Pulling strings on the mitral valve

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NeoChord rupture near the ventricular apical insertion site.

Central Message

A case of delayed rupture of NeoChords (NeoChord Inc, St Louis Park, Minn) near the insertion site in the left ventricular wall suggests caution to avoid chordal injury during insertion and vigilance for further occurrences.

See Article page e27 in the February 2019 issue.

Heuts and colleagues¹ report a case of rupture at 5 months of all 3 NeoChords (NeoChord Inc, St Louis Park, Minn) placed for mitral repair. The authors hypothesize that absence of the shock-absorbing effect of the papillary muscles or increased length of the chords compared with papillary muscle implantation length potentially led to chordal rupture.

Several series have reported reasonable clinical results using commercially available NeoChord placement in up to 213 patients with follow-up to 1 year.² No chordal rupture has been reported to date in these series or others.

The current report does raise concern that rupture of NeoChords, although not frequent, can occur relatively early after placement. Reports of early and late rupture of standardly placed polytetrafluoroethylene (Gore-Tex, WL Gore & Associates Inc, Flagstaff, Ariz) chords do exist, but the event rate is low and may relate to technical issues injuring the chord during placement or to late calcification. NeoChord failures have been reported as the result of leaflet rupture, rupture of adjacent mitral chords, and change in relative NeoChord length.² Delayed left ventricular apical rupture after NeoChord placement also has been reported.³ The current case suggests that localized trauma occurred to all 3 chords at the time of placement or some mechanical factors concentrated unsustainable stress at the point of ultimate rupture. Animal studies quoted by the authors have noted unusually high peak stresses in chords implanted at the left ventricular apex, and the authors hypothesize that chordal placement away from papillary muscles may increase that stress. NeoChord location on the ventricular wall could also affect stresses and chordal durability.

This report should be a word of caution to avoid potential chordal injury by means such as chordal clamping while tying. If this is not an isolated incident, then further technical modifications such as thicker chordal material or strain relief at the insertion through the ventricular wall

may be warranted. Yet other remaining questions include (1) the ideal number of NeoChords, (2) the ideal ventricular insertion site for NeoChords, and (3) the ideal length adjustment of NeoChords, given the variable changes in left ventricular dimensions once severe mitral regurgitation is ameliorated.

The concept behind placing NeoChords to treat mitral regurgitation does have potential advantages over other technologies. NeoChords can avoid cardiopulmonary bypass, can avoid the stenotic effects of rings and the MitraClip (Abbott, Abbott Park, Ill), can allow active repair adjustment during physiologic conditions, and could handle larger flail gaps between leaflets than feasible with the MitraClip.

Nonetheless, as with any new technology, caution is warranted until a large volume of long-term results are available for the NeoChord. The mitral valve is complex and can be capricious. One must be clever when pulling strings on the mitral valve.

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