

anechoic and comma- or mushroom-shaped unilocular on ultrasonography. In rare cases, it shows signs of a multilocular cystic mass with linear septa [3]. Although the CT scan showed the hydrocele of the canal of Nuck in the form of a homogenous fluid-filled unilocular cyst extending to the labia, its communication with the abdominal cavity could not be determined. MRI revealed well-defined, thin-walled, sausage-shaped cystic lesions in the hydrocele of the canal of Nuck. Low- and high-signal intensities were observed on the T<sub>1</sub>- and T<sub>2</sub>-weighted images, respectively [2].

The final diagnosis was made during surgery and confirmed by histopathological examination. The standardized therapeutic approach is to surgically remove edema and to ligate the processus vaginalis peritonei. Due to the rarity of hydrocele of the canal of Nuck, there are no reports on the recurrence rate of masses or simultaneous occurrence on the opposite side. The hernial sac can include peritoneal fluid, omental fat, bowel loops, the ovary, the fallopian tube, or the urinary bladder in the inguinal canal. Therefore, surgeons can avoid causing damage in the process of examining the anatomy around the inguinal canal by using preoperative imaging.

Despite the fact that hydrocele of the canal of Nuck occurs mainly in adolescence, we strongly suspected hydrocele of the canal of Nuck in this case based on the clinical symptoms and imaging diagnosis, and confirmed the diagnosis by surgical exploration without delay. This case suggests that hydrocele of the canal of Nuck should be included in the differential diagnosis of masses occurring in the inguinal area in adult females.

## References

1. Anderson CC, Broadie TA, Mackey JE, et al. Hydrocele of the canal of Nuck: ultrasound appearance. *Am Surg* 1995;61:959-61.
2. Manjunatha Y, Beeregowda Y, Bhaskaran A. Hydrocele of the canal of Nuck: imaging findings. *Acta Radiol Short Rep* 2012;1. <http://dx.doi.org/10.1258/arsr.2012.110016>.
3. Akkoyun I, Kucukosmanoglu I, Yalinkilinc E. Cyst of the canal of nuck in pediatric patients. *N Am J Med Sci* 2013;5:353-6.

## Acute Febrile Neutrophilic Dermatitis after Deep Inferior Epigastric Perforator Flap Breast Reconstruction

Michael W. Chu<sup>1</sup>, Julia A. Cook<sup>1</sup>, Alexes Hazen<sup>2</sup>

<sup>1</sup>Division of Plastic and Reconstructive Surgery, Indiana University, Indianapolis, IN; <sup>2</sup>Department of Plastic and Reconstructive Surgery, Institute of Reconstructive Plastic Surgery, New York University Medical Center, New York, NY, USA

**Correspondence:** Michael W. Chu  
Division of Plastic and Reconstructive Surgery, Indiana University, 545 Barnhill Drive, #232, Indianapolis, IN 46202, USA  
Tel: +1-317-274-3636, Fax: +1-317-278-8746  
E-mail: dr.michael.chu@gmail.com

No potential conflict of interest relevant to this article was reported.

Received: 13 Feb 2016 • Revised: 29 Mar 2016 • Accepted: 19 Apr 2016  
pISSN: 2234-6163 • eISSN: 2234-6171  
<http://dx.doi.org/10.5999/aps.2016.43.5.478>  
*Arch Plast Surg* 2016;43:478-481



Copyright © 2016 The Korean Society of Plastic and Reconstructive Surgeons  
This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Acute febrile neutrophilic dermatosis (AFND), or Sweet syndrome, is a rare neutrophil-mediated hypersensitivity reaction of unknown etiology. There are four sub-classifications of AFND: (1) idiopathic,



**Fig. 1.** Postoperative day three: the neutrophilic dermatosis lesions are seen in evolution, ranging from violaceous papules to partial-thickness skin loss and exposed dermis. Of note, there was no purulence or malodorous drainage.



**Fig. 2.** Postoperative day 13: bullous lesions progressed to complete desquamation and partial-thickness skin loss in areas of the right mastectomy flap in the deep inferior epigastric perforator free flap. However, no new areas of violaceous lesions developed after initiation of corticosteroid therapy.



**Fig. 3.** Postoperative day 13: smaller areas of bullae that progressed to desquamation and partial-thickness skin loss from the abdominal donor site.

(2) para-inflammatory, (3) paraneoplastic, and (4) pregnancy-associated [1]. Patients with AFND typically present with fever, leukocytosis, sub-epidermal edema, and red, blue, or violet papules that may coalesce into painful plaques or bullae [1-3].

