CASE REPORT

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MULTIDISCIPLINARY MANAGEMENT OF FETAL NEURAL TUBE DEFECTS: CLINICAL CASE REPORT

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Abstract. Background: *Neural tube defects, particularly myelomeningocele, are among the most severe congenital anomalies affecting the central nervous system. Early diagnosis through antenatal screening allows for optimized delivery planning and immediate intervention. However, in low-resource settings, lack of prenatal care often results in delayed diagnosis and management.* ***Clinical Case Description:*** *We present the case of a 35-year-old woman – gravida 4, para 4, who received no antenatal care and ultrasound examination throughout her pregnancy. The patient presented at term in spontaneous labor and underwent cesarean section due to obstructed labor. The neonate was delivered with a lumbosacral myelomeningocele measuring approximately 6 cm in diameter, with exposed neural tissue and cerebrospinal fluid leakage. Neurological examination revealed lower limb paralysis and neurogenic bladder. Imaging study confirmed the diagnosis, with no associated hydrocephalus. The neonate underwent early surgical repair within 48 hours of birth, followed by comprehensive neonatal care and multidisciplinary follow-up. Postoperative recovery was uncomplicated. The surgical site healed well, although neurological deficits persisted. The infant was discharged on day 12 with a structured follow-up plan involving pediatric neurology, urology, and physiotherapy. Long-term management was initiated to address functional and developmental needs.* ***Conclusions:*** *This case highlights the critical importance of prenatal care, including folic acid supplementation and routine ultrasonography, in the prevention and early detection of neural tube defects. Even in the absence of prenatal diagnosis, favorable outcomes can be achieved through timely surgical intervention and coordinated multidisciplinary care. The case underscores the dual necessity of preventive public health strategies and responsive clinical management in addressing congenital anomalies in resource-limited settings.*

Key words: *neural tube defect, myelomeningocele, prenatal care, cesarean section, neonatal surgery, multidisciplinary management, folic acid, spina bifida*

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INTRODUCTION

Neural tube defects (NTDs) are serious congenital malformations that result from incomplete closure of the neural tube during early embryogenesis, typically by the twenty-eighth day of gestation [1]. Among these, myelomeningocele represents the most severe form of spina bifida that is compatible with life, frequently associated with significant motor, sensory, and urological impairments [2, 3]. The global incidence of NTDs remains a major public health concern, with a higher prevalence observed in regions where prenatal care is limited and folic acid supplementation is not routinely practiced [4].

Early prenatal detection through second-trimester ultrasonography and maternal serum alpha-fetoprotein screening facilitates timely parental counseling, delivery planning at tertiary centers, and in selected cases, the possibility of fetal surgical repair [5, 6]. These measures significantly reduce morbidity and improve long-term outcomes. However, in the absence of antenatal surveillance, NTDs may remain unrecognized until birth, creating challenges for immediate neonatal stabilization and long-term multidisciplinary care [7-9].

This case report presents a neonate born to a mother with no antenatal care and no prenatal imaging, in whom a lumbosacral myelomeningocele was identified postnatally. It underscores the clinical importance of early diagnosis and highlights the effective coordination of multidisciplinary care teams in ensuring successful surgical intervention and rehabilitation, even when such congenital anomalies are only discovered at the time of delivery.

CLINICAL CASE DESCRIPTION

A 35-year-old woman – gravida 4, para 4 (G4P4), presented to the labor and delivery unit at term with spontaneous onset of labor. Particularly, the patient received no antenatal care and ultrasound during the pregnancy. No obstetric consultations, laboratory investigations, and prenatal imaging studies were performed. Furthermore, the patient did not take folic acid supplementation before or during the pregnancy. The previous three pregnancies had all resulted in healthy term vaginal deliveries, and their medical, surgical, and family histories were non-contributory. Due to signs of obstructed labor and fetal distress, an emergency cesarean section was performed. A neonate was delivered, with weight 3150 g and height 51 cm. Apgar scores were 7 and 9 at the minutes 1 and 5, respectively. Upon initial physical examination, a large, round cystic lesion was noted at the lumbosacral region. The lesion measured approximately 6 cm in diameter and was surrounded by erythematous skin revealing exposed neural tissue centrally with active cerebrospinal fluid (CSF) leakage. There was no skin coverage over the defect, and the overall appearance was consistent with a diagnosis of myelomeningocele (Figure 1). Neurological examination revealed flaccidity of both lower limbs, absence of deep tendon reflexes, and lack of spontaneous movement below the level of the lesion. There was no anal wink or cremasteric reflex, and anal tone was diminished.

