Scintigraphic Diagnosis of Ectopic Thyroid Gland

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═ 국문초록 ═

이소갑상선의 신티그라피진단

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김 진 우

이소갑상선은 태생기 갑상선이동의 이상으로 발생되며 갑상선의 기능저하 및 형성부전을 흔히 동반한다. 저자들은 갑상선신티그라피로 이소갑상선이 진단된 일차성 갑상선 기능저하증 4예를 경험하여 이를 문헌고찰과 함께 보고하는 바이다.

INTRODUCTION

Ectopic thyroid gland is a relatively rare condition and a developmental anomaly characterized by an aggregates of thyroid tissue in the midline anywhere from the base of the tongue to the mediastinum. The role of ectopic thyroid in the pathogenesis of non-goitrous sporadic cretinism and primary hypothyroidism has been emphasized.

Since previous case report of sublingual thyroid[1], we have recently experienced additional two cases of sublingual thyroid and one case of prelaryngeal thyroid gland, which were diagnosed by scintigraphic method. We wish to report these four cases of primary hypothyroidism with ectopic thyroid with emphasis on role of scintigraphy in detection of these unusual condition.

PATIENTS AND METHODS

Four cases with classic signs of hypothyroidism were all female and aged 14~29 years. All cases were studied with 3~4 mCi intravenous dose of ^{99m}Tc-pertechnetate which included anterior and lateral views of the neck and oropharynx, and ^{131}I scintiscan (50~80 μCi oral dose) was performed in three cases. On scintigram, the site of ectopic thyroid was determined from the anterior and lateral projections and was defined as follows: lingual-increased radiotracer uptake at the level of the lips or oropharynx; sublingual-increased radiotracer uptake at level of the mandible or submandibular gland; prelaryngeal-increased radiotracer uptake below the hyoid bone or at upper anterior neck.

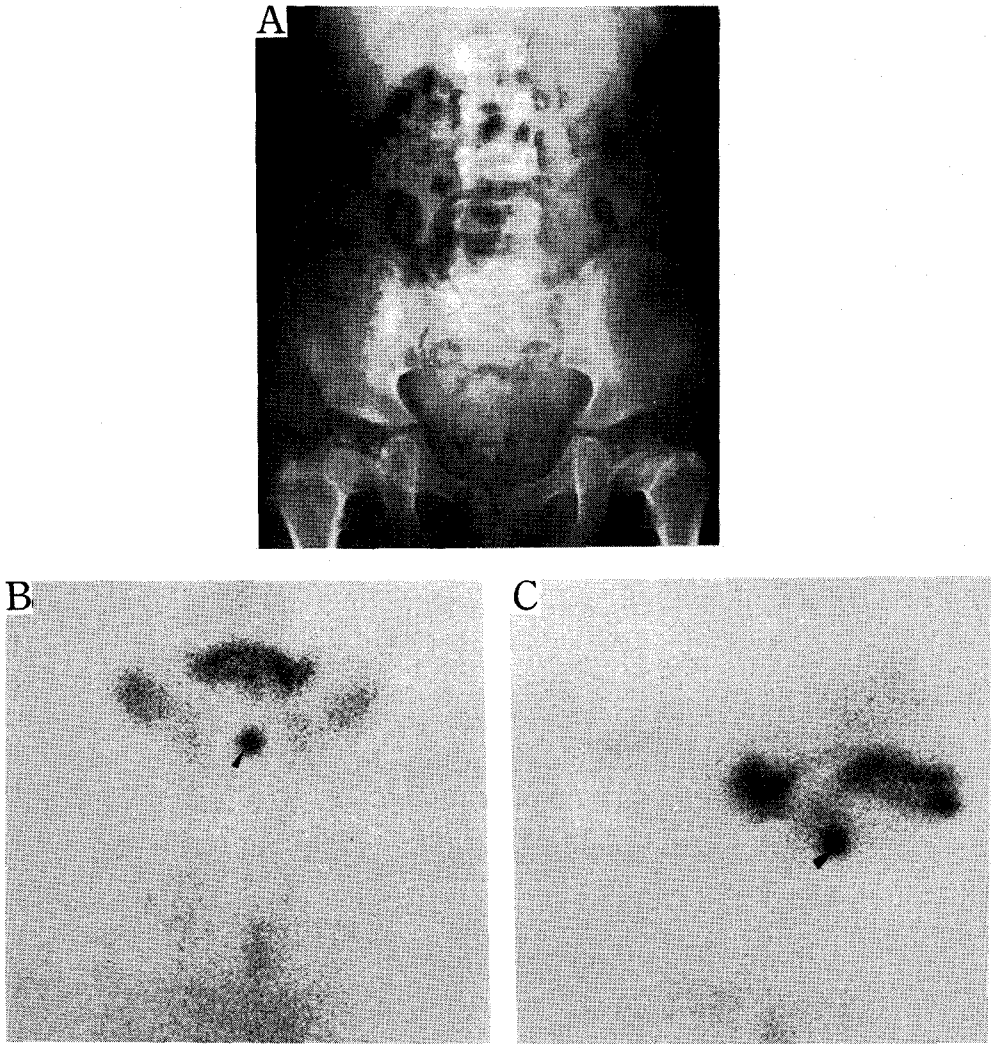

Fig. 1. Case I. Radiograph (a) demonstrates coarse fragmentations in capital femoral epiphyses and flattened lumbar vertebrae with irregular margin. Anterior (b) and lateral (c) views of scintigraph using 99mTc pertechnetate reveal no activity over the neck and a focal intense activity at midline of the mandible and inferior to the oropharynx (arrowheads), indicating sublingual thyroid.

