Published in final edited form as:

Am J Med Genet A. 2008 February 15; 146A(4): 468–473. doi:10.1002/ajmg.a.32155.

Expanding the Phenotype of SPONASTRIME Dysplasia to Include Short Dental Roots, Hypogammaglobulinemia, and Cataracts

Karen W. Gripp^{1,*}, Caitlyn Johnson¹, Charles I. Scott Jr.¹, Linda Nicholson¹, Michael Bober¹, Merlin G. Butler², Linda Shaw³, Robert J. Gorlin⁴

¹Division of Medical Genetics, A. I. duPont Hospital for Children, Wilmington, Delaware

²Section of Medical Genetics and Molecular Medicine, The Children's Mercy Hospitals and Clinics, Kansas City, Missouri

³School of Dentistry, University of Birmingham, Birmingham, UK

⁴Department of Oral Pathology and Genetics, School of Dentistry, University of Minnesota, Minneapolis, Minnesota

Abstract

SPONASTRIME dysplasia (SD) is an autosomal recessive skeletal dysplasia of the spondyloepimetaphyseal dysplasia (SEMD) type. The name was derived from “*spondylar* and *nasal* alterations with *striated metaphyses*” [Fanconi et al. 1983; *Helv Paediat Acta* 38: 267–280]. We follow two previously reported patients with SD [Patients 3, 4 in Langer et al. 1996; *Am J Med Genet* 63: 20–27]. Since the original publication, additional findings were identified in these patients.

Keywords

SPONASTRIME dysplasia; short dental roots; hypogammaglobulinemia; cataracts

INTRODUCTION

SPONASTRIME dysplasia (SD) (OMIM#271510) is an autosomal recessive skeletal dysplasia of the spondyloepimetaphyseal dysplasia (SEMD) type. The name was derived from “*spondylar* and *nasal* alterations with *striated metaphyses*” [Fanconi et al., 1983]. Its vertebral findings change with age. Midfacial hypoplasia with a depressed nasal root, short, upturned nose, disproportionate short stature, and increased lumbar lordosis are present in all cases, thoracic kyphosis is common. Striations (longitudinal densities on radiographs) develop throughout early childhood in the metaphyseal margin. Intelligence is normal. SD is rare, with 14 undisputed cases published.

*Correspondence to: Karen W. Gripp, Division of Medical Genetics, A. I. duPont Hospital for Children, P.O. Box 269, Wilmington, DE 19803. kgripp@nemours.org.

We follow two patients with SD [Langer et al., 1996; Patients 3, 4] and noted additional findings. Hypogammaglobulinemia was present in both cases, however ivIG was required only in case 4. Another case, originally reported as novel SEMD with hypogammaglobulinemia [Slaney et al., 1999] has since been diagnosed with SD [Offiah et al., 2001]. One of our patients developed bilateral posterior subcapsular cataracts at age 11. Short dental roots were noted in one, and subsequently identified in his affected brother and in an unrelated case [Cooper et al., 2000]. The presence of this extremely unusual finding in 3/3 patients with SD is unlikely to be coincidental. Using these newly identified findings in a literature search, we discovered two additional cases with skeletal and physical findings typical for SD, short dental roots and bilateral childhood cataracts [Chapman et al., 1990; Shaw, 1995; Daley et al., 1996]. These patients may now be diagnosed with SD, bringing the total to 16.

In addition to being a distinguishing finding for diagnosing SD, short dental roots are important to identify because they can result in loss of permanent teeth [Shaw, 1995; Daley et al., 1996]. Orthodontic bracing is known to cause further root shortening, and should thus be approached carefully in SD. Awareness of the increased risk for hypogammaglobulinemia and cataracts may allow for appropriate treatment.

CLINICAL REPORT

Patients 1, 2, and 3 have been clinically diagnosed with SPONASTRIME dysplasia and manifest the typical physical and radiological abnormalities of SD. Midfacial hypoplasia with a depressed nasal root, short, upturned nose, increased lumbar lordosis, and short stature are present (Fig. 1). The vertebral findings of SD change with age. Platyspondyly and a relative increase in the vertebral body height in the anterior part are seen in early childhood (Fig. 2). Concave vertebral bodies and posterior scalloping is seen in older patients. Increased lumbar lordosis is present in all cases, thoracic kyphosis is common. Striations (longitudinal densities on radiographs) develop throughout early childhood in the metaphyseal margin, later they decrease or resolve. Flattened capital femoral epiphyses and coxa vara are typical (Fig. 3).

