VOLUME 19 | MAY/JUNE 2026

WHAT'S INSIDE: ORIGINAL RESEARCH | BRIEF REPORT
CASE REPORTS | LETTER TO THE EDITOR

KANSAS JOURNAL of MEDICINE

TABLE OF CONTENTS

A Qualitative Evaluation of Infant Safe Sleep Following Free Crib Provision

Kourtney Bettinger, M.D., MPH[1]
Maheen Bangash, M.D.[2]
Danica Dodd, M.D.[3]
Carolyn R. Ahlers-Schmidt, Ph.D.[4]
Christy Schunn, LSCSW[5]
Ann Davis, Ph.D., MPH[1]
[1]University of Kansas School of Medicine-Kansas City, Kansas City, Kansas, Department of Pediatrics
[2]Mayo Clinic, Rochester, Minnesota, Department of Pediatrics
[3]University of Kansas School of Medicine-Kansas City, Kansas City, Kansas, Department of Internal Medicine
[4]University of Kansas School of Medicine-Wichita, Wichita, Kansas, Department of Pediatrics
[5]The Kansas Infant Death and SIDS (KIDS) Network

Conflict of Interest Disclosure: None.

Corresponding Author:
Kourtney Bettinger, The University of Kansas School of Medicine-Kansas City, Kansas City, Kansas, 2000 Olathe Boulevard, Mailstop 4004, Kansas City, KS 66160, kbettinger@kumc.edu.

ABSTRACT

Introduction. Unsafe sleep practices are a leading cause of infant mortality in the United States. Authors of this qualitative study examined parental perceptions and reported practices related to infant safe sleep among families who received a free portable crib after their infant's birth. Specifically, authors explored whether families used the portable crib to provide a safe sleep environment for their infants.

Methods. Parents of infants aged 2 to 11 months who received a free portable crib were invited to participate in a structured 11-question interview assessing safe sleep perceptions and practices, including crib use. Eleven families participated in the study.

Results. Six themes emerged from the interviews: (1) parents recalled receiving safe sleep counseling, often in considerable detail; (2) many parents initially planned to bed-share before receiving the crib; (3) reported sleep practices frequently differed from established safe sleep recommendations; (4) parents described multiple reasons for not consistently following recommendations; (5) participants supported the continued provision of free cribs and safe sleep counseling; and (6) parents generally found the crib helpful, although it often was used alongside other sleep arrangements.

Conclusion. Although parents recalled receiving safe sleep counseling, reported sleep practices frequently did not align with recommended guidelines. Further research is needed to better understand this gap and to identify strategies that improve adherence to safe sleep recommendations.

INTRODUCTION

To reduce the risk of sleep-related infant death, the American Academy of Pediatrics recommends that infants sleep in the same room as their parents, but on a separate sleep surface such as a crib or bassinet. Infants should be placed in the supine position on a flat, firm mattress with a fitted sheet and no additional objects in the sleep environment. Pacifier use is encouraged when appropriate, and exposure to smoke

should be avoided.[1]

Unsafe sleep practices remain a leading cause of infant mortality, contributing to approximately 3,700 Sudden Unexpected Infant Deaths (SUID) annually in the United States. SUID includes Sudden Infant Death Syndrome (SIDS), accidental suffocation and strangulation in bed, and deaths from unknown causes among infants younger than 12 months.[2] In Kansas, SUID is the second leading cause of infant mortality after congenital anomalies and accounted for 20.8% of infant deaths from 2016 to 2020. Among infants older than 27 days, SUID is the leading cause of death.[3]

Multiple interventions have been implemented to reduce SUID, most commonly educational initiatives targeting health care professionals and families. Some programs also provide safe sleep resources, including portable cribs, sleep sacks, pacifiers, and fitted sheets.[4-6] Prior studies suggest that providing a safe sleep space, particularly for families at high social risk, may increase the use of recommended sleep environments and reduce unsafe practices such as bed-sharing.[4-12] However, the generalizability of these findings is limited by variation in adoption of safe sleep recommendations across populations.[4] In addition, studies evaluating hospital-based crib distribution programs have been limited by demographic differences and potential confounding from concurrent public health campaigns.[8]

In this qualitative study, we examined parental perceptions and reported practices related to infant safe sleep among families who received a free portable crib from an academic medical center. Cribs were distributed through the newborn nursery, neonatal intensive care unit, or pediatric clinic between July 2021 and July 2022. Social workers provided cribs to families identified as lacking a safe sleep space and the financial means to obtain one. The purpose of this study was to better understand how parental perceptions and reported safe sleep practices may change following receipt of a portable crib.

METHODS

Design and Procedures

Eligible participants were parents who received a free portable crib through our academic medical center. Parents younger than 18 years who were not emancipated minors were excluded. A total of 114 parents of infants aged 2 to 11 months were identified for recruitment. Using a list provided by social workers, interviewers (KB, MB) contacted participants by telephone, making up to three attempts per parent using contact information from the infant's medical record. Certified interpreters were used when needed.

Parents who agreed to participate provided verbal consent in accordance with a University of Kansas Medical Center Institutional Review Board-approved protocol (STUDY00147829; flexible review). Interviews were conducted by telephone or Zoom based on participant preference. Participants received $30 for telephone interviews and $50 for Zoom interviews; the higher incentive for Zoom participation reflected the study team's interest in visually assessing infant sleep environments.

Author followed the COREQ (Consolidated Criteria for Reporting Qualitative Research) guidelines in conducting this study, with senior researchers (CA, AD) providing oversight to ensure methodological rigor.[13]

Measures

In addition to the structured interview, demographic information; including age, sex, relationship to the infant, preferred language, and crib distribution site, was collected to characterize the study population.

Interviewers (KB, MB) were trained in qualitative interviewing using the Morgan and Krueger framework, which emphasizes probing to elicit detailed responses.[14] Interviews were conducted either during the initial contact or at a later time convenient for participants. All interviews were audio-recorded and transcribed. For Zoom interviews, audio recordings were used for transcription. Transcripts were prepared by Transcription Professionals, and Spanish-language interviews were translated into English when necessary.

Interviews followed a structured 11-question guide designed to assess parental perceptions and practices related to infant safe sleep after receipt of the crib (See Supplemental; only available online at journals.ku.edu/kjm). The interview guide was developed by the study team, including experts in infant safe sleep (KB, CA, CS) and qualitative methods (AD), using the Morgan and Krueger framework.[14] Interviews were conducted between March and November 2022.

Data Analysis

Qualitative data were analyzed using the Morgan and

Krueger framework, which emphasizes thematic analysis.[14] Transcripts were de-identified before analysis. The analytic team included three trained coders (KB, MB, DD) and one qualitative research expert (AD).

Each coder independently reviewed transcripts to develop an initial codebook and subsequently applied codes to the data. The team met iteratively to compare coding, resolve discrepancies, and refine codes through a consensus-based process. As themes were developed and finalized, previously coded transcripts were reviewed and recoded as needed to ensure consistency.

Analysis reached thematic saturation, with no new themes emerging,[14] after which representative quotes were selected to illustrate each theme. Participant demographic data were summarized using descriptive statistics.

RESULTS

Eleven parents who received a portable crib through our academic medical center participated in the study. Participants had a mean age of 37.6 years (range, 28-51 years), and most were female (91%). Ten participants identified their relationship to the infant as mother, and one identified as father.

Most participants were non-English speaking (73%). Seven interviews were conducted in Spanish (six with certified interpreters and one by a bilingual interviewer [KB]), one interview was conducted in Swahili using a certified interpreter, and three were conducted in English. Infants ranged in age from 2 to 9 months (mean, 5.5 months). Most participants received their crib through the hospital's newborn nursery. Additional demographic information is presented in Table 1.

Using the Morgan and Krueger framework,[14] themes were derived inductively from the interview data. Six themes emerged, at which point thematic saturation was achieved.

Theme #1

Parents remembered receiving safe sleep counseling and often recalled it in detail. Parents were able to describe specific safe sleep recommendations and frequently referenced education provided by health care professionals, including pediatricians and nurses. Education was received during both the prenatal and postnatal periods and in inpatient and outpatient settings. One parent recalled:

I remember that what they told me was that…O. needed to sleep alone inside his crib and that there shouldn't be any teddy bears, any stuffed animals. There shouldn't be any sheets…any drapes or any other objects like pillows with which he might suffocate himself…They told me he was supposed to sleep…facing up and never facing down.

Table 1. Participant characteristics.

Measure	n (%)
Parent age [years]	
20-29	1 (9)
30-39	8 (73)
40-49	1 (9)
50-59	1 (9)
Parent sex	
Female	10 (91)
Male	1 (9)
Relation to infant	
Mother	10 (91)
Father	1 (9)
Language	
English	3 (27)
Spanish	7 (64)
Swahili	1 (9)
Infant Age at Time of Interview	
2 months	1 (9)
4 – 6 months	6 (55)
7 – 9 months	4 (36)
Crib Distribution Location	
Newborn nursery	10 (91)
Neonatal intensive care unit	1 (9)

Parents commonly noted that the crib should contain no additional objects and that the mattress should be firm. However, one parent recalled being told that her infant should sleep "mostly on the side when she can but mostly on her back," which is inconsistent with current recommendations for infants to sleep supine unless medically contraindicated.

Parents also reported receiving safe sleep advice from family members, friends, social workers, and counselors, although health care professionals were the primary source of recalled guidance. Several parents emphasized that health care workers strongly reinforced safe sleep recommendations. One parent stated health care professionals were "very strict about and very emphatic" about having the infant sleep alone, which influenced her child sleeping in the crib "all the time." Another parent referenced safe

sleep statistics, noting that "not [only] in the United States but statistically all over the world there are high numbers indicating that the parents themselves can end up suffocating their own babies…and that's why they need to sleep by themselves."

Theme #2

Many parents planned to bed-share before receiving the free crib. Before receiving the crib, 7 of the 11 parents reported plans to have their infant sleep in bed with them. One participant stated, "I planned for him pretty much to sleep in the bed with me." Another recalled, "I was thinking that she was just going to have to sleep with me, but then the nurses told me about [the free crib]."

Theme #3

Parents described sleep practices that often differed from safe sleep guidelines. Parents reported a range of infant sleep practices, several of which were inconsistent with recommended safe sleep guidelines. One parent described both the sleep environment and the involvement of another child in caregiving:

> *Sometimes if my son is caring for her, he sleeps with her in his bed for a short while…This is a blanket that I put down…so it's not so hard…I cover her with this [other blanket]. And the ones in the crib are to make it softer.*

Another participant stated, "…But mostly he also sleeps with me on my bed." The use of blankets and pillows in the sleep environment was commonly reported. For example, one parent stated, "No, there are not a lot of things on the bed. It's just this blanket," while another explained, "As I said, when she sleeps, it's her in her crib only with her blanket."

Theme #4

Parents identified multiple barriers to following safe sleep guidelines. Parents described several reasons for not consistently following safe sleep recommendations, including generational practices, cultural influences, and concerns about infant comfort. One parent explained the use of blankets as a longstanding family tradition: "…They're fine… Our family's…done it from generation to generation and…none of the babies got smothered or anything with the blankets."

Other parents described continuing practices based on previous experiences caring for infants. Some participants also believed that infants were safer sleeping with another person present to monitor them. One parent stated, "Like I said, every culture has a different way of doing it with babies," while another summarized the challenge by saying, "old patterns die hard."

