Original Article

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Case Report: Neck Swelling and Hearing Loss in a 12-Year-Old Girl in Basrah, Iraq: The Diagnosis of Pseudo-Pendred Syndrome is Established

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ABSTRACT

Background: Pseudo-Pendred syndrome (PPS) is a genetic disorder inherited as an autosomal recessive disorder. PPS is characterized by the presence of hypothyroid goiter combined with mild to moderate form of SNHL, not presentable at birth, with no obvious inner ear malformation. This is the major difference from Pendred syndrome in which the SNHL is congenital, severe to profound in nature, and associated with inner ear malformation, mostly enlarged vestibular aqueduct. The main etiology of PPS is thought to be formation of autoantibodies against the thyroid tissue and the cochlea.

Case report: Our reported case is a 12-year-old girl who presented goiter, hypothyroidism, and hearing loss. Examination and hormonal and radiological investigations confirmed the hypothyroid goiter. The result of the thyroid antibody test was positive (TPO test = 174 IU\mL). Audiological assessment and the CT scan of the temporal bone confirmed mild SNHL with no inner ear malformations. The patient received treatment in the form of thyroid supplement and hearing aid. On a side note, there are no other affected siblings in her family.

Conclusion: The Pseudo-Pendred syndrome is a congenital condition characterized by the presence of hypothyroid goiter with mild SNHL and normal inner ear structures. Despite the fact that no genetic analysis had been done to confirm the diagnosis of PPS, all the clinical, hormonal, immunological, audiological, and radiological assessments indicate PPS in our case. Furthermore, the main cause of the goiter and hearing loss is thought to be of autoimmune etiology.

Keywords: Pendred Syndrome, Basrah, Hypothyroidism, Goiter.

Abbreviations:
SNHL = Sensorineural hearing loss, TPO = Thyroid peroxidase antibodies, CT = Computed Tomography, T3 = Tri iodo thyronine hormone, T4 = tetra iodo thyronine, TSH = thyroid stimulating hormone

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INTRODUCTION

Vaughan Pendred was the first physician who reported the Pendred syndrome in 1896.[1] Pendred syndrome is an autosomal recessive disorder classically defined by the combination of sensorineural deafness/hearing impairment combined with goiter and an abnormal organification of iodide with or without hypothyroidism.[2] Pendred syndrome has been the subject of a wide range of epidemiological studies indicating that it may account for up to 7.5–10% of all cases of childhood deafness, which makes this syndrome the most common type of syndromic congenital hearing loss.[3,4] Pendred syndrome is caused by mutations in the PDS/SLC26A4 gene encoding for pendrin.[5] Pendrin has been proposed to function as a sulfate transporter and has an affinity for chloride, iodide, and bicarbonate, among other anions. In the inner ear, pendrin functions as a chloride/bicarbonate exchanger that is essential for maintaining the composition and the potential of the endolymph. In the thyroid, pendrin can mediate iodide efflux in heterologous cells, one of the steps required for thyroid hormone synthesis.[2,6]

CASE REPORT

A 12-year-old female patient, seen in (Fig. 1), consulted the general surgery outpatient's clinic for a prolonged history of neck swelling for 3 years. The corresponding data are illustrated in (Table 1).

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Figure 1: Our 12-year-old patient with central anterior neck swelling.

Table 1: The general demographic data of our case.

	General demographic data	Our patient
1	Gender	Female
2	Age	12 years
3	Occupation	Student
4	Residency	Urban
5	Siblings	3 [1 girl (older) and 2 boys (younger)]

During the examination, we found an anterior central neck swelling, which moves with swallowing and is mobile on palpation and soft in constancy. No palpable nodularity, hotness, and tenderness were felt, and no palpable cervical lymph nodes were detected as shown in (Fig. 1).

A complete neck examination was done, and the clinical diagnosis of moderately diffuse goiter was reached. Radiological, biochemical, and histopathological investigations in the form of neck ultrasonography and thyroid function tests (T3, T4, and TSH) were used to confirm the diagnosis. Additionally, the patient was sent for thyroid antibodies assessment, and the thyroid peroxidase (TPO) antibody test of this case was found to be 174 IU\mL, which is highly positive (normal value < 5.61 IU\mL). The result of the investigation mentioned above is shown in (Table 2).

Table 2: The results of the radiological and hematological investigations of our patient.

