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Subcutaneous Fat Necrosis with Hypercalcemia in a Nigerian Neonate: A Case Report

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ABSTRACT

Background and Objective: Subcutaneous fat necrosis (SFN) of the newborn is a rare form of panniculitis. It usually occurs in perinatal stress and is usually complicated by metabolic disorders such as hypercalcemia. While the number of cases reported worldwide has increased, there are very few cases from Nigeria.

Case Report: We report the case of a Nigerian newborn admitted at 25 hours of life with macrosomia (birth weight of 4.7 kg) and perinatal asphyxia. On the fourth day of life, she developed reddened to dark, tender areas on the back (20 x 15 cm) and back of the arms, suggestive of SFN with elevated serum calcium. The baby received oral frusemide with the resolution of hypercalcemia by the 4th month of life.

Conclusion: Panniculitis, as a form of subcutaneous fat necrosis should be considered in a neonate with a history of perinatal asphyxia and macrosomia, which requires measurement of serum calcium levels.

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Introduction

Subcutaneous fat necrosis (SFN) in neonates is a rare lobular form of panniculitis (inflammation of the subcutaneous fat) [1]. SFN usually presents as multiple erythematous to violaceous plaques and nodules that appear from a few days to weeks after birth. It occurs predominantly in perinatally stressed term and post-term newborns, with a few reports in preterm babies [2]. Predisposing neonatal risks for SFN include macrosomia, perinatal asphyxia, hypothermia, meconium aspiration, and hypoglycaemia [3]. Maternal risk factors for SFN include pre-eclampsia, eclampsia, maternal diabetes, hypertension during pregnancy, cocaine or cigarette exposure, and use of calcium channel blockers [4].

SFN usually takes a benign course, but metabolic complications are more common [2]. The metabolic complications include hypoglycemia, hypertriglyceridemia, hypocalcemia, and hypercalcemia. Hypercalcemia is the most common complication and can be as high as 70% in cases of SFN, tending to be symptomatic and including renal complications such as acute kidney injury and nephrocalcinosis [2, 5]. There are also reports of calcification in distant organs such as the liver and heart in SFN [6]. Hypercalcemia is usually the result of solidification and crystallization of SFN due to the high melting point of brown fats compared to adult fats [7]. This is followed by necrosis and granulomatous formation with increased expression of 2-alpha-hydroxylase by macrophages. Increased extra-renal production of 1,25-dihydroxycholecalciferol (calcitriol), increases calcium absorption and osteoclastic activity. Other mechanisms include increased calcium release from the necrosed fat cells and increased release of prostaglandin E from the necrosed fat cells, which tends to stimulate osteoclasts and lead to increased release of calcium [7].

Although the number of reported cases of SFN has increased worldwide since the first case report in 1926, the literature of the present study revealed only a few cases from Nigeria, one of which had hypercalcemia [8-10]. Hence, we decided to report this case of a term macrocosmic neonate with perinatal asphyxia who developed SFN and hypercalcemia during the first week of life. She was treated with oral frusemide for two weeks. This case report raises the question of whether SFN is uncommon in Nigerian newborns or whether cases are being overlooked. The study also highlights the need for regular monitoring of serum calcium and prevention of associated complications.

Case Report

A female term infant was presented at the 25th hour of life because she had not cried at birth and had Apgar scores of 2 and 4 at the first and fifth minutes respectively. The mother reported an index pregnancy in the fifth month of gestation and tested negative for hepatitis B virus, HIV, and syphilis. The mother had a complicated pregnancy with elevated blood pressure at 36 weeks of gestation with proteinuria and bilateral leg swelling. She received oral Aldomet for hypertension. She was a 25-year-old para-4 who went into spontaneous labor that lasted eight hours and delivered a live baby by spontaneous vaginal delivery. The baby did not cry at birth, so she was referred to our facility from the primary health center (PHC) with Apgar scores of 2 and 4 at the first and fifth minutes, respectively. The admission letter indicates that the baby was resuscitated by suctioning the airway and ventilating with a bag and mask for about 10 minutes.

