

ABSTRAK

Latar Belakang: Penurunan perfusi ginjal merupakan salah satu komplikasi yang sering terjadi pada operasi mayor non kardiak. Faktor intra operatif yang berperan meliputi efek inflamasi akibat tindakan bedah, vasodilatasi maupun manajemen cairan intraoperatif. Diperlukan diagnosis cepat dan sensitivitas tinggi untuk menilai penurunan perfusi ginjal yang dapat dilakukan secara praktik klinis. Kreatinin serum yang umum digunakan sebagai penanda terjadinya penurunan perfusi ginjal memiliki keterbatasan untuk deteksi dini. *Neutrophil Gelatinase-Associated Lipocalin* (NGAL) adalah salah satu biomarker yang dapat diukur secara cepat dibandingkan kreatinin serum.

Tujuan: Mengetahui perbandingan kadar NGAL urin dan kreatinin serum pasca operasi sebagai penanda penurunan perfusi ginjal pada berbagai jenis operasi mayor non-kardiak.

Metode: Penelitian observasional analitik komparatif dengan menggunakan desain *cross sectional* di RSUD Prof. Dr. Margono Soekarjo pada bulan Februari – Mei 2025. Sampel penelitian adalah pasien yang menjalani bedah laparotomi digestif, thoraks non-kardiak, dan laparotomi ginekologi *Surgical Staging* (SS) yang memenuhi kriteria yang ditetapkan. Pengukuran kadar NGAL urin dan kreatinin serum diambil secara bersamaan 4 jam pasca operasi pada 54 subjek penelitian.

Hasil: Terdapat perbedaan signifikan kadar NGAL urin pada berbagai jenis operasi mayor non-kardiak yang berbeda dengan nilai $p = 0,000$ ($p < 0,05$). Nilai rata-rata kadar NGAL urin paling tinggi pada kelompok bedah thoraks non kardiak ($160,759 \pm 34,529$), kelompok laparotomi SS ($110,562 \pm 46,065$), dan yang paling rendah pada kelompok laparotomi digestif ($95,856 \pm 38,345$). Sedangkan untuk kreatinin serum pasca operasi tidak terdapat perbedaan signifikan antar kelompok penelitian dengan nilai $p = 0,807$ ($p > 0,05$). Nilai rata-rata kadar kreatinin serum paling tinggi pada kelompok bedah thoraks non kardiak ($0,895 \pm 0,639$), kelompok laparotomi digestif ($0,854 \pm 0,471$), dan paling rendah pada laparotomi SS ($0,793 \pm 0,207$).

Kesimpulan: NGAL urin 4 jam pasca operasi berbeda secara signifikan, sedangkan kreatinin serum 4 jam pasca operasi tidak berbeda secara signifikan pada berbagai jenis operasi mayor non kardiak yang diteliti.

Kata kunci: Operasi bedah mayor non-kardiak, Kreatinin serum, NGAL, Penurunan perfusi ginjal

ABSTRACT

Background: Decreased renal perfusion is one of the frequent complications of major non-cardiac surgery. Intraoperative factors that play a role include surgery, the use of nephrotoxic drugs, and inflammatory effects. Rapid diagnosis and high sensitivity are required to assess renal perfusion impairment, which can be done through clinical trials. Serum creatinine, which is commonly used as a marker of decreased renal perfusion, has limitations and is considered less sensitive for early detection. Neutrophil Gelatinase-Associated Lipocalin (NGAL) is one of the biomarkers that can be measured rapidly compared to serum creatinine.

Objectives: This study aims to determine differences in urinary NGAL levels and differences in serum creatinine post operative in various types of non-cardiac major surgery.

Methods: Comparative analytic observational study using a cross-sectional design at Prof. Dr. Margono Soekarjo Hospital in February-May 2025. The study samples were patients who underwent laparotomy surgery for digestive, non-cardiac thoracic, and gynecological laparotomy, Surgical Staging (SS) who met the established criteria. Measurement of urinary NGAL and serum creatinine levels was taken simultaneously, 4 hours postoperatively, in 54 study subjects.

Results: There were significant differences in urinary NGAL levels in different types of non-cardiac major surgery, with a $p\text{-value}=0,000$ ($p<0.05$). The mean value of urinary NGAL levels was highest in the non-cardiac thoracic surgery group (160.759 ± 34.529), the SS laparotomy group (110.562 ± 46.065), and the lowest in the digestive laparotomy group (95.856 ± 38.345). As for postoperative serum creatinine, there was no significant difference between the study groups with a $p\text{-value} = 0.807$ ($p>0.05$). The mean serum creatinine level was highest in the non-cardiac thoracic surgery group (0.895 ± 0.639), digestive laparotomy group (0.854 ± 0.471), and lowest in SS laparotomy (0.793 ± 0.207).

Conclusion: The first 4 hours postoperative urinary NGAL was significantly different in different types of non-cardiac major surgery, while postoperative serum creatinine was not significantly different in different types of non-cardiac major surgery.

Keywords: Major non-cardiac surgery, Serum creatinine, NGAL, Decreased renal perfusion