

CASE REPORT

Mucopolysaccharidoses type IV A (Morquio syndrome): A case series of three siblings

Abstract

Mucopolysaccharidoses (MPS) are a family of inherited metabolic diseases that results from the deficiency of lysosomal enzymes involved in the degradation of the glycosaminoglycans (mucopolysaccharides). Despite the well-documented oral and dental findings of MPS type IV, there is not much literature documented about the incidence of this disorder among siblings in the same family. This report outlines the clinical and radiographic findings found in three siblings with Morquio syndrome.

Key words

Morquio syndrome, mucopolysaccharidoses type IVA, Mucopolysaccharidoses

Introduction

Mucopolysaccharidoses (MPS) are a family of inherited metabolic diseases that results from the deficiency of lysosomal enzymes involved in the degradation of the glycosaminoglycans (GAGs; mucopolysaccharides). These GAGs include dermatan sulfate (DS), heparan sulfate (HS), and keratan sulfate (KS). Chondroitin sulfate (CS) may also be involved. On the basis of clinical and biochemical studies, these disorders have been designated as MPS I through MPS VII.^[1]

Morquio and Brailsford independently reported cases of a disorder characterized by short neck, pectus carinatum, genua valga, pes planus, odontoid hypoplasia, and normal intelligence. Clinical and, later, biochemical and molecular heterogeneity was demonstrated by Dale as early as in 1931. At about 1960, this disorder was recognized as an MPS, caused by lysosomal accumulation and urinary excretion of the GAG, keratan sulfate.^[1]

Matalon *et al.* discovered the more common severe

Rekka P, Rathna PV, Jagadeesh S¹, Seshadri S²

Department of Pediatric and Preventive Dentistry, Meenakshi Ammal Dental College and Hospital, Meenakshi University, Maduravoyal, ¹Consultant Geneticist and Dysmorphologist, ²Director, Fetal Care and Research Foundation, MediScan, No. 197, Dr. Natesan Road, Mylopore, Chennai, India

Correspondence:

Dr. Rekka Prabakaran, Department of Pediatric and Preventive Dentistry, Meenakshi Ammal Dental College and Hospital, Meenakshi University, Maduravoyal, Chennai, Tamilnadu, India.
E-mail: rekkaprabakaran@yahoo.co.in

Access this article online

Quick Response Code:



Website:

www.jisppd.com

DOI:

10.4103/0970-4388.95586

form (MPS type IVA), caused by a deficiency of galactosamine-6-sulfate, an enzyme that degrades keratan sulfate. Arbisser *et al.* described a patient with normal *N*-acetylgalactosamine-6-sulfate but deficient lysosomal β -galactosidase. This generally milder condition, known as MPS type IVB, has been reported in several patients. All forms of Morquio syndrome have autosomal recessive inheritance. The frequency of MPS type IVA has been estimated to be about 1 in 76,000 to 1 in 216,400. The frequency of MPS type IVB has not been estimated, but it is rarer than MPS type IVA.^[1]

Despite the well-documented oral and dental findings of MPS type IV, there is not much literature documented about the incidence of this disorder among siblings in the same family. This paper presents the oral and radiological findings of three siblings diagnosed with MPS type IVA.

Case Reports

Three siblings of the same family, aged 16, 13, and 10 years, reported to the Department of Pediatric and Preventive dentistry, Meenakshi Ammal Dental College and Hospital, for routine dental check-up [Figure 1].

Case 1

The 16-year-old girl had been diagnosed with MPS type IVA when she was 8 years of age. Initial diagnosis was made at MediScan system, Fetal Care and Research Foundation, Mylapore, Chennai, in the light of clinical findings like coarse face, low nasal bridge, and the following radiographic findings which included spatulated ribs, gibbus deformity, vertebra bodies with beak-like projections on their lower anterior margins, and cuboidal shape of the metacarpals. A definitive diagnosis was made upon the detection of a significant increase in keratan sulfate in urine and marked deficiency of galactosamine-6-sulfate activity in her leukocytes, and her blood samples were sent to Taiwan for investigation. Family history revealed that her parents had consanguineous marriage and had subsequently two children at an interval of 3 years between the children. The siblings were also diagnosed with MPS type IVA when they were 5 and 3 years of age, respectively.

Clinically, the girl had retarded growth with short stature for her chronologic age. Bony deformities, including kyphosis, rotated legs, and short stubby hands, were evident. The girl had hearing impairment for which she was provided a hearing aid. The facial features included oblique palpebral fissures, flat nasal bridge, flared nose, and a large mouth with broad lips.



