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## Acute coronary syndrome in young patients: frequency, mechanisms and clinical outcomes following percutaneous coronary intervention

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**Introduction:** Acute coronary syndromes (ACS) mainly affect older patients and little is known on the frequency, the underlying causes and outcomes following ACS in young.

**Purpose:** To investigate the frequency, mechanisms and clinical outcomes of young patients suffering from ACS and undergoing percutaneous coronary intervention (PCI).

**Methods:** Between February 2009 and December 2016, 6720 consecutive patients undergoing PCI for an ACS were prospectively enrolled. We defined young patients as male <45 years or female <50 years. The primary endpoint was the patient-oriented composite endpoint (POCE) defined as the composite of all-cause death, myocardial infarction or any revascularization at 12 months. The mechanisms of ACS in young patients (atherosclerotic vs. embolic vs. spontaneous coronary artery dissection) were retrospectively assessed by an adjudication committee based on clinical and angiographic criteria.

**Results:** Among 6720 ACS patients, 378 (5.6%) patients were young (41±5 years, 73% male). Young patients, as compared to old patients, presented more frequently with STEMI (64% vs. 45%;  $p<0.001$ ) and single vessel disease (85% vs. 74%;  $p<0.001$ ). Cardiovascular risk factors were more frequent in young patients including BMI>30 kg/m<sup>2</sup> (34% vs. 22%;  $p<0.001$ ), smoking (68% vs. 31%;  $p<0.001$ ), positive family history of coronary artery disease (35% vs. 23%;  $p<0.001$ ) and baseline LDL-C levels (3.3±1.1 mmol/l vs. 2.9±1.1 mmol/l;  $p<0.001$ ). Diabetes mellitus was less

frequent in the young patient group (10% vs. 21%;  $p<0.001$ ). The mechanisms of ACS in young patients were atherosclerotic in 87%, coronary embolism in 9%, and spontaneous coronary artery dissection in 4%. At 12 months, the primary endpoint POCE occurred less frequently in young patients (9.3% vs. 17%; HR 0.52, 95% CI 0.37–0.73;  $p<0.001$ ). The rates of the individual components of the primary endpoint were lower in young patients including all-cause death (3.4% vs. 9.4%; HR 0.36, 95% CI 0.21–0.62;  $p<0.001$ ), myocardial infarction (1.9% vs. 3.7%; HR 0.48, 95% CI 0.22–1.01;  $p=0.053$ ) and any revascularization (5.6% vs. 7.7%; HR 0.68, 95% CI 0.44–1.05;  $p=0.083$ ). Young patients with coronary embolism or spontaneous coronary artery dissection had a higher rate of cardiac death at 12 months as compared to young patients with atherosclerotic disease (embolic vs. atherosclerotic: 9.4% vs. 2.2%; HR 4.3, 95% CI 1.11–16.71;  $p=0.02$ ; spontaneous coronary artery dissection vs. atherosclerotic: 17.6% vs. 2.2%; HR 8.1, 95% CI 2.1–31.1;  $p<0.001$ ).

**Conclusions:** Approximately one out of 20 ACS patients undergoing PCI was young and the main presumed mechanism of ACS was atherosclerosis (87%) followed by coronary embolism (9%) and spontaneous coronary artery dissection (4%). While young ACS patients carry a lower risk for future cardiovascular events as compared with older patients, the high cardiac death rates following embolic disease or spontaneous coronary artery dissections deserves particular attention.