

Case Report

Neonatal hypercalcemia associated with extensive subcutaneous fat necrosis: a case report

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ABSTRACT

Subcutaneous fat necrosis (SCFN) of the newborn is rare self-limited fat tissue inflammation that usually occurs in term or post-term newborns exposed to perinatal stress factors, such as perinatal asphyxia, meconium aspiration, neonatal sepsis, and therapeutic hypothermia. SCFN usually appears in the first few weeks of life and has a benign course with spontaneous resolution. Monitoring for complications, in particular the potentially life-threatening hypercalcemia, is crucial. In this report, we describe a male infant with extensive SCFN and neonatal hypercalcemia that went through a prolonged course.

Keywords: Hypercalcemia, Hypothermia, Neonatal, Panniculitis, Subcutaneous fat necrosis

INTRODUCTION

Subcutaneous fat necrosis (SCFN) is a systemic inflammatory disorder of the subcutaneous adipose tissue and a rare form of transient panniculitis. Although it is mainly seen in term and post-term babies, it has also been reported in preterm infants. Risk factors include perinatal hypoxia, hypothermia, meconium aspiration, obstetric trauma, neonatal sepsis, and therapeutic hypothermia. Maternal diabetes, preeclampsia, cocaine abuse, and the use of calcium channel blockers during pregnancy are some of the predisposing factors.¹ This disorder typically presents within the first six weeks of life, with indurated, erythematous nodules and plaques over bony prominences such as the back, arms, buttocks, thighs, and cheeks. Patients are generally irritable and persistently crying, as the lesions are often swollen, inflamed, and tender to touch.² SCFN usually has a favorable prognosis and, in most cases, only symptomatic treatment is required. However, some serious complications, especially hypercalcemia, may occur, for which the patient must be regularly monitored.³

CASE REPORT

A male infant weighing 4.550 kg was born at term through an emergency cesarean section due to fetal distress and meconium-stained liquor. The mother was a primigravida and 31 years old. She was noted to have mild hypertension and gestational diabetes that was controlled via dietary measures. The mother was not given any medications during pregnancy. The baby needed active resuscitation at birth included intubation and positive pressure ventilation. Apgar score was 3 and 7 at 1 and 5 minutes, respectively. Cord blood gas analysis showed metabolic acidosis (pH 7.12, PCO₂ 35 mmHg, HCO₃ 11.6 mmol/L, BE -16.6 mmol/L). After stabilization, the baby was transferred to our NICU. Physical examination revealed an LGA baby with moderate respiratory distress, bilateral fair air entry, and widespread crepitations. There were neither dysmorphic features nor congenital anomalies. The examination of other systems was unremarkable. A chest x-ray showed bilateral infiltration and hyperinflation. Later, the baby became more distressed with severe chest retractions and

his arterial blood gases (ABGs) showed respiratory acidosis and hypoxia, immediately ventilator settings were adjusted and urgent echocardiography was sought. Echocardiography revealed septal hypertrophy, small PDA, and mild pulmonary hypertension. On his 3rd day of life, the baby's respiratory status improved. Ventilator settings were gradually weaned and finally, the baby was extubated to oxygen 2 l/min via nasal prongs. The baby tolerated extubation well, and his general condition and ABGs were satisfactory. On his 4th day of life, large patches of indurated, erythematous-purplish, and tender cutaneous lesions were observed at the upper back and extended over the posterior surfaces of both arms (Figure 1).



Figure 1: Large patches of erythematous-purplish lesions on the upper back and extended over the posterior surfaces of both arms.



Figure 2: Discrete lumps of various sizes that coalesced to form several large cystic swellings.

Apart from one spike of fever 38.2 C° on the same day, the baby was fine. A septic screen was taken and antibiotics were changed; all results came back negative. As the days passed the lesions developed into discrete lumps of various sizes that coalesced to form several large cystic swellings (Figure 2). Another new small cyst appeared in the palm of the left hand. A clinical diagnosis of subcutaneous fat necrosis (SCFN) was made. On the 15th day of life, the cystic swellings progressively increased in size; the surgeon made incisions in the cysts and a large amount of thick white-yellowish material was drained. Several cultures were taken; however, all results were negative. On the 23rd day of life, small swellings in both cheeks appeared, but they resolved spontaneously.

On the 34th day of life, the serum calcium level was noticed to be high 2.98 mmol/L (normal range 2.1-2.6 mmol/l). The baby was treated with adequate hydration, intravenous furosemide (1mg/kg/day) and oral prednisolone (2mg/kg/day) both in divided doses. The baby was also fed low calcium formula and breastfeeding. Serum calcium levels were monitored closely, and the near-normal level was achieved 10 days later. Renal ultrasound and renal function tests were found to be normal. The baby essentially had asymptomatic hypercalcemia. On the 47th day of life, the baby was in good condition; and skin lesions showed remarkable regression (Figure 3).



