Spondylodiscitis in Infants Under 6 Months with Negative Blood Culture: Case Report and Literature Review

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ABSTRACT
In spondylitis, the infection is usually introduced hematogenously into the vertebral body. If it spreads to the intervertebral space, it is termed spondylodiscitis. In recent years, the incidence of pyogenic infections has increased. One of the main challenges in diagnosing spondylodiscitis is the delay due to nonspecific symptoms, particularly in infants under 1 year of age. Laboratory tests are also inconclusive, as parameters often remain normal or only slightly elevated. We present the case of a 4-month-old infant with spondylodiscitis and a negative blood culture, who was followed for 18 months. The condition resolved with conservative treatment using antibiotics and a thoracolumbosacral orthosis (TLSO) brace.
Keywords: Spondylodiscitis; spine; infant; negative culture.
Level of Evidence: IV

Espondilodiscitis en lactantes <6 meses con hemocultivo negativo. Reporte de un caso y revisión bibliográfica

RESUMEN
En la espondilitis, la inoculación generalmente es hematógena hacia el cuerpo vertebral. Si la infección se propaga al espacio intervertebral, se denomina espondilodiscitis. Hoy en día, el número de infecciones piógenas ha aumentado. Uno de los principales problemas con la espondilodiscitis es el retraso en el diagnóstico debido a los síntomas no específicos, especialmente en niños <1 año. Los análisis de laboratorio tampoco ofrecen certeza en el diagnóstico, ya que, en muchos casos, los parámetros son normales o solo están ligeramente elevados. Presentamos el caso de una paciente de 4 meses con espondilodiscitis y cultivo negativo, controlada durante 18 meses, cuyo cuadro se resolvió, de manera conservadora, con antibióticos y un corsé toraco-lumbo-sacro.
Palabras clave: Espondilodiscitis; columna espinal; lactante; cultivo negativo.
Nivel de Evidencia: IV

INTRODUCTION

The incidence of spondylodiscitis is approximately 1 in 250,000 live births.[1,2] The age distribution of pediatric spondylodiscitis follows a triphasic pattern: the first peak occurs between 6 months and 4 years of age (79%), a second, smaller peak during adolescence (20%), and only an exceptional group before 6 months of age (1%).[3] In the past, tuberculous spondylodiscitis was the most common form. Today, the number of pyogenic infections has increased, particularly those caused by bacteria from the *Staphylococcus*, *Streptococcus*, and *Kingella* genera.[3]

One of the main challenges in spondylodiscitis is the delay in diagnosis due to nonspecific symptoms and the fact that radiographic changes take 2 to 3 weeks to appear.[4] Diagnosing spondylodiscitis in children under 1 year of age is particularly difficult, as these patients are unable to cooperate during physical examination.[4]

Laboratory tests also fail to provide diagnostic certainty, and both blood cultures and cultures of biopsy material are frequently negative, with reported negativity rates ranging from 56% to 100%, depending on the series.[5]

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How to cite this article: Cullari ML, Dal Lago J, De Giano JI, Aguirre F, Aguer S, Lloyd R. Spondylodiscitis in Infants Under 6 Months with Negative Blood Culture: Case Report and Literature Review. *Rev Asoc Argent Ortop Traumatol* 2025;90(1):73-79. https://doi.org/10.15417/issn.1852-7434.2025.90.1.2009

The aim of this article is to raise awareness of this rare disease in very young patients and to establish a standardized approach to its investigation and treatment.

CLINICAL CASE

A 4-month-old, breastfed infant with no significant medical history was brought to the Emergency Department due to anuria for more than 12 hours, associated with 72 hours of constipation. The mother reported that symptoms had begun 20 days prior with an episode of diarrhea, which resolved within 48 hours. However, since then, she had noticed a change in the child's behavior, including refusal to breastfeed.

On physical examination, the patient was afebrile, clinically stable, and hemodynamically compensated. Marked pain was evident upon palpation of the thoracolumbar and perivertebral region, causing the infant to cry. Initial laboratory tests showed a white blood cell count of 16,800, an erythrocyte sedimentation rate of 75 mm/h, and a C-reactive protein level of 0.7 mg/dL. Radiographs and an MRI were performed 48 hours after admission, revealing findings consistent with spondylodiscitis at the L1-L2 level (Figures 1 and 2).

