



Pediatric diaper rashes: Getting to the 'bottom' of things

ABSTRACT

Diaper dermatitis is one of the most common skin conditions seen in the pediatric population and can cause significant distress for infants and their families. While many diaper rashes can resolve with simple treatments, having a thorough understanding of different diaper lesions can help rule out more serious conditions, guide treatment and alleviate some of the caregivers' anxiety. The following review article will provide an overview of select common and uncommon diaper eruptions.

KEYWORDS: diaper dermatitis, pediatric, diaper rash, treatment



A diaper rash is one of the most frequent complaints presented in pediatric practice and has been reported by up to 75% of parents with infants.¹ For the caregiver, the presentation of a diaper eruption can be a source of anxiety. For the physician, it can be a source of frustration as diagnosis can often be challenging given the clinical similarities that are shared among many cutaneous lesions. The purpose of this review article is to provide a brief overview and to assist practitioners with the identification, care and management of select common and uncommon diaper eruptions.

Common Diaper Eruptions

Irritant Diaper Dermatitis

Irritant diaper dermatitis (Figure 1) is one of the most widely seen causes of diaper eruptions in infants and can occur in up to 25% of diaper-wearing infants.² It is an inflammatory reaction of the skin in the perianal area resulting from prolonged contact of urine and feces, moisture, alkaline pH and mechanical disruption. It often presents as an erythematous rash involving the buttocks, genitalia, lower abdomen and thighs and can be

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accompanied by maceration, erosion and when severe, ulceration. Typically, irritant diaper dermatitis spares the inguinal folds. Treatment of irritant diaper dermatitis aims to minimize the irritating effects of urine and feces, and may include frequent diaper changes, the use of a barrier cream and the use of superabsorbent diapers. For more severe cases, a short course of 1% hydrocortisone cream can also be considered.²

Candida Dermatitis

Diaper dermatitis secondary to *Candida albicans* (Figure 2) commonly affects young infants and is characterized by erythematous papulovesicular or pustular lesions.³ Some of the risk factors predisposing infants to candidiasis include young age, episodes of diarrhea and the use of broad-spectrum antibiotic and immunosuppressive therapies.² *Candida* dermatitis is characterized by well-demarcated beefy red plaques and is often accompanied by satellite papules and pustules. It can involve the thighs, genital creases, abdomen and genitalia and is often seen with thrush. The diagnosis can be confirmed with a skin scraping examined under microscopy using potassium hydroxide and treatment is often with topical antifungal agents, such as nystatin, clotrimazole, ketoconazole and barrier creams such as zinc oxide.^{2,3}

Figure 1: Irritant diaper dermatitis



Allergic Contact Dermatitis

Allergic contact dermatitis (ACD) (Figure 3) was once thought to be a rare condition in children; however, in recent years, there is growing evidence in the literature that suggests that it is more common than previously believed.⁴ ACD typically appears in areas exposed to the allergen and presents as an erythematous, intensely pruritic eczematous lesion sparing the inguinal folds. In severe cases, the lesions may become edematous and vesiculobullous.² ACD may develop from exposure to the diaper or to products applied to the area. Common allergens docu-

Figure 2: Diaper candidiasis



mented in the literature include sorbitan sesquioleate, an emulsifier used in topical preparations, fragrances, methylisothiazolinone, iodopropylcarbamate and bronopol used in baby wipes and mercapto compounds found in the elastic borders of diapers.² If ACD is suspected, patch testing is the gold standard for diagnosis, especially when infants fail to respond to therapy. Treatment of ACD involves removing the offending agent and the use of a low potency corticosteroid.²

Seborrheic Dermatitis

Seborrheic dermatitis is frequently seen during infancy beginning at 4 to 6 weeks of age and can involve the scalp, cheeks, ear, neck, intertriginous and diaper regions.^{2,5} However, the characteristic yellow-white greasy scale is not usually seen in the diaper and the intertriginous areas.⁵ Seborrheic dermatitis often manifests as well-demarcated moist erythematous plaques in the genital and perianal regions.⁶ While the pathogenesis of seborrheic dermatitis is unknown, it is believed to be triggered by the yeast *Pityrosporum ovale* (*Malassezia furfur*) and is associated with excess sebum production.⁵ Seborrheic dermatitis can often be mistaken for atopic dermatitis; however, a key differentiating factor is that seborrheic dermatitis is usually non pruritic. Infantile seborrheic dermatitis is usually benign with spontaneous improvement by the age of 1 so it is important to

