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Diabetes Update

Vol. 4 | Issue 40| 2023

Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you "DIABETES UPDATE" which contains latest and interesting news in the field of Diabetes and Endocrinology.

- A Study on Using computed tomography and pericoronary adipose tissue radiomics to diagnose coronary artery disease in people with type 2 diabetes
- A study on poorly managed diabetes According to studies from the UK Biobank and the Hong Kong population-based cohort, HbA1c is the "risk equivalent" for mortality from cardiovascular disease.
- Relationship between Diabetic Retinopathy and Type 2 Diabetes Initiation Age
- A case report of spontaneous myonecrosis and pyomyositis in a young man with type 2 diabetic mellitus

Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback

Best Regards,

Medical Team, Micro Labs Limited

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A Study on Using computed tomography and pericoronary adipose tissue radiomics to diagnose coronary artery disease in people with type 2 diabetes

By 2045, 700 million individuals worldwide will have diabetes mellitus, according to the International Diabetes Federation (IDF). Diabetes patients are more likely to develop coronary atherosclerosis due to the vascular dysfunction brought on by the metabolic abnormalities brought on by DM.[1] Due to the fact that coronary computed tomography angiography (CTA) is a significant modality for the noninvasive diagnosis of coronary artery disease (CAD) in patients with T2DM, a few of the imaging parameters obtained by coronary CTA are increasingly being used as auxiliary indicators for the diagnosis and stratification of CAD.[2] The goal of the study was to determine whether pericoronary adipose tissue (PCAT) radiomic characteristics and computed tomography (CT) imaging parameters can enhance the diagnostic accuracy of determining whether individuals with T2DM had developed CAD.

Retrospectively, 229 individuals with T2DM and no history of CAD were enrolled in this investigation (146 were diagnosed with CAD at this visit and 83 were not). All patients' clinical data was gathered by the researchers, who also extracted imaging manifestations from CT scans and 93 radiomic characteristics of PCAT. A 7:3 ratio was used to randomly split all patients into the training and test groups. To identify patients with CAD, four models incorporating clinical factors (Model 1), clinical factors and imaging indices (Model 2), clinical factors and Radscore (Model 3), and all clinical factors (Model 4) were created.

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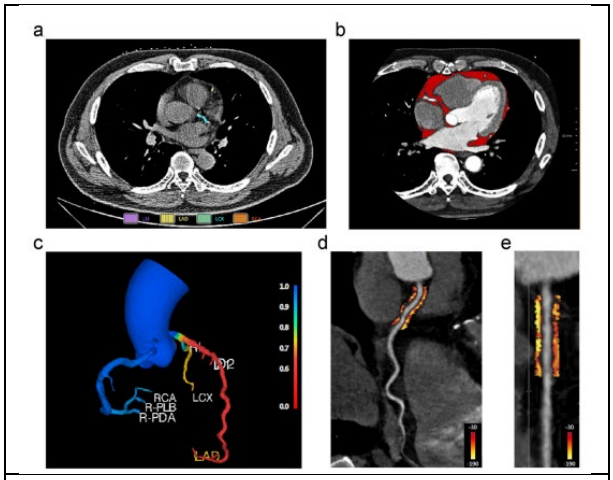

Fig.1: Representative case of imaging parameters measured by noncontrast chest CT and coronary CTA

To assess the model's effectiveness, receiver operating characteristic curves and decision curve analyses were plotted. Pairwise model comparisons using the DeLong test were then carried out to show the additive value of various. With higher identification efficacy than the other two models (each $p<0.001$), Models 2 and 4 had areas under the curves (AUCs) of 0.930 and 0.929 in the test set, respectively. Model 2 outperformed Model 1 in terms of diagnostic efficacy for diagnosing CAD ($p < 0.001$, 95% CI [0.129-0.350]). However, Model 4 did not significantly differ from Model 2 in terms of the effectiveness of CAD identification ($p=0.776$), nor did Model 3 significantly differ from Model 1 in terms of AUC ($p=0.382$). Model 2 received higher ratings overall for diagnosing CAD in T2DM patients.

In this study, four models were created and their performance was validated across the board to diagnose CAD in patients with T2DM. Both the combined model and the model integrating clinical risk factors and CT imaging parameters were found to be more effective at detecting the presence of CAD, while Model 4, which added the Radscore to Model 2, did not enhance diagnostic performance in comparison to Model 2. Due to the high glycaemic condition of the blood, which encourages the infiltration of macrophages and T lymphocytes, patients with T2DM have greater levels of chronic inflammation in the coronary vasculature. Studies have demonstrated that the coronary artery calcium score (CACS) can be used as a proxy for the amount of coronary atherosclerotic plaque to predict cardiovascular risk, and that the CACS rises with cardiovascular risk in the population of T2DM patients to serve as a composite measure of atherosclerotic disease[4]

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In conclusion, a thorough diagnostic approach that incorporates clinical risk factors for the patient and CT-based imaging characteristics is more effective at detecting the presence of CAD in T2DM patients.