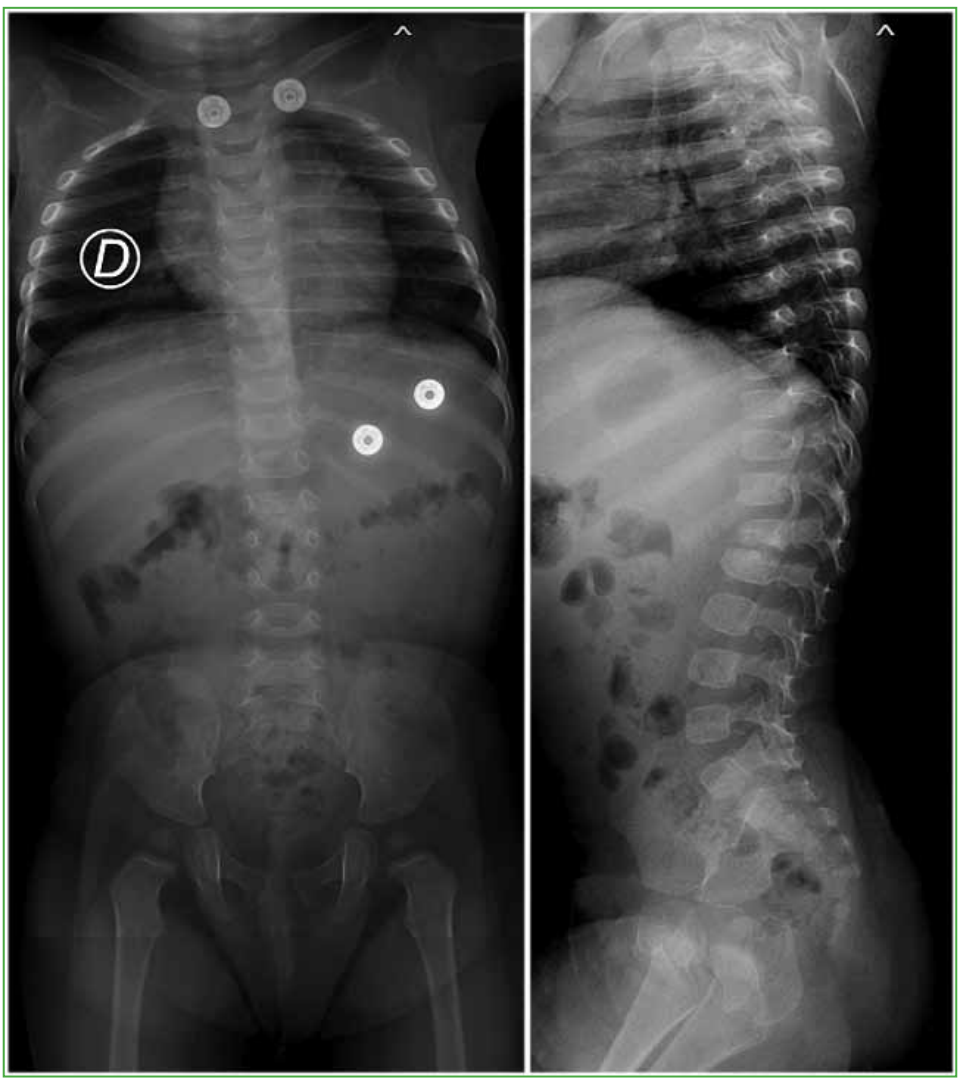

Figure 1. Anteroposterior and lateral dorsal-lumbosacral spine radiographs. Signs compatible with spondylodiscitis are observed in the L1-L2 space, with kyphosis of T12-L2 of 27°.

