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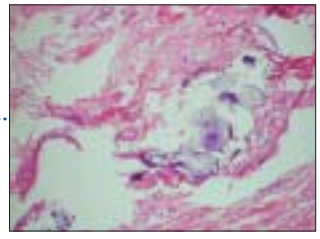

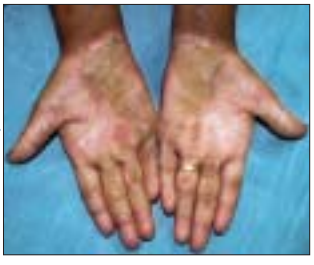

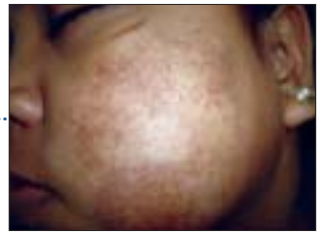

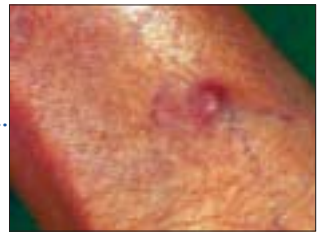

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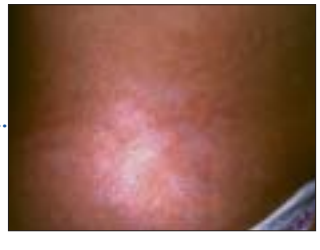

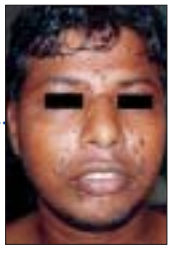

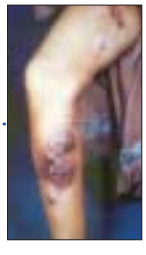

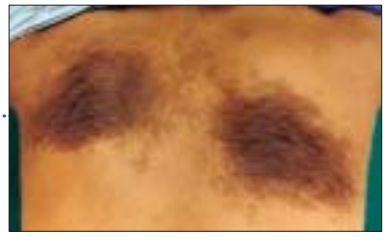

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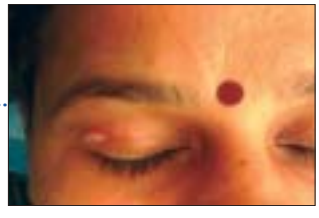

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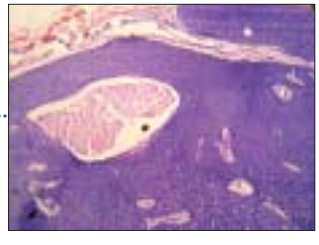

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Naxos disease: A rare occurrence of cardiomyopathy with woolly hair and palmoplantar keratoderma

R. Rai, B. Ramachandran, V. S. Sundaram, G. Rajendren*, C. R. Srinivas
Departments of Dermatology and *Cardiology, PSG Hospitals, Peelamedu, Coimbatore, India

Address for correspondence: Dr Reena Rai, Department of Dermatology, PSG Hospitals, Peelamedu, Coimbatore - 641 004, Tamil Nadu, India.
E-mail: drreena_rai@yahoo.co.in

ABSTRACT

Naxos disease is a rare genodermatosis with woolly hair, keratoderma of palms and soles and cardiomyopathy. A seven-year-old boy presented with woolly hair and hyperkeratotic lesions on the palms and soles since birth. His cardiac status was evaluated and echocardiography revealed early cardiomyopathy. Scalp biopsy revealed hair shaft in an angulated outline suggestive of woolly hair. So the diagnosis of Naxos disease was made. Since he was asymptomatic no treatment was offered but a regular follow-up of the patient and treatment of emergent symptoms should prevent sudden death.

Key Words: Cardiomyopathy, Palmoplantar keratoderma, Woolly hair

INTRODUCTION

Naxos disease is a rare autosomal recessive inherited association of right ventricular dysplasia/dilated cardiomyopathy with woolly hair and palmoplantar keratoderma.[1] Woolly hair appears from birth, palmoplantar keratoderma develops during the first year of life and cardiomyopathy is clinically manifested by adolescence with 100% penetrance. Patients present with syncope, sustained ventricular tachycardia or sudden death. Symptoms of right heart failure appear during the end stages of the disease. In the Carvajal variant, the cardiomyopathy is clinically manifested during childhood, predominantly involving the left ventricle leading more frequently to heart failure. We report a case of Naxos disease who developed early cardiomyopathy.

