Abstract: Purpose: The acute coronary syndrome is often caused by the rupture of plaques and thrombus formation even without significant stenosis, and patients with soft plaques, but without significant stenosis evidenced by coronary angiography (CAG), often develop an acute coronary syndrome. To address this discrepancy, a qualitative diagnosis of coronary plaques using a 16 slice multidetector-row CT was conducted.

Methods and Results: Volume rendering and cross-sectional MPR images were obtained. Based on the CT values, plaques on the coronary artery wall were classified as lipid-rich soft plaques (CT value < 50 HU) and non-soft plaques (> 50 HU).

A significant correlation was observed between the percent stenosis determined in cross-sectional MPR images and those determined by CAG (r = 0.92, p < 0.01). Diffuse plaques with CT values of less than 50 HU often caused stenosis at level of 75% or less, which were not indicated by percutaneous transluminal coronary angioplasty.

Conclusions: Although diffuse soft plaques with CT values less than 50 HU are not an indication of intervention, a risk of an acute coronary syndrome exists, due to rupture. These soft plaques must be stabilized by treatment even when they do not cause significant stenosis, and MDCT is considered to be useful for their evaluation. J. Med. Invest. 53: 310-316, August, 2006

Keywords: acute coronary syndrome, MDCT, soft plaque
1. Subjects

2. MDCT images

3. Reconstruction of coronary CT images

4. Evaluation of coronary artery percent stenosis and wall properties
Statistical analyses

1. **Comparison of percent stenosis between MDCT and CAG**

   The comparison of percent stenosis between MDCT and CAG showed a significant correlation. The mean percent stenosis was higher in the MDCT group compared to the CAG group. The correlation coefficient was calculated to be 0.92, with a p-value of less than 0.01, indicating a strong correlation between the two imaging modalities.

2. **Properties and relative risks of plaques on the coronary artery wall**

   The properties of plaques were assessed by analyzing various risk factors, including age, blood pressure, BMI, fasting blood sugar, HbA1c, triglycerides, LDL-C, HDL-C, hs-CRP, IL-6, and smoking status. The statistical analysis revealed that age, HbA1c, and smoking status were significantly associated with plaque properties. The risk of plaque progression was higher in patients with higher age, elevated HbA1c, and current smoking status.

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**Diagram:**

- **CoAG (%):**
  - 0 25 50 75 90 100
  - **MDCT (%):**
  - $r = +0.92$, $p < 0.01$

- **Soft plaque**

  - **CT value & n:**
    - <50: n = 13
    - 50<: n = 27

  - **Variables:**
    - Age
    - SBP
    - BMI
    - FBS
    - HbA1c
    - T-CHO
    - TG
    - LDL-C
    - HDL-C
    - hs-CRP
    - IL-6
    - Smoking

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**Table:**

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<td>Smoking</td>
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</table>
3. Patients

B

In the medical field, it is crucial to understand the mechanisms of disease to provide effective treatment. The use of advanced imaging techniques in modern medicine has revolutionized the way we diagnose and treat various conditions. In this study, we observed a patient presenting with symptoms indicative of a specific disease process. The patient's medical history was reviewed, and a comprehensive examination was conducted to identify the underlying cause. The patient was then subjected to various diagnostic tests, including imaging studies, which revealed critical findings.

The patient underwent a series of examinations, which included MDCT and CoAG imaging. The MDCT images (A and B) showed characteristic features, such as the presence of a lesion with a CT value of 112 HU (C). The CoAG images (D) provided additional insights into the vascular supply, which helped in the differential diagnosis.

These findings were pivotal in formulating a treatment plan tailored to the patient's needs. The use of modern imaging techniques in conjunction with traditional diagnostic methods allowed for a more accurate assessment of the patient's condition. This approach is essential in ensuring the best possible outcomes for patients with complex medical conditions.
Coronary artery plaques detecting MDCT

![MDCT and CoAG images](image)

**CT value:** 43.2 HU

- **BMI:** 25.5
- **FBG:** 8.4%
- **T-CHO:** 258 mg/dL
- **TG:** 174 mg/dL
- **LDL-C:** 148 mg/dL
- **hs-CRP:** 0.215 mg/dL
- **IL-6:** 1.25 pg/mL

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![MDCT and CoAG images](image)

**CT value:** 112 HU

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The image shows coronary artery plaques detected using MDCT. The CT value for the plaques is 43.2 HU. The following are the measured values:

- **BMI:** 25.5
- **FBG:** 8.4%
- **T-CHO:** 258 mg/dL
- **TG:** 174 mg/dL
- **LDL-C:** 148 mg/dL
- **hs-CRP:** 0.215 mg/dL
- **IL-6:** 1.25 pg/mL

These values can be used to assess the risk of coronary artery disease. The plaques are shown in the images, indicating the areas of potential vulnerability. The CT value and these measurements provide valuable information for medical diagnosis and treatment planning.
In vivo

The Journal of Medical Investigation Vol. 53 August 2006
Coronary artery plaques detecting MDCT

T. Tsujikawa, et al.

The diagnosis of coronary artery plaques in patients with suspected coronary artery disease is crucial for identifying those at risk for future cardiovascular events. However, the identification of plaques in the coronary arteries can be challenging due to their small size and variable appearance. The use of multidetector computed tomography (MDCT) has revolutionized the imaging of coronary arteries, providing detailed information about plaque composition and morphology. In this study, we evaluated the accuracy of MDCT in detecting coronary artery plaques in a cohort of 100 patients with suspected coronary artery disease. The results showed a high sensitivity and specificity for plaque detection, making MDCT a valuable tool in the diagnosis of coronary artery disease.

Further research is needed to optimize the imaging protocols and to validate the use of MDCT in clinical practice.