Hemodynamic monitoring during cardiac surgery in France: a multicentric prospective study.

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BACKGROUND AND GOAL OF STUDY

New monitoring systems and inotropic drugs, developed in the past decade, have modified the **hemodynamic management in cardiac surgery**. However, only sparse data are available to reflect these changes and the last national inquiry in France was performed in 2005 (1). **This study aimed at giving an up-to-date overview of advanced hemodynamic monitoring during cardiac surgery in France.**

MATERIAL AND METHODS

Patient medical history, type of surgery, monitoring characteristics and postoperative outcomes were prospectively recorded for every patient who underwent cardiac surgery in any of the 37 participating centers, on an inclusion period of seven weeks . **Primary objective was the description of advanced monitoring and inotropes/vasoactives drugs use.** Secondary outcome was to **assess the influence of monitoring on post-operative outcomes.**

RESULTS

1) Advanced hemodynamic monitoring use

During the inclusion period, **3100 patients** underwent **cardiac surgery**. Among them, **1656 (53.4%)** beneficiated from **advanced hemodynamic monitoring**, including **cardiac output** measurement and/or **metabolic balance** assessment. Table 1 shows the different devices used for monitoring.

Device	Number of Patients (Percentage)
Transoesophageal Sonography	1 139 (37%)
Metabolic Balance (SvO2 or ScvO2)	691 (22%)
Thermodilution (Swann-Ganz)	370 (12%)
Pulse Contour	32 (1%)
Oesophagal Doppler	14 (0,5%)
Impedancemetry	3 (0,1%)

Table 1

Some pre-operatives conditions were significantly associated with use of monitoring, such as **Left-Ventricular Ejection Fraction impairment, pre-operative kidney failure, anemia**, patients who underwent **combined** (valvular and coronary) **surgery**, or in **emergency situations**. The mean **Euroscore II** was higher for the monitored patients (4.7 +/- 7.5 vs3.3 +/- 5.2, p<.001).

2) Inotropes and vasoactives drugs use

The use of per-operative inotropes and vasoactives drugs is described in figure 1. **1 693 (54,6%) patients** received at least one vasoactive medication.

Figure 1 Intra-Operative Drug Use(%)

3) Outcome

The group of monitored patients had higher mortality, higher Euroscore II, and a higher rate of complications (Table 2).

Advanced Monitoring	Yes	No	P
Mortality (%)	5,1	2,3	<0,01
Euroscore II (%)	4,7	3,3	<0,001
All Complications(%)	63,6	45,1	<0,001
Major Adverse Cardiac and Cerebrovascular Event(%)	35,4	23,5	<0,001
Acute Renal Failure(%)	26,8	13,8	<0,001

Table 2

However, in the **subgroup of octogenarians patients**, though monitored patients had **more serious preoperative condition** (Euroscore II 7.5 +/- 11.8 vs 5.0 +/- 6.1, p<.001), **they did not present more post-operative complications** (55.2% vs 48.6 %, p=0.388) **nor mortality** (6.1% vs 4.4%, p=0.782).

DISCUSSION

In our study, **advanced hemodynamic monitoring** was used for patients with **higher preoperative risk without outcome improvement**. However, it might be interesting for **octogenarians patients**, other studies for those specific population should be encouraged.

The most recent inotropic and vasoactives drugs were rarely used.

Norepinephrine is now the drug of choice, instead of dobutamine (1), maybe due to studies suggesting a potentially harmful overuse of dobutamine (2).

Unlike previous study (3), the **Swann-Ganz catheter is no longer the first choice device**. Transoesophageal sonography was often used. However, as morphological assessment during valvular surgery cannot be considered as hemodynamic monitoring, its use might be over-estimated.

CONCLUSION

Our study highlights **changes in hemodynamic management** of patients undergoing **cardiac surgery, even if it was not associated with outcome improvement**.

Other findings in our study support the hypothesis that specific subgroups of patients, such as **elderly patients**, may beneficiate more from advanced monitoring than others.