

Differential Diagnosis of Skin Lesions in the Diaper Area

Slobodna Murat-Sušić, Karmela Husar

University Department of Dermatology and Venereology, Zagreb University Hospital Center and School of Medicine, Zagreb, Croatia

Corresponding author:

Slobodna Murat-Sušić MD, MS
University Department of Dermatology
and Venereology
Zagreb University Hospital Center
and School of Medicine
Šalata 4
HR-10000 Zagreb
Croatia
slosusic@vef.hr

SUMMARY Diaper dermatitis is one of the most common skin problems in children. It most commonly presents as an acute irritant contact dermatitis but a great number of dermatoses can manifest with lesions in the diaper area and have to be considered in differential diagnosis. The etiology, clinical picture and differential diagnosis of skin changes in the diaper area are presented.

KEY WORDS: diaper dermatitis, skin changes, diaper area

Received: December 16, 2006.

Accepted: March 22, 2007.

INTRODUCTION

Diapers allow better infant hygiene and sociability, serve to hold in urine and feces. Diaper dermatitis indicates inflammatory lesions of the skin area covered by diapers. The synonyms are dermatitis glutealis infantum and erythema gluteale infantum. Diaper dermatitis is one of the most commonly encountered dermatological problems in infants and small children. As many as 50% of children develop diaper rash at some point of time, and in many, the lesions occur more than once. It is estimated that only 7% of these episodes are called to the attention of the physicians (1). It most commonly presents as an acute irritant contact dermatitis but a great number of dermatoses can present with lesions in the diaper area and have to be considered in differential diagnosis.

ETIOLOGY OF DIAPER DERMATITIS

The etiology of contact irritant dermatitis in the diaper area is complex, with changes developing through interaction of numerous factors (Fig. 1). The main purpose of the diaper is to hold in the urine and feces. This causes hydration of the skin, namely of the stratum corneum, under the diaper. The barrier function of the skin is thus compromised, the permeability for irritants increases, and an ideal environment for the proliferation of microorganisms is achieved. In the diaper region, the skin is subject to constant friction of skin against the skin as well as against the diaper. With increased hydration of the skin this friction is even more pronounced, which leads to abrasive lesions. Ammonia is formed from urea, through the action of enzymes produced by bacteria in the stool. Contrary

