

CARDIOLOGY UPDATES NEWSLETTER

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Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you “Cardiology updates” which contains latest and interesting news in the field of Cardiology

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Assessment of relationship between the degree of coronary artery disease in individuals with acute coronary syndromes and the triglyceride glucose-body mass index

INTRODUCTION- Cardiovascular disease (CVD) is the world's leading cause of mortality. It is particularly prominent in low-and middle-income regions, where ischemic heart disease accounts for half of all CVD deaths. Acute coronary syndrome (ACS) comprise unstable angina, acute non-ST-segment elevation myocardial infarction (NSTEMI) and acute ST-segment elevation myocardial infarction (STEMI). These conditions lead to significant cause of death, with one person having a myocardial infarction (MI) every 40 seconds in united states.¹ Elevated insulin resistance was linked to a greater risk of adverse cardiovascular events in addition to an increased risk of atherosclerotic cardiovascular disease. It has recently been demonstrated that the triglyceride-glucose (TyG) index, which is calculated from fasting blood glucose and triglycerides, was a viable surrogate indicator of insulin resistance.² Studies has indicated a high correlation between insulin resistance and the onset of cardiovascular disease, and the triglyceride glucose-body mass index (TyG-BMI index) was accepted as a reliable surrogate indicator of insulin resistance. However, only limited studies had done on the relationship between acute coronary syndrome and the degree of coronary artery disease as measured by the TyG-BMI index.¹ The aim of this study was to assess the association between TyG-BMI index and the degree of coronary artery disease among ACS patients.



Cardiovascular disease

METHODS-A total of 1,696 ACS patients treated with percutaneous coronary intervention (PCI) were included in this retrospective cohort study. Based on TyG-BMI index tertiles, patients were split into three groups: group T1(TyG-BMI index <209.99), group T2 (209.99 ≤ TyG-BMI index < 245.86), and group T3 (245.86 ≤ TyG-BMI index). Using the SYNTAX score, the degree of CAD in patients with ACS was quantitatively evaluated, and patients with CAD were categorised as low risk (≤ 22), intermediate (23–32), and high risk (≥ 33). Greater scores on SYNTAX reflect a more complicated and severe illness. The main outcome was moderate/high SYNTAX-score complicated CAD. Baseline demographic data included patients' age, sex, BMI, smoking status, co-morbidities family history, and history of MI, PCI, and CABG and clinical data included patients' systolic blood pressure (SBP) and diastolic blood pressure (DBP) on admission, imaging data, laboratory tests and findings and blood samples were collected from all subjects in a fasting state. FBG and TG were determined with an AU5800 system (Beckman Coulter, Brea, CA). The association between the TyG-BMI index and the severity of coronary artery lesions (SYNTAX score ≤22 or SYNTAX score >22)

was examined using logistic regression, and the results included the calculation of the odds ratio (OR), and 95% confidence interval (CI).

RESULTS-This study showed that higher glucose, TC, TG, HbA1c, BMI and history of insulin and oral hypoglycemic medication usage, diabetes, and hypertension were seen in T3 group of patients. There was no statistically significant correlation found in both the univariate and multivariate logistic regression analysis between the TyG-BMI index and the moderate/high SYNTAX scores in patients with ACS. Subgroup analyses revealed that in one-way logistic regression analyses, the last tertile group (OR=2.1100;95% CI=1.1200-3.9800; P=0.0220) had a 2.11 times higher risk of having a moderate/high SYNTAX score than the first tertile group. In female patients, the TyG-BMI index was associated with a high risk of moderate/high SYNTAX score [odds ratio (OR) = 1.0076; 95% confidence interval (CI) = 1.0014–1.0138; P = 0.0160)]. Restricted cubic spline analysis revealed a linear connection between the TyG-BMI index and complicated coronary artery disease (SYNTAX score > 22) in female patients with ACS (Figure 1). In female patients with ACS treated with PCI, the study results indicated a small increase in predictive capacity following the inclusion of the TyG-BMI index to the baseline model [NRI: 0.0375 (-0.0852–0.1602), p = 0.5496; IDI: 0.0170 (-0.0025–0.0315), p = 0.0212].