Figure 1: Three siblings of same family with MPS type IVA reported for routine dental check-up

The oral findings included thickened lips, prominent rugae, macroglossia, mouth breathing, tongue thrusting, and anterior open bite. The soft tissue findings revealed hyperplastic gingival tissues, slight gingival inflammation, and gingival recession of the mandibular anterior region. The dental findings included widely spaced non-carious permanent dentition with retained primary maxillary right and left canine teeth. The enamel layer of the permanent teeth appeared very thin and the teeth were smaller and more opaque than usual. The permanent posterior teeth had thin cusps resulting in concave buccal surface showing concavity in a gingivooclusal direction, leading to poorly formed or pointed cusps tips. The permanent maxillary incisors were spade shaped and spaced.

Panoramic radiographs taken at the same visit revealed thin enamel layer and abnormalities of cusp formation. The enamel did not extend as far down the neck of the tooth as normal but appeared as thin enamel cap. Although thin, the enamel was of normal density and contrasted well with the dentine. The radiographic appearance of dentine, pulp chambers, and the root canals was normal. The permanent maxillary and mandibular third molars were in Nolla's stage 5 [Figure 2].

Case 2

The 13-year-old younger sister had similar physical, skeletal, and facial features of the elder sister. Her oral findings were also similar to her elder sister except that she had healthy gingival tissues. The dental findings revealed widely spaced permanent teeth with retained primary maxillary right and left canine teeth. It also revealed the presence of dental caries in mesial surface of permanent mandibular right and left first molars. The enamel of permanent teeth appeared to have similar findings noticed in her elder sister.

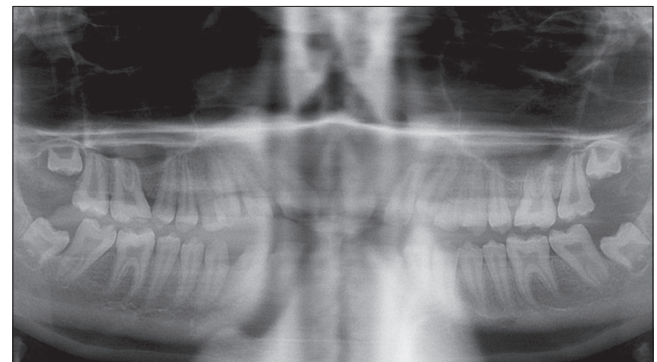


Figure 2: Panoramic radiograph of the 16-year-old sibling revealing thin enamel layer and abnormalities of cusp formation

Panoramic radiographs taken at the same visit revealed the presence of mesio-coronal radiolucency not close to pulp in permanent mandibular right and left first molar. The enamel, dentine, and pulp space of permanent teeth appeared similar to that of her elder sister. The permanent maxillary and mandibular third molars were in Nolla's stage 3 [Figure 3].

Case 3

The 10-year-old youngest sister also exhibited similar physical, skeletal, and facial features like her elder sisters. The oral findings revealed anterior open bite with generalized marginal gingivitis. The dental findings revealed mixed dentition with pre-shedding mobility present in primary maxillary right and left second molars, and mandibular right first and second molars. It also revealed the presence of dental caries in permanent maxillary and mandibular right and left first molars. The permanent maxillary central incisors were fractured (Ellis class II) [Figure 4]. The enamel of the permanent dentition was similar to that of her elder siblings.

Panoramic radiograph revealed coronal radiolucency close to pulp in permanent mandibular right and left first molars and not close to pulp in permanent maxillary right and left first molars. It also revealed erupting permanent maxillary right and left second premolars, and mandibular right first and second premolars. The enamel, dentine, and pulp space of permanent teeth appeared similar to that of her elder siblings. The permanent maxillary and mandibular third molars were in Nolla's stage 3 [Figure 5].

Discussion

This paper reports oral, dental, and radiographic findings of three girls whose incidence is reported in the same family. All the three siblings were diagnosed with MPS type IVA at their 3, 5, and 8 years of age. It shows that before the external features of the first child became apparent, the parents got conceived with the subsequent child, as the newly born child appeared normal in the first 2 years of its life. This insists the importance of prenatal genetic counseling for all the pregnant mothers.

A number of publications specifically mention the dental manifestations of Morquio syndrome. The importance placed on the teeth in the diagnosis of the syndrome varies among these papers, but it can be concluded that the dental findings are constant enough to be very helpful in diagnosis.