Additional Findings

Short dental roots.—Short dental roots of the secondary dentition were noted in Patient 1 on a panorex film, which was taken in response to the patient's complaint of tooth pain (Fig. 4A). Subsequently, short dental roots were seen in his brother, Patient 2 (Fig. 4B). Patient 2 underwent a Le Fort II osteotomy, and the panorex films taken prior to his procedure revealed the previously un-diagnosed short dental roots. Upon suspecting that short dental roots were part of the phenotype of this condition, panorex films were requested of Patient 3 in this report, who was previously diagnosed with SD [Cooper et al., 2000]. He also presented with short dental roots (Fig. 4C).

Short dental roots are an extremely unusual finding. An isolated trait of hypoplastic dental roots has been reported in two families (OMIM#146400). The anomaly has been reported to have a genetic background [Edwards and Roberts, 1990]. Microdontia, hypodontia, and dens

invaginatus may occur secondary to hypoplasia of the dental roots. Routine dental care is recommended to manage this anomaly, and orthodontic bracing should be avoided.

Hypogammaglobulinemia.—Patient 2 had numerous infections and was diagnosed with hypogammaglobulinemia at age 5 years. He had low total IgG, low IgG subclass 1; and no antibody response to tetanus and hemophilus influenza type B vaccine. The patient received ivIG until age 11 years.

Patient 1 is the older brother of Patient 2 and was diagnosed with hypogammaglobulinemia at age 18 years. Despite having a total IgG serum concentration of 22 mg/dl, the patient was asymptomatic, experiencing no recurrent infections.

An additional patient (Table I; Patient 4) had originally been published as “novel SEMD with hypogammaglobulinemia” [Slaney et al., 1999]. This patient was later diagnosed with SD [Offiah et al., 2001]. At age 6 months, she had low levels of IgG, including IgG subclasses 1, 2, 3, and 4; and very low antibodies to tetanus and hemophilus influenza type B vaccine. The IgG levels had increased at age 2 years, and the hypogammaglobulinemia was described as “transient” in the follow up report [Offiah et al., 2001]. Her physical and radiographic findings were typical for SD.

Cataracts.—Our Patient 2 developed bilateral posterior subcapsular cataracts at age 11 years. Routine eye care was highly recommended, and examination by an ophthalmologist revealed the asymptomatic cataracts. He had never received systemic steroids, and no underlying cause for the cataracts was identified.

DISCUSSION AND REVIEW

Possible Additional Cases of SPONASTRIME Dysplasia

Having identified short dental roots and cataracts in our patients with SD, we reviewed the literature for patients with dwarfism, cataracts and short dental roots. Two additional patients were identified who may also have SD (Table I; Patients 5 and 6).

Patient 5 [Chapman et al., 1990; Shaw, 1995].—This patient (Fig. 5A) was reported first as “Severe dwarfism with cataracts. A new osteo-chondrodysplasia.” He was born to nonconsanguineous parents from Bangladesh. His short stature was possibly present from infancy, but became more obvious with age. At age 16 years, his height was 99 cm (50% for age 3½ years), arm span was 107 cm. A depressed nasal bridge and midface hypoplasia were present, perhaps creating an illusion of macroglosia and/or prognathism. He had rhizomelia and shortening of the trunk. Elbow extension was limited. Platyspondyly, coxa vara, and metaphyseal striations of the knees were seen on radiographs [Chapman et al., 1990].

At age 5 years the patient reported difficult seeing in school and bilateral cataracts were subsequently noted. Visual symptoms were considerable at age 10 years. The cataracts were surgically removed at age 13 and 14 years, respectively, and vision improved. Dense posterior capsular remnants remained.

In a second publication this patient's short root anomaly was described [Shaw, 1995] (Fig. 5B). He had spontaneously lost his lower incisors at about age 7 years, and his canines were mobile at age 17 years.

The patient returned to Bangladesh after these studies were performed, and no additional information is available. While we do not have sufficient data to be certain, this patient's skeletal findings may be consistent with SD.

Patient 6 [Daley et al., 1996].—Short stature was noted in this male at around 2 years of age. At age 12 years radiographs showed extensive striations. Limited elbow extension and “stiffness of the hips” were present. His height was 135 cm at age 13 years (50% for age 9½ years).

He developed bilateral cataracts during childhood, which were surgically treated.

Narrow roots were noted on several primary teeth, which exfoliated prematurely. His permanent teeth had relatively small crowns and were loose due to extremely short, blunted roots. Most permanent teeth were lost by age 19 years.

Limited information on the skeletal radiographs is available on this patient, thus it is not possible to confirm the suspected diagnosis of SD.

