International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Bhanarkar KS et al. Int J Reprod Contracept Obstet Gynecol. 2026 Jul;15(7):2788-2792
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20262139

Case Report

A 14-year-old girl with primary amenorrhea and 46, XY karyotype: a case of Swyer syndrome

Kunika Shankar Bhanarkar*, Reenu Jain

Department of Obstetrics and Gynaecology, Max Super Speciality Hospital, Noida, Uttar Pradesh, India

Received: 30 March 2026
Revised: 02 June 2026
Accepted: 03 June 2026

***Correspondence:**
Dr. Kunika Shankar Bhanarkar,
E-mail: bhanarkarkunika14@gmail.com

ABSTRACT

Swyer syndrome (46, XY pure gonadal dysgenesis) is an uncommon condition within the spectrum of disorders of sex development. Individuals are phenotypically female but possess nonfunctional streak gonads and typically fail to undergo spontaneous pubertal maturation. The condition often presents with primary amenorrhea and carries a notable risk of gonadal neoplasia. A 14-year-old girl presented with absence of menarche and poorly developed secondary sexual characteristics. Clinical assessment combined with endocrine evaluation demonstrated elevated gonadotropins consistent with primary gonadal failure. Cytogenetic analysis confirmed a 46, XY karyotype. Pelvic imaging identified a small uterus along with bilateral streak-like gonads. These findings were confirmed through diagnostic laparoscopy. Considering the established malignancy risk associated with dysgenetic gonads, bilateral gonadectomy was undertaken. Histological examination confirmed fibrous gonadal tissue lacking germ cells, supporting the diagnosis of gonadal dysgenesis. Following surgery, the patient was initiated on estrogen therapy, which led to progressive development of secondary sexual characteristics and pubertal development during follow up. This case highlights the importance of considering Swyer syndrome in adolescents with primary amenorrhea and delayed puberty. Early recognition, timely surgical management and appropriate hormonal therapy are essential to reduce long-term complications and support normal physical development. Coordinated multidisciplinary care plays a key role in achieving favourable outcomes.

Keywords: Primary amenorrhea, 46, XY DSD, Swyer syndrome, Gonadal dysgenesis, Hormone replacement therapy

INTRODUCTION

Primary amenorrhea, defined as the absence of menarche by 15-16 years in the presence of normal secondary sexual characteristics or by 13 years in their absence, affects approximately 2-3% of adolescent girls.[1] Its etiology is broad and includes anatomical abnormalities, chromosomal disorders and endocrine dysfunctions. Among these, the identification of a 46, XY karyotype in a phenotypic female presents a diagnostic challenge and warrants evaluation for differences of sex development (DSD), a group of conditions characterized by discordance between chromosomal, gonadal and phenotypic sex.[3] Population-based studies have reported a prevalence of approximately 6.4 per 100,000 for 46, XY DSD, with gonadal dysgenesis often diagnosed during adolescence due to delayed pubertal development.[3] Swyer syndrome, or 46, XY pure gonadal dysgenesis, is a rare but clinically significant form of DSD first described by Swyer in 1955.[2] It results from failure of testicular differentiation during embryogenesis, most commonly due to abnormalities in the SRY gene, although other genes such as SOX9, WT1, and DAX1 may also be involved.[3,4] In the absence of functional testicular tissue, there is no secretion of testosterone or anti-müllerian hormone, allowing normal development of müllerian structures, including the uterus, fallopian tubes and upper vagina. However, the gonads remain as nonfunctional fibrous streaks, lacking both endocrine and reproductive capacity.[3-10] Clinically, individuals with Swyer syndrome typically present in

adolescence with primary amenorrhea and delayed or absent pubertal development.[5] The hormonal profile is characterized by hypergonadotropic hypogonadism, with elevated gonadotropins and low estrogen levels, reflecting primary gonadal failure.[3] An important aspect of management is the significantly increased risk of gonadal malignancy, particularly gonadoblastoma and dysgerminoma, arising from dysgenetic gonadal tissue. The reported risk ranges from 20%-30%.[6,7]

Therefore, early prophylactic gonadectomy is strongly recommended once the diagnosis is established.[6] Following gonadectomy, hormone replacement therapy plays a central role in management. Gradual initiation of estrogen therapy induces secondary sexual characteristics, promotes uterine growth and supports bone health.[8,9] In addition to medical management, advances in assisted reproductive technologies have made pregnancy possible using donor oocytes, as the uterus is typically functional.[12]

Beyond the physical aspects, Swyer syndrome has important psychosocial implications, particularly in adolescents coping with delayed puberty and fertility concerns. Contemporary guidelines emphasize a multidisciplinary approach involving endocrinologists, gynaecologists, geneticists and mental health professionals to optimize long-term outcomes.[8,9]

CASE REPORT

A 14-year-old adolescent girl presented with primary amenorrhea and no history of cyclical abdominal pain, virilization or chronic medical illness. Her family history was unremarkable. On clinical examination, her height was 162 cm and weight was 48 kg, with a body mass index of 18.3 kg/m². Pubertal assessment showed delayed development, with breast development at Tanner stage II and pubic hair at Tanner stage I.