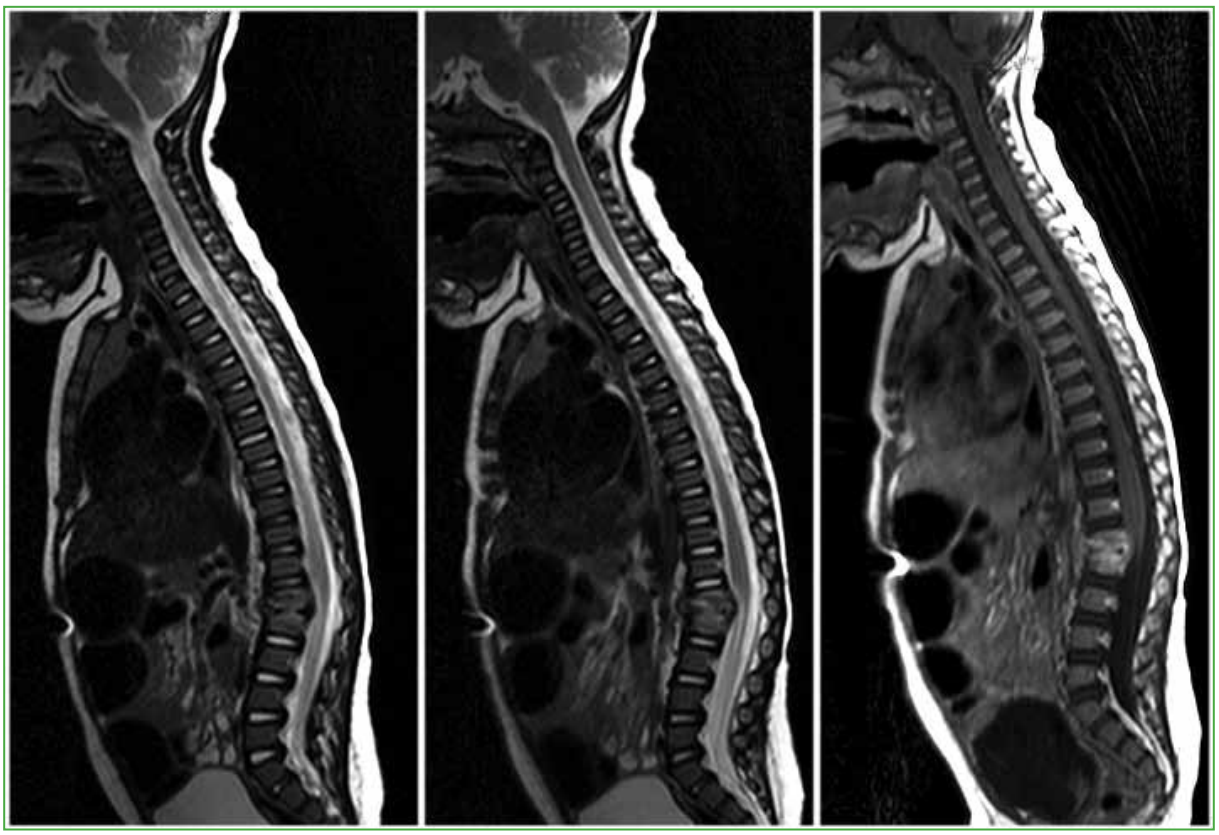

Figure 2. Spine MRI. The L1-L2 intervertebral disc shows decreased T2 signal and reduced height. After injection of gadolinium, intense enhancement of the aforementioned vertebral bodies is observed, with small anterolateral paravertebral inflammatory collections up to 6 mm in maximum thickness.

Blood cultures were obtained, and empirical antibiotic therapy was initiated with intravenous ceftriaxone (80 mg/kg/day, every 24 hours) and vancomycin (60 mg/kg/day, every 8 hours) for 21 days. During hospitalization, the infant's condition gradually improved, with a decrease in spontaneous crying. A follow-up MRI was performed after 11 days (Figure 3).

After three weeks, a thoracolumbosacral brace was recommended, and antibiotic therapy was switched to oral cefuroxime axetil syrup (125 mg/5 mL): 2.5 mL every 12 hours, along with trimethoprim-sulfamethoxazole syrup (40 mg trimethoprim plus 200 mg sulfamethoxazole per 5 mL): 5.5 mL every 12 hours.