CONCLUSION

Short dental roots, hypogammaglobulinemia and cataracts can be added to the findings seen in SD. Short dental roots were noted in 3/3 patients previously diagnosed with SD. This very unusual abnormality should be looked for in patients with SD, and dentists and orthodontists should be made aware of it. Hypogammaglobulinemia was noted in two patients previously diagnosed with SD. This abnormality may be suspected in SD patients with recurrent infections and may require treatment. Childhood cataracts were seen in one patient previously diagnosed with SD. The combination of short stature, depressed nasal bridge, striations, childhood cataracts and the very unusual short dental roots were present in two unrelated patients previously published as having unique syndromes. We suggest that these patients may also have SD.

REFERENCES

- Chapman S, Bunday S, Fletcher RF. 1990 Severe dwarfism with cataracts. A new osteochondrodysplasia. *Br J Radiol* 63:971–974. [PubMed: 2268769]
- Cooper HA, Crowe J, Butler MG. 2000 Sponastrime dysplasia: Report of an 11-year-old boy and review of the literature. *Am J Med Genet* 92:33–39. [PubMed: 10797420]
- Daley TD, Wysocki G, Bohay RN. 1996 Osteopathia striata, short stature, cataracts, and microdontia. A new syndrome? A case report. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 81:356–360. [PubMed: 8653471]
- Edwards DM, Roberts GJ. 1990 Short root anomaly. *Br Dent J* 169:292–293. [PubMed: 2261278]
- Fanconi CI, Giedion A, Prader A. 1983 The sponastrime dysplasia: Familial short-limb dwarfism with saddle nose, spinal alterations and metaphyseal striation. *Helv Paediat Acta* 38:267–280. [PubMed: 6618893]

- Langer LO Jr, Beals RK, LaFranchi S, Scott CI Jr, Sockalosky JJ. 1996 Sponastrime dysplasia: Five new cases and review of nine previously published cases. *Am J Med Genet* 63:20–27. [PubMed: 8723082]
- Offiah AC, Lees M, Winter RM, Hall CM. 2001 Sponastrime dysplasia: Presentation in infancy. *J Med Genet* 38:889–893. [PubMed: 11768397]
- Shaw L. 1995 Short root anomaly in a patient with severe short-limbed dwarfism. *Int J Paediatr Dent* 5:249–252. [PubMed: 8957839]
- Slaney SF, Hall CM, Atherton DJ, Winter RM. 1999 A new syndrome of spondyloepimetaphyseal dysplasia, eczema and hypogammaglobulinaemia. *Clin Dysmorph* 8:79–85. [PubMed: 10319195]

Fig. 1.

A,B: Our Patient 1 at age $7\frac{7}{12}$ years, note short trunk and depressed nasal bridge. **C,D:** Our Patient 2 at age $5\frac{9}{12}$ years, note depressed nasal bridge and midfacial hypoplasia.

Fig. 2. Radiographs of the spine of Patient 2 at age 2 days (**A**) and 6 months (**B**). Note striking platyspondyly (**A**), and platyspondyly and relative increase in the vertebral body height in the anterior part (**B**).

Fig. 3.
Radiograph of the lower extremity of Patient 1 at age 2 years. Note coxa vara; metaphyseal striations and small and flattened epiphyses.

Fig. 4. Panoramic radiographs of the (partial primary and) secondary dentition of Patients 1 (A), 2 (B), and 3 (C); showing short dental roots.

Fig. 5.
A, B: Photograph of Patient 5 at age 16 years, showing low nasal bridge and short stature. **C:** Panorex film Patient 5 at age 16 years, showing absence of the lower incisors and short dental roots.

TABLE I.
Summary of Clinical Features of Patients Diagnosed with SPONASTRIME Dysplasia

Finding	Patients previously diagnosed with SPONASTRIME dysplasia				Patients not previously diagnosed with SPONASTRIME dysplasia	
	Patient 1 [case 3; Langer et al., 1996]	Patient 2 [case 4; Langer et al., 1996]	Patient 3 [Cooper et al., 2000]	Patient 4 [Slaney et al., 1999; Offiah et al., 2001]	Patient 5 [Chapman et al., 1990; Shaw, 1995]	Patient 6 [Daley et al., 1996]
Short stature	+	+	+	+	+	+
Depressed nasal root	+	+	+	+	+	+
Normal IQ	+	+	+	+	+	+
Vertebral abnormalities	+	+	+	+	+	?
Epiphyseal, metaphyseal abnormalities	+	+	+	+	+	+
Striations	+	+	+	+	+	+
Coxa vara (progressive)	+	+	?	+	+	?
Short dental roots	+	+	+	?	+	+
Hypogammaglobulinemia	+	+	?	+	?	?
Cataracts	-	+	?	?	+	+