Cultural influences were discussed frequently, particularly among Spanish-speaking participants. One parent explained:

> *I know that we have a Hispanic culture, and we get to think, well how can we let the baby sleep by themselves? What if something happens to them? When, in reality, something can happen to them if we don't implement these types of habits to put them to sleep on their own with nothing around them…*

Another parent compared practices in her home country, noting that safe sleep recommendations there were not as "strict," and expressed appreciation for the education she received in the United States.

Three parents also identified infant comfort as a barrier, specifically describing crib mattresses as too firm. To make the sleep surface softer, some participants reported placing blankets or additional mattresses in the crib. One parent stated, "This is a blanket that I put down there so it's not so hard," while another commented, "On the crib that she's sleeping on right now, I think she's more comfortable because the mattress is softer."

Theme #5

Parents supported continued crib distribution and safe sleep counseling. Participants strongly supported continued safe sleep education and free crib distribution programs. One parent stated:

> *I really think that it's a very good thing that you can get the crib, especially for people like me that don't have one and aren't able to provide one at the moment. So that was, I think, that was a really good thing to do. And it's really helpful.*

Regarding education, another parent stated:

> *Well, basically to keep hammering the idea…because I didn't know [the guidelines] in the past…I feel that most*

parents are going to follow suit…The fact that many people have repeated it over time had made an impact on what I…did.

Another participant added that teaching safe sleep practices to parents with multiple children was "never in vain."

Theme #6

Parents found the free crib helpful and often used it alongside other sleep arrangements. Parents frequently used the free crib in the home and described it as useful in multiple settings. One parent stated, "She has a daybed in the living room, like a bassinet." Participants appreciated that the portable crib was lightweight and easy to move throughout the home or position beside the parent's bed. Parents also reported using the crib to safely supervise infants while performing household tasks such as cooking or cleaning. As one parent explained, "It's really helpful…the kitchen is upstairs so that's where I keep the first crib that she used, the first crib that was gifted."

DISCUSSION

In this qualitative study, we explored parental perceptions and self-reported practices related to infant safe sleep after families received a free portable crib from their infant's health care team. Six themes emerged from the interviews: (1) parents remembered receiving safe sleep counseling and often recalled it in detail; (2) many parents planned to have their infants sleep in bed with them before receiving the free crib; (3) parents described several sleep practices that did not align with safe sleep guidelines; (4) parents identified multiple reasons for not consistently following the guidelines; (5) parents recommended continued provision of free cribs and safe sleep counseling; and (6) parents generally found the crib helpful and often used it alongside other sleep arrangements. Overall, parents were familiar with safe sleep recommendations and expressed appreciation for receiving a free crib. However, many also described barriers that affected adherence to safe sleep practices at home.

Although parents often remembered and could accurately describe safe sleep recommendations, relatively few consistently reported placing their infants in fully safe sleep environments. This suggests a gap between knowledge and practice. Parents identified several reasons for not following guidelines, including cultural and family traditions, prior sleep practices used with older children, beliefs that infants preferred softer bedding, perceptions that loose objects in the crib were not dangerous, and decisions made by other caregivers. Additional research is needed to better understand this disconnect and identify strategies that improve translation of safe sleep knowledge into practice.

Several findings may also inform clinical practice. First, parents strongly supported continued distribution of free portable cribs and valued their portability, which allowed use in multiple areas of the home. Second, parents encouraged health care professionals to continue providing respectful and repeated safe sleep counseling. Third, some parents reported difficulty assembling the crib, suggesting that staff may consider assisting families with setup before discharge. Finally, parents frequently modified sleep environments to make them softer or more comfortable for infants. Increasing provider awareness of these perceptions may help expand counseling to better address why these adaptations may increase risk.

These findings are consistent with a systematic review of 29 infant safe sleep studies showing that most interventions improve self-reported safe sleep behaviors but do not result in full adherence to recommendations.[6] At our academic medical center, safe sleep education varied across clinical settings, and no standardized educational intervention accompanied crib distribution. Nevertheless, participants commonly recalled safe sleep recommendations and supported ongoing education efforts. This aligns with prior literature demonstrating that education is a core component of most successful safe sleep interventions.[4,7-12]

This study has several limitations. Findings were based on parent self-report, and infant sleep environments were not observed while infants were sleeping. Although only 11 participants were included, thematic saturation was achieved. However, participant heterogeneity may limit generalizability. Further research is needed to better understand and address the gap between safe sleep knowledge and implementation.

CONCLUSIONS

For many families, the free crib provided a safe sleep option that may not otherwise have been available based on their planned sleep arrangements prior to receiving the crib.

Although parents demonstrated substantial knowledge of and support for safe sleep recommendations, a gap remained between knowledge and reported practice. Parents identified multiple barriers to adherence and strongly encouraged health care professionals to continue counseling families on safe sleep guidelines.

ARTICLE INFORMATION

Received Jan. 15, 2026; Accepted for publication May 15, 2026; Published online June 26, 2026, Kans J Med 2026 May-Jun; 19:49-54. https://doi.org/10.17161/kjm.vol19.25004.

Acknowledgement: Authors thank the Children's Miracle Network/KUMC Department of Pediatrics and the Kansas Infant Death and SIDS (KIDS) Network for their support on this project.

Financial Support: Sunflower Pediatric Clinical Trials (NIH UG1OD024943 to A Davis) and Children's Miracle Network/University of Kansas Medical Center Department of Pediatrics.

Presentations: Presented at the American Academy of Pediatrics National Conference and Exhibition (Washington, DC, October 23, 2023) and the International Society for the Study and Prevention of Perinatal and Infant Death International Congress (Florence, Italy, October 6, 2023).

REFERENCES

1. Moon RY, Carlin RF, Hand I. Sleep-related infant deaths: Updated 2022 recommendations for reducing infant deaths in the sleep environment. Pediatrics. 2022; 150(1): e2022057990. PMID: 35726558.
2. Data and Statistics for SUID and SIDS. Centers for Disease Control and Prevention: Sudden Unexpected Infant Death and Sudden Infant Death Syndrome. 2024. https://www.cdc.gov/sudden-infant-death/data-research/data/?CDC_AAref_Val=https://www.cdc.gov/sids/data.htm. Accessed June 30, 2025.
3. Stanek JK, Goss A, Haug K, Cha I. Kansas Infant Mortality and Stillbirth Report, 2021. Kansas Department of Health and Environment. 2023. https://www.kdhe.ks.gov/DocumentCenter/View/29631/Infant-Mortality-Report-2021-PDF. Accessed June 30, 2025.
4. Hauck FR, Tanabe KO, McMurry T, Moon RY. Evaluation of bedtime basics for babies: A national crib distribution program to reduce the risk of sleep-related sudden infant deaths. J Community Health. 2015; 40(3):457-463. PMID: 25331608.
5. Moon RY, Hauck FR, Colson ER. Safe infant sleep interventions: What is the evidence for successful behavior change? Curr Pediatr Rev. 2016; 12(1):67-75. PMID: 26496723.
6. Salm Ward TC, Balfour GM. Infant safe sleep interventions, 1990-2015: A review. J Community Health. 2016; 41(1):180-196. PMID: 26143241.
7. Engel M, Ahlers-Schmidt CR, Suter B. Safe sleep knowledge and use of provided cribs in a crib delivery program. Kans J Med. 2017; 10(3):1-8. PMID: 29472971.
8. Salm Ward TC, McClellan MM, Miller TJ, Brown S. Evaluation of a crib distribution and safe sleep educational program to reduce risk of sleep-related infant death. J Community Health. 2018; 43(5):848-855. PMID: 29497933.
9. Ahlers-Schmidt CR, Schunn C, Lopez V, et al. A comparison of community and clinic baby showers to promote safe sleep for populations at high risk for infant mortality. Glob Pediatr Health. 2016; 3:2333794X16651787. PMID: 27335991.
10. Carlins EM, Collins KS. Cribs for Kids: Risk and reduction of sudden infant death syndrome and accidental suffocation. Health Soc Work. 2007; 32(3):225-229. PMID: 17896680.
11. Walcott RL, Salm Ward TC, Ingels JB, Llewellyn NA, Miller TJ, Corso PS. A statewide hospital-based safe infant sleep initiative: Measurement of parental knowledge and behavior. J Community Health. 2018; 43(3):534-542. PMID: 29188464.
12. Ahlers-Schmidt CR, Schunn C, Dempsey M, Blackmon S. Evaluation of community baby showers to promote safe sleep. Kans J Med. 2014; 7(1):1-5. DOI: 10.17161/kjm.v7i1.11476.
13. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19(6):349-57. PMID: 17872937.
14. Morgan DL, Krueger RA. The Focus Group Kit. 1st ed. Thousand Oaks, CA: SAGE Publications, Inc; 1997.

Keywords: *infant; sudden infant death/prevention and control; sleep/physiology*

KJM KANSAS JOURNAL OF MEDICINE

Microbial Characteristics and Etiologic Patterns of Endophthalmitis at a Tertiary Referral Center: A Retrospective Cohort Study

Shamir Khan, M.D.
Robert Boyle, M.D.
Maram El-Geneidy, M.D.
Amin Karadaghy, M.D.
Nathaniel Cameron, M.D.
Maggie Malmberg, M.D.
Vivek Velagapudi, M.D.
Dante Pennipede, M.D.
Radwan S. Ajlan, MBBCh
Department of Ophthalmology, The University of Kansas School of Medicine-Kansas City, Kansas City KS, USA

Conflict of Interest Disclosure: None.

Corresponding Author:
Radwan S. Ajlan, The University of Kansas School of Medicine-Kansas City, Kansas City, Kansas, 3901 Rainbow Boulevard, Kansas City, KS 66160, rajlan@kumc.edu.

ABSTRACT

Introduction. Endophthalmitis is a serious vision-threatening intraocular infection. Its etiology, microbiologic profile, and antimicrobial resistance patterns vary by region. Understanding local patterns is essential for guiding empiric therapy and improving patient outcomes. Authors of this study aimed to identify the most common etiologies, causative organisms, and resistance patterns of endophthalmitis at a Midwestern tertiary referral center.

Methods. Authors conducted a retrospective chart review of patients diagnosed and treated for infectious endophthalmitis at the University of Kansas between 2008 and 2022. Adult patients with infectious endophthalmitis who underwent vitreous biopsy with microbiologic testing were included. Clinical findings, microbiology results, antimicrobial resistance patterns, empiric treatment regimens, and patient characteristics were collected and analyzed.

Results. A total of 149 patients met the inclusion criteria, of whom 52 had positive microbiologic cultures, yielding 64 microbial isolates. The most common etiologies were endogenous infection (n = 43), postoperative infection (n = 32), infection secondary to corneal ulcer (n = 19), and trauma (n = 14). Among culture-positive cases, most isolates were bacterial (61/64). *Staphylococcus epidermidis* and *Staphylococcus aureus* were the most frequently isolated organisms, accounting for 12 and 8 isolates, respectively. Resistance was most commonly observed to erythromycin (58%) and clindamycin (33%), whereas vancomycin resistance was rare (3%).

Conclusions. Endogenous infection was the most common cause of endophthalmitis in this Midwestern cohort. Regional variation in causative organisms and antimicrobial resistance patterns highlights the importance of local surveillance and tailored empiric treatment strategies to optimize patient outcomes.