RESULTS

The most common clinical findings on admission in four cases were growth and developmental retardation. The physical examination revealed grossly myxedematous features and other classic signs of hypothyroidism.

The radiologic features were delayed bone age in three cases and coarse fragmentations in capital femoral epiphyses with flattened lumbar spine in one case (Fig. 1-a). On scintigraphic evaluation, no tracer uptake (either ^{99m}Tc pertechnetate or ^{131}I) was identified at normal site of the thyroid gland and location of complete ectopic thyroid was found to be sublingual in three cases (Fig. 1, 2) and prelaryngeal (Fig. 3) in one case.

Aspiration cytology of ectopic thyroid was perfor-

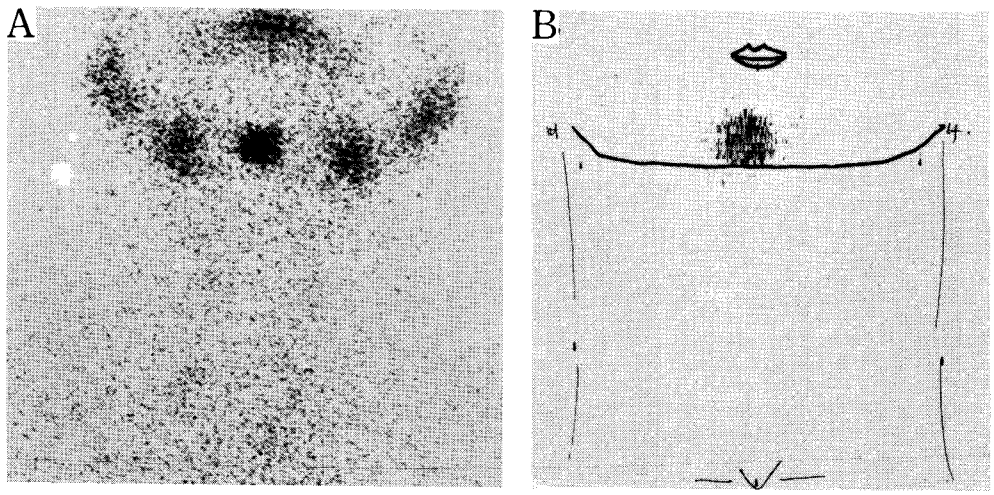

Fig. 2. Case II. Anterior view (a) of scintigraph reveals a abnormal focus with accumulation of 99mTc pertechnetate in midline of mandible, which is corresponding to a iodophilic focus on 131I scintiscan (b). The thyroidal activity is not seen over the neck.

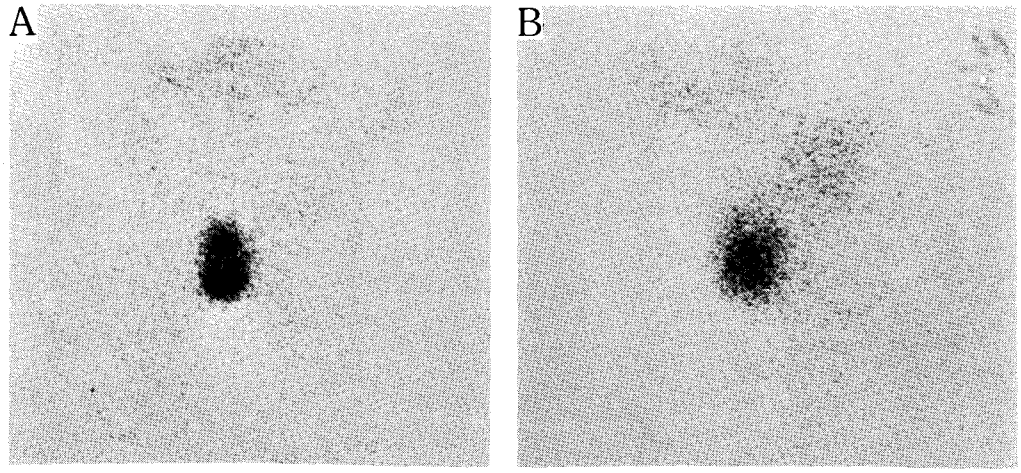

Fig. 3. Case IV. Anterior (a) and lateral (b) views of 99mTc scintigraph show a oval increased activity at mildline of upper anterior neck, which corresponds to clinically palpable mass on neck.

med in Case IV and pathologic examination disclosed nuclear atypia. The summary of four cases are shown in Table I. Thyroid replacement therapy was commenced in all cases and follow up was scheduled.

