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CASE REPORT

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# Necrotizing fasciitis in neonates: A case report and review of literature

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**Key Clinical Message**

Early recognition and treatment of necrotizing fasciitis reduce mortality rate which is 24.1% among neonates. Antibiotics and debridement are common treatments. Hyperbaric oxygen and negative pressure wound healing show potential but need further investigation.

**KEYWORDS**

infant, necrotizing fasciitis, newborn, sepsis

## 1 | INTRODUCTION

Necrotizing fasciitis (NF) is a rare fatal rapidly progressive infection that destroys all skin layers and muscles.[1] Due to nonspecific signs and symptoms, it may be misdiagnosed as cellulitis.[2,3] Prompt diagnosis and timely treatment are important factors in morbidity and mortality rates.[4] The treatment includes broad-spectrum antibiotic and surgical interventions.[5] There is little information about NF in neonates; most published articles are case reports. We aimed to present a neonate with NF and then review articles in this age group with a focus on risk factors, signs and symptoms, microbial agents, treatment, and outcome.

## 2 | CASE PRESENTATION

A 10-day-old girl presented with an erythematous lesion, with warmness and induration, in the abdomen. She was born at 34 weeks gestational age from a 31-year-old mother. The pregnancy was uneventful, except for intrauterine growth restriction (IUGR) and fetal distress which was the main reason for the preterm termination of the pregnancy with cesarean section. Her first- and fifth-minute Apgar scores were 8 and 9, respectively. Growth indicators included a birth weight of 1250 g, a height of 43 cm, and head circumference of 28 cm. She was admitted to the neonatal intensive care unit due to prematurity, IUGR, and respiratory distress syndrome. She received oxygen for 1 day. Ampicillin and amikacin were started for her. After 3 days, when the blood culture was negative, we discontinued the antibiotics.

On the 10th day, she presented with an erythematous lesion on the abdominal wall, the right side of the umbilicus, with no sign of omphalitis (Figure 1), which changed to necrosis rapidly. The patient had no umbilical line. Vancomycin (10 mg/kg/dose q12h), meropenem (20 mg/kg/dose q8h), and metronidazole (7.5 mg/kg/dose q24h) started for her, debridement, and irrigation were done via two parallel vertical incisions (Figure 1) with the diagnosis of necrotizing fasciitis continued by daily dressing with gentamycin.

The wound and blood culture were negative. On the 22nd day, she developed feeding intolerance, bilious drainage, and abdominal distension. As she had metabolic

| | Frequency, *N* (%) | Most prevalent, *N* (%) |
|---|---|---|
| Gram positive | 50 (63.29%) | *Staphylococcus aureus*, 36 (45.6%) |
| Gram negative | 17 (21.5%) | *Pseudomonas*, 5 (6.32%) |
| Fungal infection | 5 (5%) | Mucormycosis, 5 (5%) |

**TABLE 3** The most common microorganisms that cause NF in neonates.

**TABLE 4** The uncommon treatments for NF in neonates.

| Treatment | The number of patients received | Mortality |
|---|---|---|
| GCSF | 1 | 1 |
| IVIG | 2 | 0 |
| Negative pressure | 5 | 1 |
| Hyperbaric oxygen | 1 | 0 |
| Graft | 16 | 2 |

procedure, the patient receives 100% oxygen for a specified time and at a determined pressure. Hyperbaric oxygen therapy for necrotizing fasciitis is controversial, but survival and successful treatment were achieved in some studies.[72,73] Negative pressure wound healing is another procedure in which healing occurs by reduced edema, infection, and increased blood flow.[74] In our review of the neonates, antibiotic therapy, debridement, skin graft, hyperbaric oxygen, IVIG, and GCSF were used. Table 4 shows the uncommon treatments and mortality based on our review.

In our literature review among neonates, vancomycin was the most widely used antibiotic. The other frequently used antibiotics are clindamycin, gentamycin, metronidazole, and meropenem, respectively. In most of the patients, a combination of antibiotics for covering gram-positive, gram-negative, and anaerobes were used.

There were seven kinds of dressing used in neonates including honey, silver, solcoseryl, Alginate, gentamycin, Mepitel and Acticoat, and iodine. The most prevalent one was honey with a successful outcome. All the neonates for whom honey dressing was used survived (four neonates). Honey was mentioned as a debriding agent with antimicrobial effects in some literature for NF.[75]

The mortality rate was 24.1% in our review. Gangopadhyay et al. reported 20% mortality in their study of 15 neonates.[76] In another report, the mortality rate was 18.2% among 11 neonates.[68] In the review article of Hsieh et al., 39 out of 69 neonates died (56.5%).[30] In pediatric cases, it was reported 15.4%.[5]

## 4 | CONCLUSION

Although necrotizing fasciitis is fatal and life-threatening, by early recognition and appropriate treatment, mortality and morbidity rates are decreased. NF is suspected based on clinical signs, including erythema, warmth, and edema, often accompanied by systemic symptoms. Rapid progression is a hallmark feature of this condition. Surgical exploration is essential for both confirming the diagnosis and providing the treatment. Antibiotic therapy and debridement are the most frequently used treatment. Hyperbaric oxygen and negative pressure wound healing are effective treatments in some cases and need further investigation. Further studies are needed in neonates to investigate the risk factors, manifestations, and treatments of NF as there is limited research on innovative treatments in this population.

## AUTHOR CONTRIBUTIONS

**Roya Oboodi:** Conceptualization; supervision; writing – original draft; writing – review and editing. **Hamide Barzegar:** Conceptualization; data curation; supervision; writing – original draft; writing – review and editing. **Roozbeh Behzadi:** Conceptualization; data curation; writing – original draft; writing – review and editing.

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## CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests.

## DATA AVAILABILITY STATEMENT

Materials and data provided in this case study are available from the corresponding author on reasonable request.

## ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

The publication of this case was approved by the Ethics committee of Shiraz University of Medical Sciences. Written informed consent was obtained from the patient's legal guardian for the publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this