On the first day of admission: The baby was conscious, non-febrile (temperature 36.7oC), pink, with oxygen saturation of 86% on room air, non-cyanotic, non-yellow, and well hydrated. Saturation improved from 86% (at the time of admission at the 25th hour of life) to 94% with intranasal (nasal prong) oxygen at 1.5 liters per minute. Respiratory rate was 60 beats per minute (bpm) with good airflow to both lungs. Her heart rate was 150 bpm, and her blood pressure was 70/40 mmHg with first and second heart sounds. Although she was conscious, she had suppressed primitive reflexes. There were no swellings or changes in skin color on admission, while abdominal and musculoskeletal examinations were unremarkable on admission. The child's birth weight was 4.7 kg, length 58.0 cm, and occipitofrontal circumference 36.5 cm. We started treatment based on the initial diagnosis (macrosomia

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with hypoxic-ischemic encephalopathy), which included intravenous administration of 10% dextrose, observation for seizures, and broad-spectrum antibiotics (because of the risk of neonatal sepsis).

On the 3rd day of admission, the child was seizing and had reddened to dark, tender areas on the back (20 cm x1 5 cm), and back of the arms (Figure 1). The diagnosis was updated to a macrocosmic baby with hypoxic-ischemic encephalopathy and subcutaneous fat necrosis. Treatment was also updated to include intravenous diazepam to abort the baby's two seizures, phenobarbitone (for seizure control), and oral frusemide (because of increased serum calcium). Initial investigations on admission included a complete blood count. If the baby seized, blood sugar level, serum electrolytes, urea, creatinine and calcium were done as shown in Table 1. In addition, serial serum calcium was determined because of the high risk of hypercalcemia and initial elevated level (Table 1).

Day 4 to 10 of admission: The baby gradually improved and was discharged on the 10th day and took oral frusemide at home until two weeks after discharge. Follow-up: At the sixth week of life, the serum calcium level was at the upper limit of the normal range with significant improvement in the resolution of the subcutaneous fat necrosis (Figure 2). By the fourth month, there was complete resolution of the subcutaneous fat necrosis (Figure 3), normal serum calcium, and normal findings on renal ultrasound.