Diagnosis of AFND must include two major and two minor clinical findings. The major criteria consist of an abrupt onset of erythematous lesions and a neutrophilic infiltration in the dermis without vasculitis. The minor criteria include nonspecific infection, hemoproliferative comorbidities, solid tumors, pregnancy, fever, erythrocyte sedimentation rate (ESR) > 20 mm/hr, elevated C-reactive protein (CRP), neutrophilia, bands > 70%, leukocytosis > 8,000/ $\mu$ L, and response to corticosteroid therapy [4]. Serologic findings of AFND include proteinuria, hematuria, and decreased creatinine clearance [5]. Histopathologic findings show papillary dermis edema without evidence of vasculitis with dense, mature neutrophilic infiltrates within the epidermis, perivascular dermis, or adipose tissue [1]. Thus, the diagnosis of AFND is by exclusion, but infectious etiologies must be ruled out before initiating corticosteroid therapy. The differential diagnosis of AFND should exclude pyoderma gangrenosum, herpes simplex, erythema nodosum, erythema multiforme, and Behçet disease.

Treatment for AFND is targeted towards suppressing neutrophil activity. Corticosteroids have a rapid effect, and prednisone is recommended at a

dose of 1 mg/kg/day [1].

A 42-year-old Caucasian female presented to our clinic with a history of right metastatic pleomorphic lobular breast carcinoma. Her past surgical history was significant for thyroidectomy for papillary thyroid carcinoma in 2011, bilateral breast reduction in 2003, knee surgery, and two spinal disc surgeries. In February 2011, she had undergone a right mastectomy, axillary lymph node dissection, and immediate tissue expander reconstruction with acellular dermal matrix, followed by adjuvant radiotherapy. She underwent deep inferior epigastric perforator (DIEP) free flap reconstruction without incident in December 2011.

Her post-operative course was complicated by an acute onset of fever reaching 40°C on postoperative day (POD) two, accompanied by ecchymosis and erythema limited to the mastectomy flaps; the free flap skin paddle remained uninvolved. She was therefore treated for presumed cellulitis with trimethoprim/sulfamethoxazole and cefazolin. Her ESR and CRP were 100 mm/hr and 231 mg/L, respectively; however, the leukocyte count remained normal, and urine, blood, and wound cultures from POD two were all negative. On POD three, the ecchymotic mastectomy flaps developed areas of bullae, but the DIEP flap skin paddle remained viable upon a normal hand-held Doppler exam (Fig. 1). By POD four, the skin lesions progressed to epidermolysis and partial-thickness skin breakdown.



**Fig. 4.** Follow-up at 10 months after surgery shows complete resolution of the lesions with mild scarring and discoloration.



**Fig. 5.** Follow-up at 10 months after surgery with only minimal partial-thickness skin loss but no flap volume loss.

She developed leukocytosis to  $14.2 \text{ K}/\mu\text{L}$ , and the infectious disease service changed antibiotic therapy to vancomycin and meropenem.

On POD five, new lesions were seen at the previously unaffected abdominal donor site. The leukocyte count peaked at  $27.1 \text{ K}/\mu\text{L}$  with an absolute neutrophil count of  $21.8 \text{ K}/\mu\text{L}$ , 89% neutrophils, and 23% bandemia. Additionally, ESR and CRP peaked to  $135 \text{ mm/hr}$  and  $420 \text{ mg/L}$ , respectively, and the patient developed acute renal insufficiency with a creatinine level of  $1.9 \text{ mg/dL}$ . In response, the infectious disease service added fluconazole to increase anti-microbial coverage. However, the new lesions, lack of antibiotic response, elevated inflammatory markers, leukocytosis, and multiple negative cultures raised the suspicion of an autoimmune process. Therefore, dermatology sent bedside excisional skin biopsies of the right breast and abdomen for histopathologic examination. Repeat cultures, including mycobacterial and fungal, were negative, and serology studies for autoimmune diseases were also negative (human immunodeficiency virus, hepatitis B/C, antinuclear antibodies, antineutrophil cytoplasmic antibody, antiphospholipid antibodies, rheumatoid factor). Histopathologic findings showed dense neutrophilic infiltrates and papillary dermal edema without signs of vasculitis. A tentative diagnosis of AFND was made on POD five, and the patient was started on a daily dose of  $80 \text{ mg}$  of prednisone. The leukocyte

count decreased to  $18.9 \text{ K}/\mu\text{L}$  after two doses. Serum creatinine peaked on POD six at  $2.4 \text{ mg/dL}$ .

