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**MITRAL ANNULOPLASTY
RING DEHISCENCE:
OPTIMAL FORCE
DISTRIBUTION WITH
FLEXIBLE RINGS**

To the Editor:

We read with great interest the case report by Pierce and colleagues¹ describing the measurement of suture tension during mitral annuloplasty ring dehiscence in a beating-heart ovine model. In an induced hypercontractile state, they noted a high peak suture tension in the midtrigonal region that abruptly decreased with suture dehiscence. A significant increase in tension was then transferred instantaneously to the adjacent 2 sutures. The notion that ring dehiscence begins with a single point of increased tension that is sequentially distributed along the ring is intuitively appealing. Although this particular observation may have been to the result of misplacement of the culprit suture, the ability to measure the tension at each of the annuloplasty sutures provided an elegant demonstration of this phenomenon.

We (J.R.S., J.A.S.) previously performed an in vitro experimental study comparing the force required for ring dehiscence using combinations of annuloplasty rings (rigid and flexible) and suture techniques (interrupted mattress and a running suture technique).² We demonstrated that a far greater force was required to disrupt flexible rings secured with a single running suture than either type of ring secured with mattress sutures. The mode of failure in the flexible ring-running suture group most often was tissue disruption remote from the annulus rather than ring separation, which was the failure mode when mattress sutures were used.

A deep understanding of mitral valve anatomy and physiologic function, in both normal and pathological states, is now possible as a result of many recent elegant studies. For example, it is well established that the mitral annulus is a highly dynamic, saddle-shaped structure that changes configuration throughout the cardiac cycle.³ It

also has been shown that rigid rings impose mechanical forces on the mitral annulus that are discordant with its anatomy and dynamic motion.⁴ The current report by Pierce and colleagues provides additional verification of this latter observation. Experimental studies are conducted ostensibly to increase our understanding of physiology, and ultimately, to improve clinical practice. The use of rigid annuloplasty rings secured with interrupted sutures remains entrenched in current cardiac surgical technique. Why is this, given the increasing evidence of detrimental physiological effects and relatively high risk of dehiscence?

Lawrie and colleagues⁵ have reported in the *Journal* an extensive experience with mitral valve repair using flexible annuloplasty rings secured with a running polypropylene suture. They have observed no instances of ring dehiscence in more than 1000 consecutive patients. Dr John A. Spratt has had a similar experience in a personal series of nearly 300 patients. More consideration should be given to the use this technique, given the greater fidelity of attachment, capacity for normal annular motion throughout the cardiac cycle, and an improved ability to distribute annular tension.

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