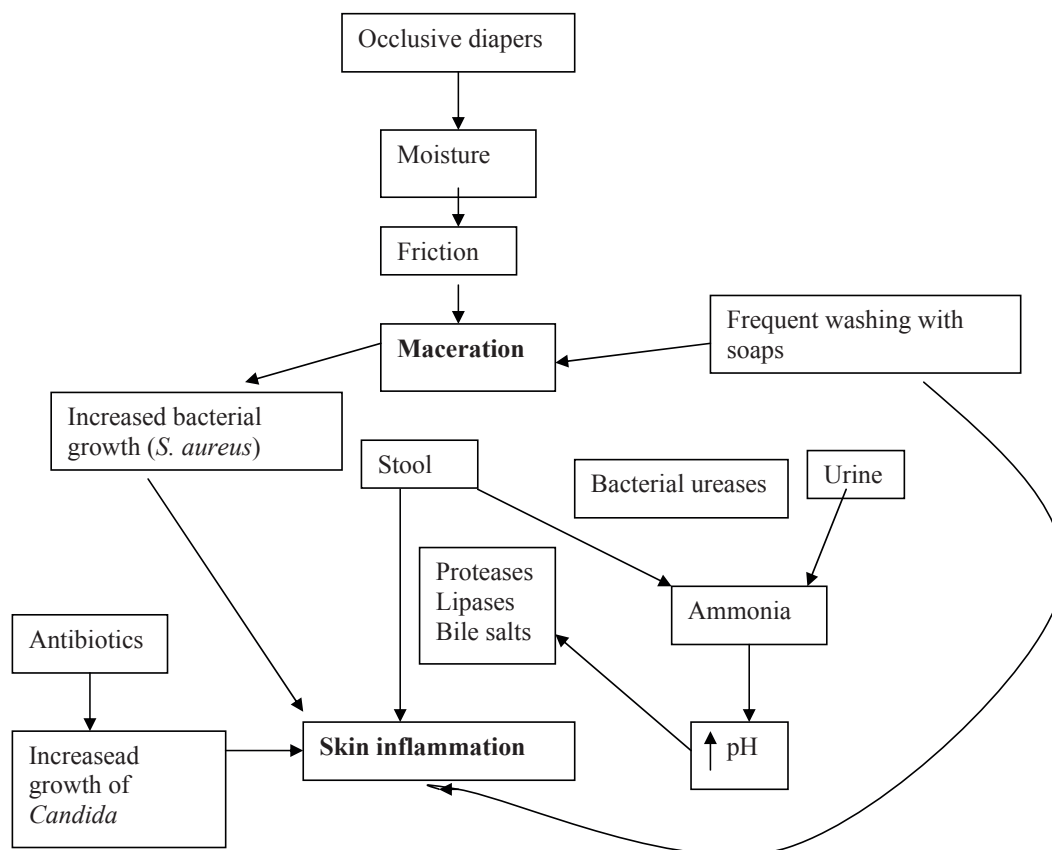


Figure 1. Factors in the development of diaper dermatitis.

to previous beliefs, it does not act as an irritant on the skin. However, its role in the development of diaper dermatitis is in increasing the pH of the diaper area, thus activating proteases and lipases from the stool. These enzymes together with bile salts act as primary skin irritants. Therefore, mixing of the stool and urine is the major risk factor for the development of diaper dermatitis (2).

Candida has an important role in the development and persistence of inflammation in the diaper area. This fungus is often isolated from stool of healthy children (30%), even more often during or after antibiotic treatment (3). Warm and moist environment promotes growth of this yeast, which can penetrate into the skin and lead to inflammation through activation of the complement. Its role in the etiology of diaper dermatitis is usually secondary. It is therefore necessary to exclude *Candida* infection in every diaper dermatitis that lasts longer than 48-72 hours.

The diaper area is an excellent environment for the growth of bacteria, i.e. *Staphylococcus aureus* and *Streptococcus pyogenes*.

CLINICAL PICTURE

Contact irritant dermatitis in the diaper area most often presents with confluent, more or less sharply demarcated erythema and edema of the skin, sometimes with madidation resembling a burn (Fig. 2). As the lesions regress, the previously inflamed skin becomes wrinkled resembling cigarette paper. The lesions are most prominent on the skin where contact with the napkin is most intensive, e.g., at convexities of the buttocks, mons pubis or labium majus. The intertriginous region is more or less spared.

Clinical presentations such as "tide water" napkin dermatitis and Jacquet's dermatitis are rarely observed. The "tide water" dermatitis is presented with band-like erythema on the borders of the napkin. This clinical presentation is probably the result of continuous cycles of wetting and drying as well as rubbing of the skin at the margins of the napkin.

A severe form of napkin dermatitis, which usually appears in older children that wear napkins, in the form of nodules and papules with erosions and ulcerations, is called Jacquet's napkin derma-



Figure 2. Acute irritant contact dermatitis of the diaper area.

titis. In males the lesions can appear on the penile glans or at the urinary meatus and can cause pain and difficult urination.

Granuloma gluteale infantum presents as firm, painless, brown-red or purple nodules 0.5 to 4 cm in diameter appearing in the diaper area. These lesions more often appear in the course of prolonged contact irritant diaper dermatitis. Repeated or prolonged application of topical corticosteroids and *Candida* infection are proposed to be involved in the development of these lesions. Granuloma gluteale infantum can be mistaken for skin lymphoma or Kaposi's sarcoma.

Perianal pseudoverrucous papules and nodules are rarely observed and usually appear in children with chronic irritation due to constant and repeated wetting and soiling of the napkin area. These lesions were first described in children with urostomies but have later been recognized in those with encompresis due to e.g., surgical colonic reanastomosis in patients with Hirschprung's disease (4). Clinical picture consists of development of multiple flat-topped, red to purple papules and nodules 2-8 mm in diameter, which are frequently moist or ulcerated (Fig. 3).

Intertrigo is a form of inflammatory process that appears deep in the skin creases where the skin rubs against the skin, e.g., in the intergluteal, inguinal region, or posterior gluteal fold. Increased dampness and temperature lead to erythema and madidation of the skin. This clinical presentation is more often seen in children that are overweight. Skin changes often appear in other skin creases as well.

As already pointed out, infection with *Candida* often complicates contact irritant dermatitis in the

diaper area. When *Candida* infection is involved, skin changes consist of erythematous, usually well demarcated plaques with desquamation on the edges, and development of white pustules. In more severe cases madidation and erosions develop.

DIFFERENTIAL DIAGNOSIS

Numerous dermatoses can affect the skin under the diapers in infants and small children (Table 1). The development of bullous impetigo caused by *Staphylococcus aureus* is especially common in newborns due to bacterial colonization of the umbilicus. It is characterized by flaccid bullae that easily rupture and lead to red, moist erosions covered with honey-colored crusts. The lesions often appear in the diaper area due to the moisture, warmth and friction of the skin in this area. The diagnosis can be confirmed by Gram stain or bacterial culture.