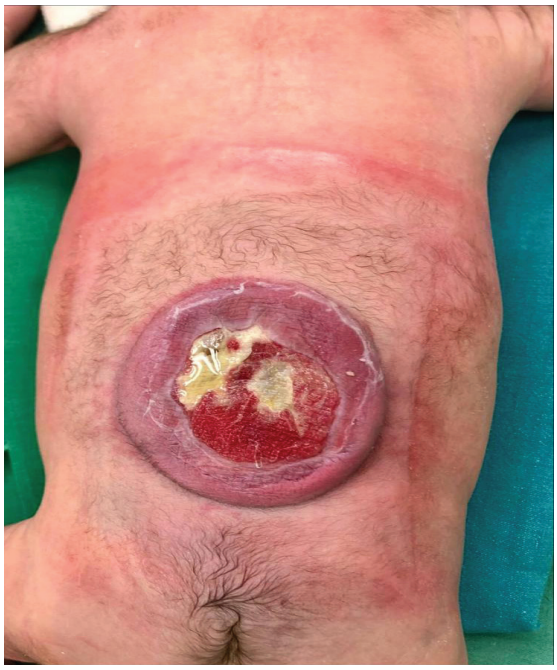

Fig. 1. Preoperative image of the neonate with myelomeningocele

Following the rise of the clinical suspicion of a neural tube defect (NTD), imaging studies were promptly initiated to assess the extent of involvement and to rule out associated anomalies. A cranial ultrasound scan was performed to evaluate for hydrocephalus or ventriculomegaly, which are common in neonates with myelomeningocele. The findings were reassuring, showing no evidence of ventricular dilation or structural intracranial abnormalities. Subsequently, an MRI scan of the spine was obtained, which confirmed the presence of a lumbosacral myelomeningocele. The neural placode was seen herniating through a bony defect at the lower lumbar vertebral level, with the surrounding soft tissue sac extending posteriorly. No Chiari II malformation was identified. Routine laboratory investigations including complete blood count, renal function tests, electrolytes, C-reactive protein, and coagulation profile were all within normal limits. These findings supported the diagnosis

and allowed for safe surgical planning without delay due to systemic complications.

A coordinated multidisciplinary team approach was crucial in the timely and successful management of this neonate. Given the open nature of the NTD and the risk of ascending infection, immediate coordination among pediatric neurosurgery, neonatology, and anesthesiology teams was initiated. The neonate was transferred to the Neonatal Intensive Care Unit (NICU) and scheduled for surgical intervention within the first 48 hours of life. The primary objective was to prevent meningitis, reduce neural tissue exposure, and ensure anatomical closure to preserve any residual neurological function.

Under general anesthesia, the neurosurgical team performed a definitive repair of the myelomeningocele. Intraoperatively, the neural placode was identified and carefully dissected from surrounding tissues. The dura was closed primarily over the neural elements, followed by meticulous multilayered closure of the paraspinal muscles and skin. Hemostasis was achieved, and the surgical site was covered with sterile dressings. The procedure was completed uneventfully, with no intraoperative complications noted, and shown in Figure 2.

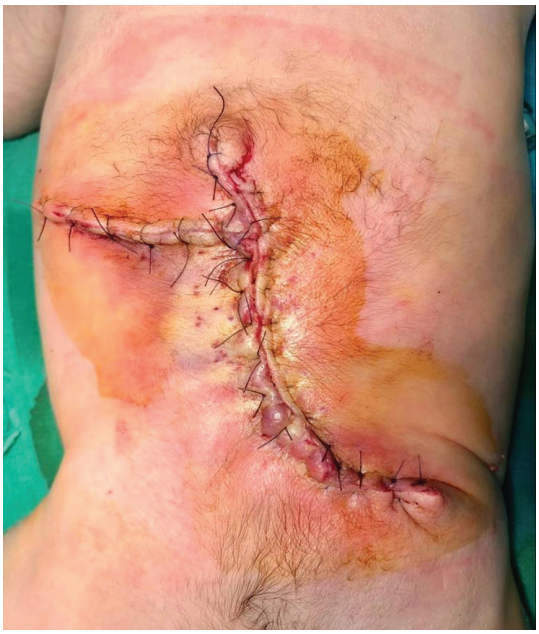

Fig. 2. Postoperative surgical wound closure image

Postoperatively, the neonate remained in the NICU for monitoring and care. Prophylactic antibiotics were administered to prevent wound infection and meningitis. Pain was managed with appropriate analgesics, and the infant was nursed in the prone position to avoid pressure on the surgical site. The wound remained dry and intact, and no CSF leakage or signs of infection were observed during the early recovery period. Due to signs of bladder dysfunction, a urinary catheter was placed, and neurogenic bladder was suspected. A multidisciplinary team was assembled for ongoing care and long-term planning. A pediatric neurologist performed neurodevelopmental assessments and advised on future surveillance for hydrocephalus and motor function. A pediatric urologist evaluated the urinary system and initiated a clean intermittent catheterization regimen to prevent urinary retention and infections. A physiotherapist began early limb range-of-motion exercises and provided caregiver education. Discussions were held with the parents to address prognosis, home care, and the need for long-term rehabilitation services. In this case, the comprehensive and team-based approach ensured prompt surgical correction, reduced the risk of complications, and laid the foundation for a structured follow-up protocol tailored to the child's functional needs.

