Presentation of mucopolysaccharidosis VII (β-glucuronidase deficiency) in infancy

SUMMARY A child is presented with mucopolysaccharidosis VII (β-glucuronidase deficiency), bringing to six the number of reported patients with the infantile onset form of this disorder. This patient exhibited the following features, previously unrecognised as part of this syndrome: presentation in the neonatal period, progressive joint contractures, and hydrocephalus. This child’s course and data from published reports indicate that mucopolysaccharidosis VII, unlike the other known mucopolysaccharidoses, is clinically recognisable in the newborn period and is most likely to be associated with moderate mental deficiency which does not progress over time.

Mucopolysaccharidosis VII (MPS VII) was first described by Sly et al1 in an infant with short stature, skeletal deformities, hepatosplenomegaly, and mental retardation. In both leucocyte and fibroblast cultures, a profound deficiency of β-glucuronidase was identified. Subsequently four additional patients with β-glucuronidase deficiency presenting in infancy have been described.8–4 We have recently evaluated a child with MPS VII who exhibited the following features previously unrecognised as part of this syndrome: presentation in the neonatal period, progressive joint contractures, and hydrocephalus. The purpose of this report is to delineate further the clinical features of this disorder and to support the concept that there exist at least two forms of MPS VII: an early onset type and at least one other form presenting in the second decade of life.

Case report

The patient (fig 1) was born after a 40 week gestation to a gravida 5, para 5, 34-year-old white woman and 36-year-old white man. The parents denied consanguinity. Gestation was remarkable for decreased fetal activity. Birthweight was 4·2 kg. (90th centile) and length was 55 cm (90th centile). He had coarse facies, a muscular torticollis, generalised contractures, bilateral metatarsus adductus, and camptodactyly of the left hand with absent distal interphalangeal creases of the third and fourth fingers.

At 11 weeks of age, he had a height of 62 cm (75th centile), a weight of 5·3 kg (30th centile), and a head circumference of 41·5 cm (50th centile). Over the first 9 months of life, he was admitted to hospital on four occasions for episodes of wheezing and pneumonia. At 9 months, his weight and height were 8·7 kg (30th centile) and 72 cm (30th centile), respectively. His head circumference, which up until 6 months had followed the 50th centile, had increased to 50 cm (>97th centile). In addition, a gibbus deformity of the lumbosacral spine and bilateral inguinal hernias were noted. Development was delayed with a history of first rolling over at 6 months and sitting at 8 to 9 months. He had a poor pincer grasp. A urine screen for acid mucopolysaccharides was normal. Complete skeletal survey revealed findings of dysostosis multiplex (fig 2). Computerised tomogram of the skull showed generalised enlargement of the third, fourth, and lateral ventricles, as well as prominence of the Sylvian fissures. A ventriculoperitoneal shunt was placed at 10 months. A ventricular tap at the time of surgery revealed increased intraventricular pressure.

At 11 months fibroblast culture and enzyme assay demonstrated a specific profound deficiency of β-glucuronidase with a mean value of 0·69 μmol substrate cleaved/mg protein/h at 37°C (normal
mean = 178 μmol). The father and mother exhibited intermediate values of 42 and 79 μmol, respectively. β-glucuronidase was assayed fluorometrically according to standard methods by measuring the 4-methyl umbelliferone released from the β-glucuronidic derivative.5

At 22 months, his height was 82 cm (10th centile), his weight was 12.2 kg (30th centile), and his head circumference was 51.5 cm (98th centile). Physical examination revealed diffuse mild corneal clouding, coarse facies, hepatosplenomegaly, a gibbus deformity, and increased joint stiffness. Development continued to be mildly delayed. Walking began at 18 months, finger feeding began at 19 months, and language was restricted to two single words. Repeat urine screen by the acid albumin turbidity test demonstrated grossly raised acid mucopolysaccharides (one hundred times the normal value).

**Discussion**

The patient described here represents the ninth report of a patient with β-glucuronidase deficiency. Six of these presented in infancy and manifest a distinct pattern of altered growth, structure, and development.1-4 The remaining three presented in the second decade of life and have few clinical similarities among one another.8 5 6 The clinical features of the infantile form of MPS VII are summarised in the table.

**TABLE Summary of clinical features of mucopolysaccharidosis VII presenting in infancy**

<table>
<thead>
<tr>
<th>Feature</th>
<th>CR1</th>
<th>MB2</th>
<th>KB3</th>
<th>JE4</th>
<th>ME4</th>
<th>TM*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postnatal growth deficiency</td>
<td>+</td>
<td>+</td>
<td>?</td>
<td>?</td>
<td>+</td>
<td></td>
<td>4/4</td>
</tr>
<tr>
<td>Macrocephaly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>3/4</td>
</tr>
<tr>
<td>Developmental delay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6/6</td>
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<tr>
<td>Coarsened facies</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>6/6</td>
</tr>
<tr>
<td>Corneal clouding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5/5</td>
</tr>
<tr>
<td>Ingual hernia</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>4/4</td>
</tr>
<tr>
<td>Hepatospleno-megaly</td>
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<td>4/4</td>
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<tr>
<td>Gibbus deformity</td>
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<td>4/4</td>
</tr>
<tr>
<td>Joint contractures</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Dysostosis multiplex</td>
<td>+</td>
<td>+</td>
<td>?</td>
<td>?</td>
<td></td>
<td></td>
<td>4/4</td>
</tr>
</tbody>
</table>

*The patient described here.

With respect to postnatal growth deficiency, height and weight were below the 3rd centile in two patients,1 9 and in two growth delay was mild (10th centile).5 With regard to macrocephaly, onset of accelerated head growth was variable, occurring in the first year in TM and CR1 4 and in the third year in KB.3 TM, the subject of this report, is the only patient in whom increased intracranial pressure requiring ventriculoperitoneal shunting has been described.

Developmental delay, mild to moderate in four of the six affected children,1 2 4 has been non-pro-
gressive in the two children followed up for some time, one for 8 years and one for 22 months. Two patients, KB and ME, showed marked developmental delay which we feel goes beyond the effect of \( \beta \)-glucuronidase deficiency. We appreciate the secretarial assistance of Ms Betty Grenier in the preparation of this manuscript.

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References


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Anal atresia and the Klein-Waardenburg syndrome

SUMMARY A 3-month-old male infant with type I Klein–Waardenburg syndrome with an imperforated anus and a perineal fistula is reported. The possible association of this gastrointestinal malformation with the KW syndrome is discussed.

The most common form of the Klein–Waardenburg (KW) syndrome is characterised by lateral displacement of the medial canthi and lacrimal punctae. The

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