Letter to Editor

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Is there a superiority of pulsatile perfusion versus non-pulsatile perfusion in the preservation of renal functions in cardiac surgery?

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Letter to Editor

In many studies, the efficacy of pulsatile flow during cardiopulmonary bypass has been investigated and controversial results have emerged. In general studies, pulsatile perfusion has been shown to be effective in reducing inflammatory response, correction of cardiac functions and systemic organ preservation. In this study, pulsatile blood flow was compared with non-pulsatile flow in patients undergoing cardiac surgery using cardiopulmonary bypass in terms of protection of renal functions.

A prospective study was performed to compare postoperative renal function between pulsatile perfusion group (PPG) (n = 52 patients) and non-pulsatile perfusion group (NPPG) (n = 48 patients) during CPB in patients undergoing cardiac surgery. In the postoperative period, parameters such as blood urea nitrogen (BUN), creatinine (Cr), creatinine clearance (CrCL), glomerular filtration rate (GFR) levels in the blood in addition to the need for dialysis were noted and the degree of kidney damage between the groups was determined. The BUN (10–50mg/dL) is an indication of renal health. BUN levels of > 50mg/dL without requiring dialysis were considered renal dysfunction. The reference ranges of serum Cr in the laboratory were 0.4 to 1.1mg/dL. Cr levels of > 1.5mg/dL or at least a 20% increase without requiring dialysis was considered renal dysfunction. CrCL was calculated using the Cockcroft and Gault formula. The reference ranges of serum CrCL in the laboratory were 80 to 120mL/min 1/1.48m^2. CrCL < 60mL/dk/1.73m^2 without requiring dialysis was considered renal dysfunction. The GFR was measured using the modification of diet in renal disease (MDRD) equation (mL/min/1.73m^2). GFR is divided into 5 stages: ≥ 90 (stage I), 60 to 89 (stage II), 30 to 59 (stage III), 15 to 29 (stage IV), and at least 15 (stage V). Generally, decreases of 50 % or more in the GFR were considered renal dysfunction. These parameters were measured postoperatively at day 7 and confirmed by at least 2 measurements. Requiring dialysis: Acute renal dysfunction was classified on the basis of RIFLE (Risk, injury, failure, loss, end-stage renal disease) criteria. Postoperative dialysis was indicated if they had diuretics-resistant oliguria associated with volume overload or hyperkalemia.

The study included 51 men and 49 women. The mean age was 51±4.1 years for the PPG and 54±5.5 years for the NPPG. Coronary bypass surgery was performed in 62 patients, mitral valve replacement in 18 patients, aortic valve replacement in 12 patients and ascending aortic replacement in 8 patients. The pre- and intra-operative demographics characteristics of the 52 patients in the PPG and the 48 patients in the NPPG are similarly and there was no statistical difference between the groups. All patients had uneventful operations and postoperative stays. Postoperative data showed that impaired renal function parameters were fewer in the PPG. The increases in the postoperative Cr and BUN levels compared to the preoperative values were markedly higher in the NPPG. The decreases in the GFR and the CrCL levels were higher in the NPPG compared with the PPG at postoperative day 7. Three patients in the NPPG required dialysis, whereas there was no in the PPG required dialysis. Consequently, renal dysfunction was higher in the NPPG than in the PPG after cardiac surgery. There were no differences between the groups in terms of post-operative clinical data (postoperative bleeding> 1000 mL, surgical revision for bleeding, blood transfusion amounts, nosocomial infection, hospital mortality, intra-aortic balloon use). There was an important difference

between the groups in terms of the length of their hospital stay. Patients in the NPPG had a significantly longer total hospital stay compared with those in the PPG.

Conclusion

This study found that pulsatile perfusion results in greater CrCL and GFR and reduced Cr and BUN levels compared with non-pulsatile perfusion, suggesting that pulsatile perfusion is beneficial in renal preservation. In addition, no need for dialysis in the postoperative period was observed in PPG. The pulsatile perfusion causes a reduction in hospital stay of patients due to the existing renal protective effects.

Competing Interests

The authors declare that they have no competing interests, and did not receive funding for this article.

Consent

Written informed consent was obtained from the patient's family for publication of this case report and any accompanying images.

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