CASE REPORT

A seven-year-old boy presented with curly hair from birth and rough palms and soles since the first year of life. On examination, his scalp hair was sparse, fine, pale, curly and brittle having the appearance of woolly hair [Figure 1]. His palms and soles showed diffuse palmoplantar keratoderma. The keratoderma was more pronounced over the medial aspect of both hands, fingers, heels and forefeet [Figures 2a and b]. He was the second sibling born to consanguineous parents and the previous sibling, had a sudden death. Other members of the family were not affected. His cardiac status was evaluated and electrocardiography showed T inversion in V1-V2. Since he was asymptomatic a Holter monitoring for arrhythmia was not done. A 2D-echocardiography revealed mild but definite dilatation of the right atrium and right ventricle with paradoxical interventricular septum suggesting early cardiomyopathy [Figure 3]. Microscopic examination of the hair with KOH mount did not reveal the presence of fungus. Scalp biopsy revealed epidermis with basket weave keratin. The papillary dermis showed a sparse lymphocytic infiltrate around the blood vessels. Hair shaft showed an angulated outline suggestive of woolly hair. A genetic screening could not be done. Since the patient had right ventricular involvement, woolly hair and palmoplantar keratoderma, a diagnosis of Naxos disease was considered.

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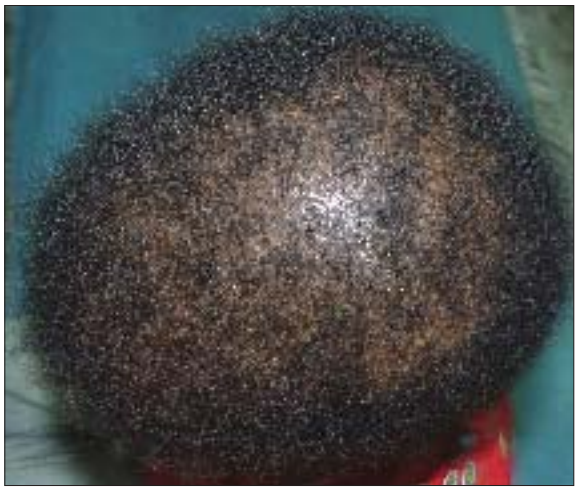
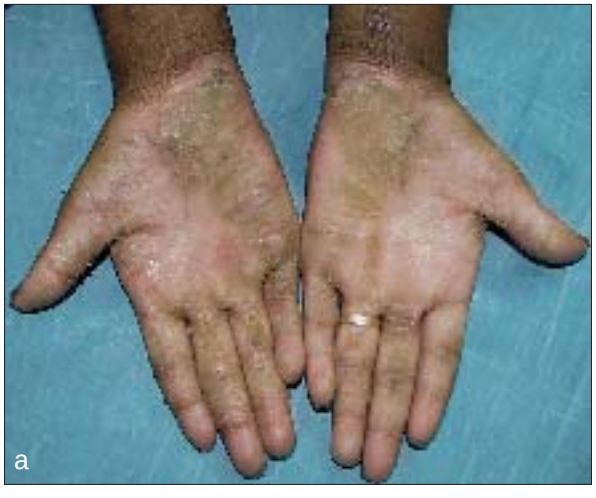


Figure 1: Woolly hair in Naxos disease



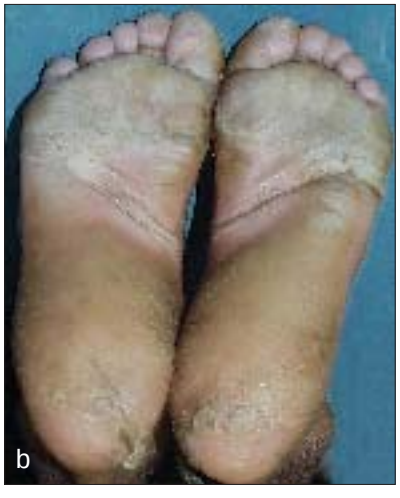


Figure 2: (a) Palmar keratoderma, (b) Plantar keratoderma.

