CAU CENTRAL ASIAN UNIVERSITY

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HEALTH OF THE NATION

CHANGES AND SOLUTIONS FOR CENTRAL ASIA

ЗДОРОВЬЕ НАЦИИ

ВЫЗОВЫ И РЕШЕНИЯ ДЛЯ ЦЕНТРАЛЬНОЙ АЗИИ

Sammit Health of Nation organized by Central Asian University

СЕРДЕЧНО-СОСУДИСТЫЕ ЗАБОЛЕВАНИЯ

09:00-09:30 Регистрация и приветственный кофе

09:30-10:00 Официальное открытие
Декан Медицинской школы CAU - Муродбек Ахроров Махмудович
• Приветственное слово Абдужабара Абдусаттаровича Абдувахитова,
• Приветственное слово - Начальник управления научного образования и инноваций Министерства здравоохранения, доктор медицинских наук, профессор Уктам Сафаевич Исмаилов
• Представление почетных гостей и экспертов

10:00-11:00 Ключевой доклад: Тяжелая сердечная недостаточность и отбор пациентов для имплантации левого желудочкового вспомогательного устройства
• Спикер: Prof. Ibrahim Oguz Karaca, M.D. (Турция)
Современные подходы к лечению тяжелой сердечной недостаточности
Критерии отбора пациентов для имплантации LVAD
Долгосрочные результаты и качество жизни пациентов с LVAD

11:00-12:00 Ключевой доклад: Современные методы лечения аритмий и роль электрофизиологии
• Спикер: Dr. T. S. Kler (Индия)
Продвинутые методы диагностики и лечения аритмий
Имплантация кардиовертер-дефибрилляторов (ICD) и бивентрикулярных кардиостимуляторов
Радиочастотная абляция и другие интервенционные методы лечения аритмий

12:00-13:00 Ключевой доклад: Гипергликемия и риск сердечно-сосудистых заболеваний
• Спикер: Профессор Jaakko Tuomilehto (Финляндия)

13:00-14:00 Обеденный перерыв

14:00-15:00 Панельная дискуссия:
Будущее лечения сердечной недостаточности и аритмий в Узбекистане
Участники:
• Доктор медицинских наук Бахтиер Джумаевич Амиркулов,
• Руководитель отделения реконструктивной хирургии приобретенных пороков сердца Тураев Феруз Фатх
• Врач высшей категории Арнопольская Дина Иосифовна
• Модератор: кмн. Низамов Улугбек Иргашевич

15:00-15:15 Yusupova Xafiza Furkatovna - Особенности когнитивных функций у больных эссенциальной гипертензией

15:15-15:25 Doniyorov Shukhration Nimatullaevich - Механическая дисперсия левого желудочка какновый маркер стратификации риска у пациентов с ИБС, перенесших инфаркт миокарда

15:25-16:00 КМН Dina Amopolskaya - ВИЧ-кардиопатия, Узбекистан.
Результаты пилотного исследования

16:00-17:30 Постерная сессия

17:30 Закрытие конференции и награждении победителей постерной сессии Жюри:
кмн. Низамов Улугбек Иргашевич, Бахтиер Джумаевич Амиркулов, Yusupova Xafiza Furkatovna, Doniyorov Shukhration Nimatullaevich, Dina Arnopolskaya

THE IMPORTANCE OF USING MAGNETIC RESONANCE IMAGING IN STUDYING PATIENTS WITH CORONARY ARTERY DISEASE AND OBESITY

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ABSTRACT

Relevance

Obesity, particularly visceral obesity, is a significant risk factor in the development of various diseases, including coronary artery disease (CAD). Obesity increases the likelihood of metabolic abnormalities and worsens the progression of cardiovascular diseases. Identifying visceral obesity is more reliable than using body mass index (BMI) and serves as a crucial factor in assessing heart disease risk. Despite the established link between visceral obesity and CAD, there remains insufficient data regarding the connection between visceral fat and ischemic heart disease. One of the most accurate methods for assessing visceral fat is Magnetic Resonance Imaging (MRI).

Objective

This study aims to identify visceral obesity in patients diagnosed with coronary artery disease and assess the correlation between these conditions using MRI.

