

Early insertion of a pulmonary artery catheter did not increase mortality in shock or the acute respiratory distress syndrome

Richard C, Warszawski J, Anguel N, et al. Early use of the pulmonary artery catheter and outcomes in patients with shock and acute respiratory distress syndrome: a randomized controlled trial. *JAMA*. 2003;290:2713-20.

QUESTION

In patients with shock (mainly of septic origin), the acute respiratory distress syndrome (ARDS), or both, does early insertion of a pulmonary artery catheter (PAC) without goal-oriented therapy increase all-cause mortality?

DESIGN

Randomized (allocation concealed*), unblinded,* controlled trial with 3-month follow-up.

SETTING

36 intensive care units in France.

PATIENTS

681 patients ≥ 18 years of age who met objective criteria for recent (≤ 12 h after onset) shock (47% of patients), ARDS lasting > 24 hours (21%), or both (32%). Exclusion criteria included hemorrhagic shock, myocardial infarction complicated by cardiogenic shock requiring revascularization, and thrombocytopenia ($\leq 10.0 \times 10^9/L$). Follow-up was 99% (mean age 63 y, 67% men).

INTERVENTION

Patients were allocated to early (≤ 2 h after randomization) insertion of a PAC ($n = 338$) or no PAC ($n = 343$). Patient management

was at the discretion of the physician. No standardized goal-oriented protocols for managing patients were proposed; the principles of treatment in both groups included optimization of circulating volume, vasoactive support as required, maximum ventilatory plateau pressure of 35 cm H₂O, and free access to echocardiography.

MAIN OUTCOME MEASURES

All-cause mortality at 28 days of follow up. Secondary outcomes included all-cause mortality at 14 and 90 days; duration of stay in the intensive care unit and hospital; ventilator-free days between day 1 and 28; and number of days between day 1 to 14 without renal support, organ system failure, or use of vasoactive drugs.

MAIN RESULTS

Analysis was by intention to treat. The groups did not differ for all-cause mortality at 28 days (Table) or for any secondary outcomes (P values > 0.05).

CONCLUSION

In patients with shock (mainly of septic origin), the acute respiratory distress syndrome, or both, early insertion of a pulmonary artery catheter without standardized management protocols did not increase all-cause mortality.

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*See Glossary.

Early insertion of a pulmonary artery catheter (PAC) vs no PAC in shock (mainly of septic origin), the acute respiratory distress syndrome, or both at 28 days†

Outcome	PAC	No PAC	RRR (95% CI)	NNT
All-cause mortality	59%	61%	3% (-10 to 14)	Not significant

†Abbreviations defined in Glossary; RRR, NNT, and CI calculated from data in article.

COMMENTARY

Since its introduction, the PAC has been controversial. Pioneers of the specialty of critical care medicine latched onto this new technology as our own special expertise, while rivals regarded the PAC with suspicion. Because it was our stock in trade, intensivists had difficulty with objectively evaluating the PAC. Besides, too many exciting new applications could be studied using PACs, including new vasoactive drugs; high levels of positive-end expiratory pressure; and interrelation of hemodynamic variables, venoarterial admixture, and oxygen consumption, and many pathophysiologic insights were gained. However, measurement of physiologic variables and attempts to correct abnormalities did not improve outcome. Fluids and pressors could be titrated to endpoints not requiring PAC measurements. A ventilator strategy based on reduction of venoarterial admixture (measured with the PAC) was found to be harmful (1). Recent nonrandomized studies have even suggested that PAC use in general does more harm than good (2). Therefore, the study by Richard and colleagues provides welcome assurance that PAC use did not jeopardize survival. However, it also shows that PACs may be useless when placed for general monitoring

and support in shock, sepsis, or ARDS in a setting where echocardiography is accessible.

The PAC is a measurement tool. As such, it has been thoroughly studied and found, when used correctly, to provide accurate and precise data. Critical care training programs may well continue to teach the insertion and use of PACs. But at this point, no more PAC trials (trials not part of a therapeutic intervention) are needed. Further, in my view, clinicians should not consider shock or ARDS to be sufficient indications for PAC insertion. Additional specific measurements and interventions are required to justify PAC use.

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