Given the favorable clinical evolution and negative blood cultures, antibiotic treatment was discontinued at five months. At present, 18 months after symptom onset, the child is engaging in age-appropriate activities without lumbar pain (Figure 4).

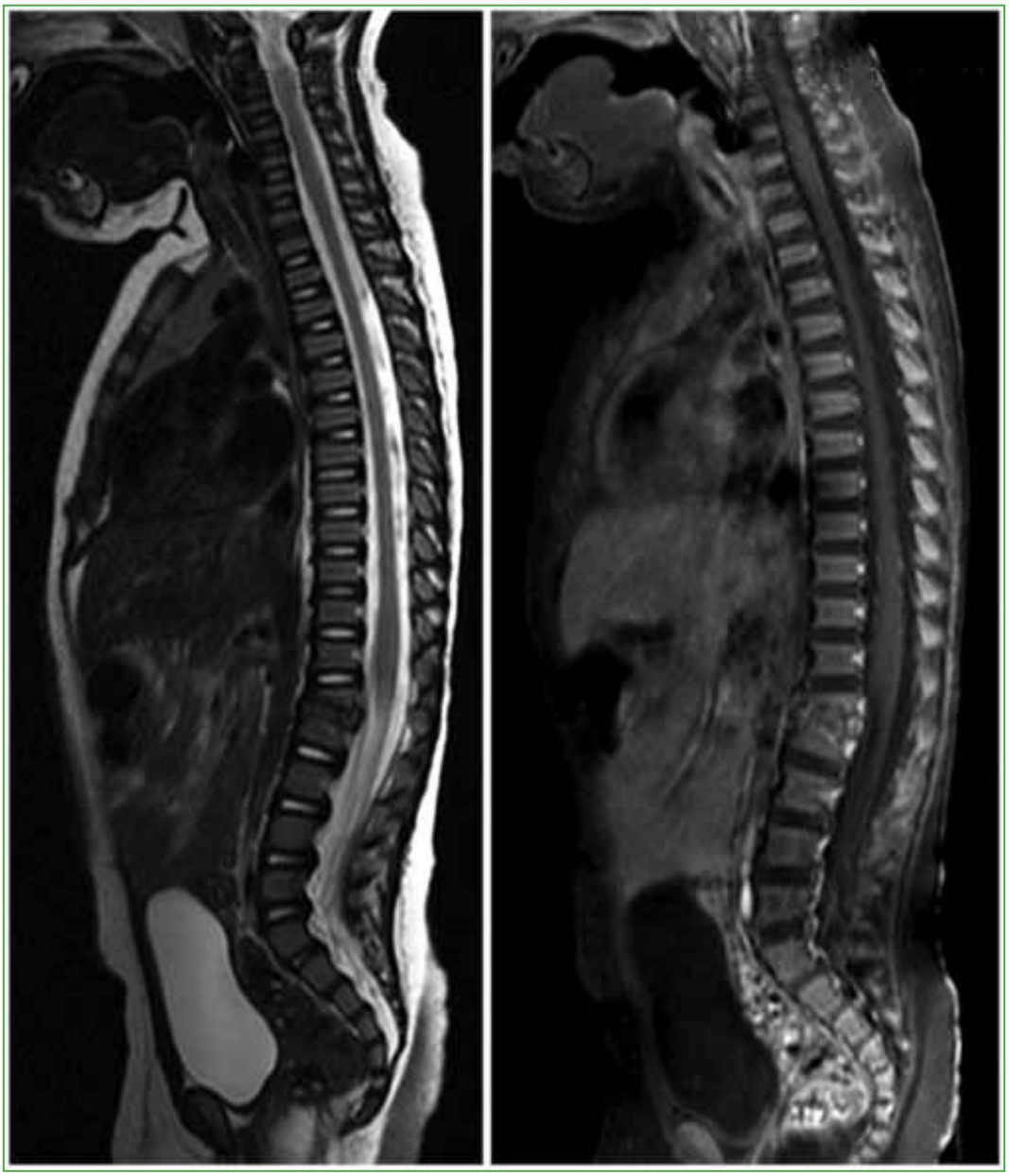

Figure 3. Spine MRI 11 days after diagnosis. A reduction of inflammatory changes in L1-L2 is observed, with a decrease in the collections previously detected.