Materials and methods

A total of 83 patients were included in this study, with an average age of 60.8 ± 7.1 years. All patients underwent medical history review, physical examination, anthropometric measurements (height, weight, waist and hip circumferences), laboratory tests, and MRI of the heart to assess the condition of the coronary arteries. The body mass index (BMI) was calculated using the Ketle formula. The data obtained from all examinations were analyzed using Microsoft Excel software.

Results

The average BMI of the patients was 32.1 ± 3.5 kg/m^2, and coronary artery disease was diagnosed 10.8 ± 5.4 years after the onset of symptoms. 93.9% of the patients had obesity, as indicated by waist-to-hip ratio. All patients were subjected to coronary angiography, which revealed coronary artery stenosis in all cases. Furthermore, coronary calcification was observed in 80.7% of the patients. The correlation coefficient between visceral obesity and stenosis caused by atherosclerotic plaques was found to be 0.21 ($p = 0.0084$), while the correlation between visceral obesity and coronary calcification was 0.24 ($p = 0.0029$).

Conclusion The study found that as visceral obesity increases, the severity of coronary artery stenosis and the occurrence of coronary calcification also rise. These findings highlight the importance of early diagnosis and management of visceral obesity as it plays a significant role in the progression of coronary artery disease and other cardiovascular diseases.

Keywords

visceral obesity, coronary artery disease, magnetic resonance imaging, atherosclerosis, coronary calcification

ANNOTATSIYA

Dolzarbligi Semizlik, ayniqsa, visseral (ichki) semizlik, turli xil kasalliklarning, shu jumladan, koronar arteriya kasalligining (KAK) rivojlanishining muhim xavf faktori hisoblanadi. Semizlik metabolik buzilishlarning rivojlanish ehtimolini oshiradi va yurak-qon tomir kasalliklarining rivojlanishini yaqqollashtiradi. Visseral semizlikni aniqlash tana massasi indeksidan (TMI) ko'ra ishonchliroq va yurak kasalliklari xavfini baholashda muhim omil hisoblanadi. Visseral semizlik va KAK o'rtasidagi aloqani aniqlash bo'yicha tadqiqotlar bor, ammo visseral yog' va ishemik yurak kasalligining o'zaro bog'liqligi haqida etarlicha ma'lumot yo'q. Visseral yog'ni baholashning eng aniq usullaridan biri — magnit-rezonans tomografiya (MRT).

Maqsadi Ushbu tadqiqotning maqsadi koronar arteriya kasalligi (KAK) bilan hastalangan bemorlarda visseral semizlikni aniqlash va ushbu holatlar o'rtasidagi aloqani MRT yordamida baholashdan iboratdir.

Materiallari va usullari Ushbu tadqiqotga jami 83 nafar bemor kiritildi, ularning o'rtacha yoshi 60.8 ± 7.1 yoshni tashkil etdi. Barcha bemorlar anamnez, tekshiruv, antropometrik o'lchovlar (bo'yi, vazni, bel va toz aylanalari), laboratoriya testlari va yurak MRTsi orqali koronar arteriyalarning holati tekshirildi. Tana massasi indeksi (TMI) Ketle formulasi bo'yicha hisoblandi. Barcha tekshiruvlardan olingan ma'lumotlar Microsoft Excel dasturi orqali tahlil qilindi.

Natijalar Bemorlardan o'rtacha TMI 32.1 ± 3.5 kg/m^2, koronar arteriya kasalligi esa simptomlar paydo bo'lishidan 10.8 ± 5.4 yil o'tgach aniqlangan. Bemorlardan 93.9%ida bel va soya aylanalari nisbati bo'yicha semizlik aniqlangan. Barcha bemorlar koronar angiografiyadan o'tkazilgan bo'lib, barcha holatlarda koronar arteriya stenozining mavjudligi aniqlangan. Shuningdek, bemorlarning 80.7%ida koronar kalsifikatsiya kuzatilgan. Visseral semizlik va aterosklerotik plastlar sababli stenoz o'rtasidagi korrelyatsiya koeffitsienti 0.21 (p = 0.0084), visseral semizlik va koronar kalsifikatsiya o'rtasidagi korrelyatsiya 0.24 (p = 0.0029) deb topildi.

Xulosa Tadqiqot natijalari, visseral semizlikning ko'payishi bilan koronar arteriya stenozining og'irligi va koronar kalsifikatsiyaning paydo bo'lishi oshishini ko'rsatdi. Bu natijalar visseral semizlikni erta aniqlash va davolashning ahamiyatini namoyon etib, u koronar arteriya kasalligi va boshqa yurak-qon tomir kasalliklarining rivojlanishida muhim rol o'ynashiga ishora qilmoqda.