INTRODUCTION

Endophthalmitis is a rare but serious vision-threatening intraocular infection.[1] It often presents acutely and can lead to irreversible vision loss or even loss of the eye if not treated promptly.[1,2] Exogenous endophthalmitis results from direct inoculation of microorganisms into the eye and has an overall incidence of approximately 0.07% following intraocular procedures.[3] Endogenous endophthalmitis (EE), in contrast, results from hematogenous spread of systemic infection to the eye.[4] EE strongly is associated with underlying conditions such as cancer, immunosuppression, diabetes, and intravenous drug use.[5] Although EE accounts for only 2% to 8% of all endophthalmitis cases,[6-8] it can progress rapidly and result in severe visual impairment, making prompt identification of causative organisms important for guiding empiric therapy.[9]

The microbiology of endophthalmitis varies by geographic region and mechanism of infection. In East Asian populations, *Klebsiella pneumoniae* is the predominant pathogen, accounting for approximately 60% of cases, largely because of its association with liver abscesses.[10] In Western populations, gram-positive bacteria, gram-negative bacteria, and *Candida albicans* are the most common pathogens, with *Staphylococcus aureus, Streptococcus* species, and *Candida albicans* being particularly prevalent in the United States (U.S.).[11] Previous U.S. studies have reported *Staphylococcus* species in approximately 25% to 35% of EE cases and *Streptococcus* species in 30% to 50% of cases.[12,13]

Regional studies provide valuable insight into local pathogen prevalence and antimicrobial resistance patterns. A study from Indiana identified coagulase-negative *Staphylococcus* species as the most common endophthalmitis isolate (37.5%), followed by *Streptococcus viridans* and *Enterococcus* species.[14] A 2024 national database analysis found that *Staphylococcus aureus*, *Streptococcus* species, and *Candida albicans* were the most common pathogens reported in the Midwest.[12] Similarly, a study from West Virginia identified methicillin-resistant *Staphylococcus aureus* (MRSA) as the leading cause of EE and reported frequent multidrug resistance to clindamycin, daptomycin, and fluoroquinolones.[15]

The purpose of this study was to identify the most common causative organisms of endophthalmitis and describe their antimicrobial susceptibility patterns at a Midwestern tertiary referral center. We also examined empiric treatment regimens and patient characteristics associated with these infections. By characterizing local disease patterns and resistance profiles, we aimed to improve understanding of endophthalmitis in the region and inform future treatment strategies.

METHODS

This retrospective single-cohort chart review was approved by the Institutional Review Board (IRB) at the University of Kansas Medical Center. Clinical data were obtained from the Healthcare Enterprise Repository for Ontological Narration (HERON) for all patients diagnosed with endophthalmitis between 2008 and 2022. The study was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[16]

Eligible participants were adults with a documented diagnosis of endophthalmitis who underwent treatment at our institution. Treatments included intravitreal tap and inject, pars plana vitrectomy (PPV), and other surgical interventions (e.g., enucleation or evisceration). Patients treated outside our facility were excluded. Demographic characteristics (age, sex, and comorbidities), microbiologic data (culture results, organisms, and antimicrobial susceptibilities), treatment modalities, and surgical outcomes were collected.

All culture isolates were classified as bacterial or fungal. Antimicrobial resistance patterns were evaluated using institutional susceptibility testing. Descriptive analyses were performed to characterize microbial isolates and antibiotic susceptibility patterns.

RESULTS

The initial HERON search identified 1,255 patients, of whom 149 met the inclusion criteria. The mean age at diagnosis was 61 ± 16.5 years, and 58% were male.

Among the 149 patients, 107 (72%) underwent tap and inject, 19 (13%) underwent PPV, 17 (11%) underwent enucleation or evisceration, and 6 (4%) underwent open-globe repair with intraocular antibiotic administration.

Endogenous infection was the most common etiology, accounting for 43 cases (29%; Table 1). Postoperative endophthalmitis was the second most common etiology (32 cases, 22%), followed by corneal ulcer-associated infection

(19 cases, 13%), trauma (14 cases, 9%), and post-injection infection (13 cases, 9%). Among postoperative cases, cataract surgery was the most common preceding procedure (13/32, 41%), followed by PPV (12/32, 38%) and keratoplasty (7/32, 22%). Chronic, device-related, and suture-related infections each accounted for 6% of cases, while 5% had an unknown etiology and 2% were bleb related.

Among patients with EE, diabetes mellitus was the most common comorbidity, affecting 14 of 43 patients (33%). Hypertension was present in 16% (7/43), and 12% (5/43) had active cancer or were receiving chemotherapy. Overall, 25% (37/149) of all patients had diabetes, 13% (19/149) had a history of cancer, and 5% (8/149) had an immunosuppressive condition or were receiving immunosuppressive therapy.

Table 1. Overview of endophthalmitis etiology from all patients included in the study.

Cause of Endophthalmitis	Number of Patients
Endogenous	43
Post Operative	32
Ulcer	19
Trauma	14
Post-Injection	13
Chronic	9
Suture / Device	9
Unknown	7
Bleb	3
Total:	**149**

Fifty-two patients (35%) had culture-positive biopsies, yielding 64 microbial isolates (Table 2). Most isolates were bacterial (61/64), while *Candida albicans* accounted for two isolates. The most common organisms identified were *Staphylococcus epidermidis* (12/64, 19%), *Staphylococcus aureus* (8/64, 12.5%), *Cutibacterium acnes* (6/64, 9%), and *Enterococcus faecalis* (5/64, 8%). *Staphylococcus epidermidis* was the predominant pathogen in postoperative and injection-related infections. Among endogenous infections, *Enterococcus faecalis* was the most frequently isolated organism (3/15 cultures), followed by *Candida albicans* and *Staphylococcus aureus* (2/15 cultures each).

Antimicrobial susceptibility testing demonstrated notable resistance patterns (Table 3). Erythromycin resistance was most common, occurring in 58% of tested isolates (18/31). Resistance to clindamycin and oxacillin was observed in 33% (10/30) and 33% (8/24) of isolates, respectively. Penicillin resistance was identified in 38% (3/8) of isolates, while 27% (7/26) were resistant to trimethoprim-sulfamethoxazole. All tested isolates were susceptible to gentamicin, linezolid, ceftriaxone, and daptomycin. Vancomycin resistance was identified in only one isolate (3%). Among the 149 patients, 25% (n = 37) had diabetes mellitus, 13% (n = 19) had a history of cancer, and 5% (n = 8) had an immunosuppressive disorder or were receiving immuno-

Table 2. Organisms from culture-positive endophthalmitis cases.

Organisms Confirmed Positive for Infectious Endophthalmitis	TOTAL
Staphylococcus epidermidis	12
Staphylococcus aureus	8
Cutibacterium acnes	6
Enterococcus faecalis	5
Streptococcus pneumoniae	4
Bacillus cereus	3
Streptococcus mitis/oralis	3
Pseudomonas aeruginosa	2
Corynebacterium amycolatum	2
Candida albicans	2
Group G streptococcus	2
Alpha hemolytic streptococci	2
Staphylococcus hominus	2
Streptococcus (CO2 dependent)*	1
Coagulase-negative Staphylococcus	1
Streptococcus salivarius	1
Enterobacter cloacae	1
Streptococcus dysgalactiae	1
Abiotrophia defectiva	1
Staphylococcus lugdunensis	1
Dermabacter hominis	1
Fusarium	1
Staphylococcus capitus	1
Mycobacterium chelonae	1
TOTAL	**64**

*CO2 – Carbon dioxide

suppressive medications.

Table 3. Resistances of antibiotics from performed sensitivity testing.

Antibiotic	Number Resistant	Total Sensitivities Performed
Erythromycin	18	31
Clindamycin	10	30
Vancomycin	1	30
Trimethoprim-Sulfamethoxazole	7	26
Tetracycline	6	25
Oxacillin	8	24
Gentamicin	0	15
Levofloxacin	2	12
Linezolid	0	12
Rifampin	1	11
Penicillin	3	8
Ceftriaxone	0	8
Ampicillin	1	5
Daptomycin	0	5

DISCUSSION

Over the 15-year study period, EE was the most common etiology, accounting for 29% of all endophthalmitis cases treated at our tertiary referral center. This finding differs from national trends, where postoperative exogenous endophthalmitis is the most common cause.[17] The relatively high proportion of EE in our cohort may reflect referral bias inherent to tertiary care centers, which often manage more complex endogenous infections requiring multidisciplinary care. In contrast, routine postoperative endophthalmitis may be managed by community ophthalmologists at the site of the original procedure. As such, our findings may reflect the unique case mix encountered at a tertiary referral center in the Midwest.

In the United States, the organisms most commonly associated with endophthalmitis include *Staphylococcus aureus*, *Streptococcus* species, and *Candida albicans*.[1,12,14,18] Among patients with EE, *Staphylococcus aureus* and *Streptococcus* species typically are the predominant pathogens, whereas *Enterococcus faecalis* is reported less frequently.[12,14,18] For example, a tertiary care center in Indiana identified coagulase-negative *Staphylococcus* species as the most common isolate (37.5%), and another regional EE study reported no cases of *Enterococcus faecalis*.[12,14] In our cohort, *Staphylococcus epidermidis* was the most frequently isolated organism overall, while *Enterococcus faecalis* was the most common pathogen among endogenous cases. This predominance of *Enterococcus faecalis* may reflect regional differences in bloodstream infections, healthcare-associated flora, or patient characteristics. These findings contribute to the growing understanding of regional microbiologic variation in Midwestern populations.

Previous studies have identified intravitreal injections, corneal transplantation, and combined ophthalmic procedures as the intraocular interventions most commonly associated with endophthalmitis. Cataract surgery and intravitreal injections have reported endophthalmitis rates of approximately 0.08% and 0.06%, respectively.[3,19] In our study, cataract surgery and intravitreal injections were the most common preceding procedures, each accounting for 13 cases (9%) of endophthalmitis. Pars plana vitrectomy (8%, n = 12) and penetrating keratoplasty (5%, n = 7) were the next most common antecedent procedures. Although we were unable to calculate procedure-specific incidence rates because total procedural volumes were unavailable, the distribution of procedure-related cases in our cohort was generally consistent with published literature.

Many patients in our study had comorbid conditions that may have increased their susceptibility to endophthalmitis, including diabetes, cancer, and immunosuppression. Previous research has identified hypertension, smoking history, coronary artery disease, diabetes, pulmonary disease, and immunocompromised status as risk factors for endophthalmitis.[20] In our cohort, diabetes was the most prevalent comorbidity (25%), followed by hypertension (20%) and a history of cancer (13%). Differences between our findings and those reported in other studies may reflect regional variation in patient populations; however, larger studies are needed to confirm these observations.

Antimicrobial susceptibility testing revealed high rates of resistance to erythromycin and clindamycin, with emerging resistance to trimethoprim-sulfamethoxazole. In contrast, vancomycin resistance was rare and was observed in only one isolate. All tested isolates were susceptible to gentamicin. Vancomycin, often combined with ceftazidime,

remains a cornerstone of empiric therapy because of its broad coverage of gram-positive organisms.[21] Our findings support the continued use of vancomycin as empiric treatment at our institution. Although gentamicin demonstrated excellent susceptibility profiles in this cohort, additional studies are needed before broader recommendations can be made.

Strengths of this study include its extended study period and comprehensive inclusion of clinically diagnosed endophthalmitis cases treated at a tertiary referral center. Several limitations should be considered. First, the retrospective design and relatively small sample size may limit generalizability. Second, some patients with endophthalmitis may not have met the inclusion criteria, potentially resulting in missed cases. Third, microbiologic culture and susceptibility data were not available for all patients. Finally, this was a single-center study, and multicenter investigations are needed to further characterize regional differences in microbiology and antimicrobial resistance patterns and to determine how these differences may influence treatment guidelines.