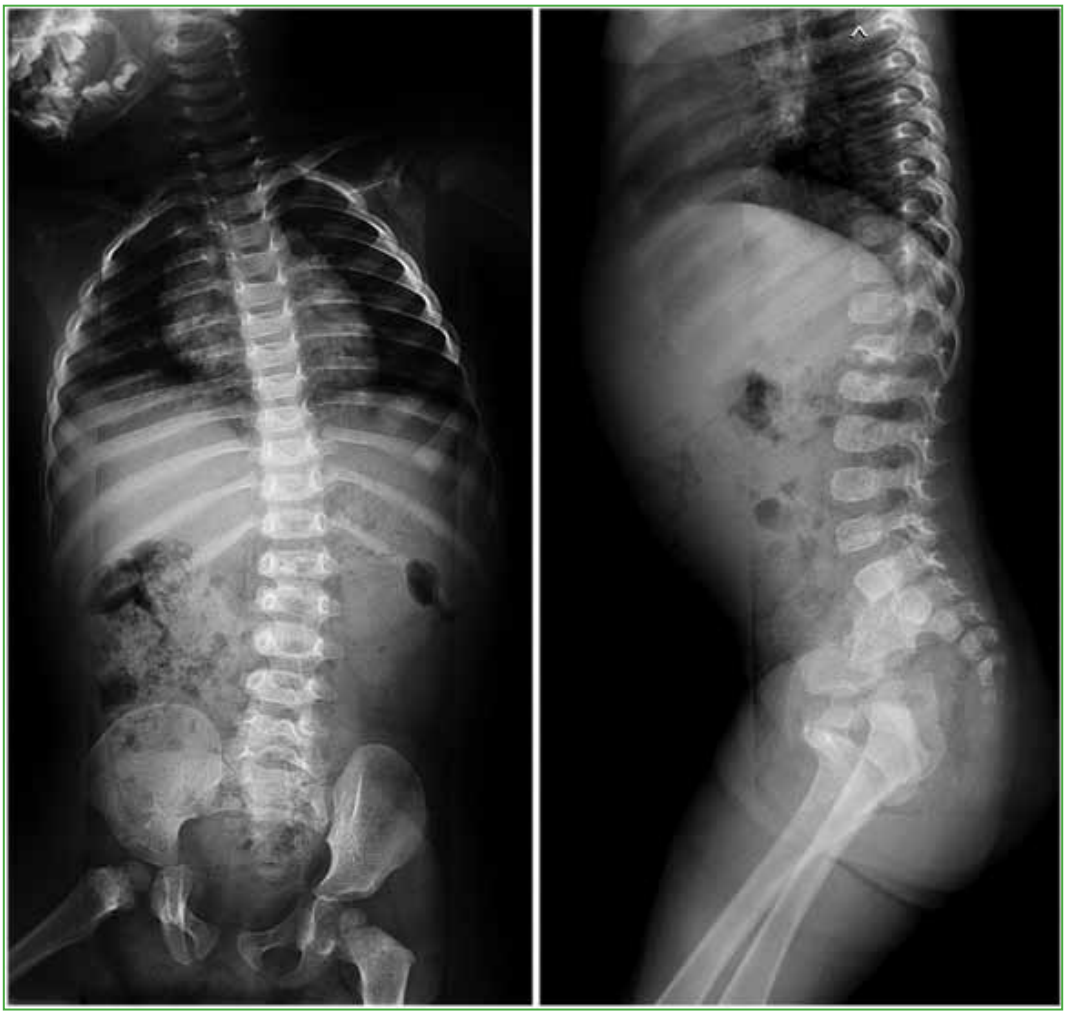

Figure 4. Anteroposterior and lateral dorsal-lumbosacral spine radiographs. Mild sequelae of spondylodiscitis of L1-L2 with wedging at L1, without significant angular deformity and kyphosis of T12-L2 of 1°.