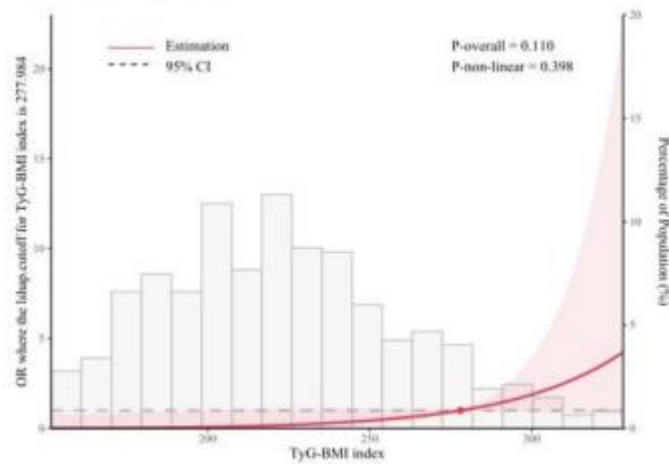


Figure 1. Restricted cubic spline analysis revealed a linear connection between the TyG-BMI index and complicated coronary artery disease (SYNTAX score > 22) in female patients

DISCUSSION-The current study showed that a higher risk of complicated CAD (moderate/high Syntax scores) is linked to the TyG-BMI index for female patients.¹ Similar to this, Zhang et al. showed that there was a significant correlation between the TyG-BMI score and major adverse cardiac and cerebrovascular events in older patients and women.³

CONCLUSION-This study concluded that in female patients with ACS, there was a linear relationship between a higher TyG-BMI score and the probability of developing complicated coronary lesions. The baseline risk model prediction ability for female ACS patients was slightly improved by the addition of the TyG-BMI index.

In female patients with ACS, a higher TyG-BMI score was linearly correlated with the probability of having complicated coronary lesions.

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

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 ($+8 \pm 5\%$ vs. $+3 \pm 5\%$, $p = 0.015$). 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 ($p = 0.052$).

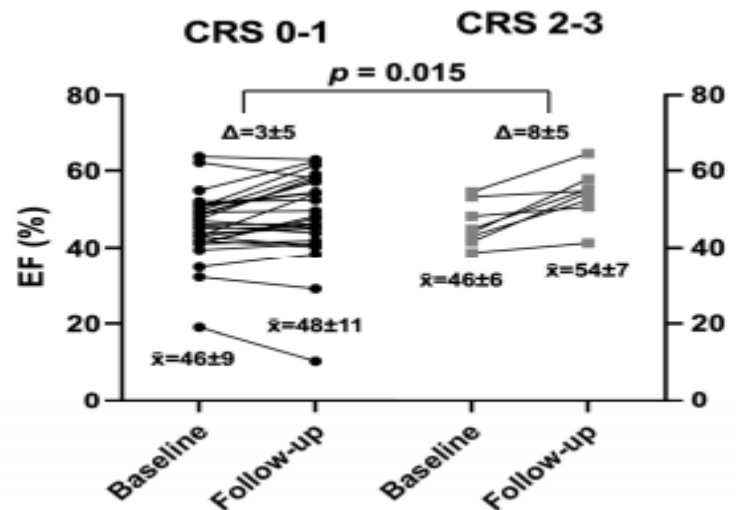


Figure 1. Baseline and follow-up left ventricular ejection fraction based on Cohen Rentrop Score (CRS 0–1: black: CRS 2–3: grey). Δ: change

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.

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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: $\geq 140/90$ mmHg vs. 120–139/80–89 mmHg ($\chi^2=3.44$, $P=0.064$), $\geq 140/90$ mmHg vs. $<120/80$ mmHg ($\chi^2=10.37$, $P=0.001$), and 120–139/80–89 mmHg vs. $<120/80$ mmHg ($\chi^2=10.36$, $P=0.001$). 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

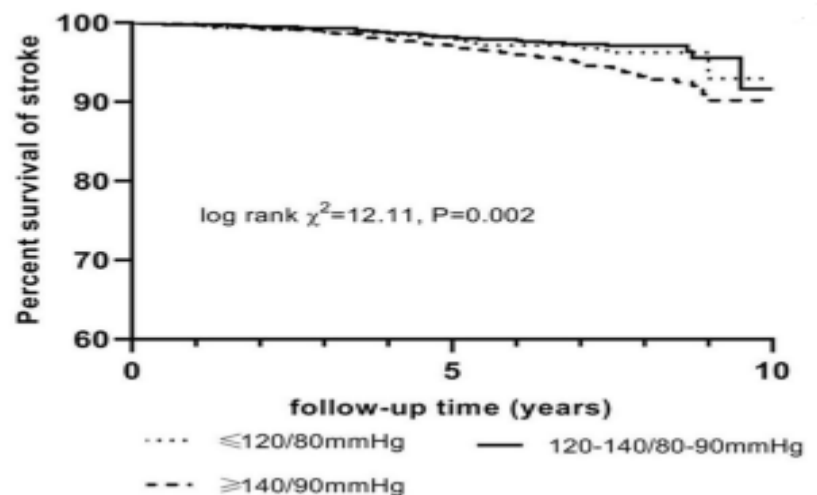


Figure 1. Kaplan-Meier curve of cardiovascular outcomes: Proportion of stroke survivors at various blood pressure management levels

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.