Perianal streptococcal disease is characterized by a sharply demarcated erythema and edema in the perianal area. The child complains of itch and sometimes pain, especially during defecation that can cause constipation. Cotton swab bacterial culture is positive for group A β -hemolytic *Streptococcus*.

Clinical picture of scabies in infants and small children is characterized by development of lesions on any region of the body. The most prominent sign of the disease is pruritus. Burrows, papules, nodules, excoriations and quite often vesiculopustular and bullous lesions can appear with secondary bacterial infection and eczematization. In children, lesions are often seen on the palms and soles, on the scalp, around the umbilicus and in the skin folds, including the diaper area. The



Figure 3. Perianal pseudoverrucous papules and nodules that developed after surgical colonic reanastomosis in a boy with Hirschprung's disease.

Table 1. Diseases with common presentation in the diaper area

- Infections:
 - bullous impetigo
 - perianal streptococcal disease
 - scabies
 - human papilloma virus (HPV) infection
 - herpes simplex virus (HSV) infection
 - human immunodeficiency virus (HIV)
- Seborrheic dermatitis
- Atopic dermatitis
- Psoriasis
- Allergic contact dermatitis
- Acrodermatitis enteropathica
- Langerhans' cell histiocytosis
- Kawasaki's disease
- Bullous mastocytosis
- Incontinentia pigmenti
- Epidermolysis bullosa
- Biotin-responsive multiple carboxylase deficiency

diagnosis is easily confirmed by demonstration of the mite, ova and scybala from the skin scrapings.

Human papilloma virus (HPV) infection in the anogenital region in infants and small children is rare and manifests with the development of warts. Since the incubation is variable, development of anogenital warts in a child even two years after delivery can be the result of perinatal transmission from the infected mother. Nevertheless, one should rule out the possible sexual abuse of the child.

Infection with human herpes virus (HSV) in the anogenital region of a child can be due to autoinoculation from a herpetic digital disease, gingivostomatitis, or from an exogenous inoculation from the carer. The infection should arise suspicion of the possible sexual abuse.

Severe napkin dermatitis can be a manifestation of HIV infection. Erosive napkin dermatitis and ulcerative lesions in the gluteal cleft have been described. Ulcerations in the napkin area can also be the result of infection with HSV, cytomegalovirus, or other opportunistic infections in a HIV-infected child (5).

In infantile seborrheic dermatitis typical lesions develop in the diaper area. These consist of scaly plaques that affect the inguinal and intergluteal folds. The lesions are sharply demarcated while the scales usually appear greasy and yellow. Mad-

idation and fissures are common. The diagnosis is made as typical lesions develop in other proximal skin folds, umbilicus, in the scalp and the face affecting the forehead, eyebrows and the post-auricular area. These lesions develop at the age of 3 to 6 weeks of life and resolve spontaneously by 6 months of age. Children appear healthy but the pruritus can be mild to moderate. Complications are rare, usually the result of secondary infection caused by *Staphylococcus aureus* or *Candida*.

Atopic dermatitis usually spares the anogenital region. This fact is surprising since atopic skin is prone to irritation. When lesions appear in the diaper area in a child with atopic dermatitis, they tend to be recurrent and resistant to treatment. Typical lesions are usually present on other skin parts. They usually cause severe pruritus.

Psoriasis is rare in infants and young children compared to adults. Sharply demarcated erythematous and infiltrated lesions that usually lack typical scales develop in the napkin area and are often the first sign of psoriasis in children. Later on typical lesions covered with scales appear on other regions. Lesions are frequently exudative in this early age. The reason for frequent development of psoriasis in infants in the napkin area is probably due to the isomorphic effect, Koebner phenomenon in a genetically predisposed child with primarily irritative napkin dermatitis (6).

Contact allergic dermatitis in the diaper area is rare in children younger than two years. One should rule it out in children with persistent lesions that do not regress with appropriate treatment. Clinical picture is similar to classic irritant contact dermatitis. The changes can appear as the result of sensitization to topical medication that is used for treatment of diaper dermatitis, rarely to detergents used for washing of cotton diapers, or chemicals in disposable diapers (7).