DISCUSSION

Spondylodiscitis typically occurs in children older than 6 months, with no gender preference.[6] The nonspecific nature of symptoms, laboratory findings, and late detection on radiographic studies often lead to initial misdiagnosis, with reported rates as high as 50%.[6,7] In neonates, symptoms and signs may be ambiguous, including drowsiness, fever, and vomiting. In cases of delayed diagnosis, the disease course may be protracted. If left untreated, children in this age group may develop irreversible spinal deformities.[8.]

In our case, the parents sought medical attention three weeks after the first symptoms (diarrhea) appeared, and the diagnosis was delayed by an additional two days following the initial emergency department visit.

Laboratory tests may not always show elevated inflammatory markers.[9] C-reactive protein is almost always elevated in cases of pyogenic spondylodiscitis, which can help distinguish it from tuberculous spondylodiscitis, where inflammatory markers may remain within the normal range.[10] In our patient's initial laboratory tests, the white blood cell count was 16,800, the erythrocyte sedimentation rate was 75 mm/h, and the C-reactive protein level was 0.7 mg/dL. These values raised doubts about the diagnosis, prompting further investigation into the disease's etiology.

MRI enables early diagnosis of spondylodiscitis.[11] Moic et al. reported that MRI has a sensitivity of 96%, specificity of 92%, and overall diagnostic accuracy of 94%.[11] In contrast, conventional radiographs have a sensitivity of 82% and a specificity of 75%. Additionally, MRI allows for differential diagnoses, such as spinal tumors and erosive osteochondrosis.[12]

Unlike in adults, there are no established guidelines for the treatment of pediatric spondylodiscitis. Some authors question the necessity of antimicrobial therapy in all cases of primary spondylodiscitis, as spontaneous resolution has been observed in some instances.[13] Generally, while awaiting laboratory test results, empirical broad-spectrum intravenous antibiotics—including coverage against *S. aureus*—are recommended for an initial period of 3 to 4 days.[14] It is important to highlight *Kingella kingae* as a reemerging pathogen responsible for osteoarticular infections.[15] This gram-negative coccobacillus belongs to the HACEK group and is part of the normal oropharyngeal microbiota, with a carriage rate of 10% in children under 4 years of age. Its incidence is lower in infants under 6 months, likely due to maternal antibody protection.[16] The fastidious nature of *K. kingae* means it does not grow easily in traditional culture media, but the use of automated systems significantly improves its detection.[16] More than 80% of *K. kingae* spondylodiscitis cases occur between 6 months and 4 years of age, with 70% affecting the L4-L5 intervertebral space.[17]

Intravenous antibiotics are typically continued for several days, and if the patient's condition improves, treatment is transitioned to oral antibiotics for a total duration of 6 to 8 weeks.

The indication for more invasive procedures, such as biopsy or needle aspiration, remains unclear. Reported identification rates for the causative organism range from 0% to 63% for needle aspiration and open biopsy.[18] However, due to surgical and anesthetic risks, these procedures are not routinely performed and are generally reserved for cases that do not respond to empirical antibiotic therapy. In our patient, clinical improvement was observed after 72 hours of antibiotic treatment, making bone aspiration unnecessary.

As suggested by Menelaus et al., we believe that spinal immobilization is crucial for achieving favorable long-term outcomes.[15] Immobilization not only facilitates infection resolution but also helps maintain spinal alignment, preventing the development of more severe deformities. Treatment discontinuation is warranted once the patient is pain-free and laboratory parameters have normalized.[19]

Our patient was prescribed orthopedic management with a thoracolumbosacral brace three weeks after initiating antibiotic therapy to correct dorsal spine kyphosis. She wore the brace for 10 months, achieving good outcomes. At the last follow-up, 18 months after symptom onset, no thoracolumbar junction deformity was present.

CONCLUSIONS

Despite its rarity in infants, infectious spondylodiscitis should be considered in the pediatric population. In most cases, the disease follows a mild course and may resolve spontaneously or with a combination of spinal immobilization and antibiotic therapy. However, distinguishing between mild and severe cases can be challenging due to the nonspecific nature of clinical signs. Magnetic resonance imaging is the gold standard for diagnosing spondylodiscitis in children under 6 months of age.

Conflict of interest: The authors declare no conflicts of interest.

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