Figure 3: Allergic contact dermatitis



reassure parents that it may resolve without any treatment.⁵ However, if treatment is desired, a topical low-potency corticosteroid or a topical antifungal such as ketoconazole have been shown to be effective.^{2,5}

Uncommon Diaper Eruptions

Jacquet's Erosive Diaper Dermatitis

Jacquet's erosive diaper dermatitis (JED) (Figure 4) is a rare and severe form of irritant diaper dermatitis that usually affects infants older than 6 months of age.⁷ JED is typically characterized by well-demarcated, red-purple lesions with elevated borders in the genital

Figure 4: Jacquet dermatitis



and perianal region. Over time, the lesions can transform into erosions and ulcers.⁷ The differential diagnosis for JED can include bacterial, fungal and viral infections, Crohn's

PERIANAL STREPTOCOCCAL DERMATITIS PREDOMINANTLY AFFECTS INFANTS AND YOUNG CHILDREN BETWEEN THE AGES OF SIX MONTHS TO TEN YEARS AND IS CAUSED BY GROUP A B-HEMOLYTIC STREPTOCOCCI (GABHS).

disease, Langerhans cell histiocytosis, granuloma gluteale infantum and syphilis.⁸ Similar to irritant diaper dermatitis, JED is caused by prolonged contact with irritants such as urine, feces or detergents, mechanical friction, and bacterial colonization.⁸ Currently, the most effective treatment for JED is to remove the offending agent and to use generous amounts of barrier creams, including zinc oxide ointment, white petrolatum and sucralfate, to protect the skin from irritants.^{8,9} If a secondary infection is suspected, topical antifungals or oral antibiotics can also be used.⁹

Granuloma Gluteale Infantum

Granuloma gluteale infantum (GGI) is a benign condition with an unclear etiology seen in infants aged 2 to 9 months.¹⁰ Classically, the lesions appear as asymptomatic, oval,

cherry-red, granulomatous nodules in areas of occlusion and are preceded by inflammation.¹¹ Some proposed causes of GGI include irritant contact dermatitis, candidiasis, starch-containing powder and the prolonged use of benzocaine and fluorinated steroids.¹¹ The diagnosis of GGI should be considered in chronic and unresponsive cases of infantile diaper dermatitis as the inflammation may mask the pathognomonic nodules.¹¹ Treatment of GGI should focus on keeping the diaper area clean and removing irritants. Lesions typically resolve spontaneously within one to two months but may leave an atrophic scar.¹¹ Topical treatments such as antifungals should only be used if the lesions are related to a *Candida* infection and topical corticosteroids should be avoided in GGI as it may be the inciting cause of GGI.¹⁰

Perianal Streptococcal Dermatitis

Perianal streptococcal dermatitis (PSD) (Figure 5) predominantly affects infants and young

Figure 5: Perianal Group A Strep



children between the ages of six months to ten years and is caused by Group A β -hemolytic streptococci (GABHS).² PSD typically presents as a bright red, moist, erythematous plaque over the perianal region with associated crusts and pustules.² Other symptoms may include perianal edema, pruritus, pain, tenesmus, anal fissures, constipation or incontinence.² Prolonged PSD may cause significant discomfort to the infant and can progress to proctitis, abscess formation and myositis.² It is often misdiagnosed and can often be confused with candidiasis, diaper dermatitis, atopic dermatitis and seborrheic dermatitis.¹³ Diagnosis of PSD can be confirmed with a perianal culture and treatment involves a broad-spectrum antibiotic such as penicillin V, or a macrolide in cases of penicillin allergy.¹² A recent study done by Meury *et al.* in 2008 found that cefuroxime was more effective than penicillin and can be considered as the treatment of choice for perianal dermatitis caused by GABHS.¹³

Langerhans Cell Histiocytosis

Langerhans cell histiocytosis (LCH) is a rare dermatological condition caused by clonal proliferation of Langerhans cells. Though it can be diagnosed in any age group, LCH predominantly affects children with peak incidence between the ages of 1 to 4 and a slight prevalence in boys. LCH can affect single

or multiple organ systems including the lungs, bones, bone marrow and the liver. It can manifest as scaly, erythematous plaques on the scalp or as yellowish-brown plaques in the diaper area and may be purpuric, vesicular, atrophic, bullous or ulcerative. The diagnosis of LCH is typically made by skin biopsy and treatment depends on the involvement of other organs, which can manifest as petechiae, hepatosplenomegaly lymphadenopathy and lytic bone lesions. Immunomodulating therapies, such as systemic glucocorticoids and chemotherapies can be used in cases of multi-organ involvement.¹⁴

