Raynaud phenomenon in children

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Abstract

Question I have several patients, mostly girls, who are living with Raynaud phenomenon. Does this condition appear in children, and what should be the course of action?

Answer Raynaud phenomenon, described in the 1860s, can present in children and even in the first decade of life. While most children will have primary Raynaud phenomenon, with no serious adverse consequences, in others it might be a sign of a pending systemic disease. Those children with a positive reaction to antinuclear antibody, specific autoantibodies associated with connective tissue disease, or nail fold capillary changes require referral to a pediatric rheumatologist and close follow-up.

Phénomène de Raynaud chez les enfants

Résumé

Question Plusieurs de mes patients, principalement des filles, vivent avec le phénomène de Raynaud. Cette affection se manifeste-t-elle chez les enfants, et quelle serait la marche à suivre?

Réponse Le phénomène de Raynaud, décrit dans les années 1860, se manifeste chez les enfants, et même durant la première décennie de vie. Alors que chez la plupart des enfants, il s'agit d'un phénomène de Raynaud primitif, sans conséquences indésirables graves, chez d'autres, cela pourrait être le signe d'une maladie systémique imminente. Les enfants qui présentent une réaction positive aux anticorps antinucléaires, des auto-anticorps spécifiques associés aux maladies du tissu conjonctif, ou des modifications des capillaires du sillon latéral des ongles doivent être aiguillés en rhumatologie pédiatrique aux fins de suivi étroit.

As a medical student in Paris, Maurice Raynaud described "local asphyxia and symmetrical gangrene of the extremities" as part of his doctoral thesis: 20 women and 5 men had a series of colour changes in their hands and feet when exposed to the cold or when the patients were under stress.[1] Despite being the one to describe what is known today as Raynaud phenomenon (RP), Raynaud was never able to obtain a position as a physician owing to the political scene in Paris during the 1860s.[2]

Raynaud phenomenon is recognized today as a transient vasospasm of peripheral arteries and arterioles that classically results in triphasic colour changes in the affected region, and it is associated with a variety of medical conditions.[3] The vasospasm causes pallor (white), followed by dilation of the capillaries and venous stasis resulting in cyanosis (blue), and finally the arteries and arterioles dilate, causing rapid return of blood flow and reactive hyperemia (red)[4] (**Figure 1**). The fingers are the most commonly affected region, usually as a response to stressors such as cold exposure.

Primary RP is common and does not need any treatment. However, an effort should be made to ensure that the RP is not secondary to scleroderma-related diseases, where irreversible digital ischemia might result in digital ulcers and amputation.[5]

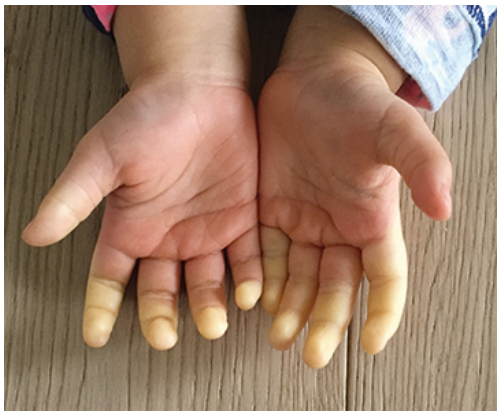
Raynaud in children

It is difficult to estimate the prevalence of RP in children, as many families might perceive the colour changes as a normal response to cold exposure. One pediatric study from the United Kingdom used survey methodology with pictures, and among 720 schoolchildren, 18% of girls and 12% of boys reported a change of colour in their fingers in cold climates at least once a month, or a "numb or tingly" sensation in the fingers with cold exposure.[6] Prevalence increased with age, especially among the girls. Another multicentre report found RP in 2.2% of children aged 0 to 10 and in 20% of those aged 10 to 20; however, there was a very wide range in the documented rate of onset among centres and between boys and girls.[7]

Most children (about 70%) present with primary RP, and secondary RP is associated with juvenile systemic lupus erythematosus, juvenile systemic sclerosis, mixed connective tissue disease, and rarely systemic sclerosis and Sjögren syndrome.[5] These need to be ruled out in every child with RP.