Kalit so'zlar

visseral semizlik, koronar arteriya kasalligi, magnit-rezonans tomografiya, ateroskleroz, koronar kalsifikatsiya

АННОТАЦИЯ

Актуальность Ожирение, особенно висцеральное ожирение, является значимым фактором риска развития различных заболеваний, включая коронарную артериальную болезнь (КАГ). Ожирение увеличивает вероятность метаболических нарушений и ухудшает течение сердечно-сосудистых заболеваний. Определение висцерального ожирения более надежно, чем использование индекса массы тела (ИМТ), и служит важным фактором в оценке риска сердечных заболеваний. Несмотря на установленную связь между висцеральным ожирением и КАГ, существует недостаток данных о связи висцерального жира с ишемической болезнью сердца. Один из самых точных методов оценки висцерального жира — магнитно-резонансная томография (МРТ).

Цель Целью данного исследования является выявление висцерального ожирения у пациентов с диагнозом коронарной артериальной болезни и оценка взаимосвязи между этими состояниями с использованием МРТ.

Материалы и методы В исследование были включены 83 пациента со средним возрастом 60,8 ± 7,1 лет. Все пациенты прошли обзор медицинской истории, физическое обследование, антропометрические измерения (рост, вес, окружности талии и бедер), лабораторные анализы и МРТ сердца для оценки состояния коронарных артерий. Индекс массы тела (ИМТ) был рассчитан по формуле Кетле. Полученные данные были проанализированы с использованием программного обеспечения Microsoft Excel.

Результаты Средний ИМТ пациентов составил 32,1 ± 3,5 кг/м^2, коронарная артериальная болезнь была диагностирована через 10,8 ± 5,4 года после появления симптомов. У 93,9% пациентов было выявлено ожирение, что подтверждается соотношением талии и бедер. Все пациенты прошли коронарную ангиографию, которая показала стеноз коронарных артерий во всех случаях.

Кроме того, у 80,7% пациентов была выявлена коронарная кальцификация. Коэффициент корреляции между висцеральным ожирением и стенозом, вызванным атеросклеротическими бляшками, составил 0,21 (p = 0,0084), а корреляция между висцеральным ожирением и коронарной кальцификацией составила 0,24 (p = 0,0029).

Заключение Исследование показало, что с увеличением висцерального ожирения увеличивается степень стеноза коронарных артерий и вероятность коронарной кальцификации. Эти результаты подчеркивают важность ранней диагностики и лечения висцерального ожирения, так как оно играет важную роль в прогрессировании коронарной артериальной болезни и других сердечно-сосудистых заболеваний.

Ключевые слова

висцеральное ожирение, коронарная артериальная болезнь, магнитно-резонансная томография, атеросклероз, коронарная кальцификация

Introduction

Recent studies have shown that individuals with a normal body mass index (BMI) still face the risk of cardiovascular diseases and complications. This is supported by the significant (up to 40%) prevalence of visceral obesity (VO) among people with normal BMI and ischemic heart disease (IHD). People with normal body weight but with VO have a 2.75 times higher cardiovascular risk and a 2.08 times higher risk of death from all causes compared to those without VO [5,26]. The accumulated scientific evidence suggests that different deposits of visceral fat may contribute to the development of endocrine and cardiovascular diseases. Epicardial adipose tissue (EAT) is unique in its anatomy and close proximity to the heart, having its own transcriptome and secretome that differ significantly from other fat deposits. EAT differs from other fat deposits in both physiological and pathological properties, which vary depending on its location [3,25]. Therefore, the development of algorithms to measure and assess the functional activity of EAT, followed by its inclusion in the interpretation of cardiovascular and metabolic risks, represents a significant area of interest. Obesity has emerged as one of the most pressing global health challenges, with its prevalence rising across both developed and developing nations. It is widely recognized as a major risk factor for a wide range of diseases, particularly those affecting the cardiovascular system. Among the various forms of obesity, visceral obesity is especially concerning due to its close association with metabolic dysfunctions and cardiovascular morbidity. Visceral obesity refers to the abnormal accumulation of adipose tissue around the abdominal organs, particularly the liver, pancreas, and intestines. Unlike subcutaneous fat, which is stored beneath the skin, visceral fat is considered biologically active and can secrete a variety of pro-inflammatory cytokines and adipokines that contribute to systemic inflammation, insulin resistance, and metabolic abnormalities.

