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Original Article

Prevalence of left and balanced coronary arterial dominance decreases with increasing age of patients at autopsy. A postmortem coronary angiograms study

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ABSTRACT

Background: In patients presenting with an acute coronary syndrome, left over right coronary dominance appears to be independently associated with increased long-term mortality. This could lead to decreasing numbers of patients with a left dominant coronary artery system in older age groups.
Methods: We assessed the type of coronary dominance in different age groups in postmortem angiograms that were routinely performed at autopsy between 1993 and 2007. Coronary dominance was determined by identifying the origin of the posterior descending artery and posterolateral branches on postmortem angiography. Age, gender, and cause of death were recorded from the autopsy database. The prevalence of left dominant, right dominant, and codominant systems was determined in three increasing age categories, with cutoffs based on tertiles.
Results: A total 1620 coronary angiograms were assessed; 167 were excluded because it was not possible to determine coronary dominance. The median age of all patients was 71 years; 56% were male. Of all deaths, 40% were classified as cardiac. Regarding coronary dominance, 81.2% was right, 9.1% was left, and 9.7% was codominant. Overall, a decrease in prevalence of left and codominant coronary systems was observed with increasing age in the three age cohorts (≤63years, 64–75 years, and ≥76 years) (P=.001 for overall comparison).
Conclusions: In this large autopsy cohort, the prevalence of a left dominant or codominant coronary system decreased with increasing age. These findings could relate to a slightly higher risk of mortality in case of left versus right coronary artery occlusion.

1. Introduction

Anatomical coronary dominance is defined by the origin of the posterior descending artery (PDA). Left coronary dominance has been shown to be associated with aortic valve disorders in multiple studies [1–4]. More recently, the relation between arterial dominance and coronary artery disease (CAD) has been described, including the severity of CAD and prognosis after an acute coronary syndrome [5–7]. In patients presenting with acute coronary syndrome, left coronary dominance was independently associated with increased long-term mortality This could imply that, on the long term, there will be a relative decrease of patients with left arterial dominance in the population. The aim of the current study was to investigate the type of coronary dominance (either left, right or balanced) in three age groups of increasing age. For this purpose, we retrospectively screened the postmortem angiograms of a large cohort of autopsied patients.

2. Materials and methods

2.1. Study population and data collection

All autopsies performed between 1993 and 2007 at the Department of Pathology of Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands, were reviewed. Postmortem coronary angiography is routinely performed in all adult patients, with some exclusion criteria such as infectious disease (HIV, hepatitis B, Creutzfeldt–Jacob disease), endocarditis, aortic root surgery, and autopsies performed during the weekends or night services. Permission for autopsy was obtained from relatives of the deceased in all cases. Cases in which prior coronary artery bypass grafting (CABG)

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made it impossible to properly assess coronary dominance were also excluded. Age, gender, and cause of death were collected from the autopsy report in each included case. Causes of death were categorized as cardiac, vascular, and noncardiovascular [8].

2.2. Coronary angiography

Coronary angiography is performed immediately after removal of the heart at autopsy. Of all hearts, three X-rays are made, according to a standard protocol using a barium solution which is injected in the coronary arteries under physiological pressure (100 mmHg). First, a blank X-ray is made. The second X-ray shows the right coronary artery (RCA) that is inflated through the right coronary ostium. The third X-ray shows additional inflation of the left coronary artery through the left coronary ostium, thus visualizing the entire coronary artery tree. All photos are taken in the anteroposterior view position.