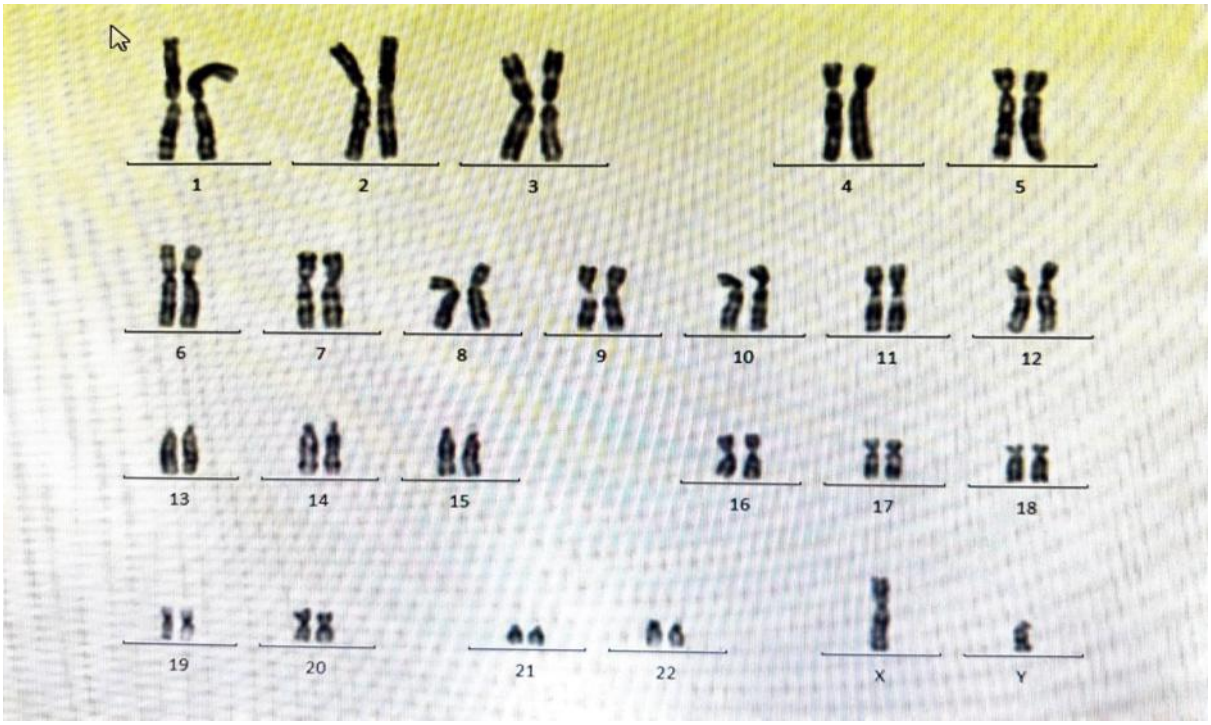

Figure 1: Karyotype: 46, XY chromosomal pattern.

External genitalia appeared normal female. A limited vaginal examination revealed a well-formed vaginal canal, although the cervix could not be clearly appreciated and no gonads were palpable. There were no clinical features suggestive of Turner syndrome or androgen excess. Bone age assessment by X-ray of the left hand corresponded to approximately 14 years, with no evidence of epiphyseal fusion. Hormonal evaluation demonstrated markedly elevated gonadotropin levels, with follicle-stimulating hormone of 119 IU/l and luteinizing hormone of 28.6 IU/l, consistent with hypergonadotropic hypogonadism. Estradiol levels were low at 13.7 pg/ml. Serum testosterone was 23.7 ng/dl, while androstenedione levels were within normal limits. Thyroid function was normal, and anti-müllerian hormone was significantly reduced (<0.01 ng/ml), indicating absent ovarian reserve. Cytogenetic analysis (Figure 1) revealed a 46, XY karyotype. Pelvic ultrasonography demonstrated a hypoplastic uterus with preserved müllerian structures and bilateral streak-like gonads. Examination under anaesthesia (Figure 2) confirmed a normally developed vagina, although the cervix remained difficult to delineate. Diagnostic laparoscopy (Figure 3) revealed a hypoplastic uterus with normal fallopian tubes and bilateral streak gonads. Intraoperative frozen section suggested ovarian-type stromal tissue without evidence of malignancy. In view of the potential risk of malignant transformation, bilateral gonadectomy was performed. Histopathological

