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# Ballooning aortic stenosis before urgent non-cardiac surgery – zest for action or necessity?

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As Europe's population grows older, the number and proportion of people in older age groups increase. It is estimated that there will be an increase in the proportion of people over 65 years old from 20% today to 30% by 2070[1]. Therefore, the number of elderly individuals in need of medical care due to age-related aggregation of comorbidities will grow continuously. The need for non-cardiac surgery (NCS) is particularly impacted by this development. It is estimated that by 2030 one fifth of individuals above 75 years old will undergo surgery each year[2].

Aortic valve stenosis (AS), a disease of the ageing heart, is frequently diagnosed among patients undergoing NCS, particularly among those in need of orthopaedic surgery[3]. Symptomatic AS and urgent need for NCS have frequently been identified as predictors of mortality and adverse cardiovascular events after NCS[4].

With the advent of transcatheter aortic valve replacement (TAVR), the natural history of symptomatic AS has changed, resulting in increased survival and less morbidity for elderly patients. TAVR results have also boosted an almost forgotten procedure, plain balloon aortic valvuloplasty (BAV). First used as a preparation before transcatheter prosthesis implantation, it is nowadays frequently used as a stand-alone option, a bridge to TAVR in patients with cardiogenic shock before percutaneous coronary intervention (PCI) or TAVR as well as before NCS[4-6].

In this issue of EuroIntervention, Debry et al report short-term outcomes of patients who underwent urgent NCS in two different centres while having concomitant AS[7].

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Of the total of 133 AS patients in need of urgent NCS, 93 underwent preoperative BAV and 40 underwent conservative treatment. In inverse probability of treatment weighting (IPTW) propensity analysis, among the invasive (BAV) and conservative treatment strategies, the incidence of major adverse events at one month (20.4% invasive vs 20.0% conservative; odds ratio [OR] 0.93, 95% confidence interval [CI]: 0.38-2.29) and three-month survival (89.2% invasive vs 90.0% conservative; IPTW-adjusted hazard ratio [HR] 0.90, 95% CI: 0.31-2.60) were not different. Besides the modest number of patients included, heterogenicity in clinical and operative characteristics makes direct comparison of these treatment strategies difficult. Patients undergoing BAV before urgent NCS were younger (mean age 79.9±9.5 vs 83.0±8.0 years)

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and more frequently underwent high-risk urgent NCS (16.1% vs 7.5%)[7]. This is an important imbalance in the baseline status of these patients which it is difficult to accommodate despite the use of IPTW propensity adjustment. While patient age plays a tangential role, the emergency nature of the surgery and the severity of cardiac diseases are important determinants of early outcomes after NCS[4]. Compared to elective NCS, emergency NCS was associated with extremely high 30-day mortality (>20%) independent of the presence or absence of AS in a large Mayo Clinic registry[4]. Debry et al[7] report much lower 30-day mortality in their manuscript, 5.4% with an invasive and 10.0% with a conservative treatment strategy. There are several reasons which explain the apparent difference. In the current registry, 55% (conservative) to 65% (invasive) of patients underwent emergency NCS. Contrary to the Mayo Clinic registry (2000-2010), data selection in the current one was between 2011 and 2019. Important improvements in operational techniques, preoperative monitoring, selection of anaesthetic agent and anaesthesia technique, use of goal-directed therapy and risk-stratified postoperative monitoring introduced during recent years have certainly contributed to the overall decrease of mortality after NCS, particularly among patients with cardiac comorbidities[8]. The lack of information regarding the operational approach (open or laparoscopic), anaesthesia technique and preoperative and postoperative monitoring further limits the current manuscript.

BAV has been reported as feasible and helpful among patients with decompensated heart failure or cardiogenic shock, particularly now with the option of minimally invasive radial BAV[6]. Increased operator expertise with BAV as well as higher institutional volumes have led to lower in-hospital mortality after urgent BAV (low- vs high-volume institutions 12.87% vs 7.17%, adjusted OR 1.91, 95% CI: 1.37-2.64)[9]. In the current manuscript, information about the yearly volume of BAV procedures is lacking (93 procedures within 8 years), which limits the extrapolatory value of this manuscript regarding the impact of increased expertise on post-BAV outcomes. The higher than expected rate of peri-BAV complications (12.9%) for this recent registry using a 9 Fr sheath size at the access site and for a very select population of AS patients might be explained by the insufficient experience of the centre, at least during the first years.

The benefit from BAV seems to depend on the clinical severity of AS. Tashiro and colleagues reported similar death and major adverse cardiac event (MACE) rates among asymptomatic AS patients and patients without AS undergoing NCS. On the other hand, symptomatic AS patients experienced more MACE than controls (28.3% vs 8.5%, p<0.001) and had higher 30-day mortality rates (9.4% vs 3.8%, p=0.097)[4]. In the field of coronary interventions, BAV has been successfully used in case of accompanying acute heart failure or cardiogenic shock[10]. The reasons why BAV was used in the invasive strategy centre are not reported, as the information about the baseline level of cardiac biomarkers such as proBNP or cardiac troponin is missing. Whether the most symptomatic patients would have benefited more from BAV before NCS cannot be evaluated from the reported data.

Nearly 22% of patients underwent low-risk NCS (expected peri-operative mortality <1%) in the current manuscript. These procedures (minor orthopaedic, gynaecologic and urological surgery) also do not belong to a high bleeding risk category which might have led to aggravation of AS during the NCS. It is difficult to understand why BAV was necessary among these patients in the current paper.

However, the current analysis gives important insight into the outcomes of AS patients in need of NCS undergoing BAV. First, the post-surgery mortality of these patients is lower than expected. Second, within a collective of all-comer AS patients in need of non-elective NCS, routine BAV is not necessary and has no impact on short-term outcomes. Is BAV before NCS just a zest for action? What about urgent orthopaedic surgery among highly symptomatic AS patients? Although the current analysis is not scientifically adequate to answer many questions of this kind, it highlights the need for well-designed randomised trials dedicated to the growing number of such patients.

## Conflict of interest statement

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