

Preoperative Low Dose Complex Carbohydrate/Citrulline Solution (COM) Reduces Acute Kidney Injury in Laparoscopic Segmental Colectomy Patients



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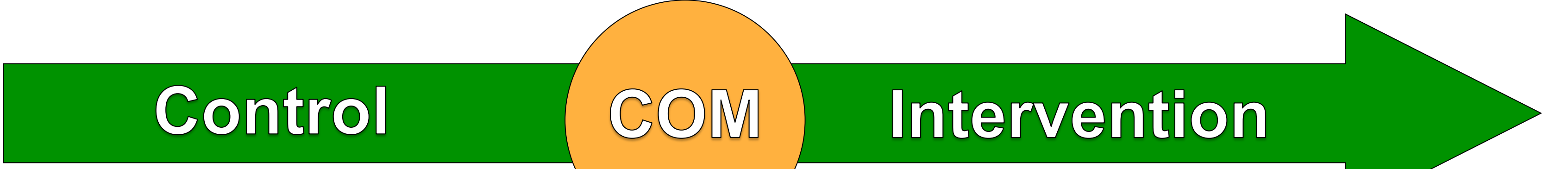
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Background

- Postoperative acute kidney injury (AKI) is associated with increased mortality and length of stay in colorectal surgery
- Rates of AKI after CRS remain high in the era of ERP ranging from 2.5-13.4%
- L-citrulline augments endothelial nitric oxide function in the kidney and preserves endothelial function
- We sought to assess the impact of COM on postoperative AKI in patients undergoing elective laparoscopic segmental colectomy