examination of gonads showed fibroconnective tissue with ovarian-like stroma with no identifiable follicles, confirming the diagnosis of gonadal dysgenesis. Postoperatively, estrogen replacement therapy was initiated at a low dose and gradually escalated to induce pubertal development and support bone health, in accordance with established management recommendations.

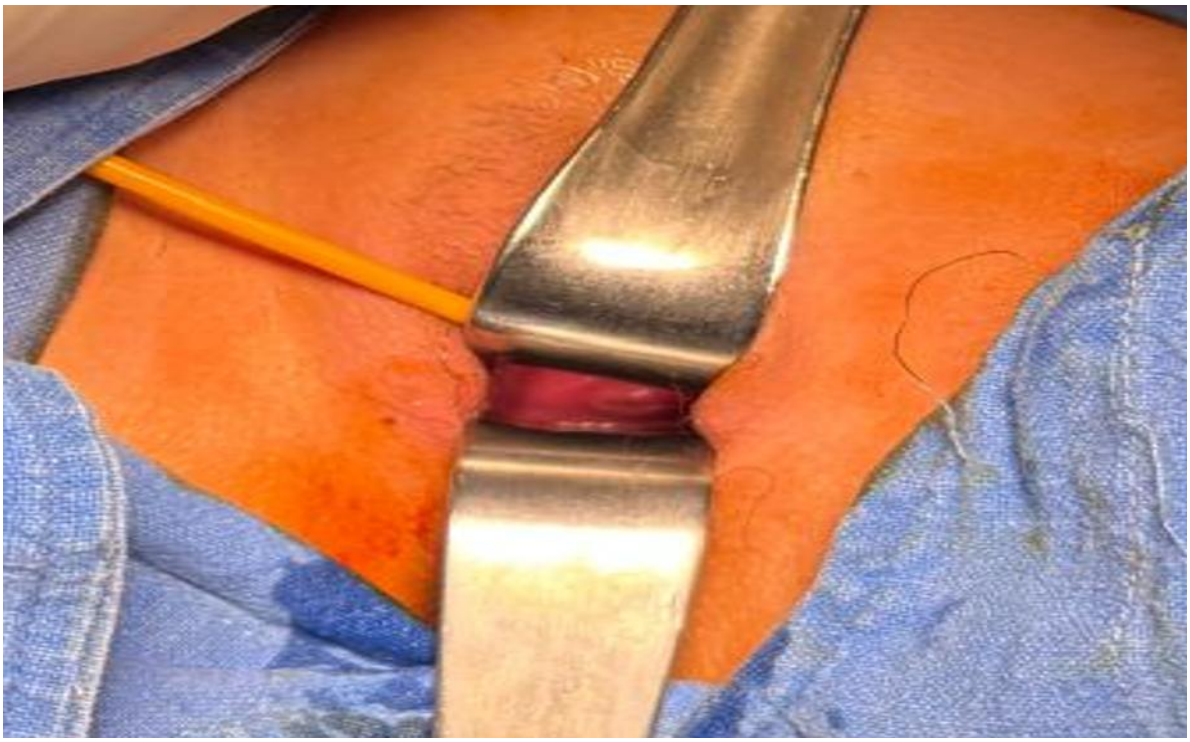

Figure 2: Examination under anaesthesia.