CONCLUSIONS

In this Midwestern cohort, EE was the most common etiology, and *Enterococcus faecalis* was the predominant pathogen among endogenous cases. These findings highlight the importance of ongoing regional surveillance to guide empiric treatment strategies. The low rate of vancomycin resistance supports its continued role in empiric therapy at our institution, while the favorable susceptibility profile of gentamicin warrants further investigation. Overall, the microbiologic and antimicrobial resistance patterns observed in this study contribute to a better understanding of endophthalmitis in the Midwest and may help inform future treatment approaches.

ARTICLE INFORMATION

Received Aug. 8, 2025; Accepted for publication Jun 15, 2026; Published online June 26, 2026, Kans J Med 2026 May-Jun; 19:55-60. https://doi.org/10.17161/kjm.vol19.24297.

Acknowledgements: The authors thank the University of Kansas Department of Ophthalmology for its support and guidance in the development of this manuscript.

REFERENCES

1. Durand ML. Endophthalmitis. Clin Microbiol Infect 2013; 19(3):227-234. PMID: 23438028.
2. Lu X, Siu-Chun Ng D, Zheng K, et al. Risk factors for endophthalmitis requiring evisceration or enucleation. Sci Rep 2016; 6:28100. PMID: 27302573.
3. VanderBeek BL, Chen Y, Tomaiuolo M, et al. Endophthalmitis rates and types of treatments after intraocular procedures. JAMA Ophthalmol 2024; 142(9):827-834. doi:10.1001/jamaophthalmol.2024.2749.
4. Gunalda J, Williams D, Koyfman A, Long B. High risk and low prevalence diseases: Endophthalmitis. Am J Emerg Med 2023; 71:144-149. PMID: 37393773.
5. Regan KA, Radhakrishnan NS, Hammer JD, Wilson BD, Gadkowski LB, Iyer SSR. Endogenous endophthalmitis: Yield of the diagnostic evaluation. BMC Ophthalmol 2020; 20(1):138. PMID: 32264861.
6. Xie CA , Singh J, Tyagi M, et al. Endogenous endophthalmitis - A major review. Ocul Immunol Inflamm 2023; 31(7):1362-1385. PMID: 36306406.
7. Relhan N, Forster RK, Flynn HW Jr. Endophthalmitis: Then and now. Am J Ophthalmol 2018; 187:20-27. PMID: 29217351.
8. Callegan MC, Engelbert M, Parke DW 2nd, Jett BD, Gilmore MS. Bacterial endophthalmitis: Epidemiology, therapeutics, and bacterium-host interactions. Clin Microbiol Rev 2002; 15(1):111-124. PMID: 11781270.
9. Durand ML. Bacterial and fungal endophthalmitis. Clin Microbiol Rev 2017; 30(3):597-613. PMID: 28356323.
10. Wong JS, Chan TK, Lee HM, Chee SP. Endogenous bacterial endophthalmitis: An east Asian experience and a reappraisal of a severe ocular affliction. Ophthalmology 2000; 107(8):1483-1491. PMID: 10919895.
11. Sheu SJ. Endophthalmitis. Korean J Ophthalmol 2017; 31(4):283-289. PMID: 28752698.
12. Aftab OM, Dupaguntla A, Khan H, Uppuluri A, Zarbin MA, Bhagat N. Regional variation of infectious agents causing endogenous endophthalmitis in the United States: A national database analysis. Ophthalmol Retina 2024; 8(9):905-913. PMID: 38492775.
13. Thomas RK, Melton R, Asbell PA. Antibiotic resistance among ocular pathogens: Current trends from the ARMOR surveillance study (2009-2016). Clin Optom

(Auckl) 2019; 11:15-26. PMID: 30881168.
14. Gemayel M, Neiweem A, Aebi B, Bracha P, Ciulla T. Microbial spectrum and antibacterial susceptibility of endophthalmitis cultures in a tertiary referral center in the Midwestern United States: An analysis from 295 patients. J Vitreoretin Dis 2021; 5(3):216-220. PMID: 37006515.
15. Lee CS, Desilets J, Fang W, Hinkle DM. The microbiological spectrum, antimicrobial resistance pattern, and visual outcomes of endogenous endophthalmitis in West Virginia 2009-2019. Int Ophthalmol 2022; 42(10):3153-3163. PMID: 35606624.
16. Cuschieri S. (2019). The STROBE guidelines. Saudi journal of anaesthesia, 13(Suppl 1), S31–S34. https://doi-org.proxy.lib.uiowa.edu/10.4103/sja.SJA_543_18.
17. Smith JM, Mathias MT, Oliver SC, Mandava N, Olson JL, Quiroz-Mercado H, Palestine AG. The influence of needle gauge and infection source on vitreous aspirate cultures. Br J Ophthalmol. 2016 Apr;100(4):453-5. doi: 10.1136/bjophthalmol-2015-307081. Epub 2015 Aug 12. PMID: 26269533.
18. Malmin A, Syre H, Ushakova A, Utheim TP, Forsaa VA. Twenty years of endophthalmitis: Incidence, aetiology and clinical outcome. Acta Ophthalmol 2021; 99(1):e62-e69. PMID: 32567150.
19. Kresloff MS, Castellarin AA, Zarbin MA. Endophthalmitis. Surv Ophthalmol 1998; 43(3):193-224. PMID: 9862309.
20. Xu LT, Price KW, Ramos MS, Nowacki AS, Yuan A, Yan J. Outcomes of a multicenter 10-year review of postinjection endophthalmitis and associated systemic medical comorbidities. J Vitreoretin Dis 2023; 7(6):504-509. PMID: 37974918.
21. Gentile RC, Shukla S, Shah M, et al. Microbiological spectrum and antibiotic sensitivity in endophthalmitis: A 25-year review. Ophthalmology 2014; 121(8):1634-1642. PMID: 24702755.

Keywords: *endophthalmitis; drug resistance, microbial; intravitreal injection*

KJM KANSAS JOURNAL OF MEDICINE

An Unusual Case of Bandl's Ring in a Dichorionic Diamniotic Twin Gestation

Fernanda Reyes, MS-4[1]
Briana Gomez, M.D.[1,2]
Jennifer Keomany, MPH[1,2]
Alexandra Meloccaro, M.D.[1,2]
[1]The University of Kansas School of Medicine-Wichita, Wichita, Kansas
[2]Department of Obstetrics & Gynecology

Conflict of Interest Disclosure: None.

Corresponding Author:
Jennifer Keomany, The University of Kansas School of Medicine-Wichita, Wichita, Kansas, 1010 N. Kansas St., Wichita, KS, 67214, jkeomany@kumc.edu.

INTRODUCTION

Bandl's ring is a rare but potentially life-threatening complication for both mother and fetus. It is a pathological constriction between the thickened upper uterine segment and the thinner lower segment, which can lead to labor dystocia with entrapment of the fetal head and/or shoulders. Associated risks include cerebral palsy, long-term neurodevelopmental deficits, and uterine rupture.[1]

The etiology remains unclear, though prolonged labor and multifetal gestation have been proposed as risk factors.[1] However, no published cases have described Bandl's ring in twin pregnancies. The reported incidence is approximately 0.02% (1 in 5,000 live births), likely an underestimate due to diagnostic challenges.[1] Earlier reports cite rates as high as 1.67%.[2]

Historically, fetal mortality exceeded 50% in the early twentieth century. The condition was first described in cadaveric studies in 1872 and later characterized in a living patient by Ludwig Bandl in 1875.[1] Descriptions may date as early as 1743.[2] Advances in obstetric care, particularly increased cesarean delivery, have likely reduced mortality.[3] Despite its clinical significance, data remain limited, especially in twin gestations and cases involving mixed modes of delivery.

We present a case of a 31-year-old G1P0 at 28.0 weeks' gestation with dichorionic-diamniotic twins and preterm premature rupture of membranes. Twin A was delivered vaginally, while Twin B required low transverse cesarean delivery for malpresentation, during which Bandl's ring was identified intraoperatively.

CASE REPORT

The patient was a 31-year-old G1P0 with a body mass index of 32 who was admitted at 28.0 weeks' gestation for expectant management of preterm premature rupture of membranes. On admission, she received latency antibiotics, neuroprotective magnesium sulfate, and a rescue course of antenatal corticosteroids. She reported vaginal bleeding, and the cervix was visually dilated to 2-3 cm. The pregnancy was further complicated by diet-controlled gestational diabetes and a shortened cervix (4 mm at 27 weeks), for which she had previously received an-

tenatal corticosteroids and was using vaginal progesterone. Magnesium sulfate was discontinued after 12 hours.

On hospital day 4 (28.3 weeks' gestation), the patient developed increased cramping. Speculum examination revealed complete cervical dilation with Twin A's head in the vagina. Magnesium sulfate was restarted, and she was transferred to the operating room. Following epidural placement, she delivered Twin A after one push via spontaneous vaginal delivery. The infant was a viable male in cephalic presentation with a single nuchal cord and clear amniotic fluid. Apgar scores were 8 at 1 and 5 minutes, and birth weight was 1233 g.

Twin B was in transverse presentation with reassuring fetal heart tones. External cephalic version was unsuccessful, and a primary low transverse cesarean section was performed. Upon entering the peritoneum, a circumferential indentation between the upper and lower uterine segments was noted, consistent with a Bandl's ring. Sevoflurane was administered for uterine relaxation. A low transverse uterine incision was made; however, delivery *en caul* was unsuccessful. An inverted T incision was then created by extending vertically through the Bandl's ring, allowing delivery of a viable male infant in complete breech presentation 54 minutes after Twin A. Apgar scores were 7 and 8 at 1 and 5 minutes, respectively, with clear amniotic fluid. Birth weight was 1213 g. Estimated blood loss was 600 mL. Both infants were admitted to the neonatal intensive care unit.

Postoperatively, the patient's hemoglobin decreased from 12.9 to 9.8 g/dL, and oral iron therapy was initiated. She was discharged on postoperative day 4. Twin A was discharged from the neonatal intensive care unit at 36.5 weeks' corrected gestational age, and Twin B at 35.5 weeks.

DISCUSSION

This case highlights the importance of early recognition and prompt management of Bandl's ring. The patient's multifetal gestation is a proposed risk factor; however, this case is notable in that Twin A was delivered vaginally, while Twin B required cesarean delivery for malpresentation and was subsequently found to be complicated by Bandl's ring.

Current management includes administration of uterine relaxants, such as terbutaline or nitroglycerin, and surgical incision through the ring.[1] In this case, sevoflurane was successfully used to achieve uterine relaxation.

Given that this patient is a G1P1 who may desire future pregnancies, an important clinical question is whether a history of Bandl's ring increases the risk of recurrence. The literature is limited, with only two case reports (Shirazi et al.[4] and Turrentine et al.[5]) describing recurrent Bandl's ring. There is currently insufficient evidence to guide recommendations for surveillance in subsequent pregnancies, representing a significant gap in knowledge.

Ultrasound may offer a potential tool for earlier recognition. Buhimschi et al.[6] described Bandl's ring as a palpable uterine indentation with ultrasound findings of a thickened upper uterine segment, thinning of the lower segment, and a constricting ring compressing the fetus, unchanged with contractions. Gupta et al.[1] further suggest that ultrasound identification of uterine contracture may facilitate earlier and more accurate diagnosis.