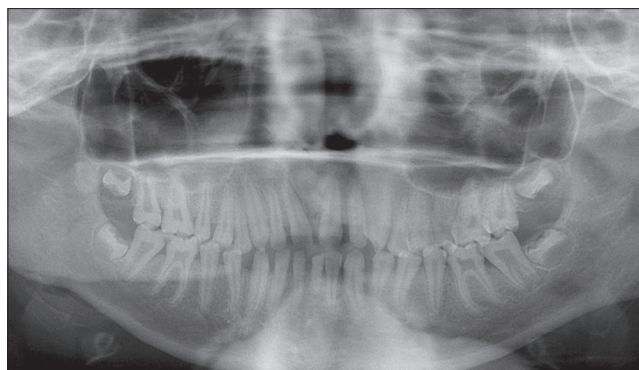


Figure 3: Panoramic radiograph of the 13-year-old sibling



Figure 4: Fractured permanent maxillary central incisors (Ellis class II)



Figure 5: Panoramic radiograph of the 10-year-old sibling

In 1952, Garn and Hurme described abnormalities of the teeth in nine siblings. Of them, three siblings showed thin enamel layer and in some places the dentine actually showed through. The surface was marked by numerous pits, and the enamel appeared to be structurally weak since it exhibited a tendency to fracture and flake off. In contrast, the six unaffected sibs had normal dentitions.^[2]

In 1966, Langer and Carey found that eight of their patients with Morquio syndrome showed a thin enamel layer with sharp pointed cusps in both primary and

permanent teeth.^[3] Levin *et al.* described similar findings in 12 affected patients, and they concluded that these dental abnormalities were specific for the Morquio syndrome and were not seen in the other MPS.^[4] However, Fujimoto and Horowitz, and Hecht *et al.* made no mention of tooth abnormalities in their reports of clinically atypical patients with MPS IVA.^[5]

In 1980, Groebe *et al.* reported on two patients with MPS IVB (β -galactosidase deficiency). Enamel hypoplasia was absent as it was in patients described by Arbisser *et al.* and those described by Trojak *et al.*^[6] As a result, Trojak *et al.* postulated that enamel thickness can be used to distinguish MPS IVB from MPS IVA. Similarly, the patients described by Maroteaux *et al.*, who were designated as having MPS IVC (enzyme defect unknown) by Beck *et al.*, appeared to have normal dentition. Therefore, it can be concluded that dental changes are highly specific for MPS IVA.^[3] In 1990, Martin J. Kinirons and Nelson examined nine children with MPS type IVA, and detailed medical, radiographic, and biomedical studies were performed independently. They reported that dental changes were present in all cases, although the severity varied. The severity of dental changes did not correlate with the clinical and biochemical findings in all cases. The dental changes were seen only in MPS type IVA and were not found in MPS type IVB or recently delineated MPS type IVC.^[3]

In our report, the dental manifestations of all the three siblings were confined to enamel defects in permanent teeth. In 1975, Gardner noted that the enamel was approximately one-third of the normal thickness, but of a normal radiodensity. The teeth were seen to be smaller, narrower, and more spaced than normal. The enamel also appeared more opaque than normal. The color of the teeth is described as grayish in some cases and yellow in others. This probably reflects normal color variation in dentine which underlies the thin translucent enamel.^[6]

The cusps of the teeth were described earlier as either flat or poorly formed or sharp and pointed cusps.

The likely explanation for this is that the thin enamel covering the pointed cusps on eruption soon wears and flakes off during mastication to produce flatter surface.^[5]

The clinical and radiographic dental findings in Morquio syndrome strongly resemble those seen in patients with hypoplastic forms of amelogenesis imperfecta. The reduced enamel thickness in X-linked and autosomal dominant forms of this latter condition can be distinguished, however, from the enamel changes of Morquio syndrome by the inheritance pattern and absence of skeletal problems.^[5]

This report outlines the clinical and radiographic findings found in three siblings with Morquio syndrome. It also highlights the importance of prenatal genetic counseling. Although most cases of Morquio syndrome are detected early by other medical specialities, an increased awareness of the condition may lead to involvement of pediatric dentist in the diagnosis at an early stage.

References

1. Gorlin RJ, Cohen MM, Hennekam RC. Syndromes of the head and neck. Newyork, USA: Oxford University Press; 2001. p. 131-5.
2. Garn SM and Hurme VO. Dental defects in three siblings afflicted with Morquio's disease. Br Dent J 1952;93:210-2.
3. Kinirons MJ, Nelson J. Dental findings in mucopolysaccharidosis type IV A (Morquio's disease type A). Oral Surg Oral Med Oral Pathol 1990;70:176-9.
4. Levin LS, Jorgenson RJ, Salinas CF. Oral findings in the Morquio syndrome (Mucopolysaccharidosis IV). Oral Surg Oral Med Oral Pathol 1975;39:390-5.
5. Barker D, Webury RR. Dental findings in Morquio syndrome (Mucopolysaccharidoses Type IVa). ASDC J Dent Child 2000;67:431-3, 407.

How to cite this article: Rekka P, Rathna PV, Jagadeesh S, Seshadri S. Mucopolysaccharidoses type IV A (Morquio syndrome): A case series of three siblings. J Indian Soc Pedod Prev Dent 2012;30:66-9.

Source of Support: Nil, **Conflict of Interest:** None declared.