Epicardial adipose tissue (EAT), also known as epicardial fat, represents true visceral adipose tissue (VAT) of the heart. EAT is located between the myocardium and the visceral pericardium and is typically found in the atrioventricular and interventricular grooves of the adult human heart. EAT originates from the same embryonic precursor as the myocardium, the splanchnopleural mesoderm. It consists of adipocytes, ganglia, nerves, and inflammatory, stromal, vascular, and immune cells [4, 7]. There is no muscular fascia between EAT and the myocardium, and both tissues share a common microcirculation. The lack of anatomical barriers allows for cross-talk between EAT and the adjacent myocardium. [1,24]

Epicardial adipocytes are smaller than those found in subcutaneous and other visceral fat depots due to a higher number of preadipocytes compared to mature adipocytes. EAT accounts for 20% of the heart's mass and 1% of total body fat under physiological conditions [2]. Physiologically, EAT plays a cardioprotective role by providing mechanical protection, serving as an energy source for the myocardium, and acting as a buffer against lipotoxicity during an excess of free fatty acids (FFAs). EAT produces anti-inflammatory adipokines such as adiponectin and adrenomedullin, which have anti-atherosclerotic and anti-inflammatory properties [5]. The fatty acid-binding protein (FABP4), highly expressed in EAT, is involved in the intracellular transport of fatty acids from EAT to the myocardium. [3,7]

It is believed that EAT provides a direct heat source for the myocardium and protects the heart during adverse hemodynamic conditions such as ischemia or hypoxia. Recent studies have shown that EAT exhibits characteristics of beige fat and expresses uncoupling protein 1 (UCP-1) at both the mRNA and protein levels [2,3,26]. Magnetic Resonance Imaging (MRI) is a powerful tool used to measure the volume of epicardial adipose tissue (EAT) in two projections: the transverse four-chamber view and the short-axis view of the heart. The EAT volume is calculated by adding the measured EAT in both the long and short axes. MRI allows for the characterization of EAT either by linear thickness in different sections of the myocardium or by total volume. Several studies have used MRI to measure the linear thickness of EAT in the atrioventricular groove, which is the area of greatest accumulation of EAT. Measurements on MRI images are typically performed at the end of diastole in a horizontal slice along the long axis of the heart. The thickness of the EAT is defined at the site of maximum fat accumulation from the myocardium perpendicular to the pericardium. Additionally, lipid content within the myocardium can be measured using proton magnetic resonance spectroscopy (1H-MRS). [12,13,25]

The modification of epicardial adipose tissue (EAT) thickness through weight loss and pharmacological treatments holds therapeutic value in cardiovascular diseases, type 2 diabetes, and metabolic syndrome. EAT represents a measurable and modifiable potential therapeutic target, which correlates with visceral obesity. The use of transthoracic echocardiography (EchoCG) to measure EAT is an economically efficient, easily accessible, accurate, and reproducible method that can be considered in evaluating cardiovascular risk. Visualization of EAT could one day serve as a useful diagnostic tool for risk stratification of metabolic syndrome and its associated conditions, including sleep apnea, atrial fibrillation, stroke, dementia, various cancers, and osteoporosis. [22,23,24]

Visceral fat in fat depots can be detected using various imaging techniques. However, the absence of non-invasive methods to quantitatively determine visceral fat mass in vivo remains one of the challenges in research. There is a need for the development of new imaging methods focused on biomarkers that are consistently expressed in visceral fat and optimization of existing approaches for clinical applications. [16,18]

Coronary artery disease (CAD), a leading cause of morbidity and mortality worldwide, involves the progressive narrowing or complete occlusion of the coronary arteries due to the accumulation of atherosclerotic plaques. These plaques, composed of cholesterol, fat, and other substances, can lead to a reduction in blood flow to the heart muscle, resulting in ischemia. Ischemia can cause severe clinical outcomes, including myocardial infarction (heart attack), heart failure, and arrhythmias, all of which represent significant public health concerns. The pathogenesis of CAD is multifactorial, with genetic, environmental, and lifestyle factors contributing to the development of atherosclerosis. Among these, obesity—especially visceral fat accumulation—has been increasingly identified as a major modifiable risk factor for CAD. Elevated visceral fat levels have been shown to contribute to endothelial dysfunction, increased blood pressure, dyslipidemia, and the promotion of atherogenesis, which accelerates the onset and progression of CAD. [5,19,20,27]