	Investigation sent	Result
1	Neck ultrasonography	Observed moderate diffuse enlargement of both lobes of the thyroid gland and the isthmus, more on the right lobe, with a marked decrease in echogenicity and no focal lesion or nodules. No cervical lymph node enlargement.
2	TSH	79 IU/mL (normal value = 0.27–4.2)
3	T3	1.61 Ug/dL (normal value = 0.07–1.62)
4	T4	1.5 Ug/dL (normal value = 5.1–14)
5	FNA from diffuse goiter	Revealed cluster of benign follicular cells on the hemorrhagic background. No evidence of malignant cells.
6	TPO antibody	174 IU\mL

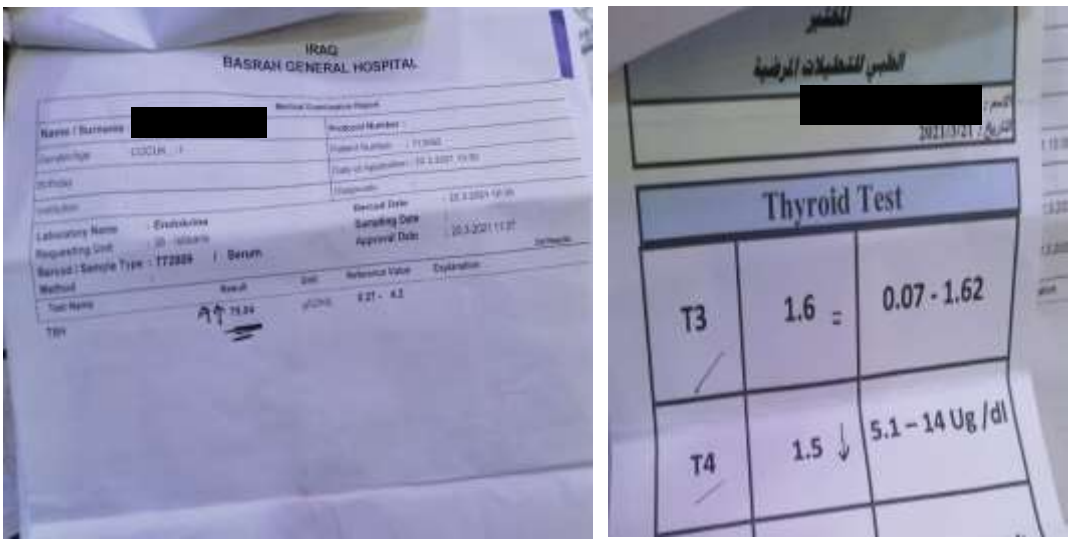

Figure 2: The thyroid function tests of our patient.

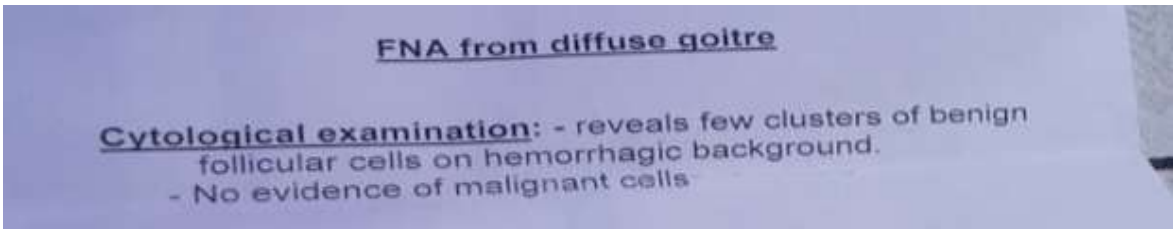

Figure 3: Fine Neddle Aspiration from the goiter of our patient.

