OSA and hypertension.[1] Comorbid OSA affects between 30 and 50 percent of hypertensive patients. Further, it was clear that in patients with OSA who also have hypertension, the blood pressure (BP) can only be slightly lowered (3 mmHg) following therapy with continuous positive airway pressure (CPAP). In addition to hypertension, OSA was linked to coronary heart disease, heart failure, stroke, and other cardiovascular risks. Moreover, valsartan was found to cause a four-fold reduction in mean 24-hour blood pressure compared to CPAP in untreated hypertensive patients with OSA in a previous 8-week randomized controlled trial. This suggested that antihypertensive medications were more beneficial for controlling blood pressure in OSA patients with hypertension; however, the long-term benefits of blood pressure control for cardiovascular disease (CVD) outcomes in OSA have not been assessed.[2] Thus, this study aimed to investigate the potential purpose of blood pressure control by assessing the relationship between blood pressure control and the long-term cardiovascular effects among individuals having both OSA and hypertension.

METHODS-This was a retrospective study, included total of 3267 patients and divided into 3 groups by the follow-up BP. The first onset major adverse cardiovascular and cerebrovascular event (MACCE) after enrolment during the follow-up period, including cerebrovascular and cardiovascular events that were fatal or non-fatal, were the primary outcomes. Every endpoint was established using the suggested definitions provided by the Standardized Data Collection for Cardiovascular Trials Initiative. Cases of fatal illness were categorized using the

international classification of diseases (ICD-10) classification code. Kaplan-Meier survival curves were utilized to assess the cumulative incidence of primary outcomes, and the log-rank test was employed to estimate the variation between the various degrees of blood pressure control. To investigate the relationship between the levels of blood pressure management in the entire cohort and OSA patients and the outcomes of CVDs (such as MACCE, cardiac event, and cerebrovascular event), Cox proportional hazards models were conducted.

RESULTS- The current study showed that at baseline, 77.6% of patients had an OSA diagnosis, with a mean age of 48.6 years. During a median follow-up of 7.0 years, 379 out of 3267 patients had MACCE. When blood pressure was not maintained below 140/90 mmHg, the incidence of stroke considerably decreased (log-rank test, P=0.022, Figure 1). Additionally, when the three groups were compared pairwise, the incidence of stroke was as follows: ≥140/90 mmHg vs. 120–139/80–89 mmHg (χ2=3.44, P=0.064), ≥140/90 mmHg vs.<120/80 mmHg (χ2=10.37, P=0.001), and 120–139/80–89 mmHg vs.<120/80mmHg (χ2=10.36, P=0.001). However, there was no discernible difference between cardiac events and MACCE and BP control. Only BP management between 120 and 139/80 and 89 mmHg was linked to the lowest risk of cerebrovascular incident after complete risk adjustment (HR: 0.53, 95%CI: 0.35–0.82). The lowest HR of the incident MACCE and cerebrovascular event was connected, separately, to the SBP control range of 120–139 mmHg. Patients who managed their blood pressure below 80 mm Hg had nearly 50% decreased risk of a cerebrovascular incident [(HR:0.51, 95% CI: 0.29–0.88)] as compared to those whose DBP ≥90 mm Hg. Nevertheless, there were no discernible advantages to control SBP and DBP for cardiac events. In patients with OSA, the HR was fairly comparable in the 120-139 mmHg and <120 mmHg groups, and the risk of cerebrovascular event was significantly lower in patients with BP control <140 mmHg compared to the subjects with SBP ≥140 mmHg. Using DBP >90 mmHg as a reference, when DBP <80 mmHg, the risk of a cerebrovascular event might drop by 54%, but the risk of MACCE decreased by 29%. In the non-OSA group, there was a decrease in the incidence of MACCE and cerebrovascular event when SBP control <140 mmHg or DBP control <90 mmHg.