Magnetic Resonance Imaging (MRI) has gained recognition as a highly effective, non-invasive imaging modality for the assessment of both visceral adiposity and coronary artery health. MRI offers high-resolution imaging capabilities that allow for the precise quantification of visceral fat volume and the visualization of coronary artery structure and patency. Unlike other imaging techniques such as computed tomography (CT) or X-ray, MRI does not involve ionizing radiation, making it a safer option for repeated assessments. Additionally, MRI's ability to provide both functional and structural information makes it an ideal tool for evaluating the interplay between visceral fat and coronary artery disease. Recent advancements in MRI technology, such as improved cardiac MRI and magnetic resonance angiography (MRA), have further enhanced its role in both the diagnosis and prognosis of CAD, particularly in patients with obesity [2,9,10,11]

The growing body of evidence linking visceral obesity to the pathophysiology of CAD has highlighted the need for early detection and management of visceral fat accumulation to mitigate the risk of cardiovascular events. MRI, with its detailed imaging capabilities, holds significant promise in both clinical and research settings for the evaluation of this relationship, providing valuable insights into how visceral fat influences the development of coronary artery disease[2,14,15]. As the global burden of obesity continues to rise, the importance of understanding the mechanisms by which visceral fat contributes to cardiovascular risk cannot be overstated. MRI's ability to monitor and assess these mechanisms offers a critical avenue for improving the prevention, diagnosis, and management of CAD in obese populations.

Materials and methods

The study involved 83 patients, with an average age of 60.8 ± 7.1 years. All participants were diagnosed with coronary artery disease and were evaluated for visceral obesity using various diagnostic methods. The study design included the following steps:

1
Patient Recruitment

The patients included in the study were selected based on their diagnosis of coronary artery disease, as confirmed through clinical examination and coronary angiography. Patients with other significant comorbidities or those who had undergone previous cardiovascular surgeries were excluded from the study.

2
Medical History and Clinical Examination

Each patient's medical history was reviewed to assess for risk factors such as hypertension, diabetes, smoking, and family history of cardiovascular diseases. A thorough clinical examination was conducted to evaluate the severity of symptoms and the presence of other health issues.

3
Anthropometric Measurements

The patients' height, weight, waist, and hip circumferences were measured. The body mass index (BMI) was calculated using the Ketle formula to assess the degree of obesity.

4
MRI Procedure

Each patient underwent a heart MRI to evaluate the state of the coronary arteries, including the presence of plaques and calcifications. MRI images were analyzed by experienced radiologists who assessed the coronary arteries and the distribution of visceral fat.

5
Coronary Angiography

All participants underwent coronary angiography, which is the gold standard for diagnosing CAD. This procedure involves injecting a contrast dye into the coronary arteries and taking X-ray images to visualize the blood vessels and detect any blockages or narrowing.

6
Statistical Analysis

The data collected from patient evaluations, including MRI findings, anthropometric measurements, and angiography results, were analyzed using Microsoft Excel. Statistical tests were applied to identify significant correlations between visceral obesity and coronary artery disease.

Results

The results of the study indicate a strong association between obesity, particularly visceral obesity, and the severity of coronary artery disease (CAD) in the participants.
The average Body Mass Index (BMI) of the patients was 32.1 ± 3.5 kg/m^2, categorizing the majority as obese according to standard BMI classifications. This highlights that obesity, especially abdominal fat accumulation, is prevalent in this cohort. The presence of coronary artery disease was confirmed in all patients, with an average

diagnosis duration of 10.8 ± 5.4 years, suggesting that these patients had been living with the disease for a significant period, potentially contributing to the progression and worsening of their condition.

Visceral obesity, assessed using the waist-to-hip ratio, was present in 93.9% of the patients. This finding underscores the critical role of abdominal fat in the development and progression of cardiovascular diseases, aligning with existing literature that links visceral fat with higher risks of coronary events, including heart attacks and strokes.

