

Childhood Stroke Unveils Asymptomatic Turner Syndrome: A Case Report

Anas Elgenidy¹

Faculty of Medicine, Cairo University, Cairo, Egypt.

Mohamed Abd-elfattah²

Department of Pediatrics,

University Children's Hospital Abu El-Reesh El-Mounira, Cairo, Egypt.

Elsayed Mohamed Elsayed³

Department of Pediatrics, Kalba hospital, UAE.

Sara Nada⁴

Faculty of Medicine, Menoufia University, Menoufia, Egypt.

Hamdah Y. Hanifa⁵

Faculty of Medicine, University of Kalamoon, Syria.

Menna Hemaia⁶

Faculty of Medicine, Zagazig University, Zagazig, Egypt

Aya Sherif⁷

Faculty of Medicine, Beni Suef University, Beni Suef, Egypt.

Khaled Saad^{8*}

Department of Pediatrics, Assiut University, Assiut, Egypt

***Corresponding author:**

Khaled Saad, Professor of Pediatrics,

Assiut University Children's Hospital, Assiut, Egypt.

Address: Assiut University Children's Hospital,

Assiut University Campus, 71111, Assiut, Egypt.

ksaad8@yahoo.com, khaled.ali@med.au.edu.eg

Abstract

Turner syndrome (TS) is a common genetic disorder affecting females, characterized by the complete or partial absence of one X chromosome. Due to its non-specific symptoms, TS often goes undiagnosed until late childhood or adolescence. We report the case of a 7-year-old girl with mosaic TS, incidentally, discovered when she presented to the emergency department with hemiplegia and hypertension. Her medical history included gastroenteritis, fever, and left-sided weakness—symptoms that are non-specific and could be attributed to various conditions. This case highlights the importance of considering TS in the differential diagnosis when young female patients present with atypical neurological symptoms.

Keywords: Turner Syndrome, Stroke, X chromosome, hemiplegia.

Introduction:

Turner syndrome (TS) is a genetic disorder affecting females, with an incidence of 25–50 per 100,000 live-born girls. It results from the complete or partial absence of one X chromosome (Wolff et al., 2010). Approximately 50% of individuals with TS have a non-mosaic 45,X karyotype. Other chromosomal abnormalities include deletions of the long or short arm, isochromosomes of the long arm, ring X chromosomes, and mosaicism involving combinations such as 45, X/46, XX (Wolff et al., 2010; Saad et al., 2014). Diagnosis relies on karyotyping and a variety of clinical manifestations.

TS is associated with an increased risk of congenital anomalies and comorbid conditions affecting the cardiovascular, renal, skeletal, endocrine, hepatic, and gastrointestinal systems (Saad et al., 2014; Fiot et al., 2022). Cardiovascular diseases are the primary cause of mortality in TS, significantly reducing life expectancy compared to the general population. About 50% of TS patients have congenital cardiovascular malformations, including bicuspid aortic valve, aortic stenosis, aortic root dilatation, atrial and ventricular septal defects, and dextrocardia (Stefil et al., 2022; Gorito et al., 2021). The most common defect is coarctation of the aorta, which may present with hypertension even in newborns (Wolff et al., 2010; Bordeleau et al., 1998; Gorito et al., 2021).

Patients with TS are prone to developing systemic hypertension at an early age, which may persist into adulthood. This hypertension can result from congenital renal malformations—present in up to 15% of TS patients—or may be idiopathic. If left untreated, chronic hypertension can lead to vascular and end-organ damage, resulting in chronic kidney disease, retinopathy, ischemic heart disease, and stroke. Early detection, appropriate treatment, systematic surveillance, and close follow-up are crucial to decrease cardiovascular morbidity and mortality (Wolff et al., 2010).

Clinically, TS has variable features, including characteristic facial features, high-arched palate, webbed neck, low posterior hairline, broad chest, and lymphedema of the hands and feet. However, the most common presentations are short stature during childhood and primary amenorrhea in adolescence. Studies have shown that one-fifth of cases are diagnosed in the neonatal period due to typical clinical features, another fifth during childhood investigations for short stature, and approximately 50% not until adolescence when presenting with primary amenorrhea. Thus, the diagnosis of TS can often be delayed in children (Wolff et al., 2010; Saikia et al., 2017; Park et al., 2013; Lee & Conway, 2014). We present a challenging case of TS that was discovered incidentally.

Presentation of Case

A 7-year-old girl, the fourth child of non-consanguineous parents and one of twins, presented to the emergency department with sudden onset of left-sided hemiplegia and high blood pressure. She had no significant past medical history or prior admissions to the pediatric intensive care unit. One week before admission, she experienced gastroenteritis, fever, and progressive weakness on the left side of her body, accompanied by facial palsy and blurred vision.

On examination, her blood pressure was markedly elevated at 170/100 mm Hg in the upper limbs and 65/45 mm Hg in the lower limbs. She exhibited tachycardia at 120 beats per minute. Neurological examination revealed weakness in the left upper limb and facial palsy consistent with an upper motor neuron lesion. Fundoscopic examination showed grade 1–2 papilledema. The chest examination was unremarkable.