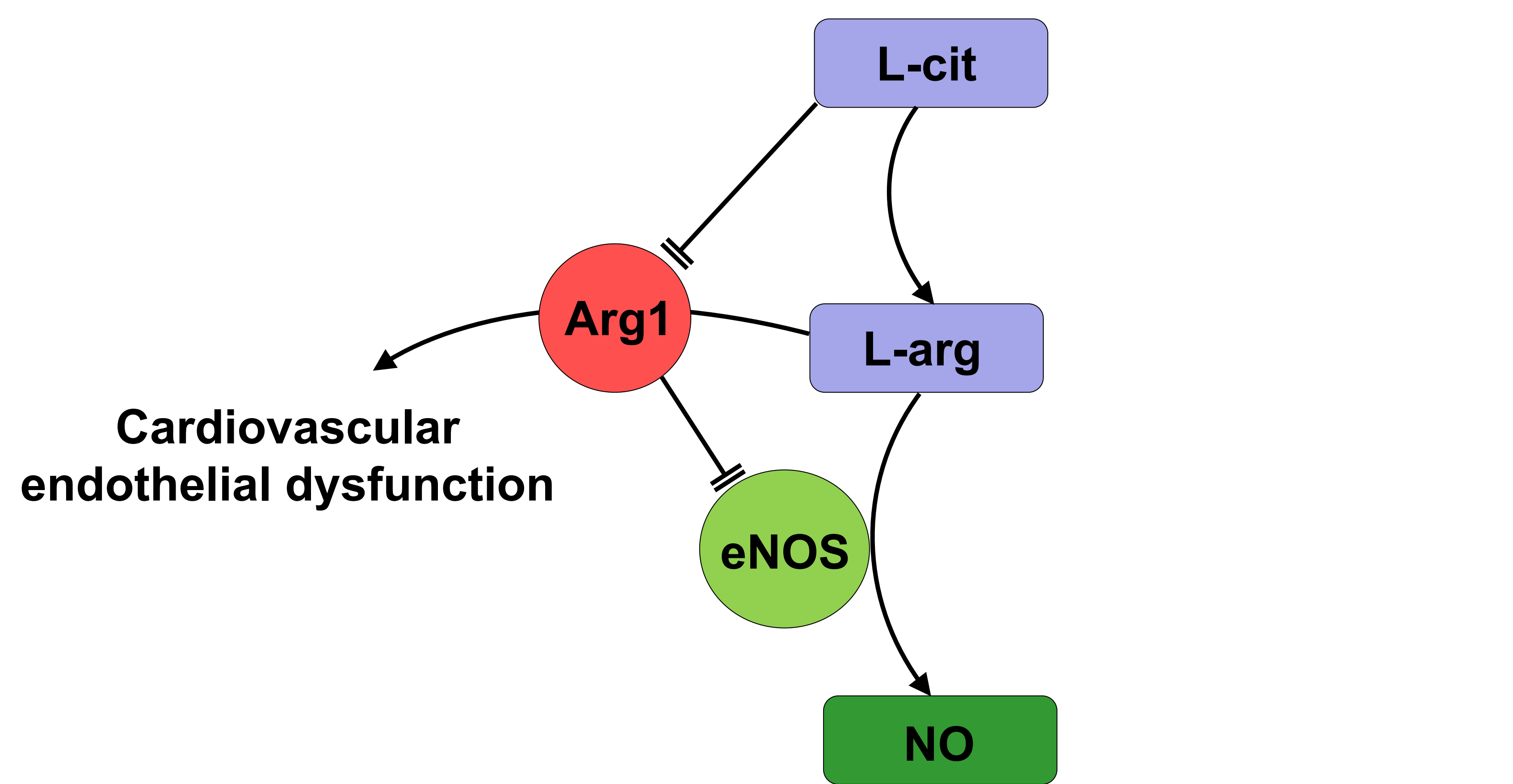
Methods

- Design: Retrospective cohort study
- Cohort: Non-diabetic, elective laparoscopic segmental colectomy patients of a single colorectal surgeon
- Primary outcome: incidence of AKI; Secondary outcome: LOS



- Control**
 - Prep/ERP
 - Ad lib sports drink until 2h preop
- COM**
- Intervention**
 - Prep/ERP + COM
 - Ad lib non-carbohydrate drink until 2h preop
- COM: 10oz of a maltodextrin (25g) and citrulline (3g) solution
 - 2 doses evening prior to surgery, 1 dose 2 hours prior to surgery
- Standardized prep & ERP throughout the study period:
 - 238gm polyethylene glycol (PEG) in 64oz sports drink
 - 3 doses 1gm neomycin/500mg metronidazole
 - Full liquid diet immediately post-operatively

Biochemical Basis



- Endothelial nitric oxide (eNOS) dysfunction is an established mechanism for renal impairment in rats
- L-arginine (L-arg) is a substrate for endothelial nitric oxide (eNOS) synthetase required for nitric oxide production in the kidney
- L-arg supplementation leads to breakdown by arginase-1 (Arg1) with deleterious effect on cardiovascular endothelial function
- L-citrulline (L-cit) is a precursor for L-arginine which provides substrate for eNOS and allosterically inhibits Arg1, enhancing eNOS function and nitric oxide (NO) production

References

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Results

- 207 patients included (N=155 COM, N=52 control)
- Reduction in AKI and LOS was statistically significant

AKI: 0.65% COM vs 5.77% p=0.049
LOS: 2.0 COM vs 3.0 p=0.004

- Groups were similar with exception of higher rate of conversion to open in the control group

| | Control | COM | P-value |
|---------------|------------|-------------|----------|
| Age | 60.4 ± 14 | 59.8 ± 13.3 | p=0.76 |
| BMI | 28.9 ± 6.6 | 28.5 ± 6.8 | p=0.67 |
| ASA | | | p=0.470 |
| Tobacco Use | 11.5% | 23.9% | p=0.075 |
| Conv. to Open | 28.8% | 13.5% | p=0.018* |

Conclusion & Discussion

- Preoperative COM was associated with reduced AKI and LOS in non-diabetics undergoing elective laparoscopic partial colectomy
- While increased rate of conversion to open surgery in the intervention group confounds interpretation of these results, incidence of AKI in the COM group was well below historical norms