



Evidence-Based Resource

Value Of US In NEC SR?

Evidence Level II

Necrotizing enterocolitis is a severe gastrointestinal disease with high rates of mortality in preterm infants. Timely diagnosis and management are crucial for improving prognosis. Despite its frequent presentation, there remains a paucity of evidence surrounding the benefits of ultrasound use separately or in combination with radiography. There is controversy regarding the value of using US in suspected and confirmed NEC patients.

Cuna and colleagues performed a systematic review and meta-analysis to identify bowel ultrasound findings of NEC patients with the outcomes of surgery or death. A total of 11 studies published from 1986 to 2017 were identified, with a total of 748 infants included in the analysis. 6 of the studies were retrospective cohort studies, 3 were retrospective case reviews, and 2 were prospective cohort studies. US was done as part of routine evaluation in 5 of the studies, and in 6, US was performed at the discretion of the clinician only.

The associations between individual bowel US characteristics and surgical outcomes or a combined outcome for surgery and death were pooled when at least three or more studies reported on the outcome. This allowed for the meta-analysis of 13 characteristics (listed below with odds ratios). Decreased bowel perfusion, peritoneal calcification, increased superior mesenteric artery flow, reduced inflation of the intestine, decreased peristalsis and ascites were not analyzed as there were insufficient studies to include in the meta-analysis.

Results of 13 individual characteristics associated with outcomes:

Pneumatosis:

- Surgery: OR 2.23 (95% CI: 1.01-4.92; p = 0.05) *
- Surgery or death: OR 2.07 (95% CI: 0.84-10.60; p = 0.11)

Pneumoperitoneum:

- Surgery or death: OR 9.63 (95% CI: 1.65-56.32; p = 0.01) *

Portal venous gas:

- Surgery: OR 1.94 (95% CI: 0.99-3.77; p = 0.05)
- Surgery or death: OR 2.98 (95% CI: 0.84-10.60; p = 0.09)

Bowel wall echogenicity:

- Surgery or death: OR 8.58 (95% CI: 3.42-21.53; p < 0.01) *

Bowel wall thickening:

- Surgery: OR 4.74 (95% CI: 2.53-8.89; p < 0.01) *
- Surgery or death: OR 3.86 (95% CI: 2.43-6.14; p < 0.01) *

Bowel wall thinning:

- Surgery: OR 3.01 (95% CI: 0.88-10.27; p = 0.08)
- Surgery or death: OR 7.11 (95% CI: 1.56-32.29; p = 0.01) *

Absent perfusion:

- Surgery or death: OR 6.99 (95% CI: 2.06-23.76; p = 0.002) *

Increased perfusion

- Surgery or death: OR 2.60 (95% CI: 0.61-11.13; p = 0.20)

Absent peristalsis:

- Surgery or death: OR 10.68 (95% CI: 1.65-69.02; p = 0.01) *

Simple ascites:

- Surgery: OR 0.46 (95% CI: 0.03-6.97; p = 0.58)
- Surgery or death: OR 0.54 (95% CI: 0.12-2.47; p = 0.43)

Complex ascites:

- Surgery or death: OR 11.28 (95% CI: 4.23-30.04; p < 0.01) *

Focal fluid collection:

- Surgery or death: OR 17.92 (95% CI: 3.11-103.31; p = 0.001) *

Dilated bowel:

- Surgery or death: OR 3.50 (95% CI: 1.81-6.75; p < 0.01) *

OR = Odds Ratio; CI = Confidence Interval

* denotes statistical significance at p < 0.05

Conclusions: Several ultrasound findings were significantly associated with surgery or death for infants with NEC, with the strongest correlations being free air, absent peristalsis, complex ascites and focal fluid collection. Only three of the included US characteristics can be assessed accurately from simple radiography: free air, pneumatosis, and portal venous gas.

A limitation of this study was the evaluation of one characteristic at a time, while in clinical practice, the characteristics are evaluated in conjunction with each other and clinical history. Findings from this review and meta-analysis indicate that infants at high-risk of NEC may benefit from US evaluation.

Systematic Reviews

[Cuna AC, Lee JC, Robinson AL, Allen NH, Foley JE, Chan SS. Bowel Ultrasound for the Diagnosis of Necrotizing Enterocolitis: A Meta-analysis. *Ultrasound Q*. 2018;34\(3\):113-8.](#)

