International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
Canada
+15878858911
editorial-office@sciformat.ca

ARTICLE TITLE	APPENDICITIS IN NEONATES (≤28 DAYS OF LIFE): CLINICAL PRESENTATION AND DIAGNOSIS
DOI	https://doi.org/10.31435/ijitss.1(49).2026.4969
RECEIVED	28 January 2026
ACCEPTED	15 March 2026
PUBLISHED	30 March 2026
LICENSE	The article is licensed under a **Creative Commons Attribution 4.0 International License.**

APPENDICITIS IN NEONATES (≤28 DAYS OF LIFE): CLINICAL PRESENTATION AND DIAGNOSIS

Anna Dominiczak *(Corresponding Author, Email: amdominiczak@gmail.com)*
Warszawski Uniwersytet Medyczny, Warszawa, Poland
ORCID ID: 0009-0008-5984-2866

Katarzyna Mazurek
Warszawski Uniwersytet Medyczny, Warszawa, Poland
ORCID ID: 0009-0007-4656-0897

Marta Brzęcka
Warszawski Uniwersytet Medyczny, Warszawa, Poland
ORCID ID: 0009-0007-1853-1415

Stanisław Rogiński
Uniwersytet Medyczny w Poznaniu im. Karola Marcinkowskiego, Poznań, Poland
ORCID ID: 0009-0007-7867-512X

Miłosz Rogiński
Gdański Uniwersytet Medyczny, Gdańsk, Poland
ORCID ID: 0009-0007-1863-1416

Krzysztof Rogiński
Collegium Medicum in Bydgoszcz, Bydgoszcz, Poland
ORCID ID: 0009-0003-9820-2443

Marek Wojciechowicz
Gdański Uniwersytet Medyczny, Gdańsk, Poland
ORCID ID: 0009-0000-3963-6805

Łukasz Chojnowski
Szpital Morski im. PCK, Gdynia, Poland
ORCID ID: 0009-0005-6077-8636

Karolina Kryca
Uniwersytet Kardynała Stefana Wyszyńskiego, Warszawa, Poland
ORCID ID: 0009-0000-1649-9967

Ksawery Szlęzak
Warszawski Uniwersytet Medyczny, Warszawa, Poland
ORCID ID: 0000-0003-2650-113X

ABSTRACT

Neonatal appendicitis is an exceptionally rare condition associated with high morbidity and mortality, primarily due to delayed diagnosis and a nonspecific clinical presentation that overlaps with more common neonatal disorders.
The aim of the study: This study aimed to systematically review recently reported cases of neonatal appendicitis with a focus on clinical presentation and diagnostic features.
Materials and methods: A systematic review was conducted in accordance with PRISMA guidelines using PubMed and Google Scholar. Fifteen case reports met the inclusion criteria.
Results: Abdominal distension was the most frequently reported presenting symptom. Classic signs of acute abdomen were often absent. Laboratory findings were nonspecific and preoperative diagnosis was uncommon. Ultrasonography provided supportive diagnostic information, while pneumoperitoneum on plain radiography often prompted urgent surgical intervention. In most cases, the diagnosis was established intraoperatively, frequently after appendiceal perforation.
Conclusions: Neonatal appendicitis presents with nonspecific clinical and diagnostic features that commonly mimic necrotizing enterocolitis. Awareness of abdominal distension as a consistent sign and careful interpretation of imaging findings may support earlier recognition and timely surgical management of this rare but life-threatening condition.

KEYWORDS

Neonatal Appendicitis, Appendicitis in Neonates, Newborn Appendicitis

CITATION

Anna Dominiczak, Katarzyna Mazurek, Marta Brzęcka, Stanisław Rogiński, Miłosz Rogiński, Krzysztof Rogiński, Marek Wojciechowicz, Łukasz Chojnowski, Karolina Kryca, Ksawery Szlęzak. (2026) Appendicitis in Neonates (≤28 Days of Life): Clinical Presentation and Diagnosis. *International Journal of Innovative Technologies in Social Science*. 1(49). doi: 10.31435/ijitss.1(49).2026.4969

Introduction

Appendicitis is a common surgical condition in the pediatric population. However, its occurrence in neonates is exceptionally rare, accounting for approximately 0.04-0.2% of all pediatric appendicitis cases. Despite its low incidence, neonatal appendicitis (NA) represents a serious clinical problem due to its association with high morbidity and mortality. Outcomes in this age group are significantly worse than in older children, primarily because of delayed diagnosis and rapid disease progression (Aslam et al., 2022; Bence & Densmore, 2020; Khan et al., 2010).

