CONGENITAL GOITER IN NORTH AMERICA *

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Congenital enlargement of the thyroid gland in North America is a very unusual occurrence. Not only is the number of reported cases small, but the number of cases with pathologic study is only 11.

Congenital enlargement of the thyroid gland was first described by Fodéré [1] in 1796 and since that time well over 400 cases have been documented. Of this group, the great majority were clinical studies in continental Europe. Crotti [2] cited 37 congenital goiters of 642 goiters reported by Demme,[3] 25 of 2,292 by Diethelm,[4] and 42 of 1,996 by Richard.[5] In striking contrast to this there have been no reports of cases from the goiter clinics of this country and, in spite of a high incidence of juvenile and adult goiters, congenital goiter has remained a rare, sporadic occurrence even in the American goiter belt. Perhaps the highest incidence of this condition is in the State of Washington where Skinner [6,7] has reported 19 clinical cases and one which was studied post mortem.

The most obvious feature in the genesis of congenital goiter is the presence of goiter in the mother. In European reports between 50 and 100 per cent of the mothers had goiters and a somewhat similar situation has been found in this country. Iodine deficiency has been incriminated as the most important cause of congenital goiter. This has been empirically demonstrated by the great prophylactic value of prenatal iodine therapy.[7] Congenital goiter has been reported to occur when mothers received excessive prenatal iodine.[8] Hyperplasia has been found in the thyroid glands of fetuses whose mothers were under thiouracil therapy.[9,10] This indicates that goiterogenic drugs such as sulfonamides, thiouracil derivatives, and thiocyanates might be responsible for congenital goiter. Some cases have obscure etiologic factors and fall into an idiopathic category.

The course of congenital goiter in those who survive the early postnatal period is usually that of a regression of the mass, probably accelerated by iodine therapy.[2] The major problem of congenital goiters when they are large is the pressure on the larynx and trachea, especially when the lateral lobes encroach on the posterior surface. This so-called circular goiter severely interferes with the air passageway, and asphyxia is the chief cause of death. Large, encircling, parenchymatous goiters

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are usually fatal. The goiters of vascular origin usually afford a good prognosis.

The pathologic anatomy of congenital goiter is essentially that of an intense, diffuse hyperplasia and hypertrophy of the thyroid gland. The normal range of weight for the thyroid gland of a newborn infant is between 1.5 and 2.5 gm. A thyroid gland such as seen in case 1, summarized below, represents at least a twenty-fold increase in size. The hypertrophy is usually symmetric, although asymmetry or substernal extensions may occur.

As to microscopic structure, diffuse parenchymatous, telangiectatic, fibrous, colloid, cystic, and adenomatous varieties have been described. The diffuse parenchymatous type is essentially due to follicular hyperplasia and is the most commonly encountered variety. There is diffuse cellular hyperplasia, expressed as follicular hyperplasia with high-cuboidal or columnar epithelium lining acini with little or no colloid; or there may be follicles filled with loose, apparently desquamated cells. A telangiectatic or vascular variety has been described frequently in the older foreign literature. Two types have been found [11]: In smaller glands, a massive hyperemia, probably related to labor, has produced increased size; in larger glands weighing from 17 to 36 gm., the majority of the increased weight is assigned to congested, hyperplastic, and hypertrophied blood vessels, particularly perifollicular capillaries. Hemorrhage within these glands may occur. Colloid goiters and fibrous goiters have been reported rarely. Cystic goiters containing cysts filled with brown liquid, rich in cholesterin, lined by epithelium, and having cartilage in the walls, have been described. Crotti [2] believed that most of the larger of these cystic goiters are teratomas. Rarely adenomatous or nodular congenital struma has been described.

In the North American medical literature 47 cases of congenital goiter have been reported, of which the great majority of reports concern clinically diagnosed cases which recovered with or without therapy. Five cases [12-16] were treated surgically. These were operated upon from the 12th day to the 18th month, either because of pressure symptoms or failure to regress (Table I). Two of the glands apparently were parenchymatous goiters, one a colloid goiter, and 2 were designated as Hürthle cell tumors. Six fatal cases [7,12,17-20] with autopsy findings have been recorded in the American literature (Table II). In the 5 cases having microscopic descriptions, epithelial hyperplasia was described uniformly.