Acrodermatitis enteropathica is a rare autosomal recessive inherited disease. A transient form can be seen in infants with severe malnutrition, in prematurely born infants on prolonged parenteral nutrition, or in breast-fed infants when the zinc level in maternal milk is low (8). The symptoms are caused by zinc deficiency, as the result of zinc malabsorption in the gastrointestinal tract. Clinical picture consists of vesiculobullous, eczematoid or dry, scaling, psoriasiform lesions that appear symmetrically in the perianal and perigenital region, around the mouth, on the cheeks and distal extremities. Photophobia, conjunctivitis, blepharitis and corneal dystrophy can develop. These babies usually have protracted diarrhea, stomatitis, glos-

sitis, paronychia, failure to thrive, and are often irritable (9). Bacterial and infections caused by *Candida* are common. The diagnosis is confirmed by determination of low serum zinc values.

Langerhans' cell histiocytosis is characterized by reddish-brown or yellowish papules that are often purpuric. The surface is covered with greasy scales but ulceration and necrosis is often observed. Lesions develop in the seborrheic areas, on the scalp, most often behind the ears, and in the napkin area. The lesions consist of histiocytes, lymphocytes, eosinophils and fibroblasts. Histiocytes in the lesions are dendritic Langerhans' cells. In infants, systemic manifestations include anemia, fever, hepatosplenomegaly, lymphadenopathy and bone infiltrations. Skin biopsy immunohistochemical analysis (CD1a positive cells) and/or electron microscopy (Birbeck granules) confirm the diagnosis.

Kawasaki's or mucocutaneous lymph node syndrome is an acute multisystemic disease that affects infants and young children. Clinical signs consist of fever of unknown etiology that lasts for more than 5 days, conjunctival injection, cervical-nonsuppurative lymphadenopathy, "strawberry tongue", redness and cracking of lips, redness of oropharyngeal mucosa, erythema, edema and desquamation of the hands and feet, and polymorphous exanthema. A tender macular to plaque-type erythema that involves perianal or the whole diaper area can be an early symptom in Kawasaki's syndrome. Later on erythema is followed by desquamation. This sign may be more frequent than "strawberry" tongue (10). Although this is usually a self-limited disease, cardiovascular complications can occur. They can be prevented by early treatment with i.v. gammaglobulin and aspirin.

Rare dermatoses such as bullous mastocytosis, Bloch-Sulzberger incontinentia pigmenti, biotin-responsive multiple carboxylase deficiency or epidermolysis bullosa can present with lesions in the anogenital region.

CONCLUSION

Diaper dermatitis is one of the most common skin problems in children. Prevention consists of frequent change of diapers in order to reduce wetness. Tight fitting diapers or plastic pants over cloth diapers are not recommended. Disposable so-called super absorbent diapers provide better absorption of dampness and increased airflow to the babies' skin compared to cloth diapers (11).

Although irritant contact dermatitis is the most usual cause of skin lesions in the napkin area, numerous and potentially serious diseases can present with changes of the skin in the diaper area as well. It is therefore important to take detailed medical history and perform thorough examination of the child.

References

1. Jordan WE, Lawson KD, Berg RW, Franxman JJ, Marrer AM. Diaper dermatitis: frequency and severity among a general infant population. *Pediatr Dermatol* 1986;3:198-207.
2. Scheinfeld N. Diaper dermatitis: a review and brief survey of eruptions of the diaper area. *Am J Clin Dermatol* 2005;6:273-81.
3. Kazaks EL, Lane AT. Diaper dermatitis. *Pediatr Clin North Am* 2000;4:909-19.
4. Goldberg NS, Esterly NB, Rothman KF, Fallon JD, Cropley TG, Szaniawski W, *et al.* Perianal pseudoverrucous papules and nodules in children. *Arch Dermatol* 1992;128:240-2.
5. Thiboutot DM, Beckford A, Mart CR, Sexton M, Maloney ME. Cytomegalovirus diaper dermatitis. *Arch Dermatol* 1991;127:396-8.
6. Morris A, Rogers M, Fischer G, Arch B, Williams K. Childhood psoriasis: a clinical review of 1262 cases. *Pediatr Dermatol* 2001;18:188-98.
7. Jacobs AH. Eruptions in the diaper area. *Pediatr Clin North Am* 1978;25:209-24.
8. Zimmerman AW, Hambridge M, Lepow MI, Greenberg RD, Stover ML, Casey CE. Acrodermatitis enteropathica in breast-fed premature infants; evidence for a defect of mammary zinc secretion. *Pediatrics* 1982;69:176-83.
9. Magdić-Jelavić V, Husar K. Acrodermatitis enteropathica. *Acta Dermatovenerol Croat* 1999;7:19-23.
10. Friter BS, Lucky AW. The perianal eruption of Kawasaki syndrome. *Arch Dermatol* 1988;124:1805-10.
11. Murat-Sušić S. Prevention and management of diaper dermatitis. *Acta Dermatovenerol Croat* 2001;9:127-30.