Nutrition Support Considerations in Non-Occlusive Mesenteric Ischemia in a Critically Ill Obese Patient: A Case Report

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Background

Non-occlusive mesenteric ischemia (NOMI) is a rare but highly fatal form of acute mesenteric ischemia, which is defined by a sudden interruption of blood supply to the intestines. NOMI occurs most commonly in critically ill, mechanically ventilated patients with hemodynamic instability presenting with low cardiac output and vasoconstriction. Mortality remains high due to diagnostic delays, rapid progression to bowel necrosis, and multisystem organ failure. While nutrition therapy is not a primary treatment for NOMI, it becomes essential following diagnosis due to repeated surgical interventions, sepsis, and increased metabolic demand, and the frequent interruption of feeding caused by hemodynamic instability. This case report highlights complexities of implementing evidence-based nutrition support in NOMI, and emphasizes the importance of individualized nutrition strategies, close monitoring, and interdisciplinary coordination to preserve nutritional status and support clinical outcomes.

Nutritional Considerations

The American Society for Parenteral and Enteral Nutrition (ASPEN) provides evidence-based clinical guidelines to support safe and effective nutrition therapy across a wide range of patient populations.

Table 1:	Enteral Nutrition (EN)
Timing & Initiation	Oral diet is preferred method of nutrition delivery. If not feasible, initiate EN withing 24-48 hours in critically ill patients.[3]
Formula Choice	Immune-modulating formula (containing both arginine and fish oils).[3] Use a commercial mixed fiber containing formulation if there is persistent diarrhea.[3]
Route	Recommend EN tube is placed lower in the GI tract.[3]
Monitoring	Monitor hyperglycemia, hyperlipidemia, hypercapnia, fluid overload, hepatic fat accumulation, EN tolerance, and signs of refeeding syndrome.[3-4]
Contraindications	EN should be withheld until the patient is hemodynamically stable.[3] Use clinical judgment for each case.[3] Delay EN in patients with overt bowel ischemia and implement PN within 3 to 7 days.[4]

Table 2:	Parental Nutrition (PN)
Timing & Initiation	EN is preferred over PN.[3] If EN and oral diet is not feasible, initiate exclusive PN immediately.[3]
Formula Choice	No difference between standardized PN or compounded PN.[3]
Dosing	A hypocaloric dose (<20 kcal/kg/d or 80% of energy needs) with adequate protein (>1.2 g/kg/d).[3]
Transition	As tolerance to EN improves, decrease PN and discontinue completely when patient is receiving >60% of target energy needs from EN.[3]
Contraindications	Patient with fluid restriction should not be candidates for peripheral parenteral nutrition due to fluid overload.[5] Discontinue if bacteremia is suspected.[3]

Case Report

Case Summary:

61-year-old female with a past medical history of type 2 diabetes, hyperlipemia, and substance abuse who presented to the ER with chest pain and was found to have severe mitral valve stenosis and occlusion of the left anterior descending artery. Patient underwent a coronary artery bypass graft and mitral valve replacement with a mechanical valve. On day 15 of admission, the patient complained of abdominal pain, feeling cold, lethargic, and later became hypotensive. Patient was urgently transferred to the operating room for an exploratory laparotomy and was found to have ischemic bowel.

Nutrition Assessment:

- Anthropometrics:
  - Ht: 5'5"
  - Wt: 260 lbs.
  - BMI: 43.3 (morbid obesity)
- Before NOMI diagnosis, patient was consuming 0% of meals
- Medications: warfarin, insulin, vasopressin, furosemide, pantoprazole, Megace, Carafate, iron, multivitamin
- Nutrition Focused Physical Findings:
  - Obese
  - Pitting edema (3+, 4+)
  - Poor wound healing of the abdomen and chest
  - Met criteria for severe acute malnutrition during admission based on <50% intake for ≥ 5 days + fluid accumulation (3-4+ edema)
- Estimated needs higher than normal for a BMI >40 to accelerate wound healing of the abdomen:
  - 25-30 kcal/kg of IBW/day
  - 2.0-2.5 g of protein/kg of IBW/day

Table 3: Hemodynamic Stability Criteria

Criteria	Ideal Ranges	Patient Values (Selected Time Point)
Pulse	60 to 100 beats/min [7]	118 beats/min
Respiratory Rate	12 to 20 breaths/min [7]	28 breaths/min
SBP	≥ 90 mm Hg [6]	82 mm Hg
MAP	≥ 65 mm Hg [6]	58 mm Hg
Temperature [6]	97.7 to 99.5 °F [7]	101.8°F

Nutrition Diagnosis

1. Inadequate oral intake related to clinical condition (post CABG) as evidenced by consuming 0% of meals per RN.
2. Altered GI function related to clinical condition (NOMI) as evidenced by abdominal pain, emesis, and exploratory laparotomy confirming ischemic bowel.

Nutrition Interventions

DAY 16:
Initiated PN due to overt bowel ischemia, hemodynamic instability, and prolonged NPO status

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DAY 24:
Trophic feeds with an immune modulating formula initiated
*EN held during instability, procedures, and suspected intolerance

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DAY 29:
TPN discontinued due to bacteremia
*PPN was contraindicated due to fluid overload

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DAY 30-33:
Extubated, passed bedside swallow, and advanced to carbohydrate-controlled diet

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DAY 38:
Reintubated, patient with bacteremia again, trophic feeds initiated and cautiously advanced to goal rate

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DAY 44:
Extubated, failed bedside swallow, soluble fiber added to tube feed three times a day due to persistent diarrhea

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DAY 50-72:
Mechanical soft diet with thin liquids + nutrition/wound supplements; oral diet until passing on Day 72

Outcomes

- Nutrition delivery was frequently interrupted by NPO status, respiratory decline, operating room trips, failed bedside swallow tests, and infection-related complications
- Sustained provision of >60-80% estimated needs not consistently achieved through oral diet, EN, and PN
- Persistent diarrhea improved with soluble fiber
- Recurrent hemodynamic instability, bacteremia, and intermittent EN tolerance

Discussion & Application

NOMI presents a unique and complex nutrition dilemma in the ICU. While early EN is generally preferred in critically ill patients, bowel ischemia requires cautious advancement and frequent reassessment of hemodynamic stability. This case highlights the tension between preventing malnutrition and avoiding exacerbation of intestinal hypoperfusion.

In obese critically ill patients, hypocaloric, high-protein feeding is recommended to preserve lean mass and reduce metabolic complications. However, repeated procedural interruptions, vasopressor requirements, bacteremia, and respiratory failure significantly limited the ability to meet estimated needs. This underscores the importance of individualized clinical judgment beyond evidence-based guidelines.

Key applications for practice include:

- Avoiding unnecessary EN discontinuation when extubation is anticipated
- Continuing EN alongside oral intake initially due to the likelihood the patient's appetite will be decreased
- Closely monitoring tolerance to feedings and advancing conservatively
- Prioritizing multidisciplinary communication to reduce nutrition interruptions

Conclusions

NOMI is associated with high mortality and profound nutrition risk. Although nutrition therapy is not a primary treatment for NOMI, it plays a critical role in supporting metabolic demands, wound healing, and preservation of lean body mass in critically ill patients. This case demonstrates the challenges of delivering consistent nutrition support amid hemodynamic instability, surgical burden, and infection. Evidence-based guidelines provide a framework; however, successful implementation requires continual reassessment, individualized modification, and interdisciplinary coordination.

References

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