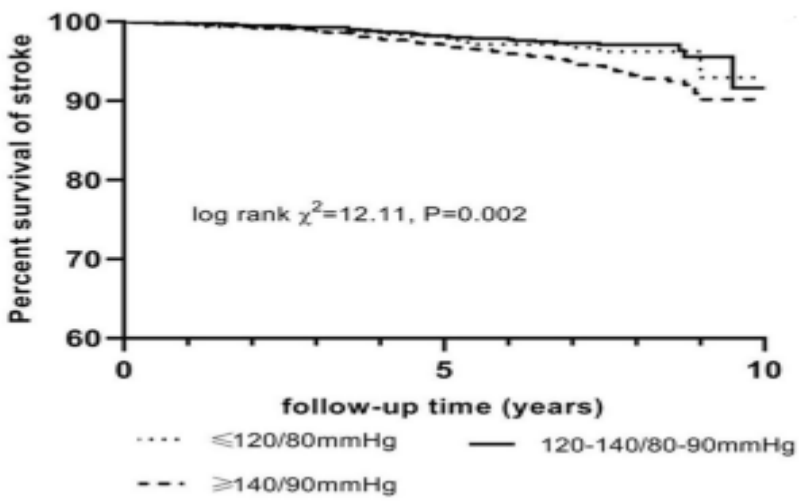

Figure 1. Kaplan-Meier curve of cardiovascular outcomes: Proportion of stroke survivors at various blood pressure management levels

DISCUSSION-The current study suggested that the risk pattern of SBP and DBP may differ by clinical outcomes in hypertension with OSA.[2] Similar to this, Itoga NK et al. showed that based on the clinical outcomes, SBP and DBP have different risk patterns.[3]

CONCLUSION-The current study concluded that anti-hypertensive medication-induced blood pressure regulation at 120–139/80–89 mmHg may have a favourable effect on MACCE incidents.

Anti-hypertensive medication-induced blood pressure regulation at 120-139/80-89 mmHg in the office and at home may have a positive impact on MACCE incidents

REFERENCES

1. Bangash A, Wajid F, Poolacherla R, Mim FK, Rutkofsky IH. Obstructive Sleep Apnea and Hypertension: A Review of the Relationship and Pathogenic Association. Cureus. 2020 May 22;12(5):e8241.

2. Yao X, Li N, Heizhati M, Wang Y, Ma Y, Wang R, Zhang D, Luo Q, Hu J, Wang M, Zhu Q. The association between blood pressure control and long-term cardiovascular outcomes in Hypertension coexistent with obstructive sleep apnea. BMC Cardiovasc Disord. 2023 Nov 21;23(1):574.

3.Itoga NK, Tawfik DS, Montez-Rath ME, Chang TI. Contributions of Systolic and Diastolic Blood Pressures to Cardiovascular Outcomes in the ALLHAT Study. J Am Coll Cardiol. 2021 Oct 26;78(17):1671-1678.

An uncommon and challenging case report of intrapericardial hydatidosis

INTRODUCTION

Hydatid cyst illness is a serious health concern, for emerging and underdeveloped nations. New treatment opportunities and preventative strategies had a significant influence on its long term results. Human tissue infections called echinococcosis were brought on by Echinococcus granulosus larvae.[1] Hydatid cysts were infrequently discovered in the pericardium and were often found in the liver and lungs. Treatment and diagnosis can be difficult since the illness can manifest itself in a variety of ways depending on where it was located and the potential consequences it might create.[2] This case report present a case on intrapericardial hydatidosis.

CASE PRESENTATION

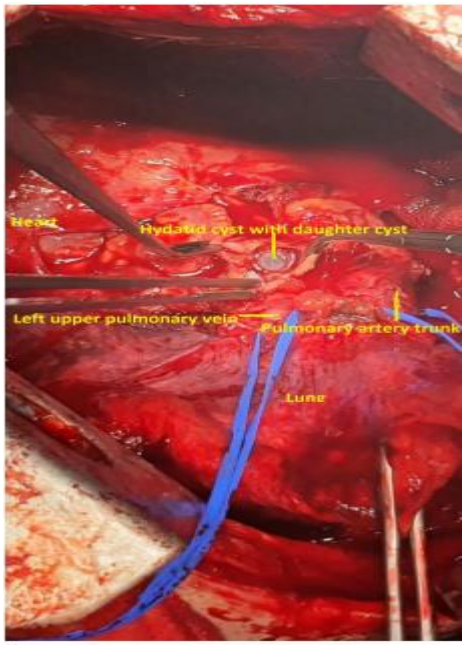

Figure 1. Intrapericardial hydatid cyst and daughter cysts within it, next to the left atrium and left upper pulmonary vein.