Figure 3: Skin lesions showed remarkable regression, but still some skin changes.

Serum calcium levels remained within the upper normal range. The surgeon advised transferring the baby to the surgical ward with the mother for regular breastfeeding. On the 58th day of life, the baby was well and ready for discharge home. Wounds healed but still some skin changes with no calcification in the lesions sites. Abdominal ultrasound showed normal kidneys with no nephrocalcinosis. Blood chemistry was normal apart from

serum calcium 2.67 mmol/L. The infant was given follow-up in OPD weekly with serum calcium level measurement. Prednisolone was weaned over the ensuing weeks and stopped at the age of 4½ months. During the entire follow-up, the infant showed normal physical and neurological development and maintained normal serum calcium and normal renal function tests. At the age of about 6 months (Figure 4); the family went back to their country, and the infant ceased to visit our clinic.



Figure 4: At the time of discharge (at age of about 6 months) complete resolution of all skin lesions.

DISCUSSION

Subcutaneous fat necrosis of the newborn is a rare, self-limiting inflammation of adipose tissue that typically develops in full-term and post-term neonates within the first few weeks of life. It is associated with various maternal and fetal risk factors: include pre-eclampsia, gestational diabetes, maternal medications (calcium channel blockers and cocaine), traumatic delivery, perinatal asphyxia, cord prolapse, meconium aspiration, and neonatal sepsis.⁴ Extensive subcutaneous fat necrosis has also been reported following therapeutic hypothermia used for severe perinatal asphyxia.⁵ It is characterized by multiple indurated plaques or nodules and the overlying skin may be purple-red, erythematous, or normal in appearance.

The common sites of involvement are the cheeks, buttocks, posterior trunk, and extremities, which develop within the first weeks of life.⁶ The diagnosis of SCFN is essentially clinical and can be confirmed by a skin biopsy that reveals the characteristic histopathologic findings of patchy areas of fat necrosis with histiocyte-predominant inflammatory infiltrate and radially oriented needle-shaped fat crystals in the cytoplasm of damaged adipocytes. Fine-needle aspiration biopsy offers a good alternative to biopsy for diagnosis with prompt, minimally invasive, and reliable results.⁷

The pathogenesis of the disease is poorly understood, but it is believed that the stress factors result in reduced tissue perfusion and the resultant hypoxemia leads to the crystallization of free fatty acids in the subcutaneous fat tissue followed by tissue necrosis. Neonatal fat has an increased ratio of saturated to unsaturated fatty acids, which results in higher melting and solidification points for stored fat.⁸ It is generally a self-limiting process that progresses toward a resolution in a period of a few weeks to 6 months. However, it may be complicated by hypercalcemia, hypocalcemia, hyperuricemia, hypoglycemia, hypertriglyceridemia, and thrombocytopenia.⁹

Local complications such as ulceration and abscess-like changes may occur, leading to spontaneous drainage, infection, and scar formation. Varied calcification may develop, which can be evaluated radiographically.¹⁰ The main differential diagnosis is sclerema neonatorum characterized by widespread panniculitis in toxically ill premature infants. Clinically, there is a diffuse wax-like hardening of the whole skin sparing the palms, soles, and genitalia. The histopathology comprises extensive fibrosis in the subcutaneous fat. Sclerema neonatorum is usually associated with a grave prognosis, and high mortality.¹¹

Hypercalcemia is the most serious complication, usually observed during the first six weeks of life, and can be observed even after the resolution of the skin lesions. It may be caused by increased extrarenal production of 1,25-dihydroxyvitamin D₃, calcium release from resolving subcutaneous lesions, or bone resorption stimulated by elevated parathyroid hormone and prostaglandin E₂.¹² Symptoms of hypercalcemia include cardiac arrhythmias, nausea, vomiting, constipation, paralytic ileus, renal impairment, hypotonia, and failure to thrive. Management of hypercalcemia includes adequate hydration and restriction of calcium and vitamin D₃ intake. Frusemide, glucocorticoids, bisphosphonates, or calcitonin may be required to treat the resistant cases of hypercalcemia.¹³

CONCLUSION

Subcutaneous fat necrosis has been usually a transient and self-limited condition. However, it may be complicated by some serious complications notably hypercalcemia. It is essential to monitor newborns with SCFN to avoid the risk of these complications. Regular monitoring of serum calcium is recommended until the age of 6 months. The diagnosis is based on the clinical history, physical examination, and if in doubt a skin biopsy. This case report aims to address the clinical importance and to increase awareness of this rare condition.

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