Picture stories

A short girl with learning disability due to Turner mosaicism with a ring X chromosome

***W A Y A Wickramaarachchi[1], T Udaya N de Silva[2], Sumudu Nimali Seneviratne[1,3]**

Sri Lanka Journal of Child Health, 2021; **50**(3): 555-557
DOI: http://doi.org/10.4038/sljch.v50i3.9748
(Key words: Turner syndrome, ring chromosome, learning disability)

Introduction

Turner syndrome (TS) affects 1:2500 live births[1]. Turner mosaicism accounts for 30% of girls with TS, and a ring X chromosome is found in around 2-5% of girls having Turner mosaicism[2]. This makes TS with ring mosaicism a rare occurrence with an incidence of 2.6-6 per million. Girls with Noonan syndrome can have a Turner-like phenotype and cognitive impairment[3]. We present a Sri Lankan girl with short stature and learning disability due to Turner mosaicism with ring X chromosome.

Case report

A 10-year-old girl was brought to hospital for assessment of short stature. She was a term baby with a birth weight of 2kg and had 2 elder siblings. There was no parental consanguinity. She had developmental delay from early childhood, and her current cognitive functioning was compatible with a 5-year-old. On examination, her height was on the 0.4th percentile, well below the mid-parental height range. She had low set ears, a shield shaped chest, widely spaced nipples, wide carrying angle and mild scoliosis (Figure 1). Cardiovascular system, including blood pressure, was normal. She was pre-pubertal.

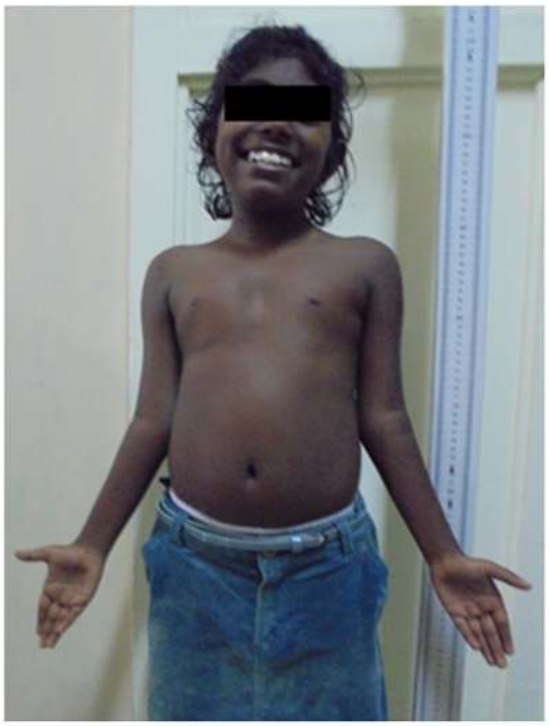

Figure 1: ***Child showing some features of Turner phenotype***

****Permission given by parents to publish photograph***

Basic biochemical investigations for short stature and skeletal age were within normal limits. Her karyotype was 46, X,r(X)(p22.2q21)[21]/ 45,x[19], where 40 cells were analysed, and two cell lines were identified, with 21 cells showing a ring X chromosome and 19 cells showing monosomy for chromosome X (Figure 2). The karyotyping was thus compatible with Turner mosaicism with a ring chromosome X.

Ultrasonography showed a left-sided partial duplex renal system and a pre-pubertal uterus while ovaries were not well visualized. Thyroid function tests and 2D-echocardiography were within normal limits. The family were counselled regarding the condition. Possibility and implications of growth hormone therapy were explained. As this child was not unduly affected by her short stature, growth hormone therapy was not commenced based on a family decision. Learning disability was evaluated further and remedial teaching was arranged. The potential need for female hormone replacement therapy to induce puberty was explained and long-term follow-up arranged.

[1]*Department of Paediatrics, Faculty of Medicine, University of Colombo, Sri Lanka,* [2]*Teaching Hospital, Anuradhapura, Sri Lanka,* [3]*Lady Ridgeway Hospital for Children, Colombo, Sri Lanka*
**Correspondence:* yashomi696@gmail.com

https://orcid.org/0000-0003-4641-536X

(Received on 07 April 2020: Accepted after revision on 22 May 2020)
The authors declare that there are no conflicts of interest
Personal funding was used for the project.

