Group G Deletion Syndromes

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Lejeune et al (1964) first described an infant mosaic for a group G chromosomal deletion which he compared to individuals with Down's syndrome and emphasized many of the 'contretype' features. Reisman et al (1966) described a patient with a G deletion who was remarkably similar and proposed the term 'anti-mongolism'. More recently a second syndrome has been described in which G deletions have been associated with a quite different and somewhat more variable appearance (Hoefnagel et al, 1967; Reisman et al, 1967; Schulz and Krmpotic, 1968; Weleber, Hecht, and Giblett, 1968). In addition, three patients with apparent monosomy G, a condition previously thought to be lethal, have now been reported and each seems to conform to one of the two recognizable patterns (Thorburn and Johnson, 1966; Al-Aish et al, 1967; Hall, Fredga, and Svenningsen, 1967). Two new cases of deletions of a group G chromosome are presented.

Case Reports

Case 1. The patient (T.Y., Fig. 1) was born weighing 2650 g after an uncomplicated 37-week gestation and delivery. The mother was 20 years old and primiparous; the father was 24 years old. There was no known exposure to teratogens during this pregnancy. Both parents were in good health and there was no family history of congenital malformations. Persistent neonatal oliguria and cyanosis since birth prompted her transfer to the University Hospital for further evaluation at 2 days of age.

On admission the child weighed 2580 g, length 41 cm, and head circumference 31 cm. She was an irritable, cyanotic, microcephalic infant female with a markedly distended abdomen, large low-set ears, 'anti-mongoloid slant', short neck, slightly small mandible, mild hypertelorism, blepharochalasia, diastasis recti, an umbilical hernia, bilateral simian creases, Brushfield spots, inwardly curved fifth fingers, and bilateral retropositioning of her fourth toes. Because of anuria, careful insertion of a speculum into the vagina resulted in approximately 150 ml of grossly bloody urine being forcefully expelled. No further problems with urination were subsequently noted. The anus, located immediately posterior to the vagina, was hypoplastic. Neurologically, she had a poor Moro reflex, symmetrical movements and reflexes, and mild hypertonia.

Diagnostic studies. Routine serum values were normal. There was gross hematuria and microscopic pyuria with 100,000 colonies of coagulase negative staphylococci on culture per ml of urine. Further detailed viral and bacterial cultures were unrewarding.

![Fig. 1. Case 1 at 6 days of age. Note the characteristic 'anti-mongoloid' facies.](http://jmg.bmj.com/ on May 29, 2017 - Published by group.bmj.com)
There was no measurable IgA with an IgM of 9 mg% and an IgG of 850 mg%. Left renal agenesis, moderate right hydrocephrosis, normal iliac index, a distended urogenital sinus, and tetralogy of Fallot were demonstrated radiologically.

Hospital course. Supportive care with an isotope, oxygen, and antibiotics were given, but the urinary tract infection persisted for one month. She remained cyanotic and had frequent spells of hypoxia until two months of age when she began to gain weight slowly and tolerated weaning from oxygen. At four months of age, she was discharged from the hospital after having gained only 830 g since birth. At that point, she was voiding without difficulty and a follow-up IVP showed some improvement of the right hydronephrosis.

Additional problems did not arise until eight and a half months of age when she developed marked irritability and progressive anorexia with no evidence of increased cyanosis or fever. She weighed 4490 g and had achieved complete head control, a social smile, and the ability to sit unsupported. On readmission she was extremely irritable, but was afebrile and was not dyspneic. New findings were: a sharp liver edge and many E. coli on urine culture. She was immediately placed on parenteral ampicillin, but died unexpectedly the next day. Although septicaemia was strongly suspected, blood cultures were negative.

Necropsy findings. The heart had a high, interventricular septal defect (1.5 cm diameter) with an hypertrophic right ventricle, an extremely small pulmonary artery, and a patent ductus arteriosus. The left kidney weighed 0.25 g and was 5 mm in diameter. It was situated upon a dilated, renal pelvis (1 x 0.5 cm). The right kidney was normal. The right ureter probed easily until 1 cm from the bladder wall where it became stenotic. The urethra was 1 cm in length with the opening close to the vulva. In the posterior wall of the bladder an ureterocoele (2 x 1 cm diameter) was noted which communicated with the bladder via several punctate openings in the bladder mucosa, but was sealed off from the left ureter via a delicate translucent membrane.

Case 2. This patient (P.S., Fig. 2) was the product of a 36-week uncomplicated gestation, 12-hour labour, and breech delivery under saddle block anaesthesia. The birth weight was 1730 g. He was the third child of a 29-year-old gravida 3 para 2 white female and a 33-year-old white male with insulin-dependent diabetes mellitus who used cyclamates extensively. Two older sibs were normal, but a maternal aunt with Down's syndrome had died at seven months of age. On the fifth day of life, he developed generalized seizures which were quickly controlled with phenobarbital. However, he remained hospitalized for two months due to repeated bouts of pneumonitis. This was thought to be secondary to his frequent regurgitations and subsequent aspiration associated with a cleft palate. He underwent repair of bilateral inguinal herniae at approximately one month of age.