On POD seven, the bullous breast lesions began to slough, but the abdominal lesions remained unchanged. The patient had infrequent changes of petroleum-impregnated gauze (Xeroform, Kendall, Mansfield, MA, USA) and non-adherent, absorbent polyethylene terephthalate (Telfa, Covidien, Mansfield) dressings to minimize skin trauma. The patient's renal insufficiency responded to prednisone and resolved without sequelae.

The patient was given a total of eight days of prednisone during which both her breast and abdominal wounds improved (Figs. 2, 3). She was discharged on POD 13 in stable condition with a final white blood cell count of  $13.0 \text{ K}/\mu\text{L}$ .

At last follow-up 10 months after surgery, her wounds had healed with minimal scarring or discoloration (Figs. 4, 5). The patient is satisfied with her reconstruction and has not elected additional revision surgeries.

AFND is an uncommon autoimmune process that is typically reported in association with hemoproliferative conditions, solid tumors, and granulocyte colony-stimulating factor therapy. In our case, the clinical findings were initially suspicious for cellulitis and mastectomy flap ischemia. However, the



skin lesions did not have the classic findings of edema, warmth, pain, purulent drainage, or response to antibiotic therapy. The abdominal donor site was closed without tension or ischemic signs like the mastectomy flaps; therefore, the development of identical lesions on the breast caused suspicion of a non-infectious etiology.

A high index of suspicion for skin pathergies (pyoderma gangrenosum, AFND, etc.) is necessary for prompt diagnosis. Early diagnosis can lead to faster treatment and help avoid potential morbidities of surgical debridement and skin trauma. However, it is critical to avoid immunosuppressive therapy before infection is ruled out because the early phases of AFND are similar in presentation to cellulitis and necrotizing fasciitis. We recommend prompt skin biopsy for tissue diagnosis, and we recommend non-adherent dressings and infrequent changes to minimize skin trauma. A multidisciplinary team approach including dermatology, hematology, and internal medicine is recommended to expedite diagnosis and treatment of the underlying disease.

We report the first case of AFND in a DIEP free flap for breast reconstruction that was successfully treated with corticosteroids and non-surgical management. Further research and long-term follow-up is warranted to develop consensus recommendations and treatment protocols for skin pathology and wound breakdown in breast reconstruction.

## ORCID

Julia A. Cook <http://orcid.org/0000-0003-0212-937X>

## References

1. Cohen PR, Kurzrock R. Sweet's syndrome revisited: a review of disease concepts. *Int J Dermatol* 2003;42:761-78.
2. Cohen PR. Pregnancy-associated Sweet's syndrome: world literature review. *Obstet Gynecol Surv* 1993;48:584-7.
3. Cook E, Epstein R, Miller R. A rare case of idiopathic neutrophilic dermatosis of the hands. *Dermatol Online J* 2011;17:11.
4. Sweet RD. An acute febrile neutrophilic dermatosis. *Br J Dermatol* 1964;76:349-56.
5. Bourke JF, Keohane S, Long CC, et al. Sweet's syndrome and malignancy in the U.K. *Br J Dermatol* 1997;137:609-13.

## Calcifications on the Entire Legs of a Systemic Lupus Erythematosus Patient

Seungki Youn, Ki Ho Kim, Soo Yeon Lim, Jeong Tae Kim, Youn Hwan Kim

Department of Plastic and Reconstructive Surgery, Hanyang University College of Medicine, Seoul, Korea

**Correspondence:** Youn Hwan Kim  
Department of Plastic and Reconstructive Surgery, Hanyang University School of Medicine, 222-1 Wangsimni-ro, Seongdong-gu, Seoul 04763, Korea  
Tel: +82-2-2290-8560, Fax: +82-2-2295-7671  
E-mail: younhwan@daum.net

No potential conflict of interest relevant to this article was reported.

Received: 10 May 2016 • Revised: 18 Aug 2016 • Accepted: 23 Aug 2016  
pISSN: 2234-6163 • eISSN: 2234-6171  
<http://dx.doi.org/10.5999/aps.2016.43.5.481>  
*Arch Plast Surg* 2016;43:481-482



Copyright © 2016 The Korean Society of Plastic and Reconstructive Surgeons  
This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Systemic lupus erythematosus (SLE) is a relatively common entity in rheumatology. Skin involvements such as nodules, vasculitis, and calcifications are commonly reported in patients with SLE [1,2]. In our center, we encounter many rheumatoid patients referred from our rheumatology clinic. However, the case shown here was very unusual even to our experienced eyes.

A 37-year-old female patient, who had suffered from SLE for 16 years, had acquired progressive calcifications on the entirety of both of her legs. The calcification lesions were initially not severe and were



**Fig. 1.** Multiple left leg defects. The left leg defects shown here are arose from calcinosis, which occurred in both legs.