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A study on poorly managed diabetes According to studies from the UK Biobank and the Hong Kong population-based cohort, HbA1c is the "risk equivalent" for mortality from cardiovascular disease.

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Type 2 diabetes mellitus (T2DM) is linked to all-cause mortality, especially in relation to a variety of cardiovascular diseases, which together account for the main cause of death in T2DM patients.[1] The purpose of this study is to compare patients with cardiovascular disease (CVD) and type 2 diabetes (T2DM) against those without these conditions in order to assess the risk of all-cause death.[2]

This study involves a prospective cohort of 497 779 adults from the UK Biobank and a retrospective cohort of 3 839 391 adults from Hong Kong. Seven illness categories were created by dividing the population: No T2DM and CVD, T2DM only with HbA1c 7%, T2DM only with HbA1c 7%-7.9%, T2DM only with HbA1c 8%-8.9%, T2DM only with HbA1c 9%, CVD only, and T2DM and CVD are the conditions that are not present. Using Cox regression, differences in all-cause mortality between groups were looked at.

In the Hong Kong cohort and UK Biobank, respectively, 423 818 and 19 844 deaths were discovered after roughly 10 years of median follow-up. The adjusted HR for all-cause mortality in the other six disease groups for the Hong Kong cohort was 1.25 (95% CI 1.23 to 1.27) for T2DM only with HbA1c <7%, 1.21 (95% CI 1.19 to 1.23) for T2DM only with HbA1c 7%-7.9%, 1.36 (95% CI 1.33 to 1.39) for T2DM only with HbA1c 8%-8.9%, 1.82 (95% CI. The corresponding HRs for the UK Biobank were 1.45 (95% CI 1.33 to 1.58), 1.50 (95% CI 1.32 to 1.70), 1.72 (95% CI 1.43 to 2.08), 2.51 (95% CI 2.05 to 3.08), 1.67 (95% CI 1.59 to 1.75) and 2.62 (95% CI 2.42 to 2.83). (Fig.1) This suggests that individuals with T2DM had a greater risk of mortality compared to those without T2DM and CVD, and an even higher risk among those with HbA1c 9% compared to those with CVD.

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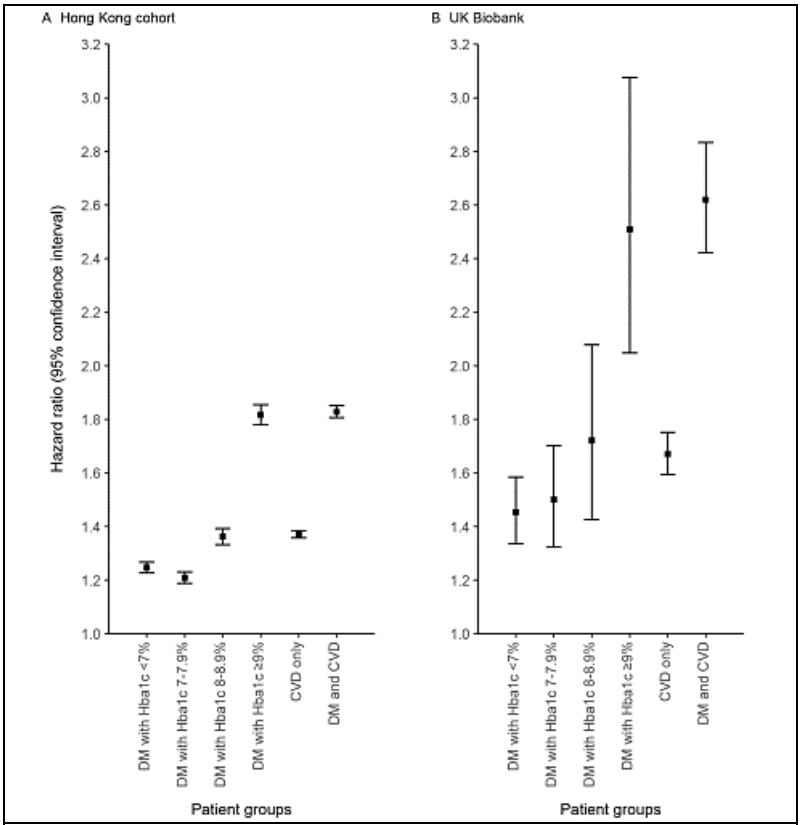

Fig.1: HR of patients with DM and/or CVD compared with patients without DM and CVD.

