Sharp Chest Pains Occurring During Right Ventricular Biopsy in a Patient 9 Years After Cardiac Transplant

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Abstract

Objectives: **The goal of this case report is to discuss the possible cause of sharp chest pain occurring during myocardial biopsy in post cardiac transplant patients.**

Materials and Methods: **A 21-year-old man who had undergone a heart transplant 9 years earlier presented with fatigue. He underwent right ventricular biopsy for further evaluation.**

Results: **During each of his 3 biopsies, he complained of severe sharp chest pain. His chest pain occurred only during biopsy and not when he had premature ventricular contraction during catheter manipulation.**

Conclusions: **The occurrence of sharp chest pain during myocardial biopsy in this patient may suggest somatic innervation of the donor heart.**

Key words: *Posttransplant chest pain, Transplant vasculopathy, Somatic innervation, Biopsy*

Case Report

The patient was a 21-year-old man who had undergone a heart transplant 9 years earlier for a failed Fontan procedure. He complained of fatigue that had developed a few months before he presented to our service. He was referred for cardiac catheterization and biopsy for further evaluation. We used right femoral artery and vein for the procedure. He had normal pulmonary arterial pressures (a pulmonary systolic pressure of 32 mm Hg and pulmonary diastolic pressure of 12 mm Hg). His wedge pressure was 12 mm Hg, and his cardiac output was 6.03 L/min. After his right heart catheterization, we performed 3 right ventricular biopsies using an 8 French Mullins sheath and a bioptome. The patient complained about severe sharp chest pain, which resolved after a few seconds, during each biopsy. Catheter induced premature ventricular contractions did not trigger any symptoms. The results of coronary angiography and intravascular ultrasonography were within normal limits. The biopsy results revealed no rejection. The patient remained hemodynamically stable without evidence of perforation and was free of chest pain few seconds later after his last biopsy.

Discussion

A heart transplant involves the removal of a diseased heart and its replacement with a donor heart that has been functionally denervated and isolated from the recipient nervous system. The cardiac sensory nervous system moderates pain perception, and sensory signals are conducted through cardiac afferents, primarily thinly myelinated A -fibers and unmyelinated C-fibers that project to the upper thoracic dorsal horn via dorsal root ganglia. Cardiac pain is usually a referred pain that is distributed by the thoracic nerves and is not a localized sharp pain. Dennervation causes several alterations in cardiac physiology, such as the inability to experience pain during myocardial ischemia. That is the main reason for which most patients with transplant allograft vasculopathy do not present with angina pectoris. In such patients, angina is absent because of the interruption of the ventricular sympathetic afferents that usually transmit cardiac pain. However, many reports present convincing evidence of the cardiac reinnervation in some patients who present with

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angina pectoris after having undergone a heart transplant. (1) Because ischemia activates the ventricular sympathetic receptor that transmits pain, the occurrence of angina associated with wall-motion abnormalities supports the presence of reinnervation. Akosah and colleagues (1) also found that the time since transplant is an important predictor of ischemia-induced angina.

Radiolabeled norepinephrine kinetics and functional markers of sympathetic nerve integrity have been used to document the partial restoration of cardiac sympathetic nerve function in humans after a heart transplant (2-5). Sympathetic re-innervation in the long term may account for the occurrence of angina in cardiac transplant recipients. A report on a series of chest pain cases in cardiac transplant patients demonstrated that reinnervation in the cardiac allograft is essential for eliciting pain after transplant (6). However, posttransplant cardiac autonomic reinnervation should not be the reason for the sharp pain that our patient experienced during biopsy. He complained of severe sharp chest pain during each of his 3 right ventricular biopsies. Those biopsy specimens were taken from 3 different sites. The localized sharp chest pain in our patient suggests possible somatic innervation of his myocardium.

To our knowledge, the occurrence of sharp chest pain during cardiac biopsy in a patient who has undergone a heart transplant has not been reported previously. We have no definitive answer for the cause of this occurrence. We suspect that in our patient, myocardial reinnervation with somatic nerve fibers may have occurred. Pericardial somatic innervation is the cause of sharp chest pain occurring in patients with pericarditis. Therefore, pericardial reinnervation involving the deep penetration of somatic fibers after transplant may explain our patient's sharp chest pain at biopsy sites near the pericardial surface. The somatic motor axon innervation of autonomic neurons in the frog heart suggests that cross-innervation can occur; an event that might explain the pain in our patient (7) warranting further investigation.

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