The clinical presentation of NA is typically nonspecific and differs from the classic manifestations observed in older patients. Symptoms such as abdominal distension, vomiting, feeding intolerance, apnea and signs of sepsis are common, while acute abdomen syndrome is often absent. The condition is frequently misinterpreted as more prevalent neonatal disorders, particularly necrotizing enterocolitis or neonatal sepsis, leading to further diagnostic delay (Hall et al., 2021a; Khan et al., 2010; Manasra et al., 2024; Naik et al., 2023).

The standard treatment for NA is surgical exploration with appendectomy. The procedure is often followed by bowel resection as most cases are diagnosed after perforation has already occurred. A distinct subgroup includes appendicitis associated with Amyand's hernia (appendicitis within an inguinal hernia sac) (Arroyo et al., 2021; Khan et al., 2010; Kumar et al., 2023).

Accurate preoperative diagnosis remains challenging. Laboratory investigations have limited diagnostic value, also imaging assessment is complicated because of neonatal anatomy and subtle radiological findings. As a result, appendicitis in neonates is rarely identified before perforation, which contributes to severe intra-abdominal infection (Akbarpoor et al., 2025; Kumar et al., 2023; Lv et al., 2024).

Therefore, a systematic synthesis of recently reported cases may help to better characterize the spectrum of clinical presentation and diagnostic findings associated with NA which could improve clinical awareness or earlier recognition.

Methodology

This study was designed as a systematic literature review conducted in accordance with the PRISMA guidelines. Data were collected through structured searches of two electronic databases – PubMed and Google Scholar, using keywords related to NA, including "neonatal appendicitis", "appendicitis in neonates", as well as "case report" and "case series". The initial search yielded 687 records from PubMed and 168 records from Google Scholar. After applying predefined filters (human studies, English language and publications from the last five years), 18 PubMed records and 50 Google Scholar records remained.

All 18 PubMed records proceeded to screening based on titles and abstracts. In the Google Scholar search, 25 of the 50 records were excluded based on titles that were not relevant to the study topic, and the remaining 25 records proceeded to title and abstract screening. In total, 43 records were screened at the title and abstract level. At this screening stage, 29 records were excluded because they did not meet the inclusion criteria, which non-case report study design, patient age exceeding 28 days or insufficient relevance to the study objectives.

The remaining 14 records were assessed for eligibility through full-text review and met all predefined inclusion criteria. These studies (4 from PubMed and 10 from Google Scholar) were included in the final synthesis. Data were analyzed focusing on clinical presentation and diagnostic features of NA.

Results

Clinical presentation

Neonatal appendicitis is characterized by a nonspecific clinical presentation that often overlaps with other neonatal abdominal conditions, mostly necrotizing enterocolitis (NEC) and, less frequently, Hirschsprung's disease (Aslam et al., 2022; Manasra et al., 2024; Naik et al., 2023; Rao et al., 2022). The most frequently reported symptom was abdominal distension, described in 80% of analyzed cases (Akbarpoor et al., 2025; Arroyo et al., 2021; Aslam et al., 2022; Delgado et al., 2021; Eze et al., 2023; Ivanova et al., 2022; Kumar et al., 2023; Manasra et al., 2024; Pal & Pal, 2025; Rao et al., 2022; Singh & Singh, 2024). Other clinical manifestations included:

- vomiting, often bilious or consisting of gastric contents (Umscheid et al., 2021),
- fever, reported in several cases (Arroyo et al., 2021; Ivanova et al., 2022),
- irritability and lethargy, with neonates presenting either excessive agitation or apathy (Hall et al., 2021b; Manasra et al., 2024),
- feeding intolerance, manifested by gastric residuals or poor sucking (Aslam et al., 2022; Rao et al., 2022),
- altered bowel habits, including constipation or less commonly bloody stools (Naik et al., 2023; Pal & Pal, 2025).

On physical examination, abdominal tenderness and guarding in the right lower quadrant were occasionally noted, although these findings were less frequent than in older children (Arroyo et al., 2021; Delgado et al., 2021). A characteristic but less common presentation was the presence of a palpable mass in the right lower quadrant or appendicitis within an inguinal hernia sac (Amyand hernia) (Arroyo et al., 2021; Hall et al., 2021b; Herrera Ojeda et al., 2025; Rao et al., 2022). In advanced cases, the disease rapidly progressed to sepsis, shock and multiorgan failure (Akbarpoor et al., 2025; Umscheid et al., 2021).

