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COMMENTARY

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Concomitant surgical revascularization in postinfarction ventricular septal rupture and ventricular aneurysm repair: A straightforward indication or a prognostic factor?

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The paper by Beliaev et al.[1] addressed a greatly debated issue about the treatment of postinfarction ventricular septal rupture (VSR), namely, the impact of concomitant surgical revascularization on early and late survival. In their paper, the authors presented a relatively large case series of patients operated in a single center for VSR and ventricular aneurysm (VA), showing that subjects who could undergo concomitant complete revascularization at the time of surgical repair had better in-hospital and long-term survival, and improved cardiac function. Although this topic has been broadly analyzed in literature with variable results, it still represents a controversial topic with no clear conclusions. These data provided by Beliaev et al. account for further information about the potential benefits of performing coronary artery bypass grafting (CABG) at the time of VSR repair, despite the generally advocated increased surgical risk related to an additional procedure and longer surgical time.[2] However, a few additional comments seem appropriate about the abovementioned paper.

First of all, most considerations about VSR treatment and outcome may be different according to the timing of surgical repair. Indeed, the STS registry showed that VSR mortality drops from 54.1% to 18.4%, when surgery is performed more than 7 days from myocardial infarction (MI), although more recent data from the National Inpatient Sample database suggest that the presence of cardiogenic shock might impact more than surgical timing on in-hospital outcomes.[3,4] To this regard, it should be noted that Beliaev et al.[1] analyzed a population of patients with subacute or chronic VSR who were operated on almost 2 months (median 55.5 days) after the index MI. As a matter of fact, less than 20% of patients presented a critical preoperative state and only four subjects required intra-aortic balloon pump before surgery, thereby indicating that a population with baseline characteristics quite different from most reports, and with an expected more favorable outcome, was taken into account. Indeed, the overall in-hospital mortality rate was 22.1%, which was lower than most of other studies, as reported by a recent meta-analysis, with patients who have undergone concomitant CABG showing significantly better survival (11.8% vs. 42.1%).[1,5] These results, however, are in accordance with a few other reports, although two recent meta-analyses observed how

concomitant CABG at the time of VSR repair had no impact on either early or late mortality.[6-9] Similarly, in the recently published CAUTION study no difference in early outcome was observed between patients who received concomitant CABG and those who did not.[10] Furthermore, Arnaoutakis et al.[11] recently observed that surgical revascularization was associated with higher 1-year mortality in the STS registry, although the authors attributed such results to longer ischemic time and to a selection bias by which more patients who received concomitant CABG required emergent surgery. However, it is interesting to observe how concomitant revascularization, in this population, had a remarkable impact on patients' survival despite the timing of revascularization being quite delayed from MI.[1]

In the setting of VSR and revascularization interplay, it is also interesting to consider the role of primary percutaneous coronary intervention (PCI). Indeed, literature data have clearly shown how the improvement and diffusion of primary PCI significantly impacted both on the incidence and on the timing of occurrence of VSR.[12–14] However, in the analyzed population, 24.5% of patients received primary PCI, most of them within 24 h.[1] Nevertheless, according to the authors, the impact of such percutaneous revascularization was negligible and, indeed, all those patients presented stent thrombosis at preoperative coronarography. Thus, they bypassed all the coronary arteries amenable to revascularization independently from the presence of a previous stent.[1]

An important and potentially limiting aspect of the paper by Beliaev and colleagues, however, regards the indication of concomitant surgical revascularization and the completeness of revascularization itself. Indeed, the significantly higher number of diseased vessels in the "revascularization" group suggests a more severe coronary artery disease among those subjects, therefore with the potential to benefit more from revascularization. In contrast, patients belonging to the other group did not receive CABG on diseased coronaries because not technically feasible, therefore identifying patients affected by a worse coronary disease from the anatomical point of view.[15] Such aspects combined with the significantly different outcome associated with concomitant CABG should suggest that those patients presenting with a coronary anatomy not amenable to revascularization are at higher risk of poor outcome. Moreover, some VSR repair techniques require a large ventricular opening on the infarct area and the closing suture often entraps the culprit vessel, therefore making its revascularization not feasible.[9] However, the authors specified that they took particular care to avoid large ventriculotomy, therefore eliminating this limit to complete revascularization.[1]

Concerning complete revascularization, the authors stated to compare patients who underwent complete surgical revascularization against those who did not receive any revascularization. However, the group of patients who underwent concomitant CABG included patients with multivessel coronary disease who received a number of grafts inferior to the number of diseased vessels, therefore intrinsically indicating that incomplete revascularization was most likely performed. As a matter of fact, all the considerations on the impact of CABG in this population are inevitably dampened by this not negligible intrinsic limit.

The authors observed an evident advantage of complete revascularization in terms of both early and late survival. However, it is noteworthy to underline that most of the deaths occurred in the early postoperative period and that the survival curves substantially remained parallel at follow-up. Therefore, although the small number of patients represents a limit of the current study, it would be important to perform a landmark analysis to see whether the clear advantage provided by concomitant CABG in the early postoperative period is maintained during the years, as other authors suggested.[7,9]

Moreover, it seems unlikely that despite concomitant CABG represents an additional procedure and, in most cases, more than one graft has been performed, the cardiopulmonary bypass and aortic cross-clamp times were not statistically different between the two groups. As the authors correctly observed, such results may be attributed to the small sample size.

The comments about left ventricular function improvement deserve a final consideration. Indeed, it is well-known that larger ventricular volumes in ischemic cardiomyopathy are generally associated with worse left ventricular function and poor survival.[16] Moreover, the STICH trial and a recent paper related to it showed that the amount of volume reduction at the time of ventricular aneurysm repair may correlate with a better outcome.[17,18] However, in the report by Beliaev et al.,[1] patients who have undergone concomitant CABG had a significantly greater end-diastolic volume and still greater, but not significantly, end-systolic volume. Although this implied a significantly greater stroke volume, therefore suggesting better ventricular contractility supported also by an improved diastolic function, there was no statistically significant difference in the ejection fraction between the two groups. Moreover, the authors reported absolute volumes instead of indexed ones and the body mass index was significantly higher in the non-CABG group. So, it is reasonable to suppose that body surface area was greater as well, and therefore, that the differences in ventricular volumes between the compared groups were still greater. Therefore, we think that the reported data do not fully support the statement that concomitant revascularization improves postoperative cardiac function and that it is not possible to draw clear conclusions on this aspect.

In conclusion, we think that the most reasonable interpretation of the interesting results reported by Beliaev et al. is that, although the small sample size does not allow us to draw definitive conclusions and larger and dedicated studies are advocated to better clarify this aspect of VSR treatment, in the population of subacute or chronic VSR, therefore often characterized by stable hemodynamic conditions and lower surgical risk, concomitant surgical revascularization should be performed whenever possible at the time of VSR repair, possibly to improve at least the early survival. On the contrary, the presence of coronary artery disease not amenable to revascularization represents a strong negative prognostic factor in surgically treated VSR patients.

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