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Indian Journal of Obstetrics and Gynecology Research

Journal homepage: www.ijogr.org

Case Report

A case report on tuberculosis in pregnancy revealing the need for an effective multidisciplinary approach and the importance of tailored therapy

Nishitha Gandavaram^{1*}, Rajalekshmi M¹

¹Dept. of Obstetrics and Gynaecology, Saveetha Medical College and Hospital, Chennai, Tamil Nadu, India



ARTICLE INFO

Article history:

Received 03-03-2024

Accepted 13-04-2024

Available online 20-08-2024

Keywords:

Tuberculosis

Pregnancy

CNS tuberculosis

Seizures

Antitubercular therapy

Multidisciplinary management

ABSTRACT

Background: Tuberculosis (TB) during pregnancy, especially with central nervous system (CNS) involvement, poses significant risks to maternal and fetal health. This case report explores the diagnostic and therapeutic challenges of managing new-onset seizures in a pregnant patient with CNS-TB.

Case Presentation: A 23-year-old primigravida presented at 36 weeks gestation with new-onset seizures. The diagnostic workup, complicated by the pregnancy, revealed a left frontal tuberculoma. The patient was started on a standard antitubercular therapy (ATT) regimen of 2HRZE followed by 4HR, taking into account the drugs' teratogenic potential and fetal safety. Despite the development of mild atonic postpartum hemorrhage (PPH), the patient gave birth to a preterm but viable infant with satisfactory APGAR scores.

Management and Outcome: The interdisciplinary team provided comprehensive care, including seizure management with Levetiracetam and postpartum follow-up for both mother and child. The patient showed neurological improvement and, alongside the newborn, had a favorable outcome.

Conclusion: This case underlines the importance of a tailored, multidisciplinary approach to managing TB in pregnancy. It also emphasizes the need for vigilant monitoring and treatment adherence to navigate the complexities of TB with CNS involvement and concurrent pregnancy.

Future Recommendations: Enhanced prenatal screening for TB, interdisciplinary protocols, research on TB medications during pregnancy, and long-term follow-up studies are recommended to improve outcomes for similar future cases.

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1. Introduction

Tuberculosis (TB) is a pervasive infectious disease that poses a significant global health challenge. When TB occurs during pregnancy, it introduces complex health risks that affect not only the mother but also the outcome of the pregnancy. In India, the interplay between TB and pregnancy is particularly concerning, as it contributes to a staggering 20% of the global TB burden among pregnant women. The estimated prevalence of TB in this demographic is 2.3 per 1000 pregnant women, a figure that highlights the scale of the issue within the country.¹

Moreover, TB is not just a disease that impacts the health of those it infects; it is also a significant contributor to maternal mortality. The implications of TB on maternal health are profound, as it can lead to complications that are detrimental to both the mother and the fetus, including increased risk of miscarriage, preterm birth, and low birth weight.²

Recognizing the severity of the situation, the National TB Programme in India has put forth guidelines that recommend the screening of all pregnant women for TB. This proactive measure is intended to facilitate early detection and treatment, thereby reducing the risk of adverse health outcomes. However, despite these

* Corresponding author.

E-mail address: nishitha656@gmail.com (N. Gandavaram).

recommendations, the actual implementation of such screening is infrequent. This gap in the execution of TB screening protocols suggests systemic challenges within the healthcare infrastructure that need to be addressed.³

This scenario calls for an in-depth exploration of the factors contributing to the high prevalence of TB among pregnant women in India, the impact of TB on maternal and fetal health, and the disconnect between policy and practice in the implementation of TB screening programs. By delving into these aspects, we can begin to understand the multi-dimensional nature of TB in pregnancy and the critical steps needed to mitigate its impact on mothers and children in India.⁴

2. Case Report

The patient is a 23-year-old primigravida at 36 weeks and 5 days of gestation, diagnosed with a left frontal tuberculoma and is currently on antitubercular therapy (ATT). She presented for her antenatal visit and has a history of being booked and immunized according to standard prenatal care protocols.

During the first trimester, her pregnancy progressed without any complications. However, in the second trimester, at 25 weeks and 3 days, she experienced her first seizure episode characterized by loss of consciousness (LOC) and involuntary movements of the upper (UL) and lower limbs (LL). Following this, she was started on Tab Levipil 500mg for seizure management.

In the third trimester, she had a second seizure episode at 29 weeks and 3 days, which led to her admission at the Institute of Obstetrics and Gynecology (IOG). An MRI of the brain revealed a caseating granuloma in the left frontal region, and MR spectroscopy showed a lipid-lactate peak. Consequently, antitubercular treatment was initiated at 30 weeks and 5 days with three tablets of HRZE regimen (Isoniazid, Rifampicin, Pyrazinamide, and Ethambutol).

