Diaper Dermatitis: Clinical Characteristics and Differential Diagnosis

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Abstract: A diverse group of diseases can cause skin conditions in the diaper area including those which are directly caused by diapers or the diaper environment, some which are not directly due to, but are worsened by, the wearing of diapers, and those which are independent of the presence of the diaper or its resulting environment. Many of these conditions are limited to this area of the skin, but others extend to skin outside this area, and some are signs of systemic disease. We review many of the important causes of eruptions in the diaper area and emphasize key points in the differential diagnosis.

Diagnosing rashes in the diaper area is an important skill. Diaper dermatitis (DD) is common, estimated to occur in 25% of children seeking care from a pediatrician (1). To help facilitate diagnosis, eruptions in the diaper region can be divided into three subgroups: skin conditions caused by the presence of the diaper, rashes exacerbated by the diaper (but not directly caused by it), and eruptions present regardless of the presence of the diaper (Table 1).

**DERMATITIS DUE TO THE DIAPER OR DIAPER ENVIRONMENT**

The most common cause of DD is irritant DD (Fig. 1A), triggered by prolonged contact between the skin and urine and feces. Irritant DD is most prominent in areas where the diaper is in direct contact with the skin, particularly on the convex surfaces, typically sparing the inguinal creases and gluteal cleft. At the same time, an increasingly common location for irritant DD is the perianal skin, where, in the presence of frequent stools or diarrhea, the diaper is not able to adequately wick away feces. When severe, this can cause erosions (Fig. 1B). Clinical manifestations are variable and include redness, papules, scaling, superficial erosions, and, less commonly, elevated papules or nodules, referred to as “pseudoverrucous papules and nodules (PVPN).” PPN (Fig. 2) are typically due to chronic, severe irritant DD (2). Jacquet’s DD, an erosive DD, and granuloma gluteal infantum, a nodular DD, are often considered on a spectrum with PVPN because they have the same predisposing factors.

Management of irritant DD requires attention to multiple contributing factors. First, decreasing exposure to urine and liquid stool is paramount. This often
Candida infection can be a cause of diaper rash if infants are in cloth or disposable diapers. Next, if using disposable diapers, diapers with absorbent gel material (AGM), which moves moisture away from the skin more efficiently, should be considered. Barrier pastes are also important to decrease contact between skin and urine and feces. Antifungal and antiyeast topical medications can be beneficial in infants with a rash for longer than 3 days, because they commonly develop Candida infection, which complicates the irritant dermatitis (3). Mild topical steroids (e.g., hydrocortisone) can help treat the inflammatory component of these rashes. If this management strategy is not effective, other causes of diaper rash should be considered. For infants with PVPN, treatment of the root cause of the chronic fecal exposure, if possible, is the best approach (3). Otherwise, frequent diaper changes, use of superabsorbent diapers, and thick application of barrier creams is the best approach (2).

Allergic contact dermatitis (ACD) also occurs in the diaper area. Some children are allergic to dyes (4), adhesives, rubber (5), and other components of disposable diapers. Clues to this etiology of diaper rash include rash only in areas the allergen contacts, such as linearly arranged pink patches or plaques corresponding to areas of skin contact with elastic diaper components (typically waistline and upper thighs). More generally, rash in the areas in contact with the diaper, but not in protected areas, can point to ACD as the etiology of DD. Products used to clean the diaper area, such as disposable wipes, can also cause ACD. The 2013 Contact Allergen of the Year, as chosen by the American Contact Dermatitis Society, was methylisothiazolinone, which is found in many diaper wipes (6). For selected patients, patch testing can be helpful in identifying the causative allergy (7).

Miliaria, most commonly miliaria rubra, can occur as a result of the heat and humidity of the diaper environment. It is caused by retention of eccrine sweat in the eccrine duct. Typical findings include erythematous papules, but small pustules are occasionally present (8). The eruption can be pruritic. Treatment involves decreasing the exacerbating heat and humidity, airing the diaper area, if possible, and using diapers with AGM, which can wick away moisture more effectively.

**DERMATITIS WORSENED BY THE DIAPER OR DIAPER ENVIRONMENT**

The second main group of diaper rashes includes eruptions exacerbated, but not directly caused by, the diaper. This group includes eruptions with infectious and noninfectious causes. The most common cause of diaper rash other than irritant DD is infection with Candida albicans (Fig. 3). Candida infection can be a
Primary cause of DD, although in many chronic cases of DD, Candida albicans acts as a secondary infectious organism, exacerbating preexisting DD. Primary Candida infection typically presents as bright, beefy-red patches with satellite macules or pustules. Small collarettes are also often present. The rash from Candida is typically accentuated in the skin folds and in male infants can involve the scrotum. Topical treatment with nystatin ointment or topical imidazole antifungals is often sufficient. Examination for oral thrush is essential. Cases with oral candidiasis, recurrent cases, and recalcitrant cases may require systemic antifungal therapy, such as nystatin solution or oral fluconazole. Severe, chronic Candida DD can sometimes be a clue to underlying immunodeficiency.

Staphylococcal and streptococcal infections can also cause DD. Perianal streptococcal infection, due to group A beta-hemolytic streptococcus, is most often characterized by bright red perianal patches. Streptococcal infection in the diaper area also presents with fiery-red erythema and maceration without satellite lesions in the intertriginous folds, similar to its presentation on the neck and axillary folds, but is less common. Pain, low-grade fever, and malaise may accompany this infection.

