Bioprosthetic leaflet perforation associated with suture tails

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Three years after aortic supra-annular valve replacement with a 21-mm Trifecta valve (St Jude Medical, Inc, St Paul, Minn), a 76-year-old man underwent reoperation for progressive paravalvular aortic regurgitation. The explanted valve contained a 1.5-mm perforation at the midportion of the noncoronary cusp (Figure 1) and a 2-mm superficial abrasion at the mid portion of the left coronary cusp (Figure 2). Grossly, this perforation appeared to be in line with the 2-0 polyester braided suture tails (NESPOLEN; Alfresa, Inc, Osaka, Japan), and microscopically, there were no specific changes to the tissue in that area to suggest an etiology for the perforation. The abrasion also appeared to be in line with 1 suture tail. We and St Jude Medical Laboratory agreed that this perforation was caused by continuous trauma of the leaflet against the suture tails.

Trifecta has externally mounted pericardial leaflets around the stent, which provide excellent hemodynamic performance.1 As the leaflet expands over the stent posts during

FIGURE 1. The explanted valve contains a 1.5-mm perforation at the midportion of the noncoronary cusp, which appears to be in line with the suture tails.

FIGURE 2. A, The explanted valve from the outflow view. Cusp 1 corresponds to the left coronary cusp. There is a 2-mm superficially abraded area. Cusp 2 corresponds to the noncoronary cusp, which contains a perforation in the midportion. B, The view from the inflow. There are no specific changes to the tissue of the valve to suggest an etiology for the perforation. SJM, St Jude Medical. (Printed with permission from St Jude Medical, Inc, St Paul, Minn.)
the systolic phase, however, the leaflet easily tends to touch su-
ture remnants, such as overknotted sutures or suture tails that
are too long.2,3 Overknotted sutures should be avoided, and
suture tails should be cut as short as possible, especially
when implanting an externally mounted bioprosthesis.

This report was approved by the institutional ethics com-
mittee of Nagoya Heart Center. Written, informed consent
was obtained from the patient.

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EDITORIAL COMMENTARY

The tail wagging the dog: Attention to detail in
valvular surgery

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Successful valve surgery requires exquisite attention to
detail at all phases of the operation. In aortic valve surgery,
careful debridement of the calcified annulus and appro-
priate sizing of the aortic root are basic techniques taught
to all cardiovascular surgical trainees. Careful placement
of annular sutures is then demonstrated to avoid paravalvu-
lar leaks. Attention to the aortotomy is important while
seating the valve to avoid tearing of the often-friable aorta.
Next, appropriate tension while tying the annular sutures
will avoid “pulling” through the native tissue while at the
same time avoiding suture breakage or worse, a loose
knot leading to an insecure valve. In this issue of the J Thorac Cardiovasc Surg 2016;152:1433-4
Journal, Dr Tamaki and colleagues turn our attention to
an often-overlooked component of the operation: suture
cutting.

The very convincing figures and the early failure of a
Trifecta (St. Jude Medical, Minneapolis, Minn) bioprosthetic point to repetitive trauma from an adjacent suture
tail. A careful review of Figure 1 in the article of Tamaki
and colleagues will demonstrate what we would normally
consider an inappropriately long suture tail. Our trainees
are instructed to cut sutures carefully at the level of the
knot and to avoid tying more than 5 or 6 throws on any given
suture to avoid a potentially dangerous suture tail. This case

report and several personal anecdotes lends evidence to the
prevailing theory that inappropriately long suture tails
either as the result of excessive throws or sutures cut too
long) can cause injury. A similar phenomenon was observed
when PROLENE sutures (Ethicon, Somerville, NJ) were
used to repair degenerative mitral valves (Marc Gillinov,
personal communication). A long tail (necessitated by the
>8 throws needed when tying PROLENE) caused repetitive
injury to a previously normal anterior mitral leaflet leading
to perforation.

The authors also allude to the fact that externally mounted
bioprosthesis such as the Trifecta or the Mitroflow (Liva-
Nova; London, United Kingdom) are more prone to this
form of injury as the cusps open wider during systole and
are therefore more likely to come into contact with annular