Coronary angiography revealed that all patients had coronary artery stenosis, characterized by the narrowing of the arteries due to atherosclerotic plaque buildup. Furthermore, 80.7% of patients showed signs of coronary calcification, a condition where calcium deposits accumulate in the coronary arteries, further exacerbating the narrowing of these vessels. This suggests that not only was there significant atherosclerotic plaque buildup, but there was also a calcification process occurring, which is a known indicator of advanced coronary artery disease and increased risk of adverse cardiovascular events.

The correlation analysis provided further insight into the relationship between visceral obesity and the severity of coronary artery disease. A significant positive correlation was found between visceral obesity and both atherosclerotic plaque stenosis (correlation coefficient = 0.21, $p = 0.0084$) and coronary calcification (correlation coefficient = 0.24, $p = 0.0029$). These findings suggest that as the level of visceral obesity increases, there is a corresponding increase in the severity of coronary artery disease, with higher degrees of fat accumulation contributing to greater arterial narrowing and calcification.

The results of this study provide compelling evidence of the detrimental impact of visceral obesity on the progression of coronary artery disease. The association between increased visceral fat and the severity of atherosclerotic plaque buildup and coronary calcification underscores the importance of addressing obesity, particularly abdominal fat, as a key modifiable risk factor in preventing and managing cardiovascular diseases. These findings also highlight the need for early intervention and targeted therapies aimed at reducing visceral obesity to potentially mitigate the progression of coronary artery disease and improve patient outcomes.

Discussion

The findings of this study emphasize the critical role that visceral obesity plays in the progression of coronary artery disease. Visceral fat is known to contribute to systemic inflammation, insulin resistance, and increased levels of harmful cholesterol, all of which accelerate the development of atherosclerosis. As the amount of visceral fat increases, it likely exacerbates the narrowing of the coronary arteries and promotes the buildup of calcified plaques, making the heart more susceptible to ischemic events. Magnetic resonance imaging (MRI) proved to be an invaluable tool in assessing both visceral obesity and the condition of the coronary arteries. Unlike traditional methods such as computed tomography (CT) or X-rays, MRI offers superior soft tissue contrast and does not involve radiation, making it a safer and more precise diagnostic option. MRI allowed for accurate quantification of visceral fat, which has direct implications for patient management and treatment planning. Coronary calcification, detected in a substantial proportion of patients, is another important finding of this study. Calcified plaques in the coronary arteries are often indicative of advanced atherosclerosis and can lead to an increased risk of cardiovascular events, including myocardial infarction. The high prevalence of coronary calcification in this cohort suggests that the presence of visceral obesity may be a significant contributor to the progression of coronary artery disease in obese individuals.

Conclusion

This study underscores the significance of evaluating visceral obesity in patients diagnosed with coronary artery disease (CAD), as it is strongly linked to the progression and severity of atherosclerosis and coronary calcification. The use of Magnetic Resonance Imaging (MRI) provides an effective, non-invasive tool for assessing visceral fat, offering detailed insights into both fat distribution and overall cardiovascular health. This approach can greatly enhance diagnostic accuracy and enable more effective management of CAD, ensuring better outcomes for patients.

Considering the robust connection between visceral obesity and cardiovascular diseases, it is crucial for healthcare professionals to prioritize the management of obesity as a primary risk factor in patients with CAD. Effective interventions aimed at reducing visceral fat, which include comprehensive lifestyle modifications—such as improvements in diet, regular physical activity, and weight loss—along with appropriate pharmacological treatments, should be integrated into the holistic care approach. Such a strategy is essential for mitigating the risk of further cardiovascular complications and improving the overall health and quality of life for individuals suffering from coronary artery disease.

Recommendations

1. Early Screening: Healthcare providers should routinely screen for visceral obesity in patients at risk for coronary artery disease, particularly those with other risk factors such as hypertension, diabetes, or a family history of cardiovascular disease.
2. Utilization of MRI: Magnetic resonance imaging should be considered as a primary

diagnostic tool for assessing visceral obesity and coronary artery health, especially in patients with obesity who are at high risk for cardiovascular diseases.

3. Integrated Treatment Approaches: A multi-faceted approach that includes dietary modifications, physical activity, weight management, and pharmacological interventions should be implemented to manage both obesity and coronary artery disease effectively.

4. Further Research: Additional studies with larger sample sizes and diverse populations are needed to further explore the relationship between visceral obesity and cardiovascular health and to refine treatment strategies.

References

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