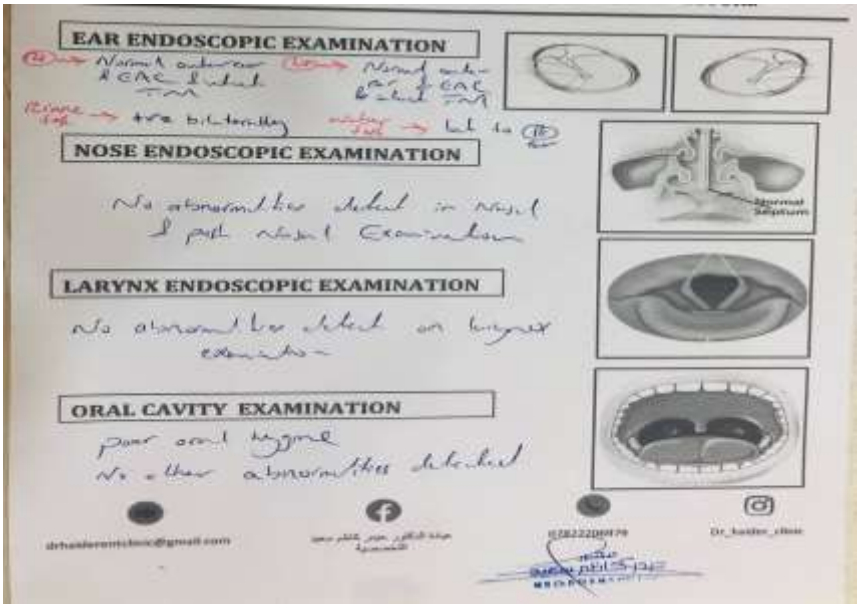

Figure 4: ENT examination of our patient.

Additionally, the patient and her family reported that she had decreased hearing acuity, which was noted at school and reported by the patient's teachers. According to the family, this decrease in hearing was treated with repeated ear syringing, wax removal, and repeated courses of antibiotics; however, no obvious improvement was observed. Otolaryngological consultation requested complete ENT examination including otoscopic examination, tuning fork test with 512 Hz fork, and pure tone audiography and tympanometric examination of both ears as shown in (Fig. 4, 5).

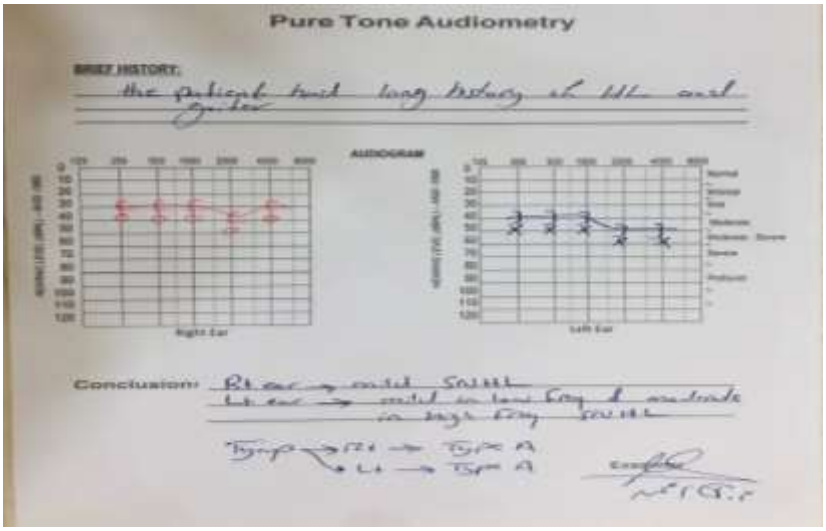

Figure 5: PTA and Tympanometric examination of our patient.

Additionally, radiological investigation in the form of computed tomography (CT) scan of both temporal bones was done as shown in (Fig. 6).

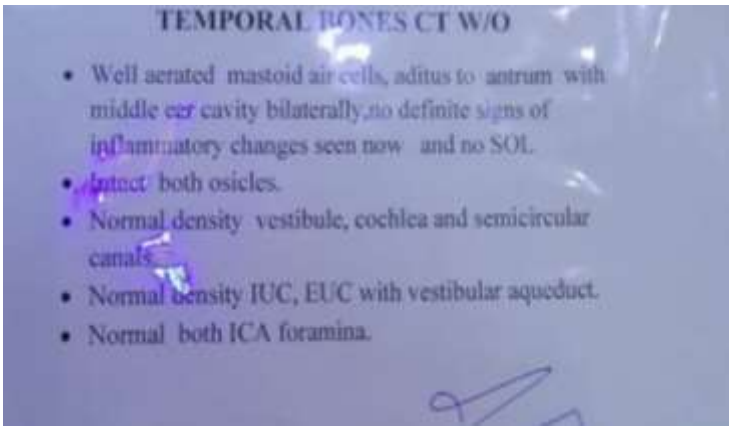

Figure 6: CT scan of the temporal bones of our patient.

The results of the ENT examination and investigation are shown in (Table 3).

Table 3: The results of ENT examination and investigation of the patient.