Infantile Granular Parakeratosis

Infantile granular parakeratosis (IGP) (Figure 6) is a benign cutaneous eruption characterized by erythematous and/or pigmented hyperkeratotic papules and plaques that are exclusively distributed in intertriginous areas. The condition was initially named as a result of its unique histopathologic feature of

Figure 6: Infantile granular parakeratosis

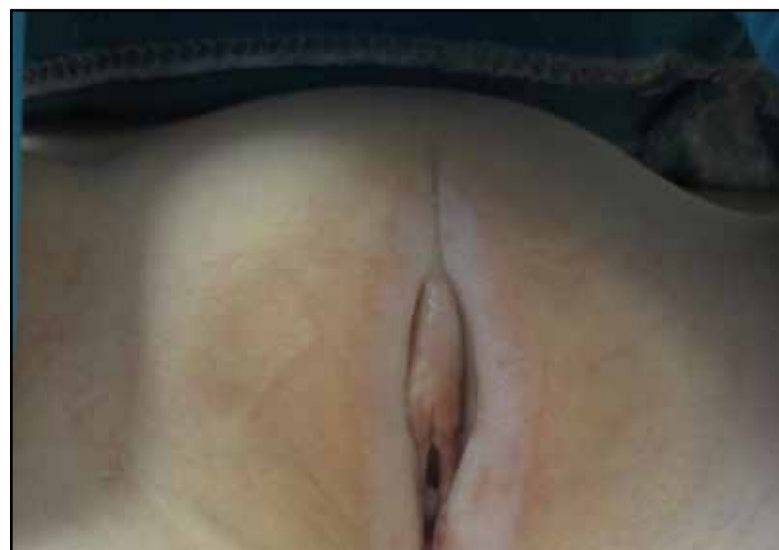


parakeratosis. While the etiology of IGP remains unclear, there are proposed theories that it is caused by a defect in the processing of proflaggrin to flaggrin, leading to a failure in the degradation of keratohyaline granules and the aggregation of keratin filaments. Risk factors that predispose individuals to the development of IGP include chemical irritants such as creams and fragrances and physical factors such as excessive sweat and friction in the intertriginous areas. Diagnosis of IGP can be made by histopathologic examination of the crusts. Treatment of IGP remains controversial; while some of the literature suggest that the lesions resolve with removal of the irritant, there has been reported cases of spontaneous resolution occurring from several weeks to years. Currently, topical and systemic corticosteroids, retinoids, antibiotics and antifungals have been reported to have variable therapeutic success while keratolytic agents have been shown to be ineffective.¹⁵

Lichen Sclerosus et Atrophicus

Lichen sclerosus et atrophicus, or lichen sclerosus (LS) (Figure 7), is a chronic relapsing and remitting inflammatory condition that affects both adults and children. In children, the average age of onset is around 4 to 5 years of age and the presentation may differ depending on whether the affected individual is male or female. Childhood LS

Figure 7: Lichen sclerosus et atrophicus



most commonly affects the genital region. In males, LS tends to be characterized by a sclerotic white ring at the tip of the prepuce, leading to difficulty retracting the foreskin and subsequently phimosis. In females, LS presents with vulvar pruritus and pain as well as dysuria or constipation. In addition, females with LS may present with smooth white atrophic papules and plaques in the ano-genital region, which may be accompanied by edema, telangiectasia, purpura and fissures. If left untreated, the labia minora may become resorbed and the vaginal introitus may become narrowed, leading to chronic pain and dyspareunia later in life.

