

First in Man: Amniotic Patch Reduces Postoperative Inflammation



To the Editor:

New-onset postoperative atrial fibrillation is noted in approximately 27% to 40% of patients after open heart surgical procedures.¹ Multiple comorbidities can arise from new-onset postoperative atrial fibrillation,

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including embolic phenomena, hemodynamic abnormalities, ventricular arrhythmias, and higher mortality rates. Although the pathophysiology of new-onset postoperative atrial fibrillation is multifactorial, inflammatory markers and mediators have been linked to the presence of atrial fibrillation. These markers may confer a prothrombotic state by promoting endothelial damage, endothelial dysfunction, and platelet activation in patients with atrial fibrillation, thus linking inflammation and thrombosis.² This leads us to explore new areas of treatment aiming to decrease postoperative inflammation to diminish new-onset postoperative atrial fibrillation. It has been shown that extracellular matrix modulates inflammatory responses during myocardial infarction.³ Furthermore, a specific type of extracellular matrix consisting of human amniotic membrane which is denuded of stem cells has demonstrated the ability to significantly reduce postischemic cardiac dysfunction and improve

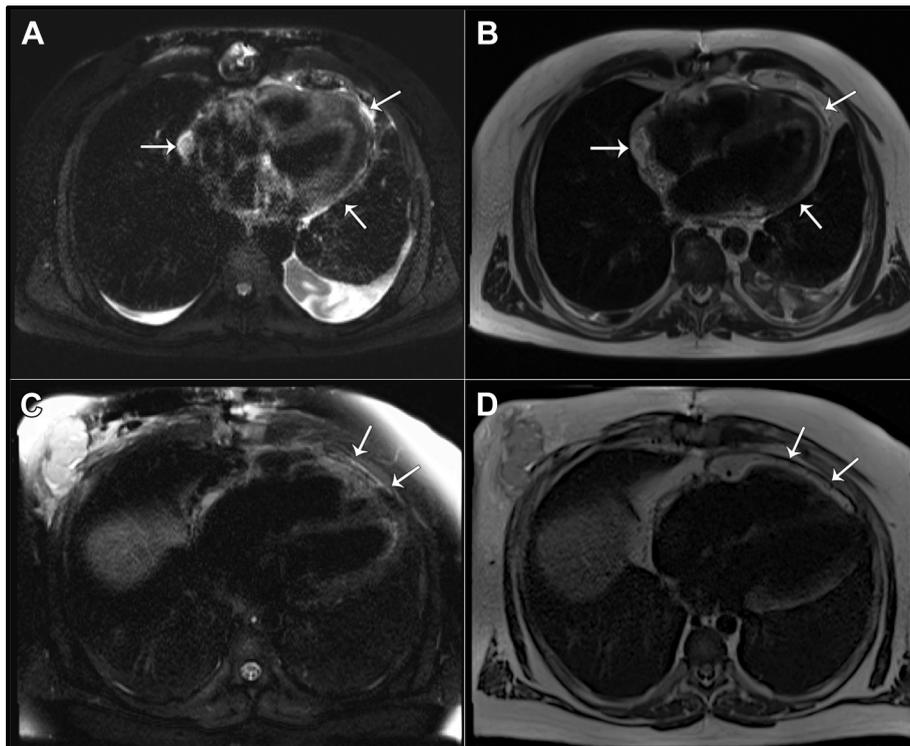


Figure 1 T2-weighted magnetic resonance images obtained on postoperative day 6 of the 56-year-old patient who did not receive an amniotic membrane patch (**A, B**) and the 24-year-old patient who did receive an amniotic membrane patch perioperatively (**C, D**). **A, C**, with fat suppression. **B, D**, without fat suppression to localize edema. *Arrows* indicate areas of extensive (**A, B**) or minimal (**C, D**) postsurgical inflammatory pericardial edema.

ischemic heart repair and blood flow recovery in rat and mouse models.^{4,5} Because similar damage occurs in patients undergoing cardiac surgical procedures, it was predicted that placing an amniotic membrane patch on the epicardial surface would provide an intact scaffold for cells to remodel various tissues after cardiac surgery. The amniotic membrane patch also was expected to decrease inflammation, and in turn decrease postoperative atrial fibrillation.

To explore this hypothesis, we compared 2 patients who underwent cardiac surgery with and without amniotic membrane patch placement. The first patient, who did not receive an amniotic membrane patch, was a 56-year-old man with coronary artery disease who had undergone coronary artery bypass grafting 3 times. Axial T2-weighted magnetic resonance imaging acquired 6 days postoperatively demonstrated extensive increased T2 signal throughout the pericardium and a small pericardial effusion consistent with postsurgical inflammatory pericardial edema (**Figure 1A**). A T2-weighted image without fat suppression was provided to localize edema with anatomic structures, including the pericardium and epicardial fat (**Figure 1B**). The second patient, treated with the amniotic membrane patch, was a 24-year-old man with constrictive pericarditis related to prior cardiac transplantation. He was treated with surgical pericardial stripping and adhesiolysis followed by placement of the amniotic membrane patch. Axial T2-weighted magnetic resonance imaging acquired 6 days postoperatively demonstrated only a small area of mildly increased T2 signal in the pericardium consistent with minimal postsurgical inflammatory pericardial edema (**Figure 1C**). A T2-weighted image without fat suppression was provided to localize edema with anatomic structures, including the pericardium and epicardial fat (**Figure 1D**). Postoperatively, the 24-year-old patient did not show signs of arrhythmia, including atrial fibrillation, and the 56-year-old man who did not receive the patch developed new-onset postoperative atrial fibrillation. This is the first example in man that suggests the anti-inflammatory properties of amniotic membrane patches

may lead to a decrease of new-onset postoperative atrial fibrillation, which warrants further study.

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