On examination (O/E), the patient was found to be afebrile with no signs of anemia (no pallor). Her vital signs were stable with a blood pressure (BP) of 110/80 mmHg and a pulse rate (PR) of 76 beats per minute (bpm). Systemic examination (S/E) of the cardiovascular system (CVS) revealed normal heart sounds (S1S2+), and respiratory system examination (RS) showed normal vesicular breath sounds (NVBS).

Physical abdominal examination (P/A) noted the uterus to be of term size, not contracting, with the baby in a cephalic presentation, and fetal heart sounds were good. Pelvic examination (P/V) revealed a gynecoid pelvis, a soft, posterior, and uneffaced cervix, with the os closed, and the vertex of the fetal head high up in the pelvis.

This detailed systematic account highlights the patient's clinical journey through pregnancy while managing a significant neurological condition with implications for both maternal and fetal health. It underscores the importance of

multidisciplinary care involving obstetrics, neurology, and potentially neurosurgery to navigate the complexities of concurrent pregnancy and brain tuberculosis.

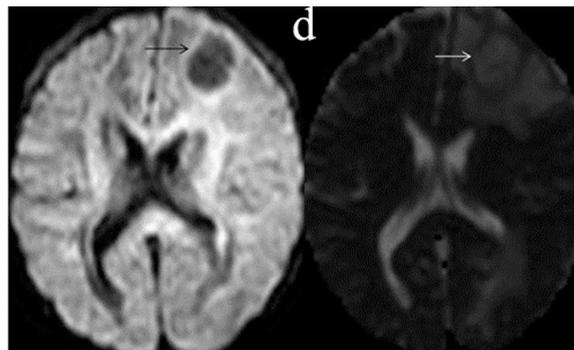


Figure 1: MRI brain revealing caseating granuloma

Pulmonology opinion-started on Tab Azee 500mgOD, Syp.Brozedex, to continue ATT, Neb Bedecort Q12H.

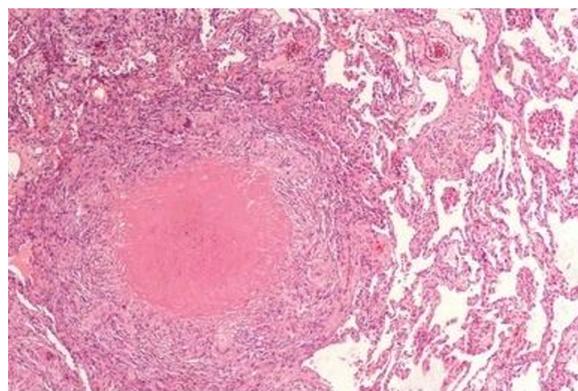


Figure 2: HPE of brain tuberculoma showing caseous necrosis

Neurology opinion-To continue Tab Levipil 500mg OD.

3. Management

The patient, a 23-year-old primigravida at 36 weeks and 6 days gestation, was administered steroid coverage to enhance fetal lung maturity in anticipation of preterm delivery. Induction of labor was initiated using Foley's catheter due to the presence of oligohydramnios, which is a condition characterized by a deficiency of amniotic fluid.

However, the induction of labor was unsuccessful due to the severity of the oligohydramnios, leading to the decision to perform an emergency Lower Segment Cesarean Section (LSCS). The indication for the cesarean delivery was the failed induction in the context of severe oligohydramnios, which can pose risks to both the mother and the fetus if not promptly managed.

Following the cesarean delivery, the patient experienced mild atonic postpartum hemorrhage (PPH), which is a

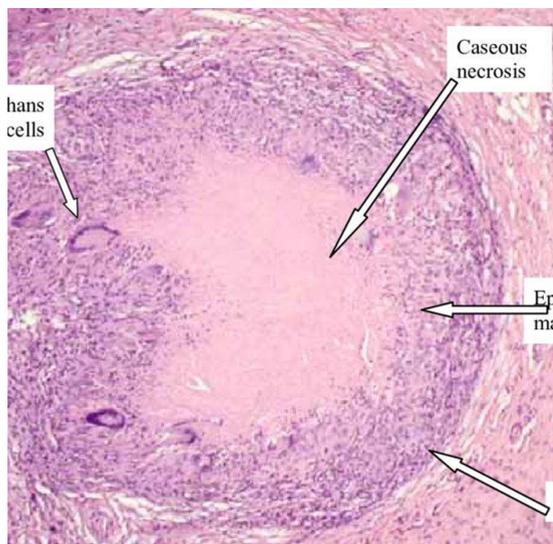


Figure 3: HPE showing caseating granuloma, caseous necrosis, epithelioid cells, Langhans giant cells, Fibroblasts and lymphocytes