2.3. Assessment of coronary artery dominance

Right coronary dominance was determined by assessing whether the RCA supplied the PDA and posterolateral branches. In cases where the left circumflex artery (LCX) supplied the PDA and posterolateral branches, it was classified as left coronary dominance. The coronary system was classified as codominant (or balanced) in the case of the RCA giving rise to branching off a PDA and the LCX simultaneously branching off large posterior branches or both arteries branching off a PDA. Examples of the dominance patterns are shown in Figs. 1 and 2. All coronary angiograms were assessed by two of four investigators

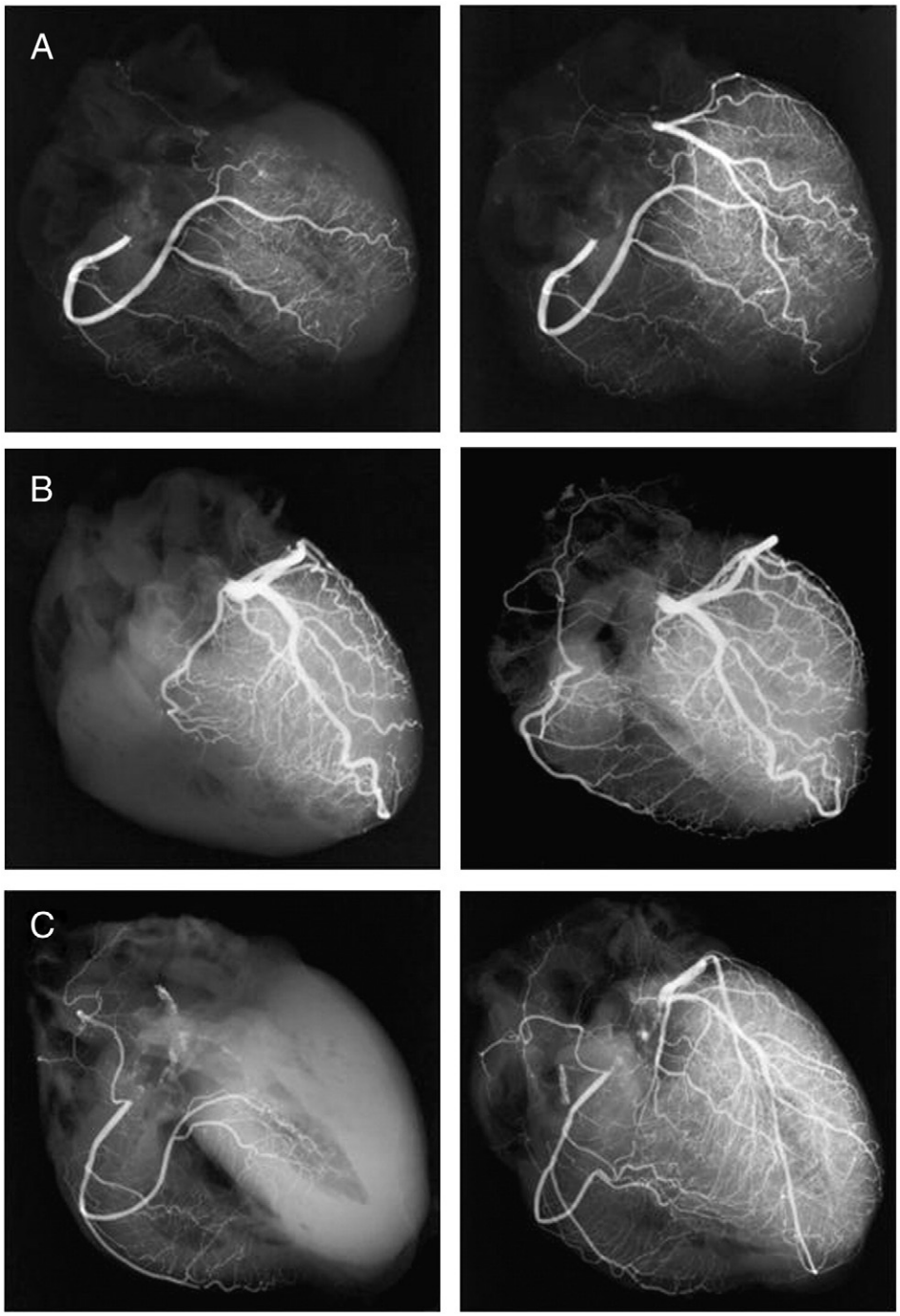

Fig. 1. Dominance patterns on postmortem coronary angiography. (A) Right dominant system. (B) Left dominant system. (C) Codominant.