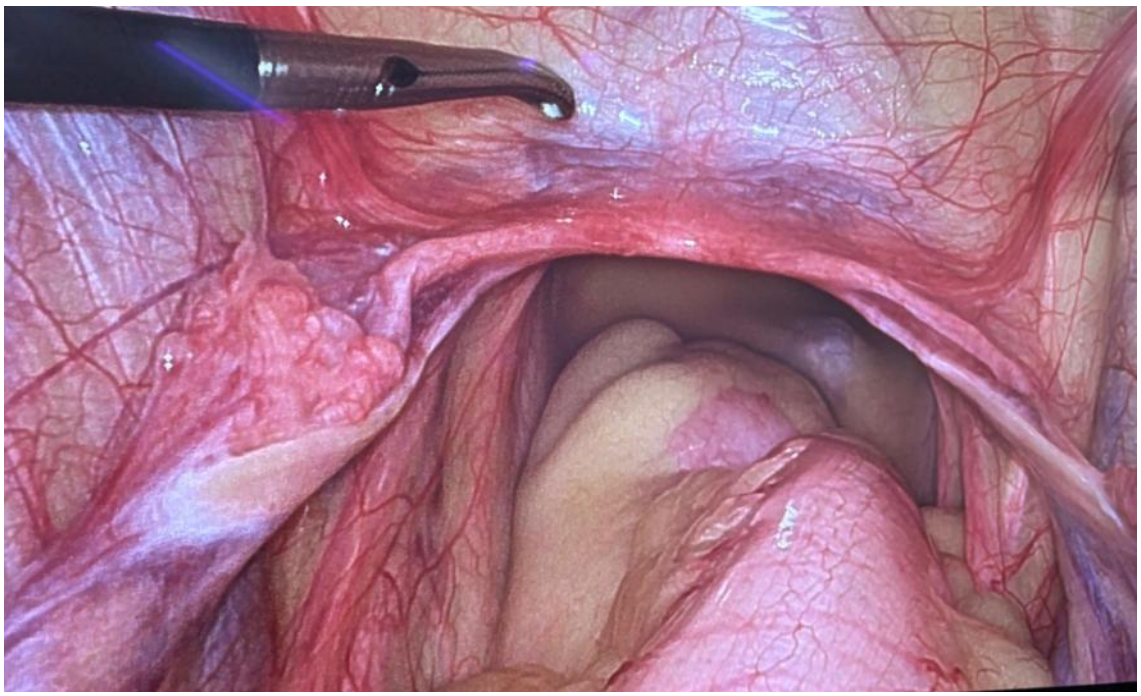

Figure 3: Laparoscopic view showing bilateral streak gonads.

At 90-day follow-up, hormonal reassessment demonstrated a decline in gonadotropin levels, with follicle-stimulating hormone decreasing from 119 IU/l to 27.2 IU/l and luteinizing hormone reducing from 28.6 IU/l to 6.77 IU/l, reflecting suppression by estrogen therapy. Estradiol levels increased from 13.7 pg/ml to 82.04 pg/ml,

indicating an adequate therapeutic response. Despite this improvement, follicle-stimulating hormone remained elevated due to persistent gonadal failure, while normalization of luteinizing hormone and appropriate estradiol levels suggested effective hormonal replacement. The patient continues under multidisciplinary follow-up for monitoring of endocrine response, pubertal progression and overall well-being.

DISCUSSION

Swyer syndrome is a rare form of DSD that typically presents during adolescence with primary amenorrhea and delayed pubertal development.[5,10] Large cohort studies indicate that gonadal dysgenesis is frequently diagnosed during adolescence, in contrast to other forms of 46, XY DSD, supporting the clinical presentation observed in this case.[3] The present case demonstrates the classical clinical, biochemical and radiological features of this condition, allowing clear clinicopathological correlation.

The patient presented at 14 years of age with primary amenorrhea and delayed secondary sexual characteristics, which is consistent with the typical presentation described in the literature.[5] The absence of virilization further supports the diagnosis, as individuals with Swyer syndrome lack significant androgen production.[3]

A key diagnostic feature in this case was hypergonadotropic hypogonadism, evidenced by markedly elevated gonadotropins and low estradiol levels, reflecting primary gonadal failure.[5] The undetectable anti-Müllerian hormone level further confirmed the absence of functional gonadal tissue.[10]

Imaging demonstrated a hypoplastic uterus with bilateral streak gonads, findings that were confirmed laparoscopically. The presence of müllerian structures indicates lack of anti-müllerian hormone activity during embryogenesis, a hallmark of Swyer syndrome.[10]

Histopathological findings of fibrous stromal tissue without germ cells confirmed gonadal dysgenesis. Although no malignancy was detected in this case, the reported risk of gonadal tumours in such patients is significant, ranging from 20%-30%.[6,7] Therefore, prophylactic gonadectomy remains the standard of care once the diagnosis is established.[6]

Postoperative management with hormone replacement therapy is essential to induce pubertal development, maintain secondary sexual characteristics and ensure optimal bone health.[8,9] The patient showed an appropriate hormonal response to estrogen therapy, as evidenced by normalization of luteinizing hormone levels and increase in estradiol levels.[9]