In a prospective follow-up study of 250 children and young adults with RP aged 10 to 20 (44% aged 10 to 16), nail fold capillaroscopy examination was performed, and 1 to 6 years of follow-up was available.[8] At the end of the follow-up period, 191 (76.4%) subjects had primary RP, 27 (10.8%) had undifferentiated connective tissue disease,

Figure 1. Pallor phase of the triphasic colour changes associated with Raynaud phenomenon



and 32 (12.8%) had a specific connective tissue disease. Mean time to a form of disease was 2 years. Nonspecific capillary changes occurred in 3 out of 10 (30.0%) patients with rheumatoid arthritis, 2 out of 9 (22.2%) with systemic lupus erythematosus, 4 out of 27 (14.8%) with undifferentiated connective tissue disease, and 18 out of 191 (9.4%) with primary RP. In a pediatric series, Nigrovic et al reported retrospective chart review findings from 123 cases from Children's Hospital of Boston; 80% were girls and 70% did not have a recognized underlying connective tissue disease.[9] Predictive factors for an underlying condition were the presence of antinuclear antibodies and abnormal nail fold capillaries. Antiphospholipid antibodies were common but not helpful in differentiating between primary and secondary RP.[9] Similarly, a 1989 study by Duffy et al from Toronto, Ont,[10] reported that among 27 patients with RP (mean age at onset was 11.7 years), 33% had primary RP, 52% had a connective tissue disease, and 15% had a probable connective tissue disease. Positive reaction to antinuclear antibody and higher nail fold capillary microscopy scores were much more common in the secondary RP group.[10]

Evaluation of children with RP

Based on limited evidence in pediatrics, a European expert panel recommended testing antinuclear antibodies, more specific antibodies associated with connective tissue disease, and nail fold capillaroscopy in all children presenting with RP.[11] The frequency of follow-up recommended depends on the presence of these risk factors, with the aim of detecting evolving connective tissue disease early in high-risk individuals. Those children with a positive reaction to antinuclear antibody, specific autoantibodies, or nail fold capillary changes need a pediatric referral and close follow-up.

Competing interests
None declared

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References

1. Davis EP, editor. *The American Journal of the Medical Sciences*. Vol. 108. Philadelphia, PA: J.B. Lippincott; 1894.
2. Prabhu AV, Oddis CV. The legacy of Maurice Raynaud. *JAMA Dermatol* 2016;152(11):1253.
3. Wigley FM. Clinical practice. Raynaud's phenomenon. *N Engl J Med* 2002;347(13):1001-8.
4. Hummers LK, Wigley FM. Management of Raynaud's phenomenon and digital ischemic lesions in scleroderma. *Rheum Dis Clin North Am* 2003;29(2):293-313.
5. Pope JE. The diagnosis and treatment of Raynaud's phenomenon: a practical approach. *Drugs* 2007;67(4):517-25.
6. Jones GT, Herrick AL, Woodham SE, Baildam EM, Macfarlane GJ, Silman AJ. Occurrence of Raynaud's phenomenon in children ages 12-15 years: prevalence and association with other common symptoms. *Arthritis Rheum* 2003;48(12):3518-21.
7. Planchon B, Pistorius MA, Beurrier P, De Faucal P. Primary Raynaud's phenomenon. Age of onset and pathogenesis in a prospective study of 424 patients. *Angiology* 1994;45(8):677-86.
8. Pavlov-Dolijanović S, Damjanov N, Ostojić P, Susić G, Stojanović R, Gacić D, et al. The prognostic value of nailfold capillary changes for the development of connective tissue disease in children and adolescents with primary Raynaud phenomenon: a follow-up study of 250 patients. *Pediatr Dermatol* 2006;23(5):437-42.
9. Nigrovic PA, Fuhlbrigge RC, Sundel RP. Raynaud's phenomenon in children: a retrospective review of 123 patients. *Pediatrics* 2003;111(4 Pt 1):715-21.
10. Duffy CM, Laxer RM, Lee P, Ramsay C, Fritzler M, Silverman ED. Raynaud syndrome in childhood. *J Pediatr* 1989;114(1):73-8.
11. Pain CE, Constantin T, Toplak N, Moll M, Iking-Konert C, Piotto DP, et al. Raynaud's syndrome in children: systematic review and development of recommendations for assessment and monitoring. *Clin Exp Rheumatol* 2016;34(Suppl 100):200-6. Epub 2016 Jul 27.

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