Subcutaneous Fat Necrosis of the Newborn: Case Review and Discussion

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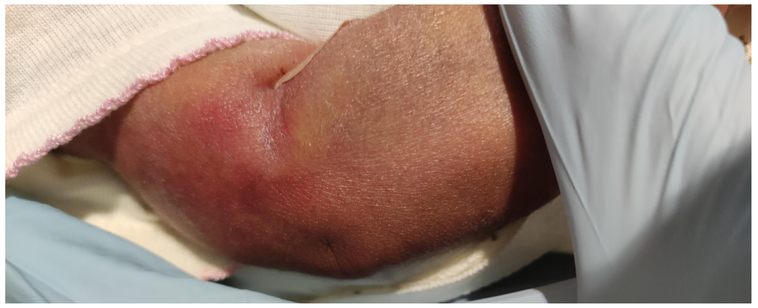
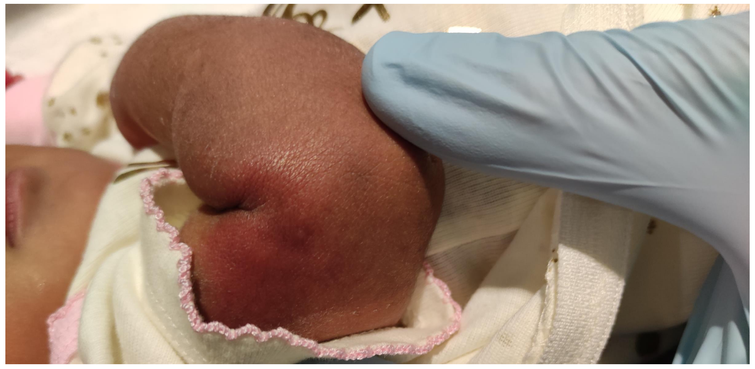
Case

- Patient was a 2-day old female, born at 38 weeks gestation to a G1P1 mother who was seronegative and GBS negative via XX. Apgar scores were 8 and 9 at 1 and 5 minutes and her perinatal course was uneventful per the chart. Given her well appearance she was brought to the newborn mother-baby unit shortly after delivery where she received her Hepatitis B vaccine within 24 hours of life and began feeding uneventfully.
- On the planned day of discharge the child's mother noticed a new rash that had not been noted on exam in the morning. The patient was re-examined by the nursery team who noted multiple subcutaneous nodules that were mobile and firm, with areas of overlying erythema, scattered across the back, and over parts of bilateral arms. The nodules and the erythema were not notably tender and there was no fluctuance or drainage/discharge. Her range of motion in the upper extremities was not limited and did not elicit pain. She had a strong cry, appropriate muscle tone, a vigorous suck, and her newborn reflexes were intact and normal. The patient also had some small areas of erythema without underlying subcutaneous nodules developing that were thought the beginnings of erythema toxicum, but aside from this the remainder of her exam was normal.
- The differential for her new rash included infectious causes, trauma, sclerema neonatorum, but given her well appearance and lack of other clinical findings these were considered less likely. Neonatology service was also briefly consulted and agreed with this assessment. Labs including a CBC and CMP were drawn to serve as a baseline and the family was counselled on the cause of the rash and need for follow up labs.
- She received routine care through her Pediatrician and had repeat CMP done after one month, which did not show evidence of hypercalcemia, at which point repeat testing was stopped.
- At around 7 months of life, she had an ED visit for an unrelated problem, at which point it was noted that she still had a small nodule palpable in her upper extremity, but it was not causing her any discomfort.

Testing and Follow Up

Screening of serum calcium levels is indicated for infants with SCFN who demonstrate signs or symptoms of hypercalcemia within six months of the resolution of the skin lesion.
If hypercalcemia is detected, weekly screening for hypercalcemia is indicated until resolution.
Serum calcium >12mg/dl warrants twice-weekly screening, and >14mg/dl warrants hospitalization.
Other laboratory screening is not routinely indicated. Imaging is never indicated unless there is a question about the diagnosis. Biopsy may be indicated if the initial diagnosis is unclear.





These images were taken at the time of diagnosis at 2 days of life, and demonstrate the violaceous erythema overlying the subcutaneous nodules.

Differential	Subcutaneous Fat Necrosis	Cold Panniculitis	Scleredema	Sclerema Neonatorum
Etiology	Direct pressure + local hypoxia and/or predisposition of neonatal fat to crystallization.	Direct contact with cold object	Exposure to cold	Affects critically ill preterm and low-birthweight newborns.
Exam Findings	Violaceous areas of erythema with underlying indurated nodules.	Well demarcated erythematous plaques at sites that were in contact with cold objects.	Skin is thickened, waxy, and edematous. There is pitting edema to affected areas. Preferentially affects legs.	Tight, waxy, purple, mottled skin that is fixed to the underlying tissues. Generally diffuse but spares palms, soles, genitalia and other areas with less adipose tissue.
Histopathology	+ Needle shaped clefts, + inflammatory cells	No needle-shaped clefts	Lymphohistiocytic lobular panniculitis.	+ Needle shaped clefts, no inflammatory cells
Prognosis	Risk of hypercalcemia. Lesions usually self-limiting within weeks/months.	Self-limiting	Self-limiting withing weeks/months	Associated with high mortality rate

Discussion

Subcutaneous fat necrosis of the newborn is an anecdotally uncommon condition; although its incidence is unknown, it does not appear to be more common in male or female newborn. It is usually seen in full term newborns who have experiences some form of perinatal stress and has some association with pregnancies complicated by maternal diabetes, hypertension, hypothyroidism, preeclampsia, placental abnormalities. SCFN is also seen in association with therapeutic hypothermia in the perinatal period (Hogeling et al, 2012)

Some have theorized that SCFN occurs as a combination of direct pressure/trauma and local tissue hypoxia, while others have suggested that the composition of neonatal adipose tissue is more prone to crystallization in cold environments. Histologically, the lesions in SCFN contain foamy macrophages, lymphocytes, neutrophils, and red blood cells among degenerate adipose tissue. Imaging of the lesions has shown decreased/intermediate T1 and increased T2 signal intensity, with a globular appearance and signal intensity similar to fat on MRI; ultrasound shows areas of increased echogenicity (Vasireddy, 2009).

The most concerning complication of SCFN, hypercalcemia, is seen in up to 50 percent of affected infants. The mechanism for hypercalcemia in SCFN is not fully understood, but studies finding elevated concentrations of 1-alpha-hydroxylase within the immune complexes of patients with SCFN suggest that this may be a causal component of it, such as what is seen with sarcoidosis (Farooque et al., 2009). Hypercalcemia usually presents within the first 28 days of life; some case studies report findings of hypercalcemia in infants as old as 10 weeks, but this is rare. Most cases of hypercalcemia (76%) resolve within 4 weeks of the detection (Stefanko et al., 2019). Though rare, there are also reports of secondary cutaneous manifestations after the initial presentation of SCFN, though these are generally self-resolving (Thomas et al., 2016). Along with hypercalcemia, there are reports of eosinophilia and nephrocalcinosis, although these appear to not be of clinical significance (Shumer at al., 2014).

Management of Hypercalcemia

Treatment of hypercalcemia caused by SCFN is not evidence based, but various case reports show frequent use of intravenous hydration, loop diuretics, glucocorticoids, and avoidance of calcium and vitamin D supplementation. In more severe cases there are reports of bisphosphonate and calcitonin usage (Alsofyani, 2018)

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