

**Bowel Ischaemia was Associated with Elevated Lactate and Pyruvate in Peritoneal fluid:  
A Prospective Observational Pilot Study**

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**Abstract**

*Purpose:* Diagnosing bowel ischaemia (BI) can be challenging with non-specific clinical, biochemical and radiological findings. We aimed to identify biomarkers in peritoneal fluid that could be utilised to enhance the diagnosis of BI.

*Methods:* A prospective single-centre observational study was conducted with adult patients undergoing laparotomy for suspected BI. Samples of preoperative serum and intraoperative peritoneal fluid were analysed. Patients with bowel perforation were excluded.

*Results:* Sixty-nine patients were identified; 5 were excluded for bowel perforation and 6 for incomplete data. Thirty-four patients had BI intraoperatively and were allocated to the ischaemia group; 24 did not have features of BI intraoperatively and were allocated to the control group. The ischaemia group had significantly higher median peritoneal fluid lactate (3.9 vs 1.2 mmol/L;  $p = 0.002$ ) and pyruvate (190 vs 114  $\mu\text{mol/L}$ ;  $p = 0.003$ ); as well as significantly higher mean serum white cell count ( $16.23 \times 10^9/\text{L}$  vs  $9.77 \times 10^9/\text{L}$ ;  $p = 0.001$ ), neutrophils ( $13.97 \times 10^9/\text{L}$  vs  $7.03 \times 10^9/\text{L}$ ;  $p < 0.001$ ) and C-reactive protein (95.56 vs 53.42 mg/L;  $p = 0.039$ ). The area under the curve (AUC) was the greatest for peritoneal fluid

lactate (0.770), followed by pyruvate (0.751); the composite AUC for these peritoneal fluid and serum biomarkers was 0.901.

*Conclusion:* BI was associated with elevated peritoneal fluid lactate and pyruvate. Introducing a composite analysis of these peritoneal fluid and serum biomarkers could improve the diagnosis of BI in surgical practice.

**Keywords:** bowel ischaemia, peritoneal fluid, biomarker, lactate, pyruvate, emergency laparotomy.