Diagnosis

The diagnosis of NA is difficult and frequently delayed (Arroyo et al., 2021; Ivanova et al., 2022).

Laboratory investigations often demonstrated leukocytosis and elevated C-reactive protein (CRP) levels; in severe cases, metabolic acidosis and elevated lactate concentrations were reported (Akbarpoor et al., 2025; Aslam et al., 2022; Manasra et al., 2024; Umscheid et al., 2021).

Abdominal ultrasonography was considered the most reliable noninvasive diagnostic tool. Key findings included an enlarged appendiceal diameter (3,5 mm or more), bowel wall thickening, free intraperitoneal fluid or localized mass in the right lower quadrant (Delgado et al., 2021; Hall et al., 2021b; Herrera Ojeda et al., 2025; Ivanova et al., 2022; Pal & Pal, 2025).

Abdominal radiography was nonspecific and commonly demonstrated dilated bowel loops or air-fluid levels suggestive of obstruction. The most significant radiographic finding was pneumoperitoneum (free air), indicating gastrointestinal perforation. (Arroyo et al., 2021; Aslam et al., 2022; Eze et al., 2023; Manasra et al., 2024; Naik et al., 2023; Rao et al., 2022; Singh & Singh, 2024).

Computer tomography was occasionally used to identify masses or localize perforation (Ivanova et al., 2022; Manasra et al., 2024).

Despite the availability of imaging modalities, the definitive diagnosis of NA was most often established intraoperatively during exploratory laparotomy, typically performed for suspected NEC or another cause of acute abdomen (Akbarpoor et al., 2025; Aslam et al., 2022; Naik et al., 2023). Postoperative histopathological examination of the resected appendix was used to confirm the diagnosis. In selected cases, rectal biopsies were also performed to exclude Hirschsprung's disease (Ivanova et al., 2022; Pal & Pal, 2025).

Discussion

This review confirms that NA presents a predominantly nonspecific clinical picture. Abdominal distension emerged as the most consistent early clinical feature across cases. However, its low specificity limits its diagnostic value when interpreted in isolation. The reviewed cases indicate that the clinical significance of this symptom lies not only in its presence, but in its trajectory – particularly when accompanied by atypical progression or failure to respond to standard NEC management (Aslam et al., 2022; Delgado et al., 2021; Kumar et al., 2023). The frequent overlap with NEC and neonatal sepsis remains principal cause of delayed diagnosis, particularly in preterm infants (Manasra et al., 2024; Naik et al., 2023; Rao et al., 2022).

Laboratory findings lack specificity, and imaging studies provide variable diagnostic support. Ultrasonography may aid diagnosis when the appendix is visualized, but its utility is limited by neonatal anatomy and operator dependency (Delgado et al., 2021). Plain radiography is generally nonspecific but becomes diagnostically relevant when pneumoperitoneum is present, often prompting urgent surgical intervention (Eze et al., 2023; Naik et al., 2023).

Perforation was reported in the majority of cases, reflecting both delayed recognition and the structural vulnerability of the neonatal appendix (Akbarpoor et al., 2025; Aslam et al., 2022; Eze et al., 2023; Herrera Ojeda et al., 2025; Ivanova et al., 2022; Manasra et al., 2024; Naik et al., 2023; Rao et al., 2022; Singh & Singh, 2024; Umscheid et al., 2021). Interestingly, many sources note a "perforation paradox": neonates with perforated appendicitis often have a better prognosis because the presence of pneumoperitoneum triggers immediate surgical intervention, whereas non-perforated cases may be treated conservatively for NEC, leading to further delay (Delgado et al., 2021; Manasra et al., 2024).

Some authors expand the understanding of NA beyond an isolated inflammatory condition by exploring its etiopathogenesis. Proposed mechanisms include localized ischemic or inflammatory processes resembling NEC, immune immaturity in preterm infants, vascular insufficiency and mechanical obstruction related to associated conditions such as Hirschsprung's disease or hypothyroidism (Arroyo et al., 2021; Eze et al., 2023; Manasra et al., 2024; Pal & Pal, 2025). There were also rare presentations including abdominal masses or prenatal onset with abscess formation which made the diagnosis even more complicated (Delgado et al., 2021; Hall et al., 2021b; Herrera Ojeda et al., 2025; Singh & Singh, 2024).

