Facteurs pronostiques en chirurgie cardiaque

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Prevention of cardiac surgery-associated acute kidney injury: a systematic review and meta-analysis of non-pharmacological interventions

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Position du problème et objectif(s) de l'étude:
Cardiac surgery-associated acute kidney injury (CSA-AKI) occurs in 20% to 40% of patients. Several pharmacological and non-pharmacological interventions have been developed to reduce the incidence of CSA-AKI. Two network meta-analyses focused on pharmacological interventions, but none has focused on non-pharmacological interventions. In this Meta-analyses, we aim to assess the effectiveness of non-pharmacological interventions to reduce the incidence of CSA-AKI.

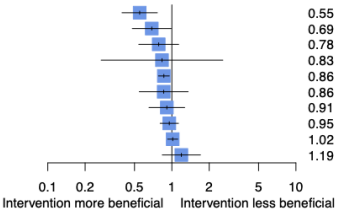
Matériel et méthodes:
PubMed, Embase, Central and clinical trial registries from January 1, 2004 (first consensual definition of AKI) to December 1, 2022 were screened. We perform a manual screening of abstracts of major anesthesia and intensive care conferences over the last 5 years and reference lists of relevant studies.All randomized controlled trials (RCTs) assessing a non-pharmacological intervention to reduce the incidence of CSA-AKI, without language restriction were included. We excluded RCTs of heart transplantation or involving a pediatric population.
For Data Extraction and Synthesis, two reviewers independently identified trials, extracted data and assessed risk of bias. Random-effects meta-analyses were conducted to calculate risk ratios (RRs) with 95% confidence intervals (CIs). We used the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) to assess the quality of evidence.
The main outcome was CSA-AKI.

Résultats & Discussion:
We included 86 trials (25,855 patients) evaluating 10 non-pharmacological interventions to reduce the incidence of CSA-AKI. No intervention had high-quality evidence to reduce CSA-AKI. Two interventions were associated with a significant reduction in CSA-AKI incidence, with moderate quality of evidence: goal-directed perfusion (RR: 0.55 [95% CI 0.40-0.76], I2=0%; Phet=0.44) and remote ischemic preconditioning (RR= 0.86 [0.78-0.95]; I2= 23%; Phet= 0.07). Pulsatile flow during cardiopulmonary bypass was associated with a significant reduction in CSA-AKI incidence but with very low quality ofevidence (RR= 0.69 [0.48; 0.99]; I2=53%; Phet<0.01) (figure 1 and 2). We found high quality of evidence for lack of effect of restrictive transfusion strategy and tight glycemic control.

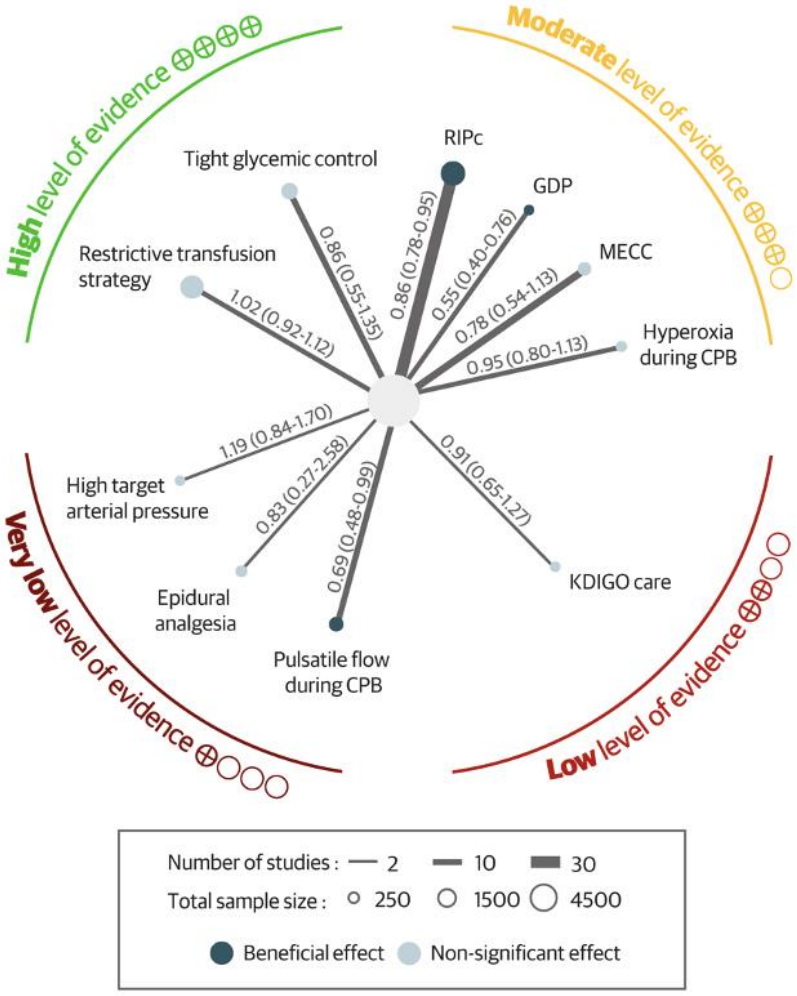
Conclusion:
In our systematic review and meta-analysis, we identified 3 non-pharmacological interventions that could reduce CSA-AKI incidence: GDP and RIPc with moderate quality of evidence and pulsatile flow during CPB with very low quality of evidence. We also identified 2 interventions (tight glycemic control and restrictive transfusion strategy) with no benefit in reducing CSA-AKI incidence and with high quality of evidence. However, many trials of cardiac surgery did not consider CSA-AKI among outcomes even though it is one of the most frequent complications after cardiac surgery. Also, when trials did consider

the CSA-AKI outcome, the definition of AKI was heterogeneous across trials despite the development and validation of consensual definitions.

Intervention	Number of RCTs	Number of events/patients Intervention group	Number of events/patients Control group	RR	CI (95%)	I2	Phet
Goal Directed Perfusion	2	44/293	84/308	0.55	[0.40; 0.76]	0%	0.44
Pulsatile flow during CPB	10	121/968	194/1025	0.69	[0.48; 0.99]	53%	0.01
Minimally invasive extracorporeal circulation	14	46/787	67/830	0.78	[0.54; 1.13]	0%	0.33
Epidural Analgesia	4	18/443	20/460	0.83	[0.27; 2.58]	56%	0.07
Remote Ischemic Preconditioning	31	855/3890	932/3848	0.86	[0.78; 0.95]	23%	0.07
Tight glycemic control	10	53/1350	76/1403	0.86	[0.55; 1.35]	26%	0.25
KDIGO care bundle	3	142/323	162/339	0.91	[0.65; 1.27]	64%	0.08
Hyperoxia during CPB	3	134/359	139/363	0.95	[0.80; 1.13]	5%	0.57
Restrictive transfusion strategie	6	956/4144	944/4145	1.02	[0.92; 1.12]	3%	0.67
High–Target arterial pressure	3	53/289	42/288	1.19	[0.84; 1.70]	0%	0.19



CPB, cardiopulmonary bypass; KDIGO, Kidney Disease Improving Global Outcomes; RCTs, randomized controlled trials; RR, relative risk; 95% CI, 95% confidence interval.



CPB, cardiopulmonary bypass; KDIGO, Kidney Disease Improving Global Outcomes; RIPc, Remote ischemic preconditioning; GDP, Goal Directed Perfusion; MECC, Minimally invasive extracorporeal circulation

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