During and after the treatment with ATG no side-effects were encountered. Hemogram report 1½ year after the treatment showed Hb 11 g/dl, TLC 7200/mm^3, neutrophils 2736/mm^3, reticulocyte count 2% and platelet 1.5 lac/mm^3. Bone marrow biopsy shows a cellularity of 20% with a few megakaryocytes and slightly bigger foci of hemopoiesis. As per the criteria for response to ATG therapy(3,4), our patient can be said to have attainted complete response.

Discussion

The exact pathogenesis of SAA is not known but the concept of alteration in the immunological regulation is strongly believed. The role of immunosuppressive therapy with ATG in the management of SAA is now well established in the West(2), the clinical response ranging from 14 to 85%(5,6). In India the drug is still on experimental therapy, its preliminary experience, particularly in children is not encouraging(2). Our patient has responded well and after attaining complete response within 3 months of treatment, has maintained normal blood counts without any transfusion for 18 months after stopping therapy. This could be due to absence of poor prognostic factors like infection and bleeding. Desired response to ATG may also not be observed if the defect is in the stem cell rather than in the microenvironment influenced by immunological dysregulation. We did not encounter any side effect during or after the therapy probably due to simultaneous use of IV methylprednisolone as adjuvant therapy(1).

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A Satellited Metacentric Marker Chromosome in a Phenotypically Normal Male (Transsexual)

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There have been reports of karyotypes including an extra small metacentric chromosome. Most of these chromosomes have been found in patients with congenital malformations and/or mental retarda-

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tion. In most instances there is no explanation of the origin of the abnormal chromosome. Gamstrop *et al.*(1) suggested that such chromosomes could be isochromosomes of the short arms of either D, E or G chromosomes.

Nielsen *et al.*(2) in 3 normal males described that such an extra chromosome was very likely a deleted Y. Small metacentric marker chromosome has been detected in phenotypically normal as well as abnormal individuals. Non-satellited accessory marker chromosomes were preferentially found in sporadic cases(3). The carrier showed severe retardation and somatic anomalies. Due to the small size of the accessory chromosome and/or inadequate cytogenetic staining technique, several investigators failed to confirm the presence or absence of satellites(4,5).

Gender identity disorders include transsexuals, transvestite and homosexual. Transsexuals are defined as having had sense of discomfort and inappropriateness about anatomical sex for atleast 2 years and have strong wish to get rid of the genitalia (and breasts in females). They are either cross living in the opposite gender role or fantasies of doing so. Gender identity disorder cases are occasionally analyzed for chromosome pattern. Available literature does not report presence of such marker chromosome in a phenotypically normal male suffering with transsexualism.

We present our findings of an extra satellited small marker metacentric chromosome in a phenotypically normal male suffering with behavioral problem of transsexualism.

Case Report

A 20-year-old male with normal developed secondary sexual characters, presented himself for change of sex. Clinical examination showed normal pubertal changes, well developed testes and male organ. Using electrolysis, patient has been removing his facial hair. Since childhood patient is behaving and dressing up like a girl. He has two sisters and one brother, all are normal. There is no history of mental retardation, abortion or still births in the family. Patient's father is dead and mother is not willing to co-operate.

Cytogenetic investigations

Buccal smear for Barr body analysis was prepared using routine technique and stained with 2% Thionine stain and 0.5% quinacrine mustard. Two hundred cells were counted for presence of X-body and Y-body each. Peripheral blood cultures were set up using standard methods. Chromosome preparations were G and C banded for analysis. Slides were also treated for NDR staining. Chromosome counting was made in 30 metaphases. Three G and C banded cells were analysed.

Chromosomes analysis showed 47 chromosomes with XY pattern and a small satellited marker metacentric chromosome present in all the cells analyzed (*Fig. 1*). In most of the metaphases, satellites were seen on one end of the marker chromosome. G-banded preparations did not reveal much information on the origin of the marker chromosome. C-banding showed two dark bands on the marker chromosome separated by a light staining area and Y-chromosome showed dark staining on the long arm (*Fig. 2*). NOR staining revealed very clear staining of satellites on most of the acrocentrics but the staining of marker chromosome is not very clear. High resolution banding is not done routinely. Patient has not turned up for second blood sample for high resolution chromosome banding.

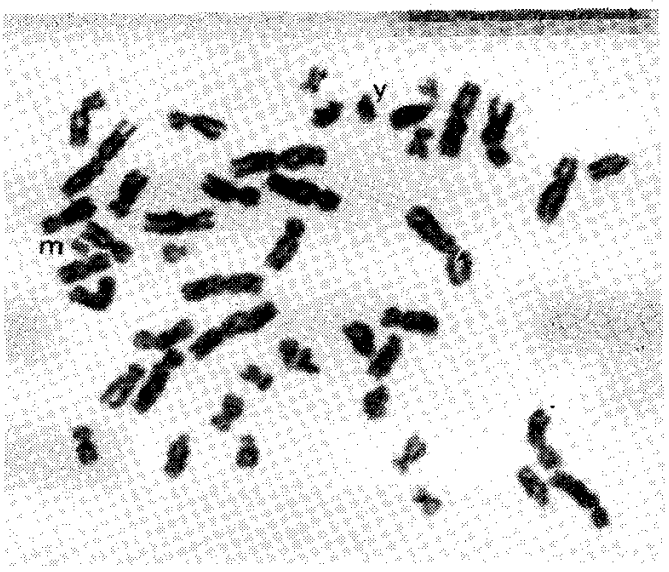

Fig. 1. Metaphase spreads showing marker (m) chromosome with satellites and a Y chromosome.