Recent literature continues to emphasize that Swyer syndrome often poses a diagnostic challenge due to its subtle clinical presentation and the need for a high index of suspicion, particularly in adolescents presenting with primary amenorrhea and delayed puberty.[11]

Beyond medical management, individuals with Swyer syndrome require long-term multidisciplinary care involving endocrinologists, gynaecologists, geneticists, and mental health professionals to address reproductive, hormonal and psychosocial needs.[8,9]

CONCLUSION

Swyer syndrome should be suspected in any adolescent presenting with primary amenorrhea, delayed puberty and a 46, XY karyotype. Early diagnosis is critical to guide timely interventions, including prophylactic gonadectomy to prevent malignant transformation of dysgenetic gonads and initiation of hormone replacement therapy to induce normal pubertal development. Estrogen therapy, followed by progesterone, allows for development of secondary sexual characteristics, uterine growth and menstrual cycle establishment, while maintaining bone health.

Fertility can be achieved using assisted reproductive techniques with donor oocytes, as the uterus is typically functional. Equally important is comprehensive psychosocial support, addressing emotional adjustment, body image and gender identity consolidation. Multidisciplinary long-term follow-up ensures optimal hormonal management, reproductive planning and mental health support, enabling affected individuals to lead healthy, fulfilling lives.

ACKNOWLEDGEMENTS

The authors would like to thank the patient and her family for their cooperation and consent for publication. Also acknowledging the contributions of the Department of pathology and the department of radiology for their assistance with histopathological evaluation and imaging studies. Special thanks to the nursing and clinical staff for their support in patient care and follow-up.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Klein DA, Paradise SL, Reeder RM. Amenorrhea: a systematic approach to diagnosis and management. Am Fam Physician. 2019;100(1):39-48.
2. Swyer GI. Male pseudohermaphroditism: a hitherto undescribed form. Br Med J. 1955;2(4941):709-12.
3. Berglund A, Johannsen TH, Stochholm K, Viuff MH, Fedder J, Main KM, et al. Incidence, prevalence, diagnostic delay, and clinical presentation of female 46,XY disorders of sex development. J Clin Endocrinol Metab. 2016;101(12):4532-40.
4. Hanley NA, Hagan DM, Clement-Jones M, Ball SG, Strachan T, Salas-Cortés L, et al. SRY, SOX9, and

DAX1 expression patterns during human sex determination and gonadal development. Mech Dev. 2000;91(2):403-7.
5. Michala L, Goswami D, Creighton SM, Conway GS. Swyer syndrome: presentation and outcomes. BJOG. 2008;115(6):737-41.
6. Zhu HL, Bao DM, Wang Y, Shen DH, Li Y, Cui H. Swyer's Syndrome with Mixed Ovarian Malignant Germ Cell Tumor and Ovarian Gonadoblastoma. Chin Med J (Engl). 2016;129(14):1752-4.
7. Lu L, Luo F, Wang X. Gonadal tumor risk in pediatric and adolescent phenotypic females with disorders of sex development and Y chromosomal constitution with different genetic etiologies. Front Pediatr. 2022;10:856128.
8. Wisniewski AB, Batista RL, Costa EMF, Finlayson C, Sircili MHP, Dénes FT, et al. Management of 46,XY differences/disorders of sex development (DSD) throughout life. Endocr Rev. 2019;40(6):1547-72.
9. Nordenström A, Ahmed SF, Van den Akker E, Blair J, Bonomi M, Brachet C, et al. Pubertal induction and transition to adult sex hormone replacement in patients with congenital reproductive hormone deficiency: an Endo-ERN clinical practice guideline. Eur J Endocrinol. 2022;186(6):G9-49.
10. Jorgensen PB, Kjartansdóttir KR, Fedder J. Care of women with XY karyotype: a clinical practice guideline. Fertil Steril. 2010;94(1):105-13.
11. Bannour I, Bannour B, Ferjani S, Boughizane S. Swyer syndrome: a diagnostic challenge. JBRA Assist Reprod. 2025;29(1):195-8.
12. Lecoindre MC, Finlayson C, Touraine P. Fertility in differences of sex development patients. Best Pract Res Clin Endocrinol Metab. 2025;39:102017.

Cite this article as: Bhanarkar KS, Jain R. A 14-year-old girl with primary amenorrhea and 46, XY karyotype: a case of Swyer syndrome. Int J Reprod Contracept Obstet Gynecol 2026;15:2788-92.