A distinct subgroup of cases associated with Amyand's hernia demonstrated more localized disease and earlier diagnosis. Those cases were associated with a more favorable outcome (Arroyo et al., 2021; Hall et al., 2021b; Herrera Ojeda et al., 2025).

Conclusions

Neonatal appendicitis remains an exceedingly rare clinical entity. Due to its non-specific presentation, it poses a direct life-threatening risk to the neonate. The high mortality rate, historically significant but declining, is primarily attributed to diagnostic delays that lead to rapid progression toward sepsis and multiorgan failure (Akbarpoor et al., 2025; Aslam et al., 2022; Manasra et al., 2024).

The primary challenge is the clinical overlap between NA and necrotizing enterocolitis (NEC), as well as Hirschsprung's disease. Because NEC is far more common, neonates with appendicitis are often initially treated conservatively, which delays necessary surgical intervention (Manasra et al., 2024).

Due to the thin appendiceal wall in neonates, perforation occurs in most cases. Paradoxically, neonates with perforation may have better outcomes than those with non-perforated NA, as the presence of free intraperitoneal air on an X-ray prompts immediate surgical consultation and exploratory laparotomy, thereby shortening the time to an accurate diagnosis (Akbarpoor et al., 2025).

Associated conditions such as Hirschsprung's disease or Amyand's hernia must be considered (Akbarpoor et al., 2025; Herrera Ojeda et al., 2025; Manasra et al., 2024).

Improving the prognosis for NA depends on maintaining a high index of clinical suspicion in neonates presenting with abdominal symptoms suggesting NEC that does not respond to treatment or shows only temporary improvement (Delgado et al., 2021). Early surgical consultation and prompt laparotomy remain the only effective strategies to reduce morbidity and mortality in this patient population (Manasra et al., 2024).

Disclosure

During the preparation of this work, the authors used ChatGPT, an AI language model developed by OpenAI, in order to revise and improve the clarity and fluency of some parts of the English text. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Author(s) contributions:

All authors contributed to the article.

Conceptualization – Dominiczak A., Mazurek K.

Formal Analysis – Dominiczak A., Mazurek K., Kryca K.

Investigation – Dominiczak A., Mazurek K., Brzęcka M., Rogiński S., Rogiński M., Wojciechowicz M., Rogiński K., Chojnowski Ł., Kryca K., Szlęzak K.

Data Curation – Dominiczak A., Rogiński K., Chojnowski Ł.

Writing-rough preparation – Dominiczak A., Mazurek K., Kryca K., Szlęzak K.

Writing – review and editing – Dominiczak A., Mazurek K., Brzęcka M., Rogiński S., Rogiński M., Wojciechowicz M., Rogiński K., Chojnowski Ł., Kryca K., Szlęzak K.

Supervision – Dominiczak A., Mazurek K.

Funding statement: This research received no external funding.

Conflicts of interest statement: The authors declare no conflict of interest.