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

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A rare case report on heart failure concomitant with prolactinoma

INTRODUCTION-Prolactinomas are the most frequent kind of pituitary tumour, with microprolactinomas more common in women and macroprolactinomas more common in males. One of the most frequent causes of hypogonadotropic hypogonadism in both sexes was hyperprolactinemia, which has led to medical management for both sexes regarding hypogonadism (infertility, oligo-amenorrhea, impotence, osteoporosis/osteopenia) and mass effects symptoms (hypopituitarism, visual loss, optic chiasm compression, cranial nerve deficits, headaches), primarily in men.¹ Around 40% of all pituitary tumours, prolactinoma is the most prevalent type. Nevertheless, there was a lack of evidence available regarding the correlation between hyperprolactinemia and heart failure.² The aim of this case report was to present the uncommon case of heart failure patient affected with giant prolactinoma.

CASE PRESENTATION-A 29-year-old man with a medical history of seizures was admitted in the hospital because of the complaints of dyspnea with exertion had becoming worse about a year. He also claimed to have visual loss in his right eye, and a vision test indicated that he no longer could perceive light in that eye. On physical examination, the feet showed bilateral pitting edema. The ECG revealed left ventricular (LV) enlargement along with a normal sinus rhythm devoid of ischemic symptoms. The chest X-ray showed significant cardiomegaly. Brain natriuretic peptide level was significantly elevated [900 pg/mL (normal <18.4 pg/mL)] according to a blood test. The coronavirus disease of 2019 (COVID-19) was unintentionally found positive. The results of transthoracic echocardiography (TTE) showed no regional wall motion abnormalities and an LV ejection fraction (LVEF) of 23%. The

diastolic diameter of the left ventricle measured 68 mm. There was no evidence of asymmetric left ventricular hypertrophy (interstitial septum thickness: 9 mm, posterior wall thickness: 11 mm). A massive tumour of $30 \times 29 \times 53 \text{ mm}^3$ was discovered on the sella turcica, as revealed by brain computed tomography (Figure 1). Non-ischaemic congestive heart failure was diagnosed based on the patient's clinical presentation and echocardiographic characteristics. This condition may be related to a pituitary tumour. The levels of prolactin and thyroid stimulating hormone were determined to be 5729 ng/mL and 9.879 $\mu\text{IU/mL}$, respectively, free thyroxine level was 0.63 ng/dL, adrenocorticotrophic hormone level was 14.1 pg/mL, cortisol level was 3.4 $\mu\text{g/dL}$, luteinizing hormone level was 0.63 mIU/mL, and follicle-stimulating hormone level was 0.75 mIU/L. A massive tumour measuring $30 \times 28 \times 48 \text{ mm}^3$ was discovered using magnetic resonance imaging. It had bilateral optic chiasmal compression and suprasellar expansion. Based on the previously described results, prolactinoma with hypopituitarism was diagnosed. Furosemide injection and continuous dobutamine infusion were given to the patient. To treat panhypopituitarism, oral medicine was given first, then an intravenous dose of hydrocortisone (100 mg/day). After heart failure status was adjusted, the “fantastic four” (an angiotensin receptor/neprilysin inhibitor (ARNI), a beta-blocker, a mineralocorticoid receptor antagonists (MRA), and an sodium–glucose co-transporter 2 (SGLT2 inhibitor) first line treatment for heart failure with a reduced ejection fraction was started. On Day 6, the patient was put on cabergoline for hyperprolactinemia. On Day 9, the commencement of levothyroxine (50 $\mu\text{g/day}$) treatment for hypothyroidism done. In practically every segment, cardiac magnetic resonance imaging showed linear mid-wall late gadolinium enhancement. In the T2-weighted picture, no high-intensity finding indicative of myocardial oedema was found. There was no significant stenosis found on the coronary computed tomography scan. By using the modified Simpson approach, the patient's LVEF on TTE improved by 31% at the end of a month. The patient had no symptoms a year after being admitted. According to the modified Simpson approach, TTE showed much better LVEF (47%) as the prolactin level dramatically dropped. Subsequent cerebral magnetic resonance imaging identified the remnant tumour, but it gradually diminished in size.



Figure 1. A) On day 1 of Brain computed tomography scan revealed a massive tumour on the sella turcica. B) On Day 13 of Contrast brain magnetic resonance imaging indicated heterogeneous high intensity with the suprasellar extension on T1-weighted image.

DISCUSSION-The current study showed that heart failure associated with prolactinoma which was quite uncommon.² Similar to this, Korgh J et al. showed that in male patients, hyperprolactinemia was associated to higher cardiovascular mortality.³

CONCLUSION-This report concluded that endocrine and heart failure treatments should be administered concurrently for patients with prolactinoma and congestive heart failure. A comprehensive approach was necessary for the successful treatment of rare illnesses.

Endocrine medication, a dopamine agonist, should be used right away to treat heart failure with decreased ejection fraction concurrent with hyperprolactinemia.

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