DISCUSSION

Embryologically, the thyroid gland develops from a median ventral diverticulum of the pharynx between the first and second branchial arches and dorsal to the aortic sac. This grows caudally as a tubular duct which bifurcates and subsequently divides into double cellular plates, from which the isthmus and lateral lobes of the thyroid gland are developed. The thyroid anlage maintains its superior attachment to the foramen cecum by the thyroglossal duct, which usually atrophies[2~6]. Any arrest of

Table 1. Summary of 4 Cases of Ectopic Thyroid

Case	Age/Sex (yrs)	Presenting Complaint	Thyroid Function					Bone Age (yrs)	Scintigraphic localization
			T3 ng/dl	T4 ug/nl	TSH uu/ml	^{131}I %/2hr	uptake %/24hr		
I	16/F	growth retardation	37	0.5	> 09	3.2	3.2	4*	sublingual thyroid
II	29/F	growth retardation	36	0.2	> 30	24.	5.7	25	sublingual thyroid
III	14/F	growth retadrtion	51	0.6		not done		6	sublingual thyroid
IV	21/F	palpable upper neck mass	113	3.5	>151	4.4	30.8	21	prelaryngeal thyroid

* associated with epiphyseal dysgenesis
Note-T3 = triiodothyronine, T4 = thyroxine

the normal descent of the thyroid will result in ectopy, anywhere between base of the tongue and its normal site.

The exact prevalence of ectopic thyroid in general population is hard to determine because such lesions are seldom discovered unless symptomatic. However about 350 cases of lingual thyroid have been reported in the literature[3,6], which is the most frequent ectopy.

The etiology of ectopy of the thyroid is unknown; it may be multifactored, as has been suggested for maldescent of the testis. Malformation or maldevelopment of the gland itself may be one of the factors and so primary non-goitrous hypothyroidism can be explained by ectopy[3].

The presence of an ectopic thyroid does not absolutely preclude the presence of thyroid tissue in the neck, but in 70% to 100% of the cases of ectopic thyroid the ectopic tissue is the only thyroid tissue present[3,5,7]. None of our cases also had normally located functioning thyroid.

The presence of an ectopic thyroid does not necessarily mean that there will be hypothyroidism. The degree of hypofunction and the age at time of diagnosis depend on the varying ability of the ectopic tissue to meet the body's metabolic demand[2]. According to Kaplan et al[3], the incidence of hypothyroidism in ectopic thyroid was 87% which was heigher than 33% reported by Neinas et al[5]. Our all cases reported here had ovious hypothyroidism.

The hypothyroidism can usually be diagnosed clinically without difficult[2]. However the roentgenologic examination is of great value. The delayed appearance and fusion of all epiphyses and epiphyseal dysgenesis have come to known as hallmark of hypothyroidism. In addition, dense transverse band at metaphyseal ends, brachycephaly with short base, flattened vertebral bodies are occasionally seen in untreated severe cases[8]. On the other hand, Leclerco et al[9] reported complete bone maturation in untreated cretinism beyond puberty as in our case IV.

^{99m}Tc-pertechnetate and ^{131}I have been widely used in evaluation of thyroid function and anatomy, however ^{123}I is now considered the radionuclide of choice for imaging in location where dependable delivery is possible. There is important difference between ^{99m}Tc and ^{131}I; technetium is trapped but not organified by the thyroid and yields increased photon reflux with greater resolution, lower radiation and faster imaging[10].

There was considerable literary debate as to choice of the radionuclides in detection of ectopic thyroid. Hayek et al[11] recommended ^{99m}Tc pertech-

netate as a most useful agent in evaluation of cryptic thyroid tissue in childhood hypothyroidism, because it may elude detection by radioiodine scan both because of low uptake and the restrictions on allowable radiation dosage. In our case I, clear depiction of sublingual gland on ^{99m}Tc scan was contrasted with unsuccessful demonstration in ^{131}I scan.

Mettler FA and Guiberteau MJ[10] recommended to use either ^{131}I or ^{123}I in searching for ectopic thyroid tissue because technetium concentrates a highly variable extent in the vincity of ectopic thyroid tissue (the salivary gland and esophagus in the neck; esophagus and blood pool of the mediastinum). In scintigraphic study of our cases using ^{99m}Tc, delineation of lower facial structures including salivary glands seems to be a rather useful anatomic landmark to localization of sublingual thyroid which is difficult to assess clinically.

The ectopic thyroid must be differentiated from other causes of midline neck masses such as lymph nodes, thyroglossal duct cyst, epidermal inclusion cyst. A well-localized uptake of pertechnetate or iodine indicates thyroid tissue is present, and a biopsy may be then unnecessary[5,12]. However the lesions simulating ectopic thyroid gland on ^{99m}Tc pertechnetate scintigraph include salivary pooling in the esophagus, vascular retention and metastatic lymph nodes[13,14].

In summary, it is suggested that ^{99m}Tc pertechnetate scintigraphy including neck and oropharynx is a useful screening or diagnostic procedure in determing ectopic presence or absence of thyroid gland in hypothyroid patient when this information is not evident on physical examination.

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