Case reports

Journal of Medical Genetics 1988, **25**, 122-127

Absence of a lateral rectus muscle associated with duplication of the chromosome segment 7q32→q34

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SUMMARY Absence of the right lateral rectus muscle and hypoplasia of the left was found in a child with congenital esotropia. He had mental and physical retardation, bilateral optic nerve hypoplasia, and many minor dysmorphic features, including brachycephaly, high forehead, poorly folded, low set ears, epicanthic folds, exaggerated Cupid's bow, long philtrum, and single palmar creases. Unusual features were a markedly ridged palate and a plantar crease which passed from the first and second interspace across the lateral border of the foot. He was found to have an unbalanced karyotype with duplication of chromosome segment 7q32→q34 (46,XY,der(2),inv?ins(2;7)(q21;q32q34)mat). The mother, maternal aunt, and sister of the proband all had a balanced rearrangement and were phenotypically normal.

Absence of one of the ocular muscles is a very rare event and an unusual cause of squint. In this paper we describe a child who had minor dysmorphic features, mental retardation, and congenital esotropia which, at operation, was found to be caused by absence of the right and hypoplasia of the left lateral rectus muscles. Chromosomal analysis revealed a duplication of segment 7q32→q34 due to an unbalanced insertional rearrangement. This rearrangement was found in a balanced form in the mother, aunt, and sister of the proband, who were all phenotypically normal.

Case report

The proband, a white male infant born on 23.6.79,

was the second child of healthy, unrelated parents. An older sister was normal and the pregnancy had been preceded by two midtrimester miscarriages (fig 1). He was born at 42 weeks' gestation weighing 3.06 kg. Routine examination showed a number of minor dysmorphic features which included bilateral epicanthic folds, a simian crease on his left hand, wide cleft between the first and second toes of both feet, and dislocatable hips.

At five and a half months of age his development was delayed and he had generalised hypotonia. A few more dysmorphic features had become apparent (fig 2). He had brachycephaly with a high forehead, poorly folded, low set, irregular ears, a depressed nasal bridge, a long philtrum, a pronounced Cupid's bow, and a markedly ridged palate (fig 3). The intercanthal distance was 22 mm (below the third centile) and the interpupillary distance was 42 mm (above the 50th centile). Both feet had an unusual crease running from the first and second interspace passing transversely across the lateral border of the foot (fig 4).

FIG 1 Family pedigree.

Received for publication 15 November 1986.

Revised version accepted for publication 29 January 1987.

FIG 2 (a) Lateral view of face of the index case. Note low set, poorly formed ears, prominent forehead, brachycephaly, and epicanthic fold. (b) Note high forehead, epicanthic folds, and convergent squint.

FIG 3 Markedly ridged palate.

He had a marked alternating convergent squint of approximately 35° with bilateral restriction of abduction, and the visual performance was poor. The ocular media were clear, but in the fundi there was bilateral optic nerve hypoplasia, both discs appearing small and pale. Surgery was carried out at

the age of four, and bimedial rectus recession produced some improvement, but on attempting bilateral lateral rectus resection the left one was found to be extremely flimsy, while the right one was absent. The inferior oblique muscles were smaller than normal, while the other recti appeared normal. At operation the right superior rectus was split sagittally and the lateral half was sutured to the lateral side of the globe. Following this the eye position was greatly improved, with only 10° of residual esotropia.

At five years three months his weight was below the 3rd centile (14.1 kg) and the general development was very retarded, although he could walk independently and understand simple commands. His hearing seemed normal but the visual performance remained very poor due to the optic nerve hypoplasia.

CYTOGENETICS

G banded chromosomes showed that the index case (IV.2) had an additional segment, including a faint dark band, inserted into band 2q21 (fig 5); this chromosomal abnormality was present in all metaphases examined from skin and blood. A balanced insertional rearrangement between chromosomes 2 and 7 was found in the mother of the index case (III.2), maternal aunt (III.5), and sister (IV.1). The shifted segment involved the faint dark band 7q33 but it is uncertain if the segment was inserted up-

FIG 4 *Unusual plantar crease.*

FIG 5 *Two partial karyotypes of chromosomes 2 and 7 from the index case. The lines connect related dark bands including the dark band 7q33 inserted into 2q21. Pair 7 is normal.*

FIG 6 *Two partial karyotypes of III.2, the mother of the index case. The lines connect related dark bands. Arrows point to the deleted region 7q32→q34 and its insertion into 2q21.*

right or inverted into chromosome 2 at q21 (fig 6). The karyotype of the balanced carriers was 46,XX,inv?(ins(2;7)(q21;q32q34), or in more detailed form, 46,XX,inv?ins(2;7)(2pter→2q21::7q32→7q34::2q21→2qter;7pter→7q32::7q34→7qter). The proband's karyotype was 46,XY,der(2)inv?ins(2;7)(q21;q32q34)mat, or in more detailed form, 46,XY,der(2)inv?ins(2;7)(2pter→2q21::7q32→7q34::2q21→2qter)mat.

The father (III.1) has a normal karyotype with an enlarged satellite region on one chromosome 21 which has apparently been inherited by the index case but not by his sister.

The genetical imbalance of the index case IV.2 is therefore a duplication of the segment 7q32→q34. In addition, there may be effects on control of rearranged genes in the vicinity of the breakpoints.

Discussion

Absence of an external ocular muscle has not previously been described in association with chromosomal abnormalities and there have been only a few reports of absent eye muscles in association with a syndrome. It has been reported with Axenfeld's anomaly¹ and Apert's syndrome.² In Duane's syndrome, in which there is little or no abduction beyond the midline, the lateral rectus muscle is well formed, but the sixth cranial nerve nucleus is absent

and the muscle is innervated from the third cranial nerve nucleus.

We have not found any other record of duplication of the segment 7q32→q34. The numerous case reports cited by Schinzel³ of dup(7)(q32→qter) describe variable features which are not found in our case. However, Nielsen *et al*⁴ reported one family transmitting 46,XX,ins(13;7)(q32;q34): three children had a deletion of 7q32→q34, all were retarded, and one, a girl, had bilateral optic atrophy and hypermetropia. This family is obviously at risk of segregating the duplication of this segment 7q32→q34 as in our case. The palatal ridging, skin creases on the soles, absent eye muscle, and optic nerve hypoplasia of our patient are unusual features which may be characteristic of 7q32→q34 duplication.

References

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Concurrent de novo interstitial deletion of band 2p22 and reciprocal translocation (3;7)(p21;q22)

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SUMMARY A child is described with a de novo interstitial deletion of band 2p22 and a reciprocal translocation (3;7)(p21;q22). The child has mild developmental delay, coloboma of the right eye, and Hirschsprung's disease. The clinical and cytogenetic findings are described.

Case report

The proband, the second child of normal unrelated parents aged 28 and 30, was born at term by elective lower segment caesarian section. Birth weight was 3035 g and the Apgar scores were 8 at one minute and 10 at five minutes. She was mildly jaundiced, lethargic, and floppy at birth. The only dysmorphic

features noted were epicanthic folds and coloboma of the right iris, which was atypical, being upwards and medially located (fig 1). Shortly after birth she developed respiratory distress, abdominal distension, and persistent vomiting. Abdominal x rays revealed generalised bowel distension with multiple fluid levels. A suction rectal biopsy showed an absence of ganglion cells and was acetylcholinesterase positive. A diagnosis of Hirschsprung's disease was made. A left iliac fossa loop colostomy was per-