Case report - Coronary

The comparison of angiographic lesions and clinical outcomes in identical twins

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Abstract

Both genetic and environmental factors are involved in the development of coronary artery disease (CAD). The degree of contribution of each individual risk factor on CAD is unknown. The extent to which the familial occurrence of coronary heart disease is due to genetic mechanisms can be assessed in twins. In our opinion, due to the chance of mortality risk in monozygotic twin being about 20 times higher than for a representative individual in the overall population, and 3.2- to six-fold higher than for the dizygotic twin of a patient with myocardial infarction, aggressive cardiac evaluation is essential for the asymptomatic twin especially if symptomatic pair’s lesion is critical. This report describes similar coronary angiographic findings of identical twins with different coronary risk factors. They both underwent coronary bypass revascularization and had similar uneventful postoperative follow-up.

Contrary to most of the opinions in some of the studies, it is shown that coronary circulation might be different, such as dominance of the left or right coronary artery even when the patients are identical twins. These researchers believed that the development of coronary arterial branches might be independent of genetic influences [1, 3]. Most of the research leading to an understanding of the genetic factors underlying coronary heart disease has focused on the genetic variability of quantitative traits associated with the disease [4–6]. But on the other hand, we cannot ignore the possibility that identical twins share more environmental risk factors, such as dietary variables and physical activity, than the normal population. The best way to overcome this problem can be achieved by investigating the twins who have different coronary risk factors. In our study, in spite of the twins having different coronary risk factors such as smoking and different cholesterol levels, localization and the characteristics of the lesion were in excellent concordance on coronary angiographic studies. In our opinion, it strongly suggests that genetic mechanism is highly related not only the development of coronary artery anatomy but also on occurrence of atherosclerotic lesions in close similar regions.

Keywords: Twins; Coronary artery disease; Coronary angiography

1. Case report

Twin A was a 62-year-old man who had been suffering from angina on effort for six months. He had some coronary risk factors such as hypercholesterolemia, obesity (Body Mass Index–BMI: 33.6 kg/m²) and active smoking for 20 years (1 box/day). He was not suffering from hypertension or diabetes mellitus. Coronary angiographic studies revealed 80% narrowing in the proximal segment of the left anterior descending artery (LAD) and 70% stenosis in the first marginal branch of the circumflex artery. RCA was occluded at midportion just before a large right ventricular free wall branch (Fig. 1). Twin A had undergone triple coronary artery bypass grafting including left internal mammary artery (LIMA) to LAD and two saphenous vein grafts to RCA and marginal branch of the circumflex artery. His postoperative period was uneventful and he was discharged from hospital on the sixth day after surgery.

Twin B was nearly asymptomatic but just had been suffering from non-specific anginal symptoms on excessive effort that is not supposed to cardiac origin. He was obese like his brother (BMI: 33.8 kg/m²) but he had no other coronary risk factors such as hypercholesterolemia, smoking, hypertension or diabetes mellitus. He desired an evaluation with coronary angiography after his brother’s history of CAD and coronary bypass procedure. Side-by-side comparison of angiograms revealed the close similarity in location and characteristics of lesions in the two brothers (Figs. 1 and 2). Twin B also underwent three-vessel coronary revascularization as LIMA to LAD, saphenous vein grafts to RCA and marginal branch of the circumflex artery. He was discharged from hospital after the sixth day of operation without any complication.

2. Discussion

Many of the genetic mechanisms that predispose people to coronary heart disease remain unknown [1, 2]. Contrary to most of the opinions in some of the studies, it is shown that coronary circulation might be different, such as dominance of the left or right coronary artery even when the patients are identical twins. These researchers believed that the development of coronary arterial branches might be independent of genetic influences [1, 3]. Most of the research leading to an understanding of the genetic factors underlying coronary heart disease has focused on the genetic variability of quantitative traits associated with the disease [4–6]. But on the other hand, we cannot ignore the possibility that identical twins share more environmental risk factors, such as dietary variables and physical activity, than the normal population. The best way to overcome this problem can be achieved by investigating the twins who have different coronary risk factors. In our study, in spite of the twins having different coronary risk factors such as smoking and different cholesterol levels, localization and the characteristics of the lesion were in excellent concordance on coronary angiographic studies. In our opinion, it strongly suggests that genetic mechanism is highly related not only the development of coronary artery anatomy but also on occurrence of atherosclerotic lesions in close similar regions.

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As a conclusion, for clinicians caring for identical twins, these observations emphasize the importance of maintaining a high index of suspicion for occult CAD in an asymptomatic twin whose co-twin has documented CAD. Due to the chance of dying from coronary heart disease within 10 years being almost 50% for a 55-year-old man if his monozygotic twin had a fatal myocardial infarction [7], we prefer aggressive cardiac evaluation for the asymptomatic twin, especially if symptomatic pair’s lesion is critical as was the case in our patient. But obviously further studies with larger numbers of twin pairs are needed to confirm the diagnostic and treatment strategies by means of formal statistical analysis on this subject, even if it is very rare to encounter for a clinician with these kind of patients.

References