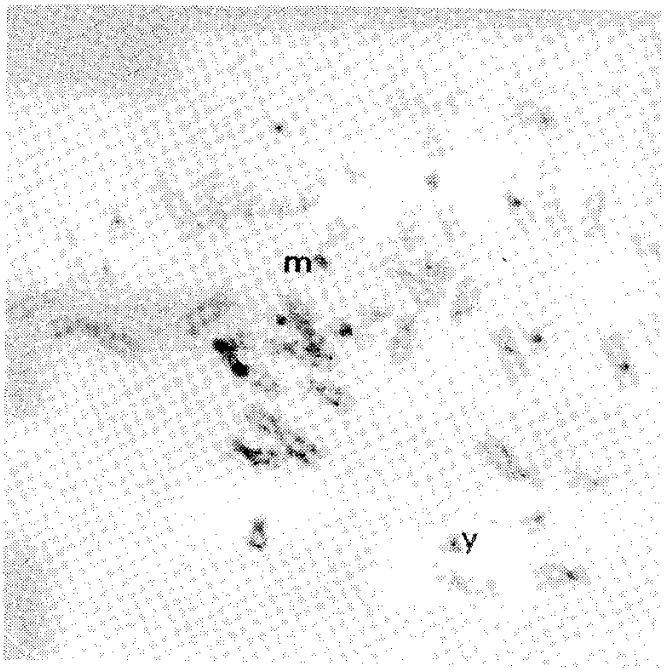

Fig. 2. C-banded metaphase showing marker (m) chromosome and Y chromosome with darkly stained long arms.

Discussion

The extra marker chromosome was found to be small metacentric chromosome which shows satellite on one end. In some cells satellites were not very clear. No significant satellite association was seen. Occasionally the marker chromosome was seen close to one of the D group chromosome. The marker chromosome in the present case was too small to reveal any significant G-banding pattern.

Marker chromosome showing satellite does suggest its origin from satellited short arm from an acrocentric chromosome. It may be either isochromosome or translocation chromosomes made up of short arm-satellite material from the D or G group chromosome. Similar findings have also been reported by Nielsen *et al.*(6). Marker metacentric chromosome originating from No. 15 is comparatively common finding. This abnormality is usually associated with mental and developmental retardation, hypotonic and behavioral disturbances. There is a possibility of short arm of chromosome No. 15 forming an isochromosome and represented as extra marker chromosome. The present case has behavioral problem and has no physical growth or mental retardation. There is no evidence at present to confirm the involvement of any specific acrocentric chromosome.

It is doubtful whether the marker chromosome is derived from any part of autosomal chromosomes other than that of the short arm satellited D or G group chromosomes. Since derivatives from any other part of autosome most probably would have led to physical and mental defects of more severe nature.

The marker chromosome being from autosomal material does not show any deleterious phenotypic effect. It is thus most likely that the marker is a supernumerary heterochromatic chromosome. Increase in heterochromatin may, however, have an effect on meiosis or mitosis as indicated from previous findings of an

increased risk of major chromosome abnormalities in the progeny of mothers with 9 qh^+(7).

An increase in heterochromatin as also found in individuals with enlarged short arms or satellites in D and G chromosomes may also involve an increased risk of phenotype aberrations. The case under investigation showed no phenotypic abnormality except the transsexual behavior.

Steinbach *et al.*(8) reviewed 31 non-familial cases of an accessory bisatellited marker chromosome. Most of them (21 cases) were ascertained by a phenotypically abnormal proband. Of the ten non-familial cases of accessory bisatellited marker chromosomes, eight individuals did not show phenotypic abnormalities. One had unilateral talus equinovarus and another patient showed a pyloric stenosis and other abnormalities.

Cytogenetic population studies have revealed further cases with supernumerary small chromosomes with or without satellites(9). Small extra chromosomes have been reported in surveys of mentally retarded individuals(10) in subfertile males(11) in children with psychiatry disorders(12) and in surveys of newborn infants(13). The frequency of these marker chromosomes seems to be highest in studies of mentally retarded populations.

A small supernumerary satellited submetacentric chromosome has been found to be associated with the so-called cat-eye syndrome(14). Some of the small satellited chromosomes have been shown to be derived from chromosome15.

Mother of the case reported in this paper does not have history of any fetal loss of offspring with phenotypic abnormalities. Friedrich *et al.*(7) reported an increase in abortions and chromosomally abnormal offspring in a family having a $9qh^+$ chromosome and in similar type of marker chromosome.

Data from reported cases of extra marker satellited or non-satellited metacentric chromosome concludes that *denovo* origin of such marker chromosome will give rise to psychiatric problem still remains to be determined.

Finding of an extra marker satellited small metacentric chromosome in a case of transsexual may be accidental.

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NOTES AND NEWS

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Guest Editor: Dr. Vimlesh Seth

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