Renal, Urological, and Microbiological Perspectives on Acute Kidney Injury Following Colectomy

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Abstract

Acute kidney injury (AKI) is a common and serious complication following major colorectal surgery (colectomy), with multifactorial pathophysiology implicating renal perfusion disruption, urinary tract manipulations, and postoperative infections. This prospective observational study evaluated renal, urological and microbiological factors associated with postoperative AKI in adult patients undergoing elective colectomy. A total of 320 patients were enrolled and followed for 7 days post-surgery; AKI was defined by KDIGO criteria (increase in serum creatinine ≥0.3 mg/dL within 48 hours or ≥1.5× baseline within 7 days). The incidence of AKI was 12.8% (41/320). In multivariate logistic regression adjusting for age, baseline eGFR, surgical complexity, and intraoperative hypotension, independent predictors of AKI were prolonged operative time (>180 min) (adjusted OR 2.5; 95% CI 1.4–4.6; p=0.003), intraoperative hypotension (mean arterial pressure <65 mmHg for >20 min) (OR 3.1; 95% CI 1.7–5.8; p<0.001), urinary catheter reinsertion due to intra-operative urological issue (OR 2.8; 95% CI 1.3–6.1; p=0.008), and postoperative culture-positive urinary tract infection (UTI) (OR 4.2; 95% CI 2.0–8.9; p<0.001). Bacterial isolates from UTI-associated AKI cases were predominantly Enterococcus faecalis (37%) and Escherichia coli (29%) including extended-spectrum β-lactamase producers. Patients with AKI had longer hospital stay (median 11 vs 7 days; p<0.001) and higher 30-day morbidity (Clavien-Dindo ≥III, 29% vs 11%; p=0.002). Urinalysis evidence of proximal tubular injury (urinary neutrophil gelatinase-associated lipocalin [uNGAL] >150 ng/mL) on postoperative day 1 was also significantly higher in AKI group (p=0.004). These findings underscore the interplay of renal perfusion, urinary tract injury/manipulation, and microbial factors in AKI after colectomy and highlight actionable risk factors for prevention and monitoring. Incorporation of intraoperative renal-protective protocols, urological evaluation of catheter management, and early microbiological surveillance may reduce AKI incidence and improve outcomes.

Keywords

Acute kidney injury, colectomy, urinary tract infection, intraoperative hypotension, uNGAL.