This research of two sizable population-based cohorts from Hong Kong and the UK Biobank showed that, only when HbA1c was below 9%, the presence of CVD was linked to a similar or lower risk of all-cause death than T2DM alone. Poorly managed HbA1c is linked to an extra risk of mortality to an equal or greater extent than CVD, as evidenced by the fact that the risk of death in T2DM with HbA1c 9% was higher relative to CVD.

In comparison to people with prior CVD but no DM, people with diabetes who have had the disease for longer than 10 years or who have high HbA1c levels (9%) had an increased risk of CVD incidence of 20% and 35%, respectively, according to a study using pooled data from four USA-based cohort studies with 27730 participants.[3]

When compared to patients with CVD, patients with T2DM who had poor HbA1c control (8%-8.9% and 9%) had a similar and higher risk of mortality, respectively. Maintaining a healthy HbA1c level is crucial for managing diabetic complications and reducing risk of mortality.

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Relationship between Diabetic Retinopathy and Type 2 Diabetes Initiation Age

In people of working age, diabetic retinopathy (DR), a frequent microvascular consequence of diabetes mellitus (DM), continues to be the principal cause of acquired vision loss and is linked to a higher risk of potentially fatal systemic vascular complications. Furthermore, DR affects 35% of those with diabetes, and 10% are at the point where their vision is

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in danger. Implementing treatments for prevention is a crucial aspect of dealing with the rising threat, and identifying the DR risk factors is crucial.[1] An underlying risk factor for DR may be earlier age at diabetes onset, according to mounting data. To ascertain the relationship between the age of diabetes onset and the chance of developing DR, the study included 7472 T2DM patients.[2]

From September 2017 to May 2022, 7472 T2DM patients in total were enrolled in the National Metabolic Management Center. Data on anthropometry, test results, and medical history were gathered. Multivariable logistic regression models were used to evaluate the independent relationship between DR and age at diabetes onset. A stratified analysis was also carried out to ascertain the impact of confounding variables.

1642 (21.98%) of the 7472 patients recruited had DR. Patients with DR began developing diabetes at ages that were significantly younger than those without DR (45 (38-53) vs. 50 (43-57) years, P<0:001). In comparison to the non-DR group, the DR group had a higher percentage of patients with T2DM that began at a younger age. According to the participants' onset ages for diabetes, which were 60, 40, 40–49, and 50–59 years, they were split into four groups. After adjusting for potential confounding factors, patients with diabetes who developed the disease before age 40 had a higher risk of developing DR than those who developed the disease between the ages of 40 and 59 (odds ratio (OR): 5.56, 95% confidence interval (CI): 3.731-8.285, P<0:001, 40-49 years (OR: 2.751, 95% CI: 2.047-3.695, P <0:001), and 50-59 years

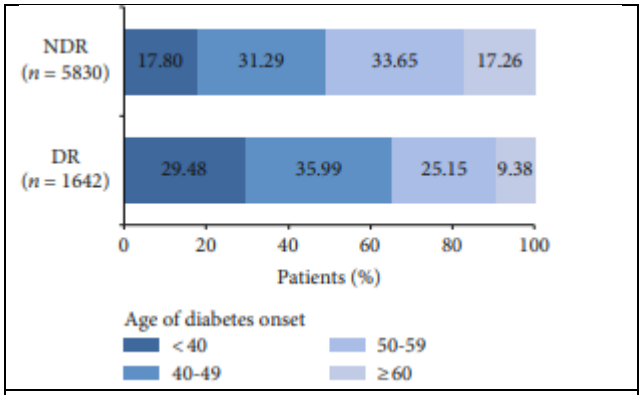

Fig.1: Distribution of the age of diabetes onset in patients with diabetic retinopathy (DR) and without diabetic retinopathy (NDR).

(Additionally, stratified analysis showed that a young age at the onset of diabetes is a separate risk factor for DR.

In this retrospective analysis, we showed that patients with DR had diabetes at a substantially younger age than patients without DR. The researchers found that people with diabetes who started having symptoms younger had a higher prevalence of DR. Patients with diabetes who were diagnosed before the age of 40 experienced the largest effects from the age at diabetes beginning on DR risk. This finding showed that early diabetes start is a distinct risk factor for the development of DR because it persisted after controlling for other conventional DR risk factors.[3] In two distinct diabetes beginning age groups (ages 40 and 60), a retrospective evaluation of 3568 individuals with T2DM using a propensity score-matched (PSM) cohort analysis revealed that patients in both early-onset disease groups had a greater chance of acquiring DR both before and after PSM.[3]

In conclusion, this study shows that a younger age at T2DM onset is connected to a significantly elevated DR risk. As a result, the age at which T2DM first manifests itself may be important for the detection, management, and prevention of this chronic illness. Early intensive glycemic control and frequent DR monitoring are necessary in patients with T2DM onset at a young age to prevent the creation and progression of DR.