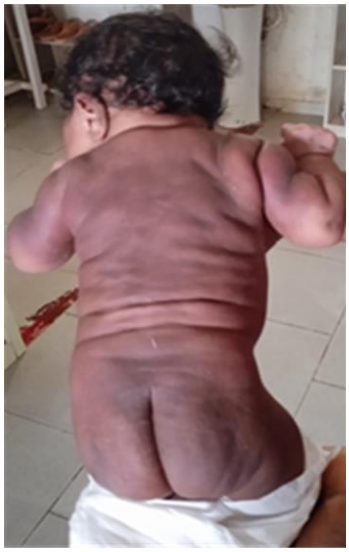

Fig 1. Distribution of subcutaneous fat necrosis noticed at the 4th day of life

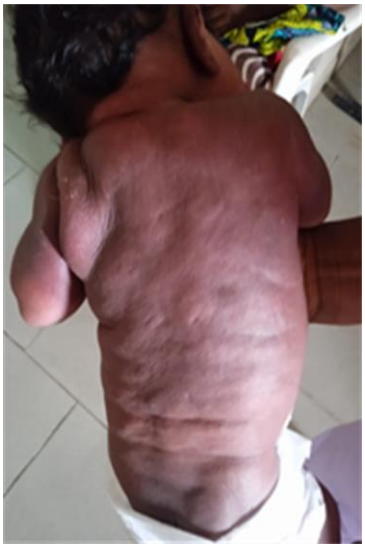

Fig 2. Resolving subcutaneous fat necrosis at the 6th week of life

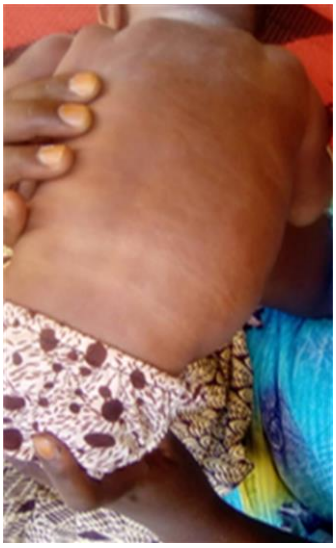

Fig 3. Resolved subcutaneous fat necrosis at the 4th month of life

Table 1. Investigation findings in the newborn

Age	Test	Results	Remarks
25 hours	Packed cell volume	50.0%	-
25 hours	WBC (Total)	7.7 X 10^9/L	-
25 hours	Platelets	256 X 10^9/L	-
25 hours	Blood sugar	5.9 mmol/L	-
4th day of admission	CSF analysis	No organism on gram staining or CSF culture	-
72 hours	Serum sodium	128 mmol/L	-
	Potassium	3.3 mmol/L	-
	Creatinine	38 µmol/L	-
	Urea	7.5 mmol/L	-
	Serum calcium	2.91 mmol/L	Ref. 2.1-2.6 mmol/L
Day 4	Serum calcium	2.92 mmol/L	-
6 weeks	Serum calcium	2.8 mmol/L	-
4th month	Serum calcium	2.5 mmol/L	-
4th month	Ultrasound scan	Normal study,	No calcium deposit

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Discussion

This case report highlighted a female neonate who was admitted at the 25th hour with a history of perinatal asphyxia and macrosomia and later developed subcutaneous fat necrosis with hypercalcaemia on the third day of admission. The baby was treated with oral frusemide, and followed-up with gradual resolution of both the SFN and hypercalcemia. In another case report from Nigeria, subcutaneous fat was observed in an infant with perinatal asphyxia in the first week of life. However, the diagnosis of SFN was not made until the ninth week of life, when the child developed recurrent fever and hypercalcemia despite numerous hospital visits. In contrast to the clinical course of SFN in our patient, Al-Ghamdi et al. from Saudi Arabia reported a neonate with extensive SFN and hypercalcemia that persisted until nine months of age. The differences with our study may be due to the early presentation and prompt treatment of our patient, and probably to a non-extensive distribution compared with the Saudi case report.

Subcutaneous fat necrosis is a rare clinical condition in newborns and usually occurs in the presence of risk factors [2]. This index has two identified risks for SFN, which include macrosomia and perinatal asphyxia. These risk factors may have acted synergistically and led to the appearance of the extensive SFN on the back and part of the extremities a few days after birth. This raises the need for continuous monitoring of newborns when more than one risk factor for SFN is present during the first weeks of life. This baby developed hypercalcemia within the first week of onset of SFN, which is consistent with observations in the literature [2].

Although the baby convulsed on the third day of admission, this could be due to a combination of hypercalcemia and perinatal asphyxia. Symptomatic hypercalcemia is more common when serum calcium exceeds 3.0 mmol/l, which is higher than the peak serum calcium value of 2.92 in this study [2]. The baby responded to hydration and oral frusemide, the recommended initial treatment for hypercalcemia associated with SFN [11]. This response may be due to the early onset of the intervention, which favoured early renal washout of calcium. Hypercalcemia is resolved completely by the fourth month of life, which is within the period reported in the literature. Furthermore, this case report highlights the need for prolonged serum calcium monitoring in this category of patients [3]. The early onset of intervention may also have been the reason for the normal renal ultrasound observed in this patient, as nephrocalcinosis is one of the most common complications of hypercalcemia [2].

Limitations of the study

The current study has some limitations: We could not determine serum parathyroid hormone (PTH), alkaline phosphatase (ALP), or urine creatinine in the urine because this was not possible at the health facility. In addition, the baby was admitted at the 25th hour of life, and an arterial blood gas (ABG) was not performed at the referring PHC because it was not available. Thus, our definition of perinatal asphyxia was based on a low Apgar score and neurologic findings on admission. In addition, skin biopsy was not performed because it was not available at our facility.

Conclusion

This case shows that SFN is not uncommon in Nigerian newborns, especially when perinatal stress and macrosomia are present. Close monitoring of serum calcium should be routinely performed in the presence of SFN, and early intervention should be started to avoid complications associated with hypercalcemia.

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Ethical Considerations

Parents gave written informed consent for this study.

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Conflict of interest

There was no conflict of interest.

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