REFERENCES

1. Akbarpoor, F., Mokhtar, J., Bashiri, E., Mathew, A., Zarnegar, L., Alabdullah, M., Al Bawwab, R., Obada, A. A., Zubar Zain, A., & Naji, H. (2025). Perforated neonatal appendicitis: An uncommon surgical emergency. *BMJ Case Reports CP, 18*(11), e268813. https://doi.org/10.1136/BCR-2025-268813
2. Arroyo, I. C., de Alarcón García, J. R., R., J. P., R. L. Á., Amillo, E. D., & Beauregard, C. S. (2021). Neonatal appendicitis: How many sides does this coin have. *Cir Pediatr, 34*(3), 143–146. https://secipe.org/coldata/upload/revista/2021_34-3_143.pdf
3. Aslam, Y., Hasan, H., Mirza, A., Ali, A., Salat, M. S., & Qamar, M. A. (2022). Neonatal appendicitis with necrotizing enterocolitis. *Journal of Ayub Medical College Abbottabad, 34*(3), 578–580. https://doi.org/10.55519/JAMC-03-9835
4. Bence, C. M., & Densmore, J. C. (2020). Neonatal and infant appendicitis. *Clinics in Perinatology, 47*(1), 183–196. https://doi.org/10.1016/J.CLP.2019.10.004
5. Delgado, C. A., Sánchez, V., Shimabuku, R., Cadillo, G., Tabuchi, M., & Durand, F. (2021). Neonatal appendicitis. *Journal of Pediatric Surgery Case Reports, 65*, 101759. https://doi.org/10.1016/J.EPSC.2020.101759
6. Eze, A., Chime, C., Eze, O., Kwon, G., Moris, D., & Tracy, E. (2023). Perforated appendicitis without peritonitis in a premature newborn: A case report. *Journal of Pediatric Surgery Case Reports, 99*, 102743. https://doi.org/10.1016/J.EPSC.2023.102743
7. Hall, A. G., Otjen, J. P., Vitanza, N. A., Riehle, K. J., & Pinto, N. R. (2021a). Neonatal appendicitis presenting as a painless abdominal mass. *Journal of Pediatric Surgery Case Reports, 72*, 101964. https://doi.org/10.1016/J.EPSC.2021.101964
8. Hall, A. G., Otjen, J. P., Vitanza, N. A., Riehle, K. J., & Pinto, N. R. (2021b). Neonatal appendicitis presenting as a painless abdominal mass. *Journal of Pediatric Surgery Case Reports, 72*, 101964. https://doi.org/10.1016/J.EPSC.2021.101964
9. Herrera Ojeda, D., Vidales-Nieto, E., Medina Vega, A., Damián Cuellar, V., Carvajal, H. G., & Cavazos Castro, A. J. (2025). Neonatal perforated appendicitis: Case report. *International Journal of Surgery Case Reports, 126*, 110748. https://doi.org/10.1016/J.IJSCR.2024.110748
10. Ivanova, E., Garunkštienė, R., & Liubšys, A. (2022). Appendicitis in a newborn: Case report and review of the literature. *Acta Medica Lituanica, 29*(1), 131–135. https://doi.org/10.15388/AMED.2021.29.1.3
11. Khan, R. A., Menon, P., & Rao, K. L. N. (2010). Beware of neonatal appendicitis. *Journal of Indian Association of Pediatric Surgeons, 15*(2), 67–69. https://doi.org/10.4103/0971-9261.70646
12. Kumar, P., Manchanda, V., & Sengar, M. (2023). Acute appendicitis as a rare cause of acute surgical abdomen in neonates: A case series. *Medical Journal of Dr. D.Y. Patil Vidyapeeth, 16*(8), S299–S301. https://doi.org/10.4103/MJDRDYPU.MJDRDYPU_317_22
13. Lv, C., Xie, C., Wang, X., & Liu, Y. (2024). Ultrasonographic characteristics of neonatal appendicitis: A case series. *BMC Pediatrics, 24*(1), 736. https://doi.org/10.1186/S12887-024-05192-1
14. Manasra, M. R., Alhroob, T., Marrawani, M., Batanje, D., Imran, Y., Harahsha, M., Amleh, A. K., & Zugayar, D. (2024). Perforated neonatal appendicitis mimicking necrotizing enterocolitis in a premature neonate: A case report and literature review. *Journal of Surgical Case Reports, 2024*(7). https://doi.org/10.1093/JSCR/RJAE471

15. Naik, P., Anne, R. P., Mathai, S. S., & Pai, N. (2023). Neonatal perforated appendicitis: A presentation of necrotising enterocolitis? *BMJ Case Reports CP, 16*(11), e257097. https://doi.org/10.1136/BCR-2023-257097
16. Pal, K., & Pal, A. (2025). Neonatal appendicitis causing intramural ileocecal stricture and intestinal obstruction. *Journal of Integrative Medicine and Research, 3*(4), 265–268. https://doi.org/10.4103/JIMR.JIMR_57_25
17. Rao, S., Saxena, N., Salvii, K., & Chavan, V. (2022). Neonatal appendicitis: A rare presentation of necrotising enterocolitis in a term infant. *Indian Journal of Child Health, 9*(4), 61–62. https://doi.org/10.32677/IJCH.V9I4.3223
18. Singh, N., & Singh, A. K. (2024). Fetal appendiceal perforation masquerading as meconium peritonitis: A report of a rare case. *Cureus, 16*(5). https://doi.org/10.7759/CUREUS.60576
19. Umscheid, J., Nguyen, K., Vasudeva, R., & Agasthya, N. (2021). Neonatal appendicitis presenting as bilious emesis and septic shock. *Kansas Journal of Medicine, 14*(2), 130–132. https://doi.org/10.17161/KJM.VOL1414990