

# Noonan Syndrome: A Case With Recurrent Keloid Formation

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*We describe a 6-year-old boy who presented with erythema and horny, follicular papules on the lateral aspects of the eyebrows and extensor surfaces of the arms. The condition was diagnosed as ulerythema ophryogenes and keratosis pilaris atrophicans faciei. The patient had the characteristic features of Noonan syndrome, including dysmorphic facial appearance, congenital heart disease, pectus excavatum, and cubitus valgus, accompanied by a tendency for keloid formation.*

Noonan syndrome, first described by Noonan et al<sup>1,2</sup> in 1963, is a genetic condition characterized by a typical craniofacial appearance, congenital cardiac defects, orthopedic abnormalities, psychomotor and growth retardation, and various skin changes.<sup>3,4</sup> We report on a patient with the typical features of Noonan syndrome accompanied by keloid formation, a combination that has rarely been reported in the literature.

## Case Report

A 6-year-old boy, the third child of nonconsanguineous Caucasian parents, had facial dysmorphism that had been recognized since birth. The family history was unremarkable. His 33-year-old mother with diabetes had undergone a normal vaginal delivery at 40 weeks' gestation. At birth he weighed 4250 g (95th percentile) and measured 54 cm (90th percentile). The neonatal period was complicated by feeding difficulties. Each feeding took almost an hour and was frequently followed by vomiting. The boy was able to sit unsupported at 8 months of age and walked at 18 months. His psychomotor development was normal, and he currently attends a reg-



**Figure 1.** Ulerythema ophryogenes involving the eyebrows, forehead, and cheeks. Dysmorphic features include a prominent forehead, ocular hypertelorism, a depressed and broad-based nasal bridge, and low-set ears.

ular school. At 2 months of age, workup of a systolic heart murmur revealed pulmonary stenosis and focal septal hypertrophy. The patient has been followed up with yearly echocardiograms. His cardiac findings have not changed, and he currently has no symptoms of heart failure. He was also found to have retractile testicles. No bleeding tendency was identified, and platelet count, prothrombin time, and activated partial thromboplastin time were all in the normal range. A karyotype study was also normal (46,XY).

The patient had erythema and small, horny, follicular papules distributed predominantly on the extensor aspects of the arms and lateral aspects of the eyebrows. First noted at 2 months, this condition worsened throughout childhood, leading to erythema of the forehead, cheeks, and upper lip. Marked alopecia of the eyebrows also developed (Figure 1). During infancy, the patient's dysmorphic features included a prominent forehead, ocular hypertelorism, a depressed and broad-based nasal bridge, and low-set ears. He had straight hair with a low-set posterior hair line. His nails were broad, with long prominent cuticles. Pectus excavatum and cubitus valgus also were noted. A psychiatric evaluation revealed that, although the patient was not intellectually retarded, he was immature for his age.

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**Figure 2.** Keloidal tissue on the third toe of the right foot.

A soft, reddish-blue keloidal tissue was noted at the tip of the third toe on the patient's right foot (Figure 2). His parents reported that this appeared when he was 4 years old, after the toe was crushed by a large stone. Initial complete excision of the lesion was followed by recurrence of a similar, more extensive lesion.

### Comment

Noonan syndrome involves multiple congenital anomalies and occurs at an estimated incidence of 1:1000 to 1:2500 live births. It is governed by autosomal dominant inheritance with variable phenotypic expression. Sporadic cases also have been reported. Affected persons have a normal karyotype, and the syndrome occurs with equal frequency in both genders.<sup>3-9</sup> The common facial features of Noonan syndrome are hypertelorism, epicanthal fold, depressed nasal root, wide nasal base, ptosis, low-set ears with thickened helix, decreased or absent eyebrows and/or eyelashes, webbed neck, and low posterior hairline. Although the weight and height of affected individuals is usually normal at birth, short stature occurs in 80% by adulthood. More than 90% of patients have a deformity of the chest, such as pectus excavatum and/or pectus carinatum. Scoliosis and talipes equinovarus are the other common bone deformities. About half of these patients have a congenital cardiac abnormality; a dysplastic, often stenotic, pulmonary valve is the most common lesion. Hypertrophic cardiomyopathy, septal defects, and patent ductus arteriosus are some other features.<sup>3,6</sup> Diagnosis of Noonan syndrome is based solely on clinical criteria because the underlying defect has yet to be discovered.<sup>4</sup>

Keloids are benign fibrous growths that occur in certain predisposed persons and usually result from an excessive tissue response to skin trauma. Keloid formation has been associated with progeria, osteogenesis imperfecta, scleroderma, and some inherited connective tissue disorders.<sup>10</sup> Although increased skin tension and endocrinologic factors have frequently been implicated in the pathogenesis of keloids, the

exact reason for the association is unknown.<sup>11</sup> We believe that our patient was an unusual case in that, in addition to possessing the typical characteristics of Noonan syndrome, he had a tendency for keloid formation. This feature of the syndrome has rarely been reported to date.<sup>12,13</sup> In her review of Noonan syndrome, Noonan<sup>4</sup> noted that patients with the condition had a tendency to form extensive keloids following surgical procedures. Genetic predisposition is most likely the basis for keloid formation in these patients, but the precise pattern of inheritance has yet to be determined.

We believe that possible predisposition for keloid formation should be kept in mind when evaluating patients with Noonan syndrome. The necessity for and consequences of every surgical procedure should be carefully evaluated.

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