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Confluent and Reticulated Papillomatosis (CARP)

Confluent and reticulated papillomatosis (CARP), also referred to as *confluent and reticulated papillomatosis of Gougerot and Carteaud*, is a rare dermatologic condition characterized by the development of multiple small, hyperkeratotic macules or papules that coalesce to form patches or plaques with a distinctive reticulated (net-like) peripheral pattern. Although typically asymptomatic, CARP can cause mild itching and may have a velvety or scaly appearance. In some rare cases, it may present with atrophic macules that resemble cigarette-paper-like lesions. The condition most commonly affects the chest and upper back, though it can also involve the face, flexural areas, and groin.

Clinical Presentation and Diagnosis

CARP is primarily diagnosed based on clinical presentation, though it may be confused with other skin conditions due to overlapping features. The key differential diagnoses include:

- ***Tinea versicolor***: CARP and tinea versicolor share similar morphology and anatomical distribution, but tinea versicolor can be differentiated by the absence of fungal elements in potassium hydroxide (KOH) preparations. Failure to respond to antifungal treatment is a strong indicator of CARP rather than tinea versicolor.
- ***Acanthosis nigricans***: Both conditions may present with a velvety texture, but acanthosis nigricans typically affects flexural areas, such as the posterior neck and intertriginous folds, and is commonly associated with endocrine disorders like diabetes mellitus, obesity, or polycystic ovary syndrome. In contrast, CARP usually lacks these systemic associations.
- ***Other possible conditions***: seborrheic dermatitis, macular amyloidosis, erythema dyschromicum perstans, and erythrasma.

Histologic Findings

Histologically, CARP is characterized by hyperkeratosis, papillomatosis, focal acanthosis, and increased melanin pigmentation. These findings, however, are nonspecific and require careful interpretation in conjunction with the clinical presentation. A skin biopsy might also show increased melanosomes, but there are no pathognomonic features for CARP, making the diagnosis primarily clinical.

Etiology and Pathogenesis

The precise cause of CARP remains unknown, but several hypotheses have been proposed:

- ***Hyperproliferation of Keratinocytes***: A widely accepted theory suggests that CARP results from a hyperproliferative state of keratinocytes in response to an unknown trigger. This may involve an inherited mutation in keratin 16 or another genetic factor.

- ***Endocrine Factors***: CARP may be associated with underlying endocrine disorders, with many patients having concurrent conditions such as diabetes mellitus or obesity.
- ***Fungal and Bacterial Involvement***: Some studies have implicated Malassezia fungi or Dietzia papillomatosis, a bacterium, as potential contributors to the development of CARP, though this theory remains speculative.
- ***Amyloid Deposition***: Another hypothesis suggests that CARP might be a localized deposition of amyloid, though this remains an area of ongoing research.

Epidemiology

CARP typically arises during puberty, with a slight male predominance. The average age of onset is around 15 years, and most cases are diagnosed in individuals between 8 and 32 years of age. While less common, CARP has also been described in pediatric and geriatric populations. The condition is observed worldwide and affects individuals of all skin types and ethnicities.

Treatment

First-line treatment for CARP is minocycline, which is administered at a dose of 50-100 mg twice daily for 6 weeks. Longer therapy may be necessary for some patients, especially those with recurrent or refractory cases. For patients who do not respond to minocycline or for those who cannot tolerate it, alternative treatments include:

- Macrolides (e.g., azithromycin or clarithromycin), which are considered second-line agents.
- Tetracycline or doxycycline may also be used as alternative antibiotics for persistent cases.
- Cefdinir, a third-generation cephalosporin, has shown some efficacy in treating CARP and may be used when first- and second-line options are ineffective.

For patients who do not respond to antibiotic therapy, or in cases where the condition is severe or resistant, additional therapeutic options may be considered. Topical retinoids, such as tretinoin, can be effective in regulating keratinocyte turnover and enhancing the overall appearance of the skin by promoting cell renewal. Another option, calcipotriene, a topical vitamin D analogue, has shown promise in certain cases by modulating cell differentiation and reducing inflammation. In cases where inflammation is a dominant factor, topical tacrolimus, an immunosuppressive agent, may be used to reduce immune response and manage skin inflammation.

For more severe or refractory cases, systemic therapies like isotretinoin or acitretin may be considered. These systemic treatments are potent and typically reserved for cases that do not respond to other modalities. However, they must be used with caution, especially in women of childbearing age, due to the teratogenic risks associated with these medications.

Despite treatment, CARP can be difficult to manage and may recur after discontinuation of therapy. In some cases, the condition may resolve spontaneously over several months to years.

Conclusion

Confluent and reticulated papillomatosis (CARP) is a rare dermatologic condition with a variety of potential etiologies and associations. The clinical presentation often mimics other dermatologic disorders, making a careful differential diagnosis essential. Although the cause of CARP remains poorly understood, treatment options have expanded over the years, with minocycline as the first-line therapy and a range of alternative treatments available for refractory cases. Ongoing research into the pathogenesis of CARP may further elucidate its underlying causes and lead to more targeted treatment strategies.

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