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A case report of spontaneous myonecrosis and pyomyositis in a young man with type 2 diabetic mellitus

In the absence of a significant arterial blockage or atheroembolism, spontaneous diabetic myonecrosis (SDM), a rare consequence of both type 1 and type 2 diabetes mellitus (DM), causes abrupt ischemia necrosis of skeletal muscle. Patients with long-standing DM are more likely to develop diabetic myonecrosis, which can also have associated microvascular consequences like retinopathy, neuropathy, and nephropathy.[1,2] It can happen without any prior trauma or infection and manifests as an initial onset of excruciating swelling that worsens over the course of a few days or weeks.[1] An unique instance of diabetic myonecrosis with pyomyositis in a young guy documented in this paper was initially misdiagnosed as cellulitis.

A 39-year-old man with a 5-day history of worsening right thigh discomfort radiating to the right ankle without prior trauma, groyne edoema, and fever presented to a district general hospital. He has a history of hypertension and type 2 diabetes. Initial haematological and biochemistry findings included a normal leucocyte count of 9.5 109/L (normal range, 4.5–11 109/L), increased C-reactive protein of 595 (normal range, 0-5), and elevated D-dimer of 604 (normal range, 243). The lower limbs were analysed using CT angiography, or computer tomography. However, it did reveal right-sided subcutaneous edoema, lymphadenopathy in the inguinal, external iliac, and obturator areas, as well as stranding around the inferior vena cava, which suggested cellulitis. There was no evidence of acute limb ischemia (Figs. 1 and 2). Despite a change in antibiotics, his clinical condition worsened, and his blood test results and pain increased. A CT scan of the abdomen and pelvis was then done, and it revealed no evidence of gas gangrene or intra-abdominal infection (Figs. 1and 2).

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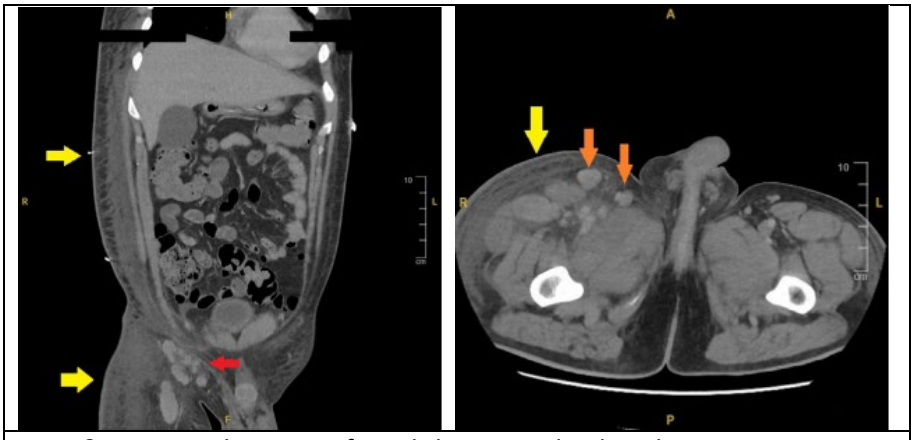

Fig.1 & 2: Coronal section of CT abdomen and pelvis showing subcutaneous edema throughout the abdomen and extending into the right upper thigh deep fascia & Transverse section of CT abdomen and pelvis showing subcutaneous edema of the right upper thigh deep fascia

A rare consequence for patients with poor chronic glucose control is diabetic myonecrosis. Along with myonecrosis, other diabetes sequelae such neuropathy, retinopathy, and nephropathy are frequently observed. Due to muscular ischemia and necrosis, patients typically feel an abrupt start of limb discomfort with edoema and soreness, however presentational delay may also be present.[3] The patient in this scenario was first mistreated and given cellulitis medication. Osteomyelitis, septic arthritis, appendicitis, diverticulitis, hematoma, and muscle rupture are just a few of the many differentials that could exist. Even though life-threatening pathologies like necrotizing fasciitis frequently present with localised discomfort that is out of proportion to the examination's results, they may share some myonecrosis findings.[2]

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Rare consequences of uncontrolled diabetes include pyomyositis and myonecrosis. Imaging must be used correctly and quickly when evaluating individuals who have infection-related localised pain and swelling. A muscle biopsy may be considered in circumstances that are uncertain. After muscle rest, glucose level adjustment, pain control, and targeted antibiotics for pyomyositis, patients show good prognosis and recovery.

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