Brain MRI revealed a hemorrhagic stroke (Figure 1) and partial cerebral infarction due to ischemia. Echocardiography showed left ventricular hypertrophy, indicative of chronic hypertension. Computed tomography angiography (CTA) of the aorta demonstrated a coarctation distal to the left subclavian artery (Figure 1). Laboratory tests showed hemoglobin of 13 g/dL, hyponatremia at 132 mEq/L, normokalemia at 3.6 mEq/L, and normal international normalized ratio (INR). Urinalysis revealed proteinuria of 39 g/24 h.

The patient was started on ampicillin-sulbactam, doxazosin mesylate (0.6 mg), and hydralazine hydrochloride (0.2 mg). Blood pressure remained elevated despite treatment, fluctuating between

140/90 mm Hg and 144/100 mm Hg. Antihypertensive therapy was adjusted, and a beta-blocker was added. A thrombophilia panel was performed due to the stroke, and imaging studies revealed thrombosis in the aorta and its branches. Enoxaparin was initiated for anticoagulation.

By the eighth day of admission, her blood pressure stabilized at 115/65 mm Hg but required ongoing antihypertensive medication. Neurologically, the left lower limb weakness improved, while the left upper limb weakness persisted. Swelling was noted in the right upper limb; however, the D-dimer test was normal.

A chromosomal analysis confirmed the diagnosis of Turner syndrome with a 45,X karyotype. The patient underwent cardiac catheterization with stent placement to correct the aortic coarctation. Following the procedure, her blood pressure stabilized, and laboratory values, including antineutrophil cytoplasmic antibodies (ANCA), complement component 3 (C3), and antinuclear antibodies (ANA), returned to normal. She was discharged in good health after a seven-day stay in the intensive care unit. Figure 2: Cardiac CT with 3D reconstruction showing severe narrowing in the arch of the aorta, distal to the left subclavian artery.

Discussion

We reported a case of a 7-year-old girl who was presented with left-sided hemiplegia and hypertension, leading to the incidental diagnosis of Turner syndrome (45,X karyotype). Initial symptoms of gastroenteritis, fever, and unilateral weakness are non-specific but, upon further investigation, were attributed to a hemorrhagic stroke and cerebral ischemia.

Turner syndrome is caused by the absence or structural abnormalities of one X chromosome in females (Wolff et al., 2010). It affects multiple organ systems, including the cardiovascular and nervous systems, and is associated with short stature, gonadal dysgenesis, congenital anomalies, and increased morbidity and mortality (Davis & Geffner, 2019).

A comprehensive study involving 781 Danish women with TS reported standardized mortality ratios of 3.5 for coronary heart disease and 2.2 for cerebrovascular disease, indicating a significantly higher risk compared to the general population (Stochholm et al., 2006).

Diagnosis of TS can be challenging due to its variable and often non-specific clinical features. While some cases are identified prenatally through procedures like amniocentesis, others are diagnosed based on physical characteristics such as short stature, webbed neck, and lymphedema. Additional manifestations may include ovarian failure, hearing loss, cardiac defects, and learning difficulties (Ranke & Saenger, 2001).

In our patient, hypertension was a significant finding. Hypertension is common in TS, affecting up to 40% of children and adolescents and 60% of adults, with higher detection rates when using ambulatory blood pressure monitoring (De Groote et al., 2015; Fudge et al., 2014; Los et al., 2016). Structural cardiovascular anomalies, such as coarctation of the aorta — as seen in our patient — contribute to hypertension in TS (Gravholt et al., 2017; De Groote et al., 2015). Left ventricular hypertrophy observed on echocardiography is a consequence of chronic hypertension.

The coarctation of the aorta was addressed with stent placement via cardiac catheterization, which led to stabilization of her blood pressure. Anticoagulation therapy with enoxaparin was initiated due to thrombosis detected in the aorta and its branches, highlighting the prothrombotic risk in TS patients. The patient's neurological symptoms partially improved with treatment. Persistent left upper limb weakness may require long-term rehabilitation. The swelling in the right upper limb warrants further evaluation to rule out possible thrombotic events or lymphedema, which can be associated with TS.

This case underscores the importance of comprehensive cardiovascular evaluation in patients with TS, even when the diagnosis is not initially apparent. Regular monitoring and early intervention are crucial to manage hypertension and prevent severe complications such as stroke.

Conclusion

This case highlights the need for clinicians to consider Turner syndrome in young female patients presenting with unexplained hypertension and neurological symptoms. Early diagnosis through karyotyping is essential for appropriate management. Regular cardiovascular assessments and blood pressure monitoring are vital to detect and treat potential complications promptly, thereby improving outcomes and reducing morbidity and mortality in patients with Turner syndrome.

Notes on Informed Consent

Informed consent for publication was obtained from the patient's parent. A comprehensive case description was provided, ensuring that any identifying information was appropriately anonymized. Participation was voluntary, and the parents were informed of the right to withdraw consent at any time. Confidentiality has been maintained throughout the reporting of this case.