A 22-year-old male had been complaining of persistent dry cough for more than a month before being admitted. Additional symptoms that have gotten worse over the last two weeks include fatigue, low-grade fever, night sweats, and chest pain. Normal cardiac and respiratory function was found during the physical assessment. An X-ray of the chest showed left pleural effusion and mediastinal hypertrophy. The results of Contrast-enhanced computed tomography (CECT) images revealed a walled cystic mass lesion up to 56x50 mm near the pulmonary artery, ascending aorta, and upper left atrium. The lesion may be located in the pericardium and had a 10 mm endoatrial filling defect. The findings were consistent with a hydatid cyst, left pleural effusion, and peripheral lung upper left lobe consolidation. An extracardiac multicameral cystic mass next to the left atrium was seen on Magnetic resonance imaging (MRI) and transesophageal ultrasonography. There was also a mass effect in the left upper pulmonary vein and no cardiac infarction following the administration of contrast material. For the cytological assessment of the fluid, the patient had thoracocentesis and fine needle aspiration (FNA) of the upper left lobe consolidation performed. There was no visible malignancy, but the biopsy revealed pulmonary infarction. An antibody titer test was conducted, in case the imaging results suggested the presence of a hydatid cyst, however the results were negative. Following a thorough preoperative evaluation and consultations, as well as seven days of albendazole premedication, the patient had a left anterolateral thoracotomy performed by a thoracic surgeon. The pericardium was opened behind the phrenic nerve to allow the pulmonary vein entry to be followed intrapericardially from the lung's hilum. Because of its retrocardiac location, the cystic tumor was particularly difficult to locate once the pericardium was opened. The decision was made to open the Botali duct so that there would be easier access to the location. Because the cyst was closely located to the left pulmonary veins, compressing them, and heavily attached to the left atrium, it took around thirty minutes to mobilize. After the surgical field was isolated using gauze impregnated with hypertonic solution (NaCl 10%), the cystic mass, measuring 5 cm in diameter, had all of its contents taken away. The discovered cyst was an echinococcal cyst that contained many, up to 10 mm-diameter daughter cysts. No involvement or penetration of the heart wall was discovered after the removal of the daughter cysts and a partial resection of the pericyst (Figure 1). The remained hollow of the cyst was cleaned out and left exposed using a hypertonic solution (10% NaCl). A wedge resection of the consolidation area of the left upper lobe was carried out (the specimen's biopsy confirmed lung infarction, as was previously reported on a biopsy carried out by FNA). The pericardium was left exposed, and a chest drain was positioned near to the pericardiotomy site before the chest cavity was closed. Following

surgery, the patient recovered well and was allowed to leave the hospital five days later in good health.

DISCUSSION

This case report showed that CECT images revealed a walled cystic mass lesion up to 56x50 mm near the pulmonary artery, ascending aorta, and upper left atrium. The lesion may be located in the pericardium and had a 10 mm endoatrial filling defect.[2] Similar to this, Guha A et al. showed that CT revealed a massive cystic lesion with datached floating hyperdense membrane inside the inferior pericardial space underneath the right atrium and right ventricle.[3]

CONCLUSION

The current case report concluded that pericardial echinococcosis is an extremely rare condition that requires a highly specialized multidisciplinary therapy. The cyst's bulk effect might create difficulties, such as the pulmonary vein being compressed, resulting in a pulmonary infarction. Radiology and transesophageal ultrasonography values were critical in the diagnosis. Surgery was always suggested in these patients, however the surgical technique was questionable.

Pericardial echinococcosis is an extremely rare condition that requires a highly specialized multidisciplinary therapy.

REFERENCES

1. Nasri S, Aichouni N, Lokman S, El Ouafi N, Kamaoui I, Skiker I. Cardiac hydatid cyst: 2 case reports. Radiology Case Reports. 2021 Dec 1;16(12):3829-33.

2. Caushi F, Hysa E, Skenduli I, Lisha L, Hatibi A, Bica L, Bala S, Rulli F. A rare and challenging case of intrapericardial hydatidosis. Journal of Cardiothoracic Surgery. 2023 Nov 20;18(1):336.

3. Guha A, Ranjan R, Saxena P, Mehta Y. A rare case of cardiac hydatid cyst. Ann Card Anaesth. 2021 Oct-Dec;24(4):470-472.