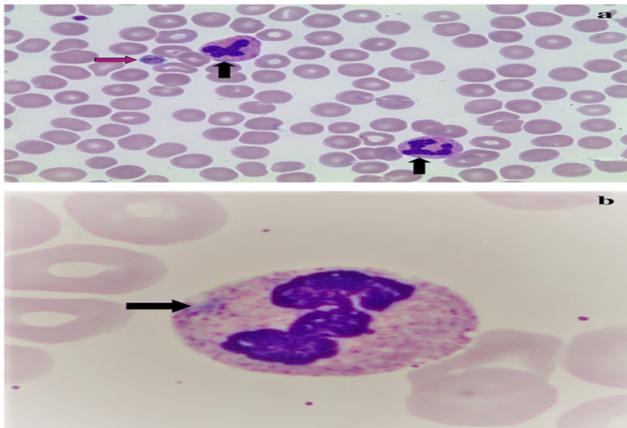


Figure 4: Peripheral blood smear of the case study showing no specific hematological manifestations

condition where the uterus does not contract strongly enough to compress the blood vessels and control bleeding after childbirth. This condition was managed medically without the need for further surgical intervention.

The newborn, a preterm boy weighing 1.910 kilograms, was assessed to be small for gestational age (SGA), indicating a birth weight below the 10th percentile for the gestational age. The baby's health at birth was evaluated using the APGAR scoring system, which assesses Appearance, Pulse, Grimace, Activity, and Respiration. The scores were 8 out of 10 at one minute and 9 out of 10 at five minutes, suggesting that the baby had good vital signs and was adapting well post-delivery.

Both the baby and the mother were reported to be doing well following the birth. However, postoperatively, the

patient reported experiencing a cough, which would require evaluation to rule out any complications, particularly given the patient's history of tuberculosis and the recent surgical procedure. This symptom may warrant further medical assessment to ensure that it does not signify any underlying respiratory complications or infections, especially in the context of the patient's antitubercular treatment.

4. Discussion

Crafting a detailed discussion on the intersection of new-onset seizures and tuberculosis (TB) in pregnancy and its management requires a comprehensive look into the pathophysiology of both conditions, the diagnostic challenges, the implications for maternal and fetal health, and the multidisciplinary approach necessary for treatment. Given the intricate relationship between TB, seizures, and pregnancy, it is essential to examine each aspect methodically.

4.1. Complexities of tuberculosis in pregnancy

TB during pregnancy introduces a host of complexities due to the altered immunological state of the expectant mother. The immune system's modifications during pregnancy are aimed at protecting the fetus but may also compromise the mother's ability to combat infections like TB. Consequently, pregnant women have an increased susceptibility to TB, and the infection can lead to severe maternal and fetal complications.

The effects of maternal TB range from direct health consequences for the mother, such as increased morbidity, to profound implications for the fetus. These include an elevated risk of spontaneous abortion, especially if the TB infection is not promptly recognized and treated. Perinatal mortality rates are higher in infants born to mothers with TB due to a combination of direct infection and secondary effects of maternal illness. Infants may be born SGA or with LBW as a result of the infection's impact on placental function and fetal nutrition. Preterm labor is also more common, often precipitated by the body's inflammatory response to TB or as a side effect of systemic illness in the mother. Rarely, the infection can cross the placental barrier, leading to congenital TB in the newborn.

4.2. Diagnosing CNS-TB in the context of pregnancy

When a pregnant woman presents with new-onset seizures, the differential diagnosis is broad. CNS-TB, particularly tuberculomas, must be considered, but the similarity of symptoms to other pregnancy-related conditions complicates the diagnostic process. For instance, the hypertension and proteinuria characteristic of pre-eclampsia can also be seen in CNS-TB. Seizure disorders may be confused with eclampsia, a severe complication of pre-eclampsia. Hyperemesis gravidarum and the raised

intracranial pressure from a brain tumor can both mimic the nausea and vomiting seen in CNS-TB.⁴

Therefore, reaching a definitive diagnosis of CNS-TB necessitates a high index of suspicion and the judicious use of diagnostic modalities. This includes imaging like MRI and specific laboratory tests, keeping in mind the safety of these procedures during pregnancy.