Conflict of Interest: The authors declare no conflicts of interest.

References

- Bordeleau, L., Cwinn, A., Turek, M., Barron-Klauninger, K., & Victor, G. (1998). Aortic dissection and Turner's syndrome: Case report and review of the literature. *Canadian Journal of Emergency Medicine*.
- Davis, S. M., & Geffner, M. E. (2019). Cardiometabolic health in Turner syndrome. *American Journal of Medical Genetics Part C: Seminars in Medical Genetics*, 181(1), 52–58.
- De Groote, K., Demulier, L., De Backer, J., De Wolf, D., De Schepper, J., T'Sjoen, G., & Van Coster, R. (2015). Arterial hypertension in Turner syndrome: A review of the literature and a practical approach for diagnosis and treatment. *Journal of Hypertension*, 33(7), 1342–1351.
- Fiot, E., Alauze, B., Donadille, B., Samara-Boustani, D., Houang, M., De Filippo, G., ... & Simon, D. (2022). Turner syndrome: French national diagnosis and care protocol (NDCP). *Orphanet Journal of Rare Diseases*, 17, Article 112.
- Fudge, E. B., Constantacos, C., Fudge, J. C., & Davenport, M. L. (2014). Improving detection of hypertension in girls with Turner syndrome using ambulatory blood pressure monitoring. *Hormone Research in Paediatrics*, 81(1), 25–31.
- Gorito, V., Baptista, C., Santos, P., Costa, A. M., & Carvalho, J. (2021). Coarctation of aorta in Turner mosaicism. *International Journal of Pediatrics and Adolescent Medicine*, 8(4), 268–270.
- Gravholt, C. H., Andersen, N. H., Conway, G. S., Dekkers, O. M., Geffner, M. E., Klein, K. O., ... & Backeljauw, P. F. (2017). Clinical practice guidelines for the care of girls and women

with Turner syndrome: Proceedings from the 2016 Cincinnati International Turner Syndrome Meeting. *European Journal of Endocrinology*, 177(3), G1–G70.

- Lee, M. C., & Conway, G. S. (2014). Turner's syndrome: Challenges of late diagnosis. *The Lancet Diabetes & Endocrinology*, 2(4), 333–338.
- Los, E., Quezada, E., Chen, Z., Lapidus, J., & Silberbach, M. (2016). Pilot study of blood pressure in girls with Turner syndrome: An awareness gap, clinical associations, and new hypotheses. *Hypertension*, 68(1), 133–136.
- Park, J., Kim, Y. M., Choi, J. H., Lee, B. H., Yoon, J. H., Jeong, W. Y., ... & Kim, G. H. (2013). Turner syndrome with primary hyperparathyroidism. *Annals of Pediatric Endocrinology & Metabolism*, 18(2), 85–88.
- Ranke, M. B., & Saenger, P. (2001). Turner's syndrome. *The Lancet*, 358(9278), 309–314.
- Saad, K., Abdelrahman, A. A., Abdel-Raheem, Y. F., Othman, E. R., Badry, R., Othman, H. A., & Sobhy, K. M. (2014). Turner syndrome: Review of clinical, neuropsychiatric, and EEG status: An experience of tertiary center. *Acta Neurologica Belgica*, 114(1), 1–9.
- Saikia, U., Sarma, D., & Yadav, Y. (2017). Delayed presentation of Turner syndrome: Challenge to optimal management. *Journal of Human Reproductive Sciences*, 10(4), 297–301.
- Stefil, M., Kotalczyk, A., Blair, J. C., & Lip, G. Y. H. (2022). Cardiovascular considerations in management of patients with Turner syndrome. *Trends in Cardiovascular Medicine*, 32(6), 362–369.
- Stockholm, K., Juul, S., Juel, K., Naeraa, R. W., & Gravholt, C. H. (2006). Prevalence, incidence, diagnostic delay, and mortality in Turner syndrome. *The Journal of Clinical Endocrinology & Metabolism*, 91(10), 3897–3902.
- Wolff, D. J., Van Dyke, D. L., & Powell, C. M. (2010). Laboratory guideline for Turner syndrome. *Genetics in Medicine*, 12(1), 52–55.

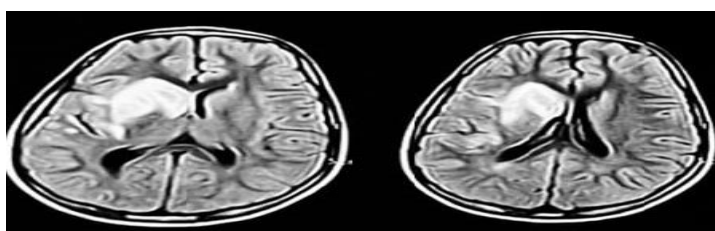


Figure 1: MRI brain with hemorrhagic stroke and partial brain infarction.



Figure 2: Cardiac CT with 3D reconstruction showing a severe narrowing in the arch of the aorta distal to left subclavian artery.