not only with individuals and anatomic regions but also with disease processes, the uniform closure height, although ideal sometimes, must also be relatively ischemic in others. This suggests that even in humans, tolerance of a certain degree of ischemia exists in anastomotic lines. It is important to know, however, in circumstances where blood flow may already be threatened, that attention to staple closure height with respect to bowel wall thickness may help preserve sutureline blood flow.

Inflexibility, a characteristic of all machines, is probably the most notable shortcoming of the stapler. Although staple closure height is adjustable in some instruments, the size and spacing of individual staples are not. A wider choice of diameters of the circular staplers, as well as size and spacing of staples, may enhance its use and reception by the surgical craftsman.

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Discussion

DR. GEORGE H. A. CLOWES, JR. (Boston, Massachusetts): Dr. Chung, I would like to ask you a question as to whether we have any correlation between your observations on blood flow and the actual healing of suture lines in the gut of some animals other than the rat. The rat, unfortunately, is a poor animal to choose for something like this. Since rats have great resistance to infection, all you have to do is be socially clean for the rat to heal.

Secondly, most of us were brought up to believe that the serosa and its inflammatory reaction are of greatest importance in localization of leaks and infection at colonic suture lines. Dr. Ravitch's experiments some years ago in which he placed a rubber dam around a suture line and got a large percentage of breakdown showed the importance of the adjacent tissue to walling off infection at the suture lines.

Do I quote you correctly on that? Dr. Ravitch is going to respond.

DR. MARK M. RAVITCH (Pittsburgh, Pennsylvania): I believe one of the problems with almost any study of intestinal anastomosis is that nature is so forgiving and the *vis medicatrix naturae* is so beneficent that unless you do a bad job the bowel will heal very well.

I only need to remind you that we all have learned to apply our sutures lightly and tie them just tightly enough so they do not produce any compression. Yet, Edgar Poth of Galveston has done just the opposite. He puts the sutures through all thicknesses of bowel and says you must tie them tightly until you feel them cut through the muscle. He gets perfect results, and he can show by naked eye observation that whereas in a few minutes the lightly placed suture produces a little area of ischemia when edema comes, in contrast, his tight sutures loosen and there is no ischemia. This seems almost an anti-intellectual, anti-perfection argument, but the fact is that you can go home happy with the technique you have always used even though it disagrees with every one else's technique, and you get good results because nature is so forgiving.

DR. RAPHAEL S. CHUNG (Closing discussion): I thank the discussants for their comments.

Dr. Clowes, the ongoing experiments in our lab in which we tried to produce strictures by tight stapling is still ongoing. All I can say is it is difficult to produce bad results by tight stapling, as Dr. Ravitch has just pointed out.

I would also like to point out the enormous amount of clinical data indicating that over 90% of the time you can get away with closing the staple at a fixed gap of 2 mm, up and down the GI tract.

The significance of these laboratory data is that when the patient is at risk of developing anastomotic dehiscence because of pre-existing adverse conditions such as ischemia, the anastomoses should be sewn or stapled loosely rather than tightly.