	ENT Examination	Result
1	Ear examination	Normal outer ear, no mass or wax observed in the external canal, intact tympanic membrane.
2	Otoscopic examination	The tympanic membrane is intact with normal color and mobile with Valsalva.
3	Tuning fork test	Rinne test: positive in both ears Weber test: lateralized to the right ear ABC test: decreased bilaterally
4	Pure tone audiometry	Right ear: mild SNHL Left ear: mild to moderate SNHL
5	Tympanometry	Right ear: type A Left ear: type A

6	CT scan of the temporal bones	Bilaterally well-aerated mastoid cells, aditus and middle ear cavity, no inflammatory changes seen, intact ossicles, normal density vestibule, cochlea, SCC, IUC, EUC and vestibular aqueduct.

DISCUSSION

The late discovery of hearing loss in a child is problematic enough as it affects nearly all aspects of the behavior and development of the child. Congenital hearing loss is one of the serious conditions that are usually missed in a child as neonatal hearing screening programs are not well established in developing countries such as Iraq. Moreover, congenital hearing loss is caused by both environmental and prenatal factors, such as low-income settings, congenital infections, particularly cytomegalovirus infection, and genetic causes of defective development of the hearing organ such as gene mutation.[2]

Since 1896, when Vaughan Pendred described the Pendred syndrome as a combination of deaf-mutism and goiter,[7] a great variability in the description of the syndrome has emerged with a lot of variable presentations even within the same family.[8,9]

Pendred syndrome is an autosomal recessive disease classically characterized by dyshormonogenetic goiter and sensorineural deafness.[6] The hallmark of the syndrome is impaired hearing, which is associated with inner ear malformations such as an enlarged vestibular aqueduct (EVA), the Mondini malformation of the cochlea, and enlargement of the endolymphatic duct.[2,9,10]

Clinically, the diagnosis of Pendred syndrome is often missed, and this is due to the variable causes of both the hearing impairment and/or the thyroid dysfunction.[11]

The hearing loss of Pendred syndrome is usually congenital, severe to profound SNHL, which results from the congenital malformation of the inner ear structures, mainly the enlargement of the endolymphatic duct.[12,13]

The goiter status in Pendred syndrome is usually present in up to 83% of the patients, ranging from simple enlargement of one or both lobes to huge multinodular goiter compressing the larynx, trachea, and esophagus with a variety of symptoms and effects. The thyroid status is usually euthyroid in up to 60% of the patients diagnosed with Pendred syndrome, and the remaining 40% usually exhibit the hypothyroidism status.[9,12,14]

The diagnosis of Pseudo-Pendred syndrome is made when there is no defect or mutation in the PDS/SLC26A4 gene encoding for pendrin, which results in the dyshormonogenetic goiter and congenital inner ear abnormalities.[15] Concerning this condition, Pseudo-Pendred syndrome, while there is no mutation in the gene responsible for pendrin encoding, the formation of autoantibodies against the thyroid tissue or the cochlea occurs.[16,17] These antibodies are mainly thyroid peroxidase antibodies (TPO) with the generation of anticochlear antibodies.[10,16,17]

Furthermore, Pseudo-Pendred syndrome is also inherited as an autosomal recessive condition characterized by a dyshormonogenetic goiter associated with SNHL of mild or unremarkable severity

without inner ear malformation.[17] The main etiology of SNHL is of autoimmune origin.[10] In our case, a 12-years-old female patient presented a long history of goiter and hearing loss. The examination and investigations confirmed the presence of moderately diffuse goiter and hypothyroidism. Otological and pure tone audiometric examination revealed mild to moderate SNHL in both ears. The CT scan confirmed normal inner ear structures with no deformity. However, we have no genetic study in our governorate to confirm the exact gene mutation. Regarding the management of the patient's condition, the patient received treatment in the form of thyroid hormone supplement and continuous mongering combined with the administration and fitting of a hearing aid.

Based on the literature we searched, to the best of our knowledge, no case of Pseudo-Pendred syndrome has been reported or discovered in Iraq.

CONCLUSION

Pseudo-Pendred syndrome is a genetic condition characterized by the presence of a hypothyroid goiter with hearing loss that is of mild and delayed onset SNHL. It differs from the classical Pendred syndrome in that the inner ear is normal without any sign of congenital malformation. Even though we do not have the proper genetic analysis to confirm this diagnosis, the clinical, hormonal, audiometric, and radiological assessments helped us reach the diagnosis of Pseudo-Pendred syndrome in this case.

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Conflict of interest

None

Ethical approval

Verbal consent from the family had been taken to share and discuss this case.

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