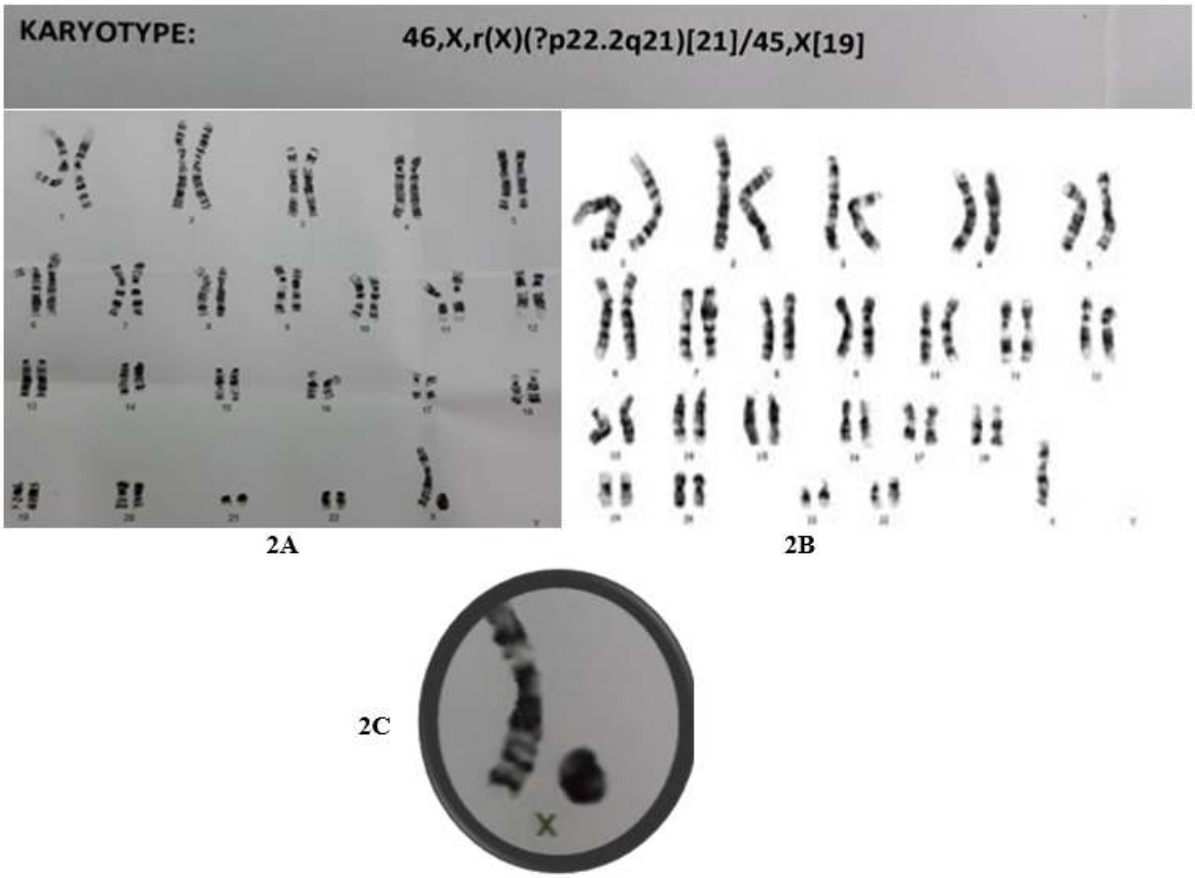

Figure 2: ***Karyotype report indicating Turner mosaicism with 21 cells showing a ring X chromosome 46,X,r(X) cell line (2A) , and 19 cells showing monosomy for X chromosome 45,X cell line (2B). 2C shows a closer view of the ring X chromosome.***

Discussion

The principal clinical features in TS are short stature, primary amenorrhea and infertility[4]. Turner mosaicism usually has a milder phenotype. Ring chromosomes are commonly caused by 2 terminal breaks in both chromosome arms with fusion of the broken ends. The acentric portion frequently disappears giving rise to partial monosomy. Phenotype varies depending on the size of the ring chromosome and deletions of short and long arms[4]. Females with Tuner mosaic with a ring X chromosome karyotype can have the characteristic features of TS including short stature, cubitus valgus, ovarian dysgenesis, and thyroid disorders[4,5]. Lack of certain other TS features, such as neck webbing and early life lymphoedema is reported in this rare genotype, and were also absent in our patient[6].

While girls with TS usually have normal intelligence (although often weak in arithmetic, visuospatial skills, and processing speed)[2], more pronounced learning disability and autism spectrum disorders are commonly seen in TS with ring chromosome[4]. There can be significant phenotypic overlap between girls with TS and Noonan syndrome[3]. In Noonan syndrome, cognitive issues and learning disabilities are frequent, with 10%-40% requiring special education[3]. In this child, karyotyping confirmed the diagnosis as Turner syndrome with ring mosaicism rather than Noonan syndrome.

Early growth hormone therapy can rectify growth failure and improve height in TS[7]. However, there is a lack of data on growth hormone utilisation in girls with Turner mosaicism with ring X chromosome. Spontaneous puberty and menarche has been reported in two girls, who later required female hormone replacement therapy in young adulthood[6].

References

1. Stochholm K, Juul S, Juel K, Naeraa RW, Højbjerg Gravholt C. Prevalence, incidence, diagnostic delay, and mortality in Turner syndrome. *Journal of Clinical Endocrinology and Metabolism* 2006; **91**(10): 3897-902. https://doi.org/10.1210/jc.2006-0558 PMid: 16849410

2. Rovet J. Turner syndrome: a review of genetic and hormonal influences on neuropsychological functioning. *Child Neuropsychology* 2004; **10**(4): 262-79. https://doi.org/10.1080/09297040490909297 PMid: 1562184

3. Romano AA, Allanson JE, Dahlgren J, Gelb BD, Hall B, Pierpont ME, *et al.* Noonan syndrome: clinical features, diagnosis, and management guidelines. *Pediatrics* 2010; **126**(4): 746-59. https://doi.org/10.1542/peds.2009-3207 PMid: 20876176

4. Gürsoy S, Erçal D. Turner Syndrome and its variants. *Journal of Pediatric Research* 2017; **4**(4): 171. https://doi.org/10.4274/jpr.35744

5. Sybert VP, Mccauley E. Turner's syndrome. *New England Journal of Medicine* 2004; **351**: 1227-38. https://doi.org/10.1056/NEJMra030360 PMid: 15371580

6. Lee YL, Shuib S, Wu LL. Turner Syndrome with Ring X Chromosome: Do they have a distinct phenotype? *IIUM Medical Journal Malaysia* 2018; **17**(3):

7. Spiliotis BE. Recombinant human growth hormone in the treatment of Turner syndrome. *Therapeutics and Clinical Risk Management* 2008; **4**(6): 1177. https://doi.org/10.2147/TCRM.S1440 PMid: 19337425 PMCid: PMC2643099