4.3. Antitubercular therapy and pregnancy outcomes⁵

The treatment of TB in the general population is well-established, but managing TB in pregnancy, particularly CNS-TB, requires careful consideration of the drugs' teratogenic potential and their effect on the fetus. The standard course of ATT for CNS-TB involves an initial two-month intensive phase of HRZE therapy, followed by a continuation phase of HR therapy for 9 to 12 months. This regimen is crucial for penetrating the blood-brain barrier and ensuring effective treatment of CNS lesions.

However, the slow growth and potential encapsulation of tuberculomas present challenges. These characteristics allow the bacteria to evade the immune system and resist pharmacological treatment, necessitating prolonged therapy. The selection of antitubercular drugs must also consider their impact on fetal development, requiring a balance between effective treatment and safety.⁶

4.4. Case discussion and integrated care⁷

In the case presented, the initiation of ATT and the subsequent neurological improvement highlight the effectiveness of the treatment regimen. The positive pregnancy outcome further emphasizes the importance of a carefully tailored approach to managing TB in pregnant patients. Such an approach is multifaceted, involving the following key components:

4.5. Multidisciplinary management⁸

Effective management of TB in pregnancy, particularly with CNS involvement, requires a collaborative approach. Obstetricians, neurologists, infectious disease specialists, and pharmacologists must work together to navigate the complexities of treatment while minimizing risks to both mother and child.

4.6. Monitoring and managing seizures⁹

The occurrence of seizures in pregnancy necessitates additional considerations, including the selection of antiepileptic drugs that are safe for use during pregnancy. In this case, the use of Levipil (Levetiracetam) and its dosing were carefully considered to control seizures while mitigating potential adverse effects on the fetus.

4.7. Managing tuberculosis and pregnancy complications¹⁰

A comprehensive management plan must address the direct and indirect effects of TB on pregnancy. This includes monitoring for obstetric complications such as preterm labor, which may be precipitated by systemic inflammation or the stress of illness on the mother's body. Additionally, vigilant monitoring for signs of fetal distress and growth restriction is critical.

4.8. Treatment compliance and continuation¹¹

Adherence to the ATT regimen is essential for successful treatment, but pregnancy can present barriers to compliance, such as hyperemesis gravidarum or concerns about drug effects on the fetus. Patient education and support are crucial to ensure consistent treatment adherence, and postpartum continuation of therapy is vital, especially with CNS involvement.

4.9. Safety of antitubercular drugs in pregnancy¹²

The safety profile of antitubercular drugs during pregnancy and breastfeeding must be carefully evaluated. Drugs like Isoniazid and Rifampicin are generally considered safe, but the risk-benefit ratio must be assessed continuously throughout the course of treatment.

4.10. Postpartum follow-up¹³

The postpartum period requires ongoing attention to both the mother's and the infant's health. In this case, the mother's postoperative cough could signify an infectious complication, warranting further evaluation to exclude conditions such as post-TB pulmonary disease or drug-resistant TB.

4.11. Neurological improvement and pregnancy outcome^{14,15}

The neurological improvement in the mother following ATT suggests that the CNS lesions were responsive to treatment. The favorable pregnancy outcome, with the birth of a living, albeit preterm, boy with satisfactory APGAR scores, underscores the success of the multidisciplinary management approach. However, the infant's SGA status and prematurity warrant close follow-up for any delayed or long-term complications.

5. Conclusion

The case presented exemplifies the intricate and multifaceted challenges of managing tuberculosis (TB) in a pregnant patient, particularly when complicated by central nervous system (CNS) involvement and the onset of seizures. The conclusion drawn from this case underscores

several critical points and lessons learned:

1. **Effective multidisciplinary approach:** The positive outcomes in this case were largely due to the seamless collaboration between various specialties including obstetrics, neurology, and infectious diseases. This team-based approach allowed for comprehensive care that addressed the myriad of risks associated with maternal TB and CNS involvement during pregnancy..
2. **Importance of tailored therapy:** Antitubercular therapy (ATT) was customized to the patient's condition, taking into account the dual objectives of managing TB and ensuring the safety of the fetus. The neurological improvement and the lack of severe adverse reactions in the mother or fetus attest to the effectiveness of this personalized treatment regimen.
3. **Early diagnosis and management:** Prompt recognition of the symptoms of CNS-TB, despite their similarity to other pregnancy-related conditions, was crucial in this case. Early diagnosis and the subsequent initiation of ATT were pivotal in managing the patient's condition and preventing further complications.
4. **Adherence to treatment:** The patient's adherence to the prescribed ATT regimen, despite the challenges of pregnancy, was essential. The continuation of treatment postpartum indicates a commitment to health that likely contributed to the favorable outcome.
5. **Addressing complications:** The management of mild atonic postpartum hemorrhage (PPH) and the subsequent medical complications, such as the postoperative cough, were handled effectively, preventing further maternal morbidity.
6. **Monitoring fetal well-being:** Despite the presence of risk factors such as severe oligohydramnios and the necessity of preterm delivery, the infant was born alive with satisfactory APGAR scores. This highlights the importance of vigilant fetal monitoring and timely intervention.
7. **Long-term care and follow-up:** The necessity for long-term follow-up cannot be overstressed. Both the mother and the preterm infant will require ongoing care to monitor for any delayed effects of the disease and the treatment.
8. **Educating for better outcomes:** This case also emphasizes the need for patient education regarding TB during pregnancy. Knowledge about the implications of the disease and the importance of treatment adherence can empower patients to participate actively in their care, potentially leading to better outcomes.
9. **Research and development:** Finally, the case advocates for continued research into safer and more effective TB treatments during pregnancy and the development of guidelines for managing such complex cases.