While the etiology of LS is unknown, it is currently thought that there is a genetic and an autoimmune component associated with this disease. Although some people experience spontaneous remission during puberty, many do not and are predisposed to an increased risk of developing squamous cell carcinoma in adulthood; because of this, it is essential



to monitor patients every 6 to 12 months. Currently, topical ultra-potent corticosteroids are used as a first line therapy for LS and have been shown to be effective in improving the atrophy, erosions and associated anatomic changes. The current recommendation is to use a steroid ointment once or twice a day for four to eight weeks and intermittently for flare-ups. Although steroid atrophy is a common concern that many patients and physicians have, it is thought that intermittent use of this therapy improves the atrophy associated with LS and can minimize the risk of malignancy. Recently, topical tacrolimus or pimecrolimus have also been reported to be an effective treatment for controlling inflammation in children with LS.¹⁶

Diaper Psoriasis

Diaper psoriasis typically occurs in children younger than the age of two and is characterized as bright erythematous, well-demarcated plaques in the inguinal folds (Figure 8). It can be associated with features of psoriasis, such as nail changes and papulosquamous plaques in other areas of the body.^{2,17} Treatment of diaper psoriasis aims to minimize symptoms and can include topical corticosteroids, vitamin D analogues as well as topical calcineurin inhibitors, such as tacrolimus.^{2,17} However, because infants have a higher ratio of body surface area to mass, widespread application of topical corticoster-

Figure 8: Diaper psoriasis



oids may potentially lead to systemic absorption.¹⁷ To minimize the risk of potential side effects, which may include skin atrophy and striae, combination and rotational therapies with steroid-sparing alternatives should be considered.¹⁷ For severe cases, phototherapy and systemic medications such as cyclosporine, retinoids and methotrexate can also be used.^{2,17}

Infantile Perianal Pyramidal Protrusions

Infantile perianal pyramidal protrusion (IPPP) is a benign condition that presents as a solitary pyramidal protrusion anterior

Figure 9: Infantile perianal pyramidal protrusion





SUMMARY OF KEY POINTS

Treatment of irritant diaper dermatitis aims to minimize the irritating effects of urine and feces, and may include frequent diaper changes, the use of a barrier cream and the use of superabsorbent diapers.

Diagnosis of perianal streptococcal dermatitis can be confirmed with a perianal culture and treatment

involves an antibiotic such as penicillin V, or a macrolide in cases of penicillin allergy.

Topical ultra-potent corticosteroids are used as a first line therapy for lichen sclerosus and have been shown to be effective in improving the atrophy, erosions and associated anatomic changes.

to the anus (Figure 9).¹⁸ IPPP is mostly observed in newborn girls and is commonly mistaken as a skin tag/fold. Currently, there are 3 classifications of IPPP: constitutional, acquired and IPPP caused by lichen sclerosus et atrophicus (LSA). Constitutional IPPP is thought to be a congenital and/or a familial condition and is often discovered at birth. An acquired IPPP is often associated with constipation. IPPP caused by LSA has been considered to be either an atypical form of LSA or an early mani-

festation of the disease. IPPP is a clinical diagnosis and the differential diagnosis may include sexual abuse, rectal prolapse, perianal lesions associated with Crohn's disease and hemorrhoids. Treatment for IPPP varies depending on the etiology of the condition. Constitutional IPPP typically regresses after several weeks so treatment is often not necessary. For acquired IPPP, treatment should be directed at managing constipation while IPPP caused by LSA can be treated with topical corticosteroids.¹⁸



CLINICAL PEARLS

The diagnosis of granuloma gluteale infantum should be considered in chronic and unresponsive cases of infantile diaper dermatitis as the inflammation may mask the pathognomonic nodules.

Although some patients with lichen sclerosus experience spontaneous remission during puberty, many do not and are predisposed to an increased risk of developing squamous cell carcinoma in adulthood; because of this, it is essential to monitor patients every 6 to 12 months.

Summary

Diaper dermatitis is an extremely common problem in the pediatric population with significant consequences. Although irritant diaper dermatitis is the most common culprit of diaper eruptions, it is important to consider and rule out uncommon mimickers. For conditions such as irritant diaper dermatitis, allergic contact dermatitis, granuloma gluteale infantum and Jacquet's erosive diaper dermatitis, the goal of treatment is to minimize the exposure of the infants' skin to potential allergens and irritants. For others, such as *Candida* dermatitis, perianal streptococcal dermatitis, Langerhans cell histiocytosis, lichen sclerosus and diaper psoriasis, treatment is often necessary to prevent further complications. Clinical findings, especially in cases where the lesions are unresponsive to therapy, should provide clues and encourage practitioners to consider some of the more rare causes of pediatric diaper rashes. In general, physicians should play an active role in educating caregivers on the importance of proper skin care practices in the health of infants to prevent future problems and recurrences.

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