Interstitial deletion in the long arms of chromosome 1:
46,XY,del(1)(pter→q22;q25→qter)

SUMMARY A child was brought to us with multiple anomalies. On examination we found an interstitial deletion in the long arms of chromosome 1. We studied genetic and chromosome markers, comparing our clinical and cytogenetic findings with other reported cases of chromosome 1 interstitial deletion.

Few cases of chromosome 1 interstitial deletion, with banding, have been published. As far as we know, only four clinical descriptions of patients with this type of deletion have been reported: Turleau et al\(^1\) 46,XX,del(1)(q24q32); Koivisto et al\(^2\) 46,XY,del(1)(q25q32); Garver et al\(^3\) in two sibs with del(1)(q25q32); and Schwanitz et al\(^4\) 46,XY,del(1)(q22q25) associated with a pericentric inversion (1)(q25p13). All these cases had similar congenital malformations.

Case report

The proband was born on 3.1.77 to non-consanguineous parents. Family history was unremarkable.

Received for publication 10 February 1980

The father was 25 and the mother 21. During pregnancy the mother, who worked with solvents, suffered from vulvovaginitis and metrorrhagia in the first three months and developed oedema which was treated with diuretics. Pregnancy was at term and delivery normal.

At birth the child weighed 1720 g (<3rd centile), was 40 cm tall (<3rd centile), and had a head circumference of 29.5 cm (<3rd centile). When we saw him 11 months later he weighed 4050 g (<3rd centile), was 54 cm tall (<3rd centile), and had a head circumference of 32.5 cm (<10th centile). Physical examination revealed microbrachycephaly with closed fontanelles and fused sutures, frontal bossing, sparse eyebrows, bilateral exophthalmus, epicanthus and hypertelorism, low set ears which were slightly pointed and without lobules, bilateral cleft lip, and cleft palate (fig 1). Other abnormal features included a slightly keel-shaped thorax, bilateral inguinal hernia, hips with bilateral coxa vara, bilateral cryptorchidism with hypoplastic scrotum, short broad hands and feet, clinodactyly of the 5th finger of both hands, and a transverse palmar crease in the right hand. X-ray examination showed the bone age to be retarded and he had only 11 pairs of ribs. Neurological examination was abnormal for his size, although not for his age. The ponderos-tatural curve rose slowly throughout this period. The VDRL, toxoplasmosis, cytomegalovirus, rubella, CSF, blood and urine tests were all normal.

CHROMOSOME STUDIES

Chromosome analysis was carried out on peripheral blood lymphocytes\(^5\) by G banding,\(^6\) Q banding,\(^7\) and C banding.\(^8\) The karyotype showed an interstitial deletion in the long arms of chromosome 1, because of loss of material between the q22q25 bands: 46,XY,del(1)(pter→q22;q25→qter) (figs 2 3).

The parents’ karyotypes were normal. In an attempt to discover the source of the deleted chromosome we studied the C banding pattern of

![Facies of the proband.](http://jmg.bmj.com)
the parents and proband without reaching any conclusion.

**GENE MARKER STUDIES (MRC 4103)**

The results of blood groups and enzyme and plasma protein markers are given in the table.

Assays of red cell UGPP at pH 7.8 using the method given by Bergmeyer showed that the patient and his parents had similar levels of this enzyme. UGPP is known to lie in the region 1q21→1q23. However, lack of control samples from children of the same age makes us reluctant to assert that UGPP is not in the deleted region 1q22→1q25. A further reason for caution is that the UGPP locus assigned to chromosome 2 by Shows et al might contribute to the UGPP activity.

The proband is heterozygous for the markers MNSs, Jk, and Gc, which have not been firmly assigned to an autosome, and for the markers PGM₁ and Fy, which are known to be on chromosome 1. These five markers can be excluded from the deleted region 1q22→1q25. The proband has also inherited Do⁺ from his father and Km¹ from his mother, but because C banding was not informative we cannot say which of these two markers can also be excluded.

**TABLE**  
Study of the family's genetic markers

<table>
<thead>
<tr>
<th></th>
<th>ABO</th>
<th>D</th>
<th>C</th>
<th>e</th>
<th>P₁</th>
<th>M</th>
<th>N</th>
<th>S</th>
<th>K</th>
<th>Lα</th>
<th>Lb</th>
<th>Fya</th>
<th>Fyb</th>
<th>Jka</th>
<th>Jkb</th>
<th>Doα</th>
<th>Cob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Father</td>
<td>0</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>0</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Proband</td>
<td>0</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>PGD</th>
<th>αFUC</th>
<th>PGM₁</th>
<th>UGPP₁</th>
<th>PEPC</th>
<th>GLO</th>
<th>AK₁</th>
<th>αHb</th>
<th>PGP</th>
<th>ADA</th>
<th>GPT</th>
<th>Tf</th>
<th>Gc</th>
<th>Gm</th>
<th>Pi</th>
<th>Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Father</td>
<td>A</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>BC</td>
<td>+1</td>
<td>-2</td>
<td>-10</td>
</tr>
<tr>
<td>Mother</td>
<td>A</td>
<td>2-1</td>
<td>2-1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>C</td>
<td>+1</td>
<td>+2</td>
<td>-10</td>
</tr>
<tr>
<td>Proband</td>
<td>A</td>
<td>2</td>
<td>2-1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>C</td>
<td>2-1</td>
<td>+1</td>
<td>-2</td>
</tr>
</tbody>
</table>

The Duffy blood group (Fy) is known to lie on chromosome 1q distal to 1q11 and has been lost in deletions from 1q25→1q32. Our patient's deletion would exclude Fy from the region 1q22→1q25 so that Fy probably lies proximal to our breakpoint in 1q22 or in 1q21 if the published family data are also considered.