Staphylococcus aureus infection (Fig. 4) can develop in newborns due to colonization of the umbilical stump. Staphylococcus aureus infection affects older diapered children as well. Small papules and pustules may be present, or in the case of toxin-producing bacteria, larger, fragile blisters of bullous impetigo can be seen. Other findings such as folliculitis or—much less commonly—furuncles or abscesses may also occur with S. aureus infection. Staphylococcus aureus infection can also present with perianal dermatitis with a virtually identical appearance to classic perianal streptococcal infection (9). Bacterial infections in the diaper area typically require oral antibacterial treatments, although topical agents such
as mupirocin may be helpful in recurrent cases or as adjunctive treatment (10).

Inflammatory conditions such as seborrheic dermatitis and psoriasis may also present in the diaper area. Seborrheic dermatitis is most commonly recognized as “cradle cap,” with white to yellow scaling on the scalp, but the diaper area may be affected in conjunction with scalp or intertriginous involvement (Fig. 5). Diaper rashes due to seborrheic dermatitis usually present as well-demarcated, erythematous patches with inguinal fold involvement but without the degree of scale often seen on the scalp. Resolution of seborrheic dermatitis usually occurs by age 6 to 9 months (11). Treatment with mild topical corticosteroids is usually sufficient.

So-called napkin psoriasis in the diaper area may present as an unusually persistent DD, even in the absence of other signs of psoriasis. It typically involves the skin folds and often the gluteal cleft; patients can have a family history of psoriasis, which together with the eruption’s lack of complete response to low-potency steroids, can be a clue to diagnosis.

A unique eruption seen in the setting of Candida infection or napkin psoriasis is the so-called psoriasiform id eruption (Fig. 6A, B) (12). It is typically seen after a fairly severe Candida DD and often develops soon after the initiation of treatment, with scaly papules and plaques spreading onto the torso, neck, and face. It usually resolves spontaneously, although treatment with low- to mid-potency corticosteroids may hasten resolution. It does not necessarily indicate a tendency toward the future development of psoriasis (12).

ERUPTIONS IN THE DIAPER AREA INDEPENDENT OF THE DIAPER

Eruptions can be located in the diaper area independent of the presence of the diaper. The list of such conditions is long and beyond the scope of this article,
but several important ones are highlighted (3). Infantile hemangiomas (IH), can present in the diaper area as localized superficial vascular plaques or nodules or as an area of erythema and ulceration, which is occasionally misdiagnosed as a “diaper rash” (Fig. 7). In cases with involvement of a territory of skin, extracutaneous anomalies can be present with a Lower body infantile hemangioma, including Urogenital anomalies or ulceration, Myelopathy, Bony deformities, Anorectal malformations or arterial anomalies, and Renal anomalies (LUMBAR syndrome). Patients with suspected LUMBAR syndrome warrant more-detailed examination with imaging. Ulceration can complicate IH in the diaper area in up to 50% of cases (13).

Langerhans cell histiocytosis is one of the most serious causes of eruptions in the diaper area. Typically, patients with this rare disorder will have scale, crusting, and barely palpable hemorrhagic papules resembling petechiae, often involving the inguinal creases. They can also have atrophy and deep ulcerations. Clues to this diagnosis include additional involvement of the scalp, ears, or oral mucosa. The majority of patients with Langerhans cell histiocytosis have skin findings (14), and skin biopsy can be vital to making the diagnosis. Early recognition of these findings in the diaper area facilitates timely treatment for affected infants.

Zinc deficiency is an important cause of diaper rashes, most often presenting with a sharply demarcated eruption with accentuated scale at the margin. The scale typically has a slightly golden brown to mahogany color. These plaques may also occur around the mouth and eyes and in the neck folds. The most commonly affected infants are exclusively breastfed premature infants. These children can become zinc deficient as they outgrow the zinc supplied in breast milk. Other causes include cystic fibrosis and an autosomal-recessive disorder (acrodermatitis enteropathica) in which patients lack a zinc transporter to aid in gastrointestinal absorption.

Kawasaki disease (KD; mucocutaneous lymph node syndrome) is another important, potentially life-threatening condition in which a perineal eruption may be an important clue to diagnosis. The majority of patients with KD have accentuated erythema in the diaper area (15). Erythematous macules and patches with early desquamation are typical.

The exanthem seen with hand, foot, and mouth syndrome often involves the diaper area. With the advent of epidemics of Coxsackie virus A6 infection, this may be even more commonly seen than with other causative enteroviruses (16). The rash with Coxsackie A6 infection is more exuberant than with other strains of the virus and presents with variable morphologies, including vesicles, bullae, eczema herpeticum–like punched-out erosions, purpura, petechiae, and Gianotti-Crosti–like papules (16). Although the diaper area, especially the groin and buttocks, is often affected, the exanthem may be more generalized. Involvement of the hands, feet, and perioral area are seen in most cases.

In sum, cutaneous eruptions in the diaper area can be caused by the diaper, exacerbated by the diaper, or occur independent of the presence of the diaper. Using this classification scheme can aid in efficient diagnosis and treatment of these conditions.

CONFLICTS OF INTEREST
Lawrence F. Eichenfield has served as a consultant for Procter and Gamble.

REFERENCES