Postoperative recovery was smooth, with the neonate showing good wound healing and no signs of infection, dehiscence, or CSF leakage. The surgical site remained clean and intact during daily evaluations. The infant remained hemodynamically stable and began tolerating feeds gradually. However, neurological examination continued to show persistent hypotonia and paralysis of both lower limbs, with no recovery of motor function below the level of the lesion. The bladder remained distended without spontaneous voiding, and clean intermittent catheterization was maintained as part of ongoing bladder management. Follow-up cranial ultrasound scan conducted ten days postoperatively showed no development of hydrocephalus, but serial monitoring was advised due to the ongoing risk in such cases.

The neonate was discharged home on day 12 of life with a comprehensive care plan. The family was counselled extensively about the prognosis, the likelihood of permanent lower limb paralysis, the importance of maintaining bladder hygiene, and the need for regular follow-up with pediatric neurology, urology, and physiotherapy services. Early involvement in a neurodevelopmental support program was arranged. At the one-month outpatient follow-up, the wound had healed well, with no complications. Bladder management continued at home, and physiotherapy was initiated to preserve joint mobility and prevent contractures. Long-term follow-up was planned to include orthopedic evaluations, renal function monitoring, and neurodevelopmental assessments to address evolving functional needs.

DISCUSSION

In NTDs, myelomeningocele represents one of the most severe congenital malformations affecting the central nervous system [10]. NTDs result from failed closure of the neural tube during the third to fourth week of embryogenesis and are associated with significant lifelong neurological, orthopedic, and urologic morbidity [11]. The incidence of NTDs varies globally, with higher prevalence noted in populations with poor access to periconceptional folic acid supplementation and prenatal care. Early antenatal diagnosis through routine second-trimester ultrasonography and maternal serum alpha-fetoprotein screening can enable detection of most open NTDs and facilitates counseling, pregnancy management, and planned delivery in tertiary centers equipped for neonatal surgical care.

This case is particularly instructive because the NTD was discovered only at birth, in the complete absence of antenatal screening. The mother's lack of prenatal care eliminated the possibility of early detection, which could have enabled prenatal counseling or, in some cases, consideration of in utero surgical repair. Despite the delayed diagnosis, the case demonstrates that rapid postnatal assessment and a timely, well-coordinated surgical approach can still yield favorable outcomes. Early closure of the defect within 48 hours is critical to reduce the risk of meningitis, preserve remaining neurological function, and promote optimal wound healing.

However, the neurological prognosis in cases of open myelomeningocele often remains guarded, as the damage to neural structures typically occurs in utero and is irreversible. In this case, the infant exhibited significant lower limb motor deficits and bladder dysfunction consistent with the level and severity of the lesion. These deficits require lifelong multidisciplinary management, including neurology, urology, orthopedics, and rehabilitation. Long-term outcomes are highly variable and depend on the level of the lesion, presence of hydrocephalus, associated anomalies, and access to comprehensive follow-up services.

This case reinforces the vital importance of early folic acid supplementation, routine prenatal screening, and timely access to maternal healthcare services, particularly in resource-limited settings. Furthermore, it highlights how prompt surgical and supportive care can mitigate some of the risks associated with delayed diagnosis, while also underlining the role of long-term neurodevelopmental planning.

CONCLUSIONS

This case of postnatally diagnosed myelomeningocele in a neonate born to an unmonitored pregnancy exemplifies the challenges and clinical responsibilities associated with delayed presentation of preventable congenital anomalies. Despite the absence of antenatal diagnosis, the successful outcome was made possible through early recognition, timely surgical intervention, and coordinated multidisciplinary care. However, the persistence of significant neurological deficits despite surgical repair illustrates the limitations of postnatal management in reversing pre-existing neural damage. The long-term prognosis will depend on vigilant follow-up and supportive interventions tailored to the child's evolving needs.

This case highlights that NTDs are often preventable with timely folic acid supplementation and detectable through routine prenatal ultrasonography, which remains crucial for early diagnosis and delivery planning. Surgical closure within the first 48 hours of life is essential to minimize infection risks and preserve neurological function. A multidisciplinary postnatal care approach is vital to address the neurological, urological, and orthopedic outcomes, and public health initiatives must prioritize expanding access to antenatal care in underserved communities to prevent such outcomes in future pregnancies.

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Ethical statement: *This study has been performed in accordance with the ethical standards as laid down in the Declaration of Helsinki.*

Consent for publication: *Consent form for publication was signed by the parent and collected.*

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