

Postinfarction ventricular septal rupture repair: Is it just a matter of the surgical technique?

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The paper by Belyaev et al.¹ presented a relatively large case series of patients operated for postinfarction ventricular septal rupture (VSR) addressing a relevant and often debated issue regarding this condition: the role of the surgical technique on the incidence of residual VSR (rVSR) and on patients' early (in-hospital) and late survival.² Indeed, VSR represents a severe and often life-threatening condition, associated with high mortality despite prompt treatment.² By describing their modification of Tabuchi's "double-patch" technique, they demonstrated a low rate of rVSR, no intraoperative mortality, and a relatively low in-hospital mortality.^{1,3} In fact, while most studies traditionally reported in-hospital mortality ranging from 20% to 60%, as confirmed by the recently published results from the CAUTION multicenter study, where early mortality among 475 patients was 40.4%, their observed rate of in-hospital deaths was 26.5%.⁴ The series by Belyaev et al. has several peculiarities which deserve specific comments and analysis. Indeed, only five patients presented a nonhemodynamically significant postoperative rVSR, with two of them dying during hospitalization, and one patient required emergent reoperation due to hemodynamically relevant rVSR. Despite some studies reporting an rVSR rate as high as 40%, the relatively low incidence of VSR recurrence observed by Belyaev et al. is not far from the 12.9% reported in the CAUTION study, where, however, almost half of patients required reoperation, although not impacting on in-hospital mortality.⁴⁻⁶ Nevertheless, while all the patients considered for this paper underwent a repair through the "double-patch

frame" technique, in the population considered in the CAUTION study a quite variable set of techniques was adopted.^{1,4}

Based on the above-mentioned aspects, while we congratulate the authors for the good results observed in this group of patients undergoing the "double-patch frame" repair, we believe that several features must be also highlighted and most likely imputed as a potential favorable predisposing factor for such favorable outcome in the reported series. Indeed, although the advantages of left ventricular aneurysm exclusion in reducing ventricular volume, restoring ventricular shape, and reducing the arrhythmic risk related to necrotic scar, have been well addressed in the past decades, and might potentially contribute to the better survival of this population compared to other techniques not addressing ventricular aneurysm, it is also possible that the patient cohort considered in the paper is somehow different from the patients generally presented and managed in other studies about VSR.^{2,7,8} For instance, although the current study included patients diagnosed with acute or subacute VSR, the time frame considered for patients' eligibility reached 1 year from myocardial infarction (MI). Notwithstanding, the median time from MI to VSR repair was 56 days. As a matter of fact, such a delayed timing of VSR repair may intrinsically identify a subset of patients who were stable enough to wait for surgery, indicating more favorable hemodynamic conditions and clinical status at the time of the surgical correction. Furthermore, such a rather unusual long time between the VSR onset/diagnosis and the operation, allowing the

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development of a stronger fibrous scar, which is more suitable for durable repair, while achieving myocardial recovery from ischemia.^{4,8} These aspects might partially justify the low rate of rVSR, in addition to the advantages related to the technique itself. Similarly, the timing of surgery has been often advocated to strongly influence patients' mortality, as described in the report of the Society of Thoracic Surgeons, where among 2876 subjects operated for VSR, in-hospital mortality dropped from 54.1% to 18.4% if patients were operated 1 week after rupture occurrence.^{4,8}

However, despite the possible selection bias attributed to these patients, in this paper still 20.4% of them presented in the critical preoperative state, whereas other studies generally reported preoperative cardiogenic shock in almost half of the patients.^{4,8} Moreover, although the significant delay from MI occurrence, urgent and emergent surgery was required in 71.4% and 20.4% of patients, respectively, possibly suggesting that delayed treatment is not completely free of risks for patients' worsening. Indeed, while waiting for intervention, the inter-ventricular communication may expand, thereby increasing the shunt fraction and worsening right ventricular overload.⁹ For these reasons, our group recently proposed a management algorithm aimed at delaying surgery for at least 7 days, while maintaining hemodynamic stability, possibly with the adoption of appropriate mechanical circulatory support devices.⁹

Nevertheless, only three patients were supported preoperatively with intra-aortic balloon pumps (IABP). Moreover, even though after surgery all patients developed low cardiac output requiring inotropes, IABP was adopted in 42.9% of subjects and only one patient received extracorporeal membrane oxygenation. This could also explain why 8 patients out of 13 died due to multiorgan or cardiac failure after surgery. Indeed, the role of mechanical circulatory support is gaining progressively more credits in the management of VSR, both for achieving patients' stabilization before surgery and for providing a protected early perioperative course, possibly protecting from suture dehiscence and rVSR even in case of early surgery, when the necrotic myocardium is still friable and fragile.^{9,10}

In conclusion, while surgical techniques for VSR repair have evolved and improved over the last decades, even incorporating the rationale and advantages of combined procedures, as in the case of the "double-patch frame" technique, in-hospital mortality has often remained substantially unchanged and unsatisfactorily high. Nevertheless, the real impact of the surgical technique on patients' outcomes, as in the case of this paper, may actually be blunted by many other more relevant factors, such as the baseline patients' characteristics, and an adequate preoperative and perioperative management, to optimize the hemodynamic conditions and the timing from VSR diagnosis-to-surgery, possibly with the appropriate

adoption of mechanical circulatory supports to improve the still suboptimal in-hospital mortality even for the subset of patients with the poorest preoperative conditions and the ones developing/perpetuating low cardiac output after surgery.

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