Importantly, Bandl's ring may develop prior to labor and has been associated with fetal head compression and adverse neurologic outcomes. Lauria et al.[3] reported two cases diagnosed at cesarean delivery for non-reassuring fetal heart tones, in which both infants were subsequently diagnosed with cerebral palsy. In these cases, imaging suggested that the injury occurred at least 21-24 hours prior to delivery.[3]

Given the potential for severe maternal and fetal morbidity, further research is needed to better define risk factors, recurrence risk, and optimal strategies for early detection. Improved understanding may enhance clinical suspicion, guide management, and inform counseling for future pregnancies.

CONCLUSIONS

Bandl's ring is a rare but potentially catastrophic obstetric complication. We report a novel presentation in a dichorionic–diamniotic twin pregnancy with mixed delivery, in which the first twin was delivered vaginally and the second required cesarean delivery complicated by intraoperative identification of a constriction ring. To our knowledge, this is the first reported case of Bandl's ring identified during delivery of the second twin following successful vaginal delivery of the first.

This case highlights that Bandl's ring may develop despite apparently normal labor progression and should remain a critical consideration in multifetal gestations, particularly

in the setting of labor dystocia. Rapid intraoperative recognition and decisive management, including uterine relaxation and vertical incision, were essential to optimizing maternal and neonatal outcomes.

Given the potential for severe morbidity, heightened clinical awareness and suspicion are imperative. Further investigation is needed to define risk factors, improve early detection, and clarify recurrence risk to better inform management and counseling in future pregnancies.

ARTICLE INFORMATION

Received Feb. 10, 2026; Accepted for publication Apr, 1, 2026; Published online June 26, 2026, Kans J Med 2026 May-Jun; 19:61-63. https://doi.org/10.17161/kjm.vol19.25142.

REFERENCES

1. Gupta R, Nageeb EM, Minhas I, et al. Emergent Cesarean Section in a Bandl's Ring Patient: An Obstetrics and Gynecology Simulation Scenario. Cureus 2018;10(12):e3800. PMID: 30868014.
2. Rucker MP. Constriction ring dystocia. Am J Obstet Gynecol 1946 Dec;52(6):984-992. PMID: 20277420.
3. Lauria MR, Barthold JC, Zimmerman RA, Turrentine MA. Pathologic uterine ring associated with fetal head trauma and subsequent cerebral palsy. Obstet Gynecol 2007 Feb;109(2 Pt2):495-497. PMID: 17267871.
4. Shirazi EM, Maassen RA. Can Bandl's ring be recurrent? Proc Obstet Gynecol 2020;10(1):Article 9. doi:10.17077/2154-4751.1513.
5. Turrentine MA, Andres RL. Recurrent Bandl's ring as an etiology for failed vaginal birth after cesarean section. Am J Perinatol 1994 Jan;11(1):65-66. PMID: 8155216.
6. Buhimschi CS, Buhimschi IA, Weiner CP. Ultrasonographic observation of Bandl's contraction ring. Int J Gynaecol Obstet 2004 Jul;86(1):35-36. PMID: 15207670.

Keywords: *labor, obstetric; dystocia; pregnancy, twin; obstetric labor complications; obstetric labor, premature*

KJM KANSAS JOURNAL OF MEDICINE

Pneumothorax Secondary to Lymphangioleiomyomatosis

Allison M. Coy, M.D.
The University of Kansas School of Medicine-Kansas City, Kansas City, Kansas, Department of Family Medicine and Community Health

Conflict of Interest Disclosure: None.

Corresponding Author:
Allison M. Coy, The University of Kansas School of Medicine-Kansas City, Kansas City, Kansas, 3901 Rainbow Boulevard, Kansas City, KS 66160, acoy@kumc.edu.

INTRODUCTION

Lymphangioleiomyomatosis (LAM) is a rare multisystem disease characterized by abnormal proliferation of smooth muscle-like cells, leading to cystic lung disease, abdominal angiomyolipomas, and lymphatic involvement, which may result in lymphadenopathy and chylothorax.[1] It occurs almost exclusively in women and may be sporadic or associated with tuberous sclerosis complex.[2]

Patients may be asymptomatic and diagnosed incidentally on imaging or present with progressive dyspnea or spontaneous pneumothorax.[3] Diagnosis is primarily clinical, based on characteristic imaging findings in conjunction with associated disease features.[4]

Due to its rarity, evidence guiding management is limited, and recommendations largely are based on expert opinion and case reports. Treatment for moderate to severe disease typically involves the mammalian target of rapamycin (mTOR) inhibitor sirolimus, while advanced cases may require lung transplantation.[5]

I present a case of a patient who developed an incidental contralateral spontaneous pneumothorax following Port-A-Cath placement and was subsequently diagnosed with LAM.

CASE REPORT

A 44-year-old woman with no significant past medical history was diagnosed with triple-negative breast carcinoma after palpating a left-sided breast mass. She had experienced a multi-year delay in screening mammography due to the COVID-19 pandemic. Following biopsy and staging, she began neoadjuvant chemotherapy with plans for subsequent surgical resection.

She underwent right subclavian Port-A-Cath placement, and a post-procedure chest radiograph revealed a moderate left-sided pneumothorax (Figure 1). She was asymptomatic, hemodynamically stable, and maintaining adequate oxygen saturation on room air. She was transferred from the outpatient surgery center to The University of Kansas Hospital for further evaluation and management.

Computed tomography (CT) of the chest demonstrated a moderate left hydropneumothorax, right pleural effusion, and innumerable thin-

walled cysts throughout both lungs, along with scattered bilateral pulmonary nodules suggestive of LAM (Figures 2 and 3). She remained clinically stable during admission and was discharged without intervention.

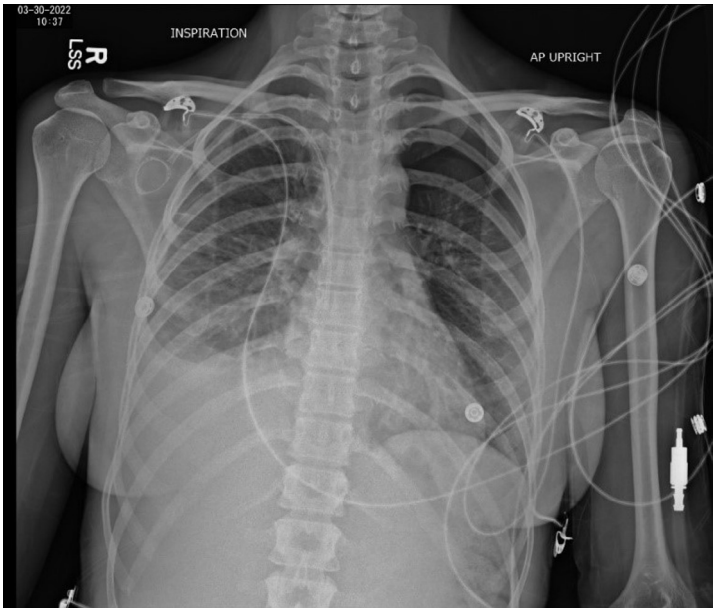

Figure 1. Chest x-ray with moderate left pneumothorax.

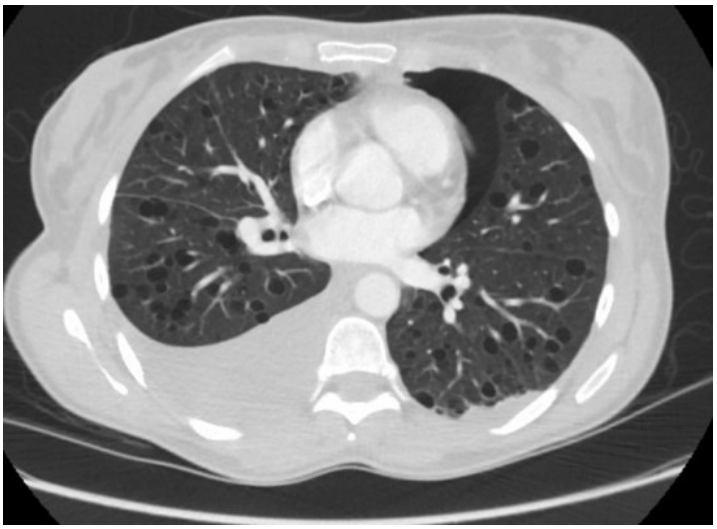

Figure 2. CT chest with contrast showing moderate left hydropneumothorax, right pleural effusion, thin-walled cysts, and scattered bilateral pulmonary nodules.

Given concern for LAM versus metastatic disease, additional evaluation was performed. CT of the abdomen and pelvis was negative for renal angiomyolipomas. Thoracentesis revealed chylothorax, and cytology was negative for malignancy. A repeat chest radiograph one month later showed improvement of the pneumothorax.

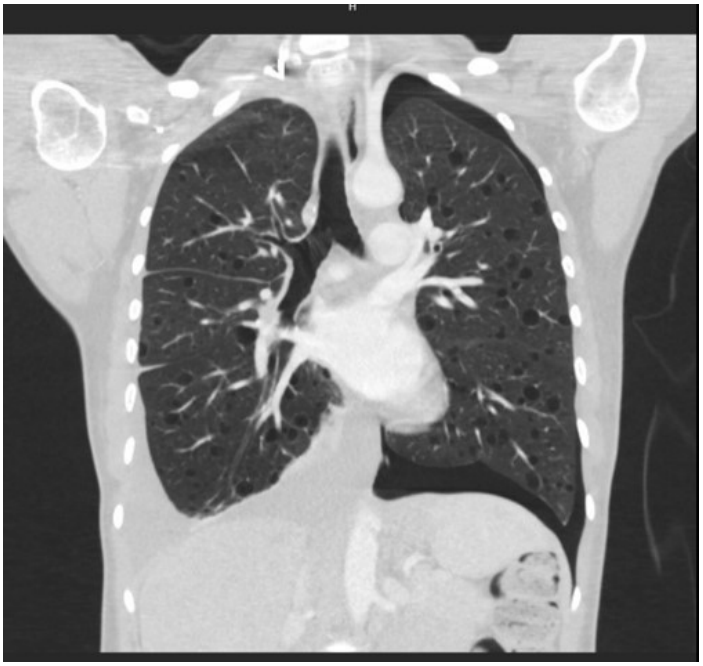

Figure 3. CT chest with contrast showing moderate left hydropneumothorax, thin-walled cysts, and scattered bilateral pulmonary nodules.

After completing neoadjuvant chemotherapy, she underwent total mastectomy with axillary lymph node dissection. Due to an elevated risk of pneumothorax, bilateral chest tubes were placed preoperatively. She subsequently received adjuvant chemotherapy and radiation therapy.

Nine months later, she developed a small spontaneous right-sided pneumothorax. Pleurodesis was recommended but declined. She has since completed breast cancer treatment and currently is in remission.