**Discussion**

There are two known cases, one published, the other a personal communication (G S Sekhon, 1978), of interstitial deletions in chromosome 1 involving the same zone. The first case is a del(1)(q22q25) associated with an inv(1)(q25p13) in a 3-year-old mentally retarded child with delayed growth,
hypotonia, micrognathia, abnormal ears, high arched palate, hypoplastic fingers, bilateral inguinal hernia, cryptorchidism, and pes valgus. The other case\textsuperscript{13} is a del(1)(q21 or 22q25) in a 16-month-old boy with microcephaly, frontal bossing, epicanthal folds, microphthalmia, abnormal ears, high arched palate, bifid uvula, micrognathia, small middle phalanges of the 5th fingers, clinodactyly, umbilical hernia, left cryptorchidism, small penis and scrotum, hypotonia, and delayed bone age.

Some of these clinical anomalies, delayed growth, malformed ears, micrognathia, abdominal hernias, hypotonia, and cryptorchidism, were also present in our case. These are all anomalies common to many non-specific chromosomopathies and some of them are to be found accompanying interstitial deletions in other zones of the long arms of chromosome 1.\textsuperscript{1-3} Further reports will be required to establish a characteristic clinical spectrum.

Our results suggest that the $F_y$ locus might lie...
proximal to our breakpoint in 1q22 or in 1q21. Our
UGPP assay results might suggest that UGPP lies
in the same region but this should be interpreted
with caution.

Acknowledgements are due to Dr Maluenda of the
Pediatric Service of the C E Ramón y Cajal, to Dr
G de la Fuente of the Universidad Autónoma of
Madrid, to Miss Jean Noades for blood group
determinations, and to members of the MRC Blood
Group Unit and MRC Human Biochemical Genetics
Unit, University College London.

C Estévez de Pablo, J M García Sagredo,
M T Ferro, P Ferrando, and C San
Román
Servicio de Genética Médica,
C E Ramón y Cajal,
Madrid, Spain

References
1 Turlau C, Roubin M, Chavin-Colin F, Stage M, de
Grouchy J. Déletion intercalaire de novo del(1) (q24
q32-1) chez une enfant malformée. Ann Genet (Paris)
2 Koivisto M, Akerblom HK, Remes M, de la Chapelle A.
Primary hypothyroidism, growth hormone deficiency and
congenital malformations in a child with the karyotype
46,XY,del(1) (q25q32). Acta Paediatr Scand 1976;65:
513-8.
3 Garver KL, Ciocco AM, Turack NA. Partial monosity
or trisomy resulting from crossing over within a re-
4 Schwantiz G, Schmid P, Hagale CH, Daffner RW,
Grosse KP. Partial deletion of 1q, following a peri-
centric inversion, in a boy with multiple minor morpho-
logic anomalies and mental retardation. Acta Genet Med
5 Arakaki DT, Sparkes RS. Microfleuocytes for culturing
6 Seabright M. A rapid banding technique for human
7 Caspersson T, Zech L, Johansson C, Modest EJ.
Identification of human chromsomes by DNA-binding
8 Chandley AC, Fletcher J. Centromere staining at meiosis
9 Bermeyer HU. Methods of enzymatic analysis. New York,
10 Report of the Committee on the Genetic Constitution of
11 Shows TB, Brown JA, Gogging AP, Haley LL, Byers MG,
Eddy RL. Assignment of a molecular form of UDP
glucose pyrophosphorylase (UGPPS) to chromosome 2
12 Cook PJL, Page BM, Johnston AW, Stanford WK,
Gavin J. Four further families informative for 1q and the
13 Sekhon GS, Hillman RE, Yu R, Aronson MM, Greene
AE, Coriell LL. Deletion in the long arm of chromosome
1 from a subject with multiple congenital abnormalities.

Requests for reprints to Dr C Estévez de Pablo,
Servicio de Genética Médica, C E Ramón y Cajal,
Madrid 34, Spain.

Interstitial deletion of the long arm
of chromosome 5 in a deformed
boy: 46,XY,del(5)(q13q15)

SUMMARY A boy with mental retardation and
physical abnormalities had an interstitial deletion
of one chromosome 5: 46,XY,del(5)(q13q15).

Deletion of the short arm of chromosome 5 is well
known syndrome. Interstitial deletions, however, are
uncommon. We had the opportunity to study a
patient with an interstitial deletion of the long arm
of a chromosome 5.

Case report

The proband was born after a normal pregnancy. A
caesarean section was performed for fetal distress.
He was the second child of the family. The parents,
21 and 25 years old, were in good health and had
normal intelligence. A sister was born prematurely
2 years previously and died at 6 days of age. She had
no malformations. The family history was otherwise
unremarkable and there had been no abortions.
Birthweight was 2500 g, length 45 cm, and head
circumference 34.5 cm. The Apgar score was 9.

On physical examination the following abnormal
findings were present (fig 1): a small and narrow
forehead, a small, broad, upturned nose, a flat nasal
bridge, hypertelorism, upward curving eyelashes, a
large prominent metopic suture, a triangular shaped
mouth, a large philtrum with a deep groove, retro-
micrognathia, large ears, short neck, short upper
limbs, syndactyly of the big toe and the 3rd and 4th
toes, and clinodactyly of the 5th finger. A cardiac
murmur was also heard. The result of the physical
examination was normal.

Received for publication 24 January 1980