DISCUSSION

Naxos disease was first described by Protonotarios *et al.,* in families originating from the Greek island of Naxos. Apart from Naxos, affected families have been detected in other Greek Aegean islands, Turkey, Israel and Saudi Arabia and two cases have been reported from India.[2-7] A variety of Naxos disease, reported as Carvajal syndrome presents at a younger age with predominantly left ventricular involvement leading to early heart failure and exhibits a clinical phenotype similar to that of dilated cardiomyopathy.[2,6]

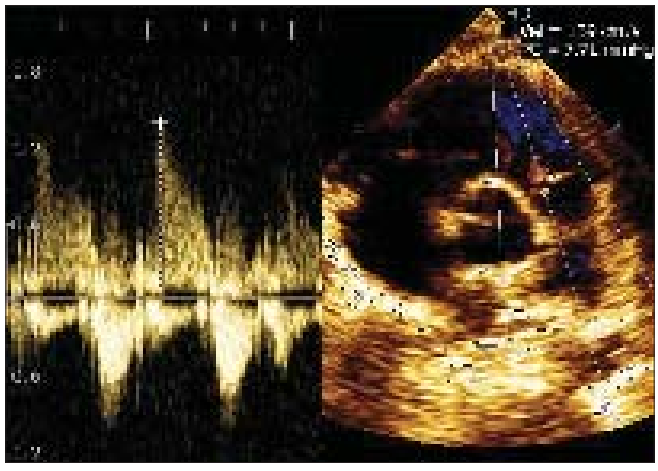


Figure 3: Echocardiogram of the patient showing cardiomyopathy

Woolly hair appears from birth, whereas palmoplantar keratoderma develops during the first year of life when infants start to use their hands and feet. The cardiomyopathy clinically manifests by adolescence and shows 100% penetrance.[8] Patients present with syncope, sustained ventricular tachycardia or sudden death. Symptoms of right heart failure appear during the end stages of the disease. One-third patients become symptomatic before the 30th year of life. In some cases, a few clinical findings of an early heart disease can be detected during childhood.

A two base-pair deletion in the plakoglobin (cell adhesion protein) gene (*Pk2157del2TG*), which maps to17q21, has been identified as the cause of Naxos disease and provided evidence that the pathogenesis might be related to a defect in myocardial mechanical coupling.[9] In the Carvajal disease variety two different mutations of the desmoplakin gene (*Dsp7901del1G* and *DspG2375R*), affecting the C-terminal of the protein, have been found as causative genes.[10] Defects in the linking sites of these proteins can interrupt the contiguous chain of cell adhesion, particularly under conditions of increased mechanical stress or stretch, leading to cell death, progressive loss of myocardium and fibro-fatty replacement.

Naxos disease, associated with progressive cardiomyopathy, has adverse prognosis, especially in the young. In a long-term study of an unselected population of patients with Naxos disease it was shown that risk factors for sudden death

included history of syncope, the appearance of symptoms, severely progressive disease of the right ventricle before the age of 35 years and the involvement of the left ventricle.[8]

The primary goal is the prevention of sudden cardiac death. Implantation of an automatic cardioverter defibrillator is indicated in patients who develop symptoms and/or structural progression, particularly before the age of 35 years.[11] Antiarrhythmic drugs are indicated for preventing recurrences of episodes of sustained ventricular tachycardia. In an attempt to control Naxos disease, systematic genetic screening of the populations at risk has been initiated and is starting to identify the heterozygous carriers of the plakoglobin gene mutation.

In this child, the electrocardiography did not reveal any arrhythmia. Since the patient was asymptomatic he was not given any treatment but parents were counseled regarding the disease. A regular follow-up of this patient and treatment at the time of symptoms will prevent sudden death. Naxos syndrome is rare and only two cases have been reported from India. Although cardiomyopathy usually manifests by adolescence, this patient had early involvement of his right ventricle.

Whenever woolly hair is associated with any kind of palmoplantar keratoderma, a search for possible cardiac abnormalities is recommended.[2]

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