At seven months, when he was first admitted to the University Hospital, he had minimal head control, followed a moving light inconsistently, and responded to a loud noise with a profound, startled reflex. At that time his weight was 4050 g, length was 56 cm, and head circumference was 37.5 cm. He was a small, pale, infant male with microphthalmia, hypertelorism, epicanthal folds, a depressed nasal bridge, low set ears with a prominent tragus, a cleft palate involving the posterior two thirds and uvula, micrognathia, prominent umbilicus, and bilateral inguinal herniorrhaphy scars with testes in the inguinal canals. There was marked tapering of the distal phalanges of both hands and a large space between the second and third fingers such that the thumb and index finger were used as a single unit. The flexor crease over the proximal left fifth interphalangeal joint was absent. Hip abduction was severely limited bilaterally and pterygium were present at the elbows and knees with prominent pits over them on the extensor surfaces. Neurologically, he demonstrated increased muscle tone, a mild Moro reflex, absent ankle jerks, and inability to roll over. He did smile and grasped objects clumsily.

Diagnostic studies. Radiologic evaluation revealed a localized evagination of the right hemidiaphragm, subluxation of the left hip, suggestive subluxation of the right hip, conical shape of the distal phalanges of both great toes, normal acetabular angles, undeveloped para-nasal sinuses with a fore-shortened appearance of the nose, deviation of the nasal septum, and a normal IVP.
A pneumoencephalogram was normal. An EEG was interpreted as being mildly abnormal because of frequent sharp theta transients with emphasis on the right side. Ophthalmologic examination under general anesthesia revealed slightly increased intraocular pressure and Bergemeister's papillae.

**Cytogenetics and Dermatoglyphics**

(Tables I and II)

In both patients karyotypic analysis of the skin and peripheral leucocytes were done using the standard cytogenetic techniques.

**Case 1** (Fig. 3). There were four G chromosomes, one of these had very large satellites and recognizable short arms. Another of the G group chromosomes had no detectable short arms; this chromosome was not seen in centromere association with other acrocentric chromosomes.

**Case 2** (Fig. 4). This patient had four G group chromosomes, one of which appeared to be a Y chromosome, and the other three were normal satellite chromosomes. In addition to these normal chromosomes, there was a consistently metacentric chromosome without satellites which was half the

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<tr>
<td>Leuc.</td>
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<tr>
<td>Leuc.</td>
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**TABLE I**

**CYTOGENETIC STUDIES**

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**TABLE II**

**DERMATOGLYPHS**

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**Fig. 3.** A partial karyotype of case 1. Lines a, b, and c are of the patient. Lines d and e are of the father and mother respectively.
The size of the smallest G chromosomes. As seen on the partial karyotypes the parents did not have these variations in either case. Table II lists the fingertip patterns seen in these patients. The karyotypes of the parents in both instances showed normal chromosomes (Figs. 3 and 4).

![Karyotype Image](image_url)

**Fig. 4.** A partial karyotype of case 2. Lines a, b, and c are of the patient. Lines d and e are of the father and mother respectively.

**Discussion**

As more G deletion cases have been reported, two patterns or syndromes seem to have emerged as suggested by Reisman et al (1967) and again by Weleber et al (1968). The first pattern is characterized by a peculiar 'anti-mongoloid' appearance with downward slanting palpebral fissures, blepharochalasia, large low-set ears, protruding nose, and micrognathia. Serious cardiovascular, renal, urogenital, gastrointestinal, and minor musculoskeletal anomalies are also seen as well as thrombocytopenia and decreased IgA (Lejeune et al, 1964; Reisman et al, 1966; Hall et al, 1967; Challacombe and Taylor, 1969; Engel et al, 1966; Penrose, 1966). Our first patient (Fig. 1) bears a striking resemblance, both in her facial appearance and in her associated anomalies, to the patients described by this group. However, our first case and other patients with 'anti-mongolism' had several features commonly seen in Down's syndrome, eg, Brushfield spots, simian creases, inwardly curved fifth fingers, and retropositioning of the fourth toes.

The second pattern of anomalies typically includes mental retardation, hypotonia, ptosis, epicanthal folds, flat nasal bridge, low set ears, bifid uvula, cutaneous syndactyly, and minor anomalies of the musculoskeletal system (Thorburn and Johnson, 1966; Al-Aish et al, 1967; Hoefnagel et al, 1967; Reisman et al, 1967; Schulz and Krmpotic, 1968; Weleber et al, 1968). Our second patient (Fig. 2) shows many of these features, but also had a cleft palate, microphthalmia, diffuse hypertonia, pterygium, and pits over muscle insertions.

Although we attribute our patients' anomalies to their chromosomal aberrations, the association of a set of anomalies with a particular chromosomal defect does not prove a cause and effect relationship since, in several kindreds, group G deletions have been reported without associated anomalies. In addition, familial short arm deletions of group G chromosomes have been found in patients with chronic granulocytic leukaemia, chronic lymphocytic leukaemia, Down's syndrome, atrial sepal defects, anomalous pulmonary venous return, Albright's syndrome, and numerous congenital malformations (Neu, Leao, and Gardner, 1966).

**Summary**

Two new cases of G deletion syndromes are presented with emphasis being placed on the emergence of two distinct syndromes. The first case, 'anti-mongoloid' syndrome is characterized by a typical facies, hypertonicity, and severe cardiovascular, renal and genito-urinary anomalies; the second and less distinctive syndrome by mental retardation, hypotonia, flat nasal bridge, epicanthal folds, bifid uvula, cutaneous syndactyly, and minor skeletal anomalies.

**REFERENCES**


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