In conclusion, this case serves as a poignant reminder of the complexities inherent in treating TB in a pregnant patient with CNS involvement. It is a testament to the importance of a judicious, patient-centered approach that considers the unique challenges of pregnancy. Through collaborative efforts, adherence to evidence-based treatment protocols, and vigilant monitoring, it is possible to navigate these challenges and achieve favorable maternal and neonatal outcomes.

6. Future Recommendations

Building on the insights from the presented case of tuberculosis (TB) in a pregnant patient with CNS involvement and seizures, the following recommendations can be considered for future cases and policy development:

1. **Enhanced prenatal screening:** There should be a protocol for enhanced screening for TB in populations where TB is endemic, especially among pregnant women. Early detection of TB can lead to timely interventions that can mitigate the risks to both the mother and the fetus..
2. **Interdisciplinary protocols:** Development of interdisciplinary protocols that include obstetrics, infectious disease, neurology, and neonatology can streamline the management of similar complex cases. These protocols can ensure that all healthcare providers follow a standardized approach while still allowing for individualized care.
3. **Research on TB medications in pregnancy:** More research is needed on the safety and efficacy of TB medications during pregnancy. This research should focus on the impact of these drugs on the developing fetus and the health of the mother, with an emphasis on minimizing potential adverse effects.
4. **Long-term follow-up studies:** Longitudinal studies to monitor the outcomes of children born to mothers with TB and CNS involvement are essential. These studies could provide valuable data on the long-term neurodevelopmental and health outcomes for these children.
5. **Educational programs:** Strengthening educational programs for healthcare professionals and patients on the importance of TB screening and the implications of TB during pregnancy can improve outcomes. Educated patients are more likely to adhere to treatment regimens and follow-up appointments.
6. **Strengthening public health infrastructure:** Improving public health infrastructure to better support the implementation of national TB programs, particularly those related to prenatal care, can enhance the screening and treatment of TB in pregnant women.
7. **Breastfeeding guidance:** Given the complexities of TB treatment and the potential effects on lactation,

clear guidelines should be established for breastfeeding while on ATT. These guidelines should provide information on drug transmission through breast milk and offer alternatives if breastfeeding is contraindicated.

8. Social support systems: Establishing strong social support systems to help pregnant women navigate the challenges of TB treatment can improve adherence to therapy. Support can include assistance with transportation to healthcare facilities, nutritional support, and counseling services.
9. Access to safe and effective treatment: Ensuring access to safe and effective treatment for TB in pregnancy should be a priority. This could involve subsidizing medications, providing them free of charge, or integrating them into existing prenatal care programs.
10. Advocacy for pregnant women with TB: There should be increased advocacy for the needs of pregnant women with TB, including efforts to reduce stigma, ensure equitable access to care, and promote research funding for this vulnerable population.
11. Global collaboration: Collaboration at the international level to share best practices, research findings, and resources can help lower-income countries better manage TB in pregnancy.
12. Policy development: Policymakers should be informed about the complexities of managing TB in pregnancy to ensure that health policies and funding allocations are responsive to the needs of this population.

Implementing these recommendations could improve the management of TB in pregnancy and the outcomes for both mothers and their children, helping to ensure that cases like the one presented are managed with the highest standards of care.

7. Sources of Funding

None.

8. Conflict of Interest

None.

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Author biography

Nishitha Gandavaram, Postgraduate (Obstetrics and Gynaecology)

Rajalekshmi M, Professor

Cite this article: Gandavaram N, Rajalekshmi M. A case report on tuberculosis in pregnancy revealing the need for an effective multidisciplinary approach and the importance of tailored therapy. *Indian J Obstet Gynecol Res* 2024;11(3):515-520.