DISCUSSION

This case describes a patient with triple-negative breast cancer diagnosed with LAM after a spontaneous pneumothorax contralateral to a recent port placement. LAM typically affects women aged 20-40 years but can occur in postmenopausal women.[6] Most cases are sporadic, with an estimated prevalence of 19 per million women, though recognition is increasing.[7]

Tuberous sclerosis complex (TSC), an autosomal dominant disorder characterized by hamartomas, is strongly associated with LAM; approximately 34% of women with TSC have radiographic evidence of LAM.[8,9] Mutations in TSC genes lead to dysregulated cell growth via mTOR pathway activation.[10]

LAM commonly presents with dyspnea on exertion and may include pneumothorax, hemoptysis, chylothorax, chylous ascites, and renal angiomyolipomas.[11] About one-third of cases are diagnosed following pneumothorax, and obstructive patterns are common on pulmonary function testing.[12] Evaluation includes pulmonary function testing and imaging, with differential diagnoses including other cystic lung diseases such as Birt–Hogg–Dubé syndrome and pulmonary Langerhans cell histiocytosis.[13]

Diagnosis should follow American Thoracic Society criteria using the least invasive approach.[4] In asymptomatic patients where diagnosis would not alter management, close clinical monitoring without invasive testing may be appropriate. Management depends on disease severity. Sirolimus, an mTOR inhibitor, stabilizes lung function and is recommended for patients with declining function or symptomatic chylous effusions.[15-17]

Spontaneous pneumothorax in LAM carries a high recurrence risk. Initial management includes chest tube placement, with consideration of blood patch for persistent air leak.[18] Pleurodesis or pleurectomy generally is recommended after the first episode, as recurrence rates are high and outcomes are similar between approaches.[1,19] Chylothorax may be managed with observation, drainage, or pleurodesis depending on severity.[20]

Exogenous estrogen may worsen disease and should be avoided; pregnancy may increase the risk of progression and complications.[21] Registry data suggest a median transplant-free survival exceeding 20 years, with better outcomes in those with preserved lung function.[22] Lung transplantation remains the definitive treatment for end-stage disease, with outcomes generally favorable compared to other indications, although recurrence in the transplanted lung has been reported.[23]

CONCLUSIONS

LAM is a rare cystic lung disease that may occur sporadically or with TSC. It often presents with spontaneous pneumothorax, as in this case, and carries a high risk of recurrence, supporting early consideration of pleurodesis.

ARTICLE INFORMATION

Received Sept. 3, 2025; Accepted for publication Apri. 27, 2026; Published online June 26, 2026 Kans J Med 2026 May-Jun; 19:64-67. https://doi.org/10.17161/kjm.vol19.24389.

Acknowledgements:

The author thanks staff affiliated with The University of Kansas Cancer Center, Breast Clinic, General Surgery, Pulmonary, and Family Medicine team that helped provide care to the patient during her cancer treatment and hospitalizations.

REFERENCES

1. McCarthy C, Gupta N, Johnson S, Yu J, McCormack F Lymphangioleiomyomatosis: Pathogenesis, clinical features, diagnosis, and management. Lancet Respir Med 2021; 9(11):1313-1327. PMID: 34461049.
2. Elia D, Cassandro R, Caminati A, Luisi F, Harari S. Lymphangioleiomyomatosis. Presse Med 2023; 52(3):104173. PMID: 37696446.
3. Hohman D, Noghrehkar D, Ratnayake S. Lymphangioleiomyomatosis: A review. Eur J Intern Med 2008; 19(5):319-324. PMID: 18549932.
4. Gupta N, Finlay GA, Kotloff R, et al. Lymphangioleiomyomatosis diagnosis and management: High-resolution chest computed tomography, transbronchial lung biopsy, and pleural disease management. An official American Thoracic Society/Japanese Respiratory Society Clinical Practice guideline. Am J Respir Crit Care Med 2017; 196(10):1337-1348. PMID: 29140122.
5. Gibbons E, Minor B, Hammes S. Lymphangioleiomyomatosis: Where endocrinology, immunology and tumor biology meet. Endocr Relat Cancer 2023; 30(9):e-230102. PMID: 37410387.
6. Taylor J, Ryu J, Colby T, Raffin T. Lymphangioleiomyomatosis. N Engl J Med 1990; 323(18):1254-1260. PMID: 2215609.
7. Lynn E, Forde S, Franciosi A, et al. Updated prevalence of lymphangioleiomyomatosis in Europe. Am J Respir Crit Care Med 2024; 209(4):456-459. PMID: 38060201.
8. Rebaine Y, Nasser M, Girerd B, Leroux C, Cottin V. Tuberous sclerosis complex for the pulmonologist. Eur Respir Rev 2021; 30(161):200-348. PMID: 34348978.
9. Moss J, Avila N, Barnes et al. Prevalence and clinical characteristics of lymphangioleiomyomatosis (LAM) in patients with tuberous sclerosis complex. Am J Respir Crit Care Med 2001; 164(4):669-671. PMID: 11520735.

10. Chorianopoulos D, Stratakos G. Lymphangioleiomyomatosis and tuberous sclerosis complex. Lung 2008; 186(4):197-207. PMID: 18408969.
11. Xu K, Xu W, Liu S, et al. Lymphangioleiomyomatosis. Semin Respir Crit Care Med 2020; 41(2):256-268. PMID: 32279296.
12. Ryu J, Moss J, Beck G, et al. The NHLBI lymphangioleiomyomatosis registry: Characteristics of 230 patients at enrollment. Am J Respir Crit Care Med 2006; 173(1):105-111. PMID: 16210669.
13. Raoof S, Bondalapati P, Vydyula R et al. Cystic lung diseases: Algorithmic approach. Chest. 2016; 150(4):945-965. Epub 2016 May 13. PMID: 27180915.
14. Sengupta S, Peterson T, Sabatini D. Regulation of the mTOR complex 1 pathway by nutrients, growth factors, and stress. Molecular Cell 2010; 40(2):310-322. PMID: 20965424.
15. LAM Clinic and Research Network. 2024. https://www.thelamfoundation.org/find-support/locate-a-lam-clinic. Accessed March 20, 2026.
16. McCormack F, Inoue Y, Moss J, et al. Efficacy and safety of sirolimus in lymphangioleiomyomatosis. N Engl J Med 2011; 364(17):1595-1606. PMID: 21410393.
17. McCormack F, Gupta N, Finlay G, et al. ATS/JRS Committee on lymphangioleiomyomatosis. Official American Thoracic Society/Japanese Respiratory Society clinical practice guidelines: Lymphangioleiomyomatosis diagnosis and management. Am J Respir Crit Care Med. 2016; 194(6):748-61. PMID: 27628078.
18. Walker S, Hallifax R, Ricciardi S, et al. Joint ERS/EACTS/ESTS clinical practice guidelines on adults with spontaneous pneumothorax. Eur Respir J. 2024; 63(5):2300797. PMID: 38806203.
19. Almoosa K, Ryu J, Mendez J, et al. Management of pneumothorax in lymphangioleiomyomatosis: effects on recurrence and lung transplantation complications. Chest. 2006; 129(5):1274-81. PMID: 16685019.
20. Ryu J, Doerr C, Fisher S, Olson E, Sahn S. Chylothorax in lymphangioleiomyomatosis. Chest. 2003; 123(2):623-7. PMID: 12576391.
21. Johnson S, Cordier J, Lazor R, et al. European Respiratory Society guidelines for the diagnosis and management of lymphangioleiomyomatosis. Eur Respir J 2010; 35(1):14-26. PMID: 20044458.
22. Gupta N, Lee H, Ryu J, et al. The NHLBI LAM registry: Prognostic physiologic and radiologic biomarkers emerge from a 15-year prospective longitudinal analysis. Chest. 2019; 155(2):288-296. PMID: 29940164.
23. Khawar M, Yazdani D, Zhu Z, Jandarov R, Dilling D, Gupta N. Clinical outcomes and survival following lung transplantation in patients with lymphangioleiomyomatosis. J Heart Lung Transplant. 2019; 38(9):949-955. PMID: 31303421.

Keywords: *lung diseases; lymphatic diseases; lymphangioleiomyomatosis*

KJM KANSAS JOURNAL OF MEDICINE

Aggressive Plasmablastic Myeloma with Retroperitoneal Extramedullary Plasmacytoma

Ty M. Moore, D.O.[1,2]
Morgan B. Heitt, D.O.[1,3]
Jeries Kort, M.D.[1,4]
[1]The University of Kansas School of Medicine-Kansas City, Kansas City, Kansas
[2]Department of Internal Medicine
[3]Department of Pathology
[4]Department of Hematologic Malignancies and Cellular Therapeutics

Conflict of Interest Disclosure: None.

Corresponding Author:
Ty Moore, The University of Kansas School of Medicine-Kansas City, Kansas City, Kansas, 3901 Rainbow Boulevard, Kansas City, KS 66160, tmoore20@kumc.edu.

INTRODUCTION

Multiple myeloma (MM) is a clonal plasma cell malignancy with a heterogeneous spectrum of clinical presentations and biological behaviors. While most cases follow an indolent or moderately aggressive course, certain histologic variants are associated with particularly poor outcomes. Plasmablastic myeloma is one such variant, characterized by immature plasma cell morphology, a high proliferative index, frequent cytogenetic abnormalities (e.g., *MYC* dysregulation), and a propensity for extramedullary spread.[1] These features often are associated with resistance to standard therapies and reduced survival.[2,3]

Extramedullary disease in MM most commonly involves soft tissues adjacent to bone lesions; however, involvement of deep visceral or retroperitoneal structures is rare and may mimic other malignancies, leading to diagnostic uncertainty.[4,5] Plasmablastic myeloma can be particularly challenging to distinguish from plasmablastic lymphoma, an aggressive subtype of diffuse large B-cell lymphoma with overlapping morphologic and immunophenotypic features.[1]

We present a case of plasmablastic myeloma manifesting as a large retroperitoneal extramedullary plasmacytoma with minimal bone marrow involvement. This case highlights key diagnostic challenges, therapeutic considerations, and the potential for rapid disease progression despite timely recognition and treatment.

CASE PRESENTATION

A 53-year-old man with no prior history of plasma cell dyscrasia presented with progressive abdominal fullness and discomfort, early satiety, and flank pain. He denied weight loss, fevers, or night sweats. Examination revealed abdominal distension without tenderness, lymphadenopathy, or hepatosplenomegaly. Laboratory studies showed normocytic anemia and renal dysfunction.

Computed tomography (CT) demonstrated a large retroperitoneal mass causing ureteral compression with hydroureteronephrosis. Biopsy revealed a diffuse infiltrate of plasmablastic cells with prominent nucleoli and high mitotic activity (Figure 1). Immunohistochemistry showed expression of CD138, CD38, and MUM1 with kappa light chain

restriction (Figure 2). The cells were positive for *MYC*, and the Ki-67 index was approximately 90% (Figure 3). The differential diagnosis included plasmablastic myeloma and plasmablastic lymphoma. Bone marrow biopsy demonstrated 1% polyclonal plasma cells. Positron emission tomography/CT showed intense uptake confined to the retroperitoneal mass without lytic lesions or distant disease.

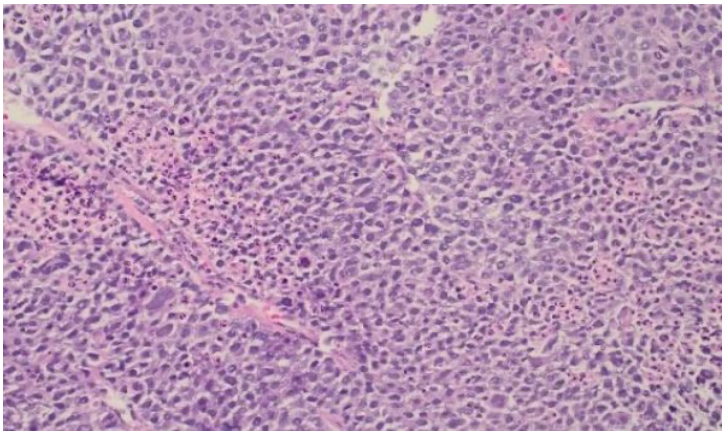

Figure 1. Histology with diffuse infiltrate of intermediate to large cells with nuclear pseudoinclusions and occasional plasmablastic and pleomorphic morphology (H&E, 20x).

