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LETTERS TO THE EDITOR

Double Balloon Aortic Valvuloplasty in Children

Beekman and associates (1) compared single and double balloon valvuloplasty techniques in children with aortic stenosis and concluded that the double balloon approach may be superior to the single balloon technique for the relief of aortic valve obstruction. Because we recently compared single and double balloon valvuloplasty for pulmonary valve stenosis (2,3) and concluded that double balloon valvuloplasty is comparable to, but not superior to, the single balloon technique for relief of this condition, we critically examined the data of Beekman et al. We find several problems, including 1) dissimilarity between the patient groups; 2) differences in balloon diameter and length used in the two groups; 3) nonexamination of valve morphology; and 4) lack of follow-up results.

1. Dissimilarity between groups. Six of the 16 patients in the single and 1 of the 11 in the double balloon group had an aortic valve gradient >90 mm Hg ($p < 0.01$ by chi-square test). This suggests that there are more patients with a severely stenotic aortic valve in the single than in the double balloon group, a factor that may have been responsible for larger residual gradients after valvuloplasty.

2. Differences in balloon diameter and length. Although the balloon and anulus diameters are not given, the balloon anulus ratios are given, and the mean values in the two groups appear similar. The range of balloon/anulus ratios in the single balloon group appears reasonable, whereas the range in the double balloon group, particularly the upper range of 1.72, is much larger than that in the single balloon group. This difference could have partly explained the better result in the former group.

Long balloons were used in 6 of the 11 patients in the double balloon group and in only 2 of the 16 in the single balloon group ($p < 0.001$). Long balloons result in stable maintenance of balloons across the aortic valve during valvuloplasty. Therefore, the single balloon group may not have had adequate valvuloplasty, which explains the poor results in this group. In addition, for the same inflation pressure, longer balloons have a greater dilating force than do shorter balloons (4). This favorable effect could have caused the better result in the double balloon group.

3. Influence of valve morphology. Sholler (5), Perry (6) and their coworkers examined aortic valve morphology (valve leaflet thickness and pliancy) and found a small but significantly greater ($p < 0.01$) reduction in valve gradient after aortic valvuloplasty in patients with thin and pliant valves than in patients with thick valves. Aortic valve morphology was not examined by Beekman et al., but it is possible that such morphologic differences could account for the difference in results.

4. Follow-up result. The conclusions of Beekman et al. are based solely on immediate results of balloon valvuloplasty. At least intermediate-term results are necessary to evaluate the effectiveness of valvuloplasty as has been demonstrated in pulmonary valve stenosis (2,7,8). Simple stretching of the valve may temporarily decrease the valve gradient only to be followed by restenosis, which can only be detected by restudy at follow-up.

It is possible that the double balloon technique is superior to the single balloon technique, but at this point Beekman et al. do not have enough data to support that viewpoint. However, we are not opposed to the use of double balloons when the valve anulus is too large to dilate with a commercially available single balloon or when a single balloon cannot be safely passed across the femoral vessels (2,3,7–9).

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Reply

In our study we utilized the two valvuloplasty techniques in two consecutive groups of children similar in age, weight, valve anulus diameter and aortic valve gradient. The short-term results of valvuloplasty differed in the two groups, with the double balloon technique reducing the peak systolic gradient by 67% compared with a 43% reduction with a single balloon technique ($p < 0.001$). The complications, including valvuloplasty-induced aortic insufficiency, were similar in both groups.

As we were careful to point out in our report, the two valvuloplasty techniques were not randomly assigned but rather were applied to two consecutive groups of children. The selection criteria used to enroll patients and the methods used to assess hemodynamic status before and after valvuloplasty were identical in the two groups. Furthermore, using appropriate statistical tests we were unable to discern a difference between groups in age, weight, cardiac output, prevalvuloplasty gradient or valve anulus size. Nevertheless, because valvuloplasty technique was not randomized, there may have been unidentified confounding factors differing

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