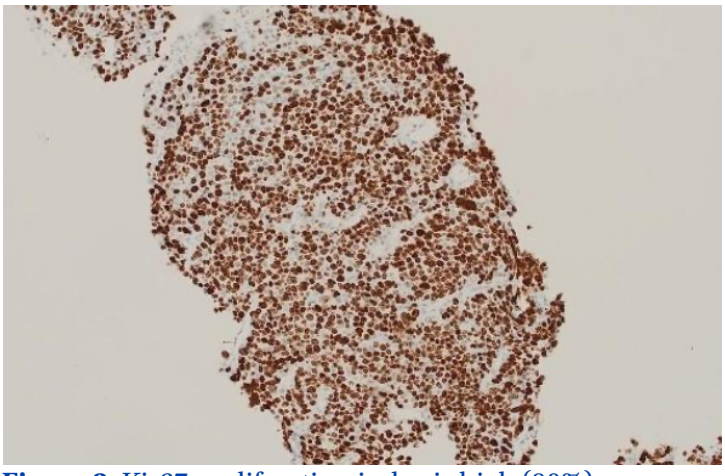

Figure 2. Ki-67 proliferation index is high (90%).

Serum studies identified an IgG kappa monoclonal protein and a markedly elevated free light chain ratio (>300), meeting myeloma-defining criteria.[6,7] The diagnosis of extramedullary plasmacytoma with multiple myeloma was established.

The patient required bilateral nephrostomy tubes for obstructive uropathy. He was treated with dexamethasone followed by cyclophosphamide, bortezomib, and dexamethasone (CyBorD). Surgical resection was not feasible due to vascular encasement, and radiation therapy was planned. He was transitioned to daratumumab, lenalidomide, bortezomib, and dexamethasone (D-RVd).[8]

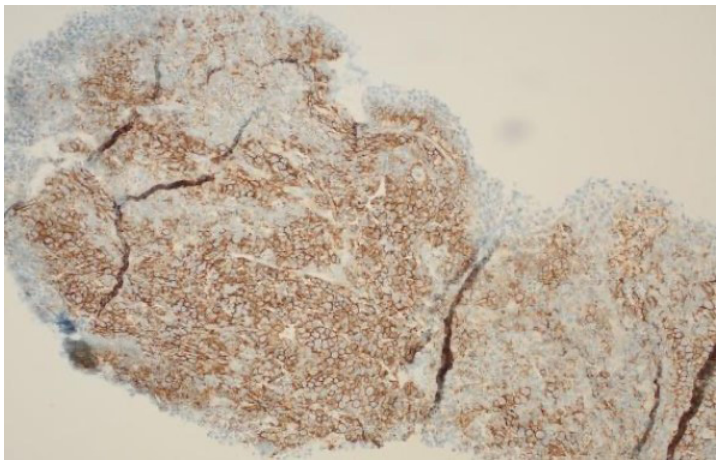

Figure 3. Neoplastic cells demonstrate strong positivity for CD138 (syndecan-1).

He was readmitted with rapid disease progression and worsening renal failure due to light chain nephropathy, requiring hemodialysis. Treatment was escalated to bortezomib, dexamethasone, doxorubicin, cyclophosphamide, and etoposide (VD-ACE), resulting in transient biochemical and radiographic improvement.

Despite therapy, the mass progressed with vascular encasement, leading to obstructive shock and worsening renal failure. Plasmapheresis was considered but deferred due to hemodynamic instability. The patient died less than three months after diagnosis.

DISCUSSION

This case highlights the aggressive nature of plasmablastic myeloma, particularly when associated with extramedullary disease.[9] Plasmablastic morphology, marked by immature plasma cells and a high proliferative index (Ki-67 ~90%), is linked to treatment resistance and poor survival.[2]

It also underscores the diagnostic challenge of distinguishing plasmablastic myeloma from plasmablastic lymphoma, given overlapping morphologic and immunophenotypic features. Clinical and laboratory findings are critical: in this case, a monoclonal paraprotein, markedly abnormal serum free light chain ratio, anemia, and renal dysfunction supported a diagnosis of multiple myeloma despite minimal marrow involvement.[1,6] According to In-

ternational Myeloma Working Group criteria, biopsy-proven extramedullary plasmacytoma with myeloma-defining events is sufficient for diagnosis.[6,7,9]

Extramedullary disease is a recognized marker of aggressive biology and poor prognosis. Retroperitoneal involvement is rare and may present with nonspecific symptoms due to mass effect, delaying diagnosis and complicating management.[9]

Although anti-CD38–based regimens, including daratumumab-containing combinations, have improved outcomes in multiple myeloma, responses in plasmablastic and extramedullary disease often are limited.[8,10-12] This patient's rapid clinical deterioration reflects the aggressive course typical of this variant.

Plasmablastic myeloma carries a poor prognosis, with median overall survival of 8-15 months despite intensive therapy.[13,14] Adverse features include *MYC* dysregulation, a high proliferative index, and extramedullary spread.[13,15] These findings highlight the limitations of marrow-based assessment and the importance of early recognition of extramedullary disease.

CONCLUSIONS

Plasmablastic myeloma is a rare, aggressive variant that may present with minimal marrow involvement and prominent extramedullary disease. This case emphasizes the importance of integrating clinical, laboratory, radiologic, and pathologic data for accurate diagnosis. Despite timely treatment, outcomes remain poor, underscoring the need for improved therapeutic strategies.

ARTICLE INFORMATION

Received Jan. 29, 2026; Accepted for publication Apr. 30, 2026; Published online June 26, 2026, Kans J Med 2026 May-Jun; 19:68-71. https://doi.org/10.17161/kjm.vol19.25065.

REFERENCES

1. Kitamura S, Morichika K, Nakachi S, et al. Two cases of plasmablastic myeloma mimicking plasmablastic lymphoma with in-depth review of literature. Cancer Reports. 2025;8(2):e70094. PMID: 39907148
2. Kolawa A, McLain JH, Siddiqi I, Mohrbacher A. Patient characteristics and outcomes in plasmablastic neoplasms: an institutional retrospective study. Blood. 2023;142(Supplement 1):6272-6272. doi:10.1182/blood-2023-185129.
3. Mais DD, Sanford KW. Quick Compendium of Clinical Pathology. 5th ed. American Society of Clinical Pathologists Press; 2024.
4. Watanabe N, Morijiri M, Shimizu M, et al. A case of retroperitoneal extramedullary plasmacytoma with multiple metastases. Clin Imaging. 2000;24(6):365-367. PMID: 11368939.
5. Wang J, Li J, Zhang F, Zhang P. Retroperitoneal extramedullary plasmacytoma: A case report and review of the literature. Medicine (Baltimore). 2018;97(46):e13281. PMID: 30431616.
6. Rajkumar SV, Dimopoulos MA, Palumbo A, et al. International Myeloma Working Group updated criteria for the diagnosis of multiple myeloma. Lancet Oncol. 2014;15(12):e538-e548. PMID: 25439696.
7. Firsova MV, Mendeleeva LP, Kovrigina AM, Solovev MV, Savchenko VG. Plasmacytoma in patients with multiple myeloma: morphology and immunohistochemistry. BMC Cancer. 2020;20(1):346. PMID: 32321465.
8. Tan CJ, Kacerek D, Kampirapawong N, Godara A, Chaiyakunapruk N. Treatment of Multiple Myeloma in Patients Refractory to Daratumumab/Anti-CD38 Monoclonal Antibodies: A Systematic Review. Cancer Med. 2025;14(5):e70585. PMID: 40052837.
9. Ilyas U, Umar Z, Pansuriya AM, Mahmood A, Lopez R. Multiple Myeloma With Retroperitoneal Extramedullary Plasmacytoma Causing Renal Failure and Obstructive Shock From Inferior Vena Cava Compression: A Case Report. Cureus. 2022;14(11):e31056. PMID: 36475223.
10. Guedes A, Becker RG, Teixeira LEM. Multiple Myeloma (Part 1) - Update on Epidemiology, Diagnostic Criteria, Systemic Treatment and Prognosis. Rev Bras Ortop (Sao Paulo). 2023;58(3):361-367. PMID: 37396092.
11. Atanackovic D, Steinbach M, Radhakrishnan SV, Luetkens T. Immunotherapies targeting CD38 in multiple myeloma. OncoImmunology. 2016;5(11):e1217374. PMID: 27999737.
12. Katodritou E, Kastritis E, Gatt M, et al. Real-world data on incidence, clinical characteristics and outcome of patients with macrofocal multiple myeloma in the novel therapeutic era: A study of the Greco-Israeli

collaborative myeloma working group. Clin Lymphoma Myeloma Leuk. 2019;19(10):e190-e191. PMID: 32048329.

13. Kolawa A, McLain JH, Siddiqi I, Mohrbacher A. Patient characteristics and outcomes in plasmablastic neoplasms: an institutional retrospective study. Blood. 2023;142(Suppl 1):6272. doi:10.1182/blood-2023-185129.
14. Dah K, Lavezo JL, Dihowm F. Aggressive Plasmablastic Myeloma with Extramedullary Cord Compression and Hyperammonemic Encephalopathy: Case Report and Literature Review. Anticancer Res. 2021 Nov;41(11):5839-5845. PMID: 34732460.
15. Liu Y, Jelloul F, Zhang Y, et al. Genetic Basis of Extramedullary Plasmablastic Transformation of Multiple Myeloma. Am J Surg Pathol. 2020 Jun;44(6):838-848. PMID: 32118627.

Keywords: *multiple myeloma; plasma cells; retroperitoneal neoplasms; daratumumab*

KJM KANSAS JOURNAL OF MEDICINE

Cranial Nerve III Palsy and Nothnagel Syndrome in a Patient with Vascular Risk Factors: A Case Report

Ethan Scharf, M.D.
Clifford Kissling, M.D.
The University of Kansas School of Medicine-Wichita, Wichita, Kansas

INTRODUCTION

Cranial nerve III (CN III) palsy with pupillary involvement often is attributed to aneurysmal compression, making it a critical diagnosis to consider. However, midbrain syndromes such as Nothnagel syndrome demonstrate that ischemic infarction can produce a similar clinical presentation.[1] Careful bedside examination remains essential for accurate lesion localization and to avoid misdiagnosis. This case of CN III palsy accompanied by contralateral ataxia highlights the importance of recognizing Nothnagel syndrome as a rare but instructive manifestation of midbrain pathology.

CASE REPORT

An 80-year-old man presented with acute diplopia and imbalance. Physical examination revealed a dilated, minimally reactive right pupil, limited extraocular movements (EOMs), ptosis secondary to levator palpebrae involvement, and left-sided ataxia. Magnetic resonance imaging (MRI) of the brain without contrast demonstrated subacute infarcts involving the medial midbrain and superior cerebellar peduncle (Figure 1). Following admission, dual antiplatelet therapy was initiated, and blood pressure was closely monitored. After stabilization, he was discharged to an inpatient rehabilitation facility with the goal of returning to his baseline level of function. Prior to admission, he reported mild balance difficulties and required moderate assistance when navigating stairs and uneven surfaces. During hospitalization, his pupillary reactivity and diplopia improved progressively. By discharge on hospital day 11, he required only supervision-level assistance and demonstrated notable improvement in mobility, pupillary function, and extraocular movements, which were approaching baseline.

DISCUSSION

Nothnagel syndrome is a rare midbrain syndrome that often is underdiagnosed because of its complex clinical presentation. It results from lesions involving the CN III fascicle and superior cerebellar peduncle.[1] This case highlights the value of integrating physical examination findings with neuroimaging to distinguish between compressive

Conflict of Interest Disclosure: None.

Corresponding Author:
Ethan Scharf, The University of Kansas School of Medicine-Wichita, Kansas City, Kansas, 1010 N Kansas St., Wichita, KS 66160, escharf@kumc.edu.

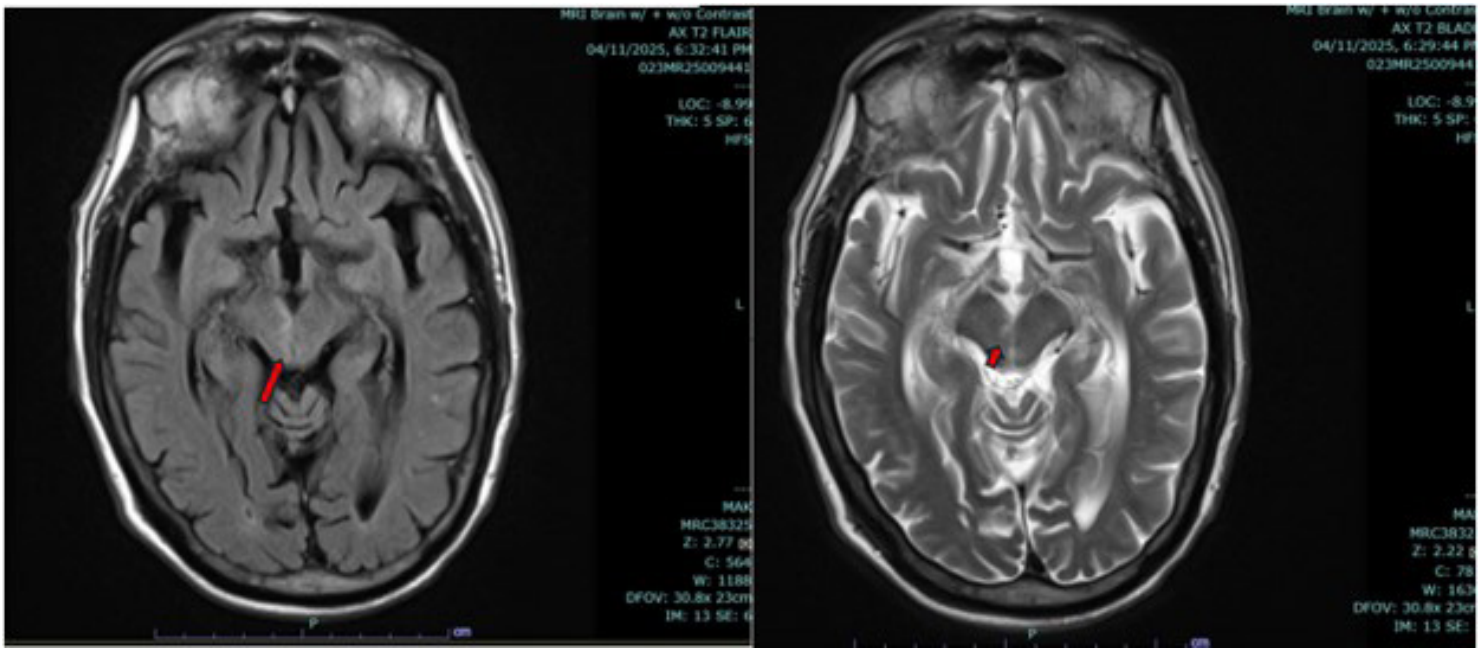

Figure 1. A small focus of T2/FLAIR hyperintensity in the right medial midbrain in the territory near the cerebral peduncle indicated with the red arrows consistent with a lesion relevant to Nothnagel syndrome.

and microvascular causes of CN III palsy.

Although non-pupil-sparing CN III palsy classically raises concern for aneurysmal compression,[2,3] this case demonstrates that microvascular ischemia, particularly in patients with vascular risk factors such as hypertension and hyperlipidemia, can produce a similar presentation. Initial concern for aneurysmal compression was warranted given the patient's pupillary involvement. However, progressive improvement in extraocular movement function, levator palpebrae strength, and resolution of mydriasis during rehabilitation supported a microvascular ischemic etiology.[3] This conclusion was further supported by the patient's vascular risk profile, which included hyperlipidemia, peripheral vascular disease, and tobacco use.

CONCLUSIONS

In elderly patients with vascular risk factors, CN III palsy with pupillary involvement does not necessarily indicate an aneurysm. This case underscores the importance of neuroimaging, clinical progression, and risk-factor assessment in guiding the diagnosis and management of rare midbrain syndromes such as Nothnagel syndrome.

ARTICLE INFORMATION

Received Sept. 3, 2025; Accepted for publication Jun. 15, 2026; Published online June 26, 2026, Kans J Med 2026 May-Jun; 19:72-73. https://doi.org/10.17161/kjm.vol19.24386.

REFERENCES

1. Joyce C, Le PH, Peterson DC. Neuroanatomy, Cranial Nerve 3 (Oculomotor). 2023 Mar 27. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 30725811.
2. Triarhou LC, Manto M. Nothnagel Syndrome. Cerebellum 2023; 22(4):487-505. PMID: 35817948.
3. Bolton N, Gushchin A, Williams KM. 2. Acquired third nerve palsy. Dis Mon. 2021 May;67(5):101131. doi: 10.1016/j.disamonth.2021.101131. Epub 2021 Mar 5. PMID: 33678417.

Keywords: *stroke; syndrome; ophthalmoplegia; gait ataxia; cranial nerves*

KJM KANSAS JOURNAL OF MEDICINE

Exploring the Potential of NRX-101 for Pediatric Bipolar Depression: A Call for Research and Equity

Muhammad Yusuf, M.D.
Maryam Tariq, M.D.
Ann Genovese, M.D.
The University of Kansas School of Medicine-Kansas City, Kansas City, Kansas, Department of Child & Adolescent Psychiatry

Despite longstanding recognition of the need for pediatric-specific data, many psychiatric medications prescribed to children and adolescents initially were studied primarily in adults, and for some conditions, pediatric evidence remains limited. While certain treatments are supported by robust pediatric trials; such as stimulant medications for attention-deficit/hyperactivity disorder (ADHD) (Multimodal Treatment of ADHD Study), fluoxetine for adolescent depression (Treatment for Adolescents with Depression Study), and sertraline for youth anxiety disorders (Child/Adolescent Anxiety Multimodal Study); significant gaps remain for other medications.[1-3] As a result, adolescents with severe psychiatric illness sometimes are treated with therapies whose safety and efficacy in this population are not fully established. Our patients deserve interventions grounded in rigorous pediatric research.

Emerging data on NRX-101, a fixed-dose combination of D-cycloserine (an NMDA receptor modulator) and lurasidone (an atypical antipsychotic), have generated interest for the treatment of severe bipolar depression and suicidality in adults.[4] Lurasidone already is FDA-approved for bipolar depression in youth aged 10 years and older, with demonstrated efficacy and generally favorable tolerability.[5] D-cycloserine introduces a novel mechanism by modulating NMDA receptors, which may enhance antidepressant effects while also addressing suicidality and executive functioning deficits commonly observed in adolescent bipolar disorder (e.g., impairments in attention and working memory).[6,7]

Preliminary Phase 2 trials of NRX-101 in adults suggest potential benefits for depressive symptoms and suicidality; however, detailed results have not yet been fully reported.[4] Given the substantial clinical burden and elevated risk of suicidal ideation and attempts among adolescents with bipolar disorder, further investigation in youth populations is warranted.[6]

Once adult efficacy and safety are established, academic-led, multisite randomized controlled trials will be important to evaluate NRX-101 in adolescents with treatment-resistant bipolar depression. Such studies should incorporate developmentally appropriate assessments and

Conflict of Interest Disclosure: None.

Corresponding Author:
Maryam Tariq, The University of Kansas School of Medicine-Kansas City, Kansas City, Kansas, 8000 W. 127th Street, Overland Park, Kansas, 66213 Mtariq519@gmail.com.

interventions and ensure equitable inclusion of youth from diverse racial, ethnic, and socioeconomic backgrounds.

It is also important to recognize that trial outcomes may differ by sponsorship. Industry-sponsored studies often enroll participants with less severe symptoms, which can influence placebo response and limit generalizability, whereas academic-led trials may better reflect real-world clinical populations. Accordingly, rigorously designed academic studies are important for establishing evidence-based prescribing practices in pediatric psychiatry.

Through careful, well-designed research, the field can ensure that emerging pharmacologic innovations such as NRX-101 are both safe and effective for adolescents. Expanding pediatric trials with attention to developmental and equity considerations will strengthen the evidence base and ultimately improve psychiatric care for youth.

ARTICLE INFORMATION

Received Dec. 24, 2025; Accepted for publication Apr. 30, 2026; Published online June 26, 2026, Kans J Med 2026 May-Jun; 19:74-75. https://doi.org/10.17161/kjm.vol19.24939.

REFERENCES

1. A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. The MTA Cooperative Group. Multimodal Treatment Study of Children with ADHD. Arch Gen Psychiatry. 1999 Dec;56(12):1073-86. PMID: 10591283.
2. March J, Silva S, Petrycki S, et al. Fluoxetine, cognitive-behavioral therapy, and their combination for adolescents with depression: Treatment for Adolescents With Depression Study (TADS) randomized controlled trial. JAMA. 2004 Aug 18;292(7):807-20. PMID: 15315995.
3. Compton SN, Walkup JT, Albano AM, et al. Child/Adolescent Anxiety Multimodal Study (CAMS): rationale, design, and methods. Child Adolesc Psychiatry Ment Health. 2010 Jan 5;4:1. PMID: 20051130.
4. ClinicalTrials.gov. National Library of Medicine. NRX-101 for Maintenance of Remission From Severe Bipolar Depression in Patients With Suicidal Ideation (SBD-ASIB). 2024. https://clinicaltrials.gov/study/NCT03396068. Accessed March 22, 2026.
5. Latuda (lurasidone hydrochloride) [package insert]. Silver Spring, MD: U.S. Food and Drug Administration; 2018.
6. Kowatch RA, DelBello MP. Pediatric bipolar disorder: emerging diagnostic and treatment approaches. Child Adolesc Psychiatr Clin N Am. 2006 Jan;15(1):73-108. PMID: 16321726.
7. Pavuluri MN, West A, Hill SK, Jindal K, Sweeney JA. Neurocognitive function in pediatric bipolar disorder: 3-year follow-up shows cognitive development lagging behind healthy youths. J Am Acad Child Adolesc Psychiatry. 2009 Mar;48(3):299-307. PMID: 19182689.

Have a manuscript ready to publish?

Visit our website for instructions on submitting a manuscript. journals.ku.edu/kjm

Publication Staff

Editorial Board Members

Kansas Journal of Medicine is partially supported by Wichita Medical Research & Education Foundation
wichitamedicalresearch.org

Medical Science
1010 N. Kansas • Wichita, KS 67214 • 316-293-3811 • kjm@kumc.edu