Symmers [13] has reported a case which he designated as a congenital Hürthle cell tumor. Morrow [14] later, apparently on the basis of Symmers' case, recorded another similar case. Whether or not these cases

differ substantially from the many other cases of congenital goiter does not detract from the fact that both were present at birth and thus fall into the category of congenital goiters. It would appear that they represent, at the most, variants of the usual parenchymatous congenital goiter.

TABLE I

North American Congenital Goiter Treated Surgically

	Maternal goiter	Age at time of operation	Thyroid gland removed	Microscopic appearance
Williamson[15]	Not stated	18 mos.	25.5 gm.	Diffuse hyperplasia
Peterson and Sondern[16]	Not stated	5 wks.	6 x 4 x 3 cm. and 4 x 2.5 x 2 cm.	Colloid goiter
Davies[12]	Moderate goiter	12 days	6 gm.	Subinvolution of hyperplastic gland
Symmers[13]	Not stated	6 wks.	47 gm.	Hürthle cell tumor
Morrow[14]	Not stated	2 mos.	4 x 2 x 1.5 cm.	Hürthle cell tumor

As the number of recorded autopsied cases of congenital goiter is only 6, and no adequate presentation of the pathologic anatomy has appeared in the American literature, the following 2 cases of fatal congenital goiter with autopsy findings are presented.

TABLE II

North American Cases of Congenital Goiter with Necropsies

	Maternal goiter	Survival period	Size of thyroid gland	Microscopic appearance
Skinner[7]	None	7.5 hrs.	16.3 gm.	Not given
Abt[17]	Not stated	Died soon after birth	Size of walnut	Vascular and hyperplastic
Mitchell and Struthers[18]	Not stated	6 wks.	12 cm. in circumference at isthmus	Fibrosis and hyperplasia
Hill[19]	Goiter	4 days	57 gm.	Hyperplasia with considerable colloid
Solis-Cohen and Steinbach[20]	Myxedematous appearance	48 hrs.	41 gm.	Hyperplasia
Davies[12]	Medium goiter	13 days	Each lobe 4 cm. in diameter	Marked hyperplasia
Case 1	None	½ hr.	50 gm.	Marked hyperplasia
Case 2	None	5 hrs.	20 gm.	Marked hyperplasia

REPORT OF CASES

Case 1

Baby boy C. The mother was a 24-year-old primipara. She received only ferrous sulfate and calcium as medication during her pregnancy. Hydramnios developed in the last trimester. Due to some cephalopelvic disproportion, delivery was somewhat difficult. The mother had had two subsequent pregnancies which were uneventful. At no time had she shown thyroid enlargement or symptoms.

The newborn infant never breathed properly and expired ½ hour after delivery. An autopsy was performed 18 hours after death. Body weight was 3890 gm.; length, 52 cm. External examination revealed slight overlapping of the parietal bones and

a large, soft mass in the anterior portion of the neck extending symmetrically from the clavicle to either side of the mandible. On internal examination the viscera other than the thyroid gland were within normal limits except for atelectatic lungs. The thyroid gland weighed 50 gm. and both lobes and the isthmus were symmetrically enlarged (Fig. 1). The surface was dark red-brown and the capsule was somewhat thickened.

Microscopically, the thyroid gland was composed of loosely arranged balls of cells with poorly preserved acinar linings which gave a desquamated appearance. The cells had a faintly acidophilic cytoplasm which usually was indefinite in outline. Most nuclei were of intermediate size but small and large hyperchromatic nuclei were common (Fig. 2). In the periphery of lobules the acini were small and had discrete, sharply outlined cells (Fig. 3). Colloid was absent throughout. A very prominent perifollicular distribution of hyperemic capillaries was present. Aside from a fairly thick collagenous capsule, connective tissue was not prominent.

Case 2

Baby boy A. The mother was a 29-year-old primipara who gave birth to the child at 6½ fetal months. Hydramnios was present which enlarged the uterus to the size of a term pregnancy. The baby was born by vertex presentation, although both arms were prolapsed. The child breathed poorly and expired 5 hours after birth. The mother showed no evidence of goiter and received no unusual medication.

The autopsy was performed 3 hours post mortem. External examination revealed a symmetric mass, 3 by 5 cm., in the anterior portion of the neck. On internal examination the thyroid gland was symmetrically enlarged, weighing 20 gm. Each lobe measured 4 by 2 by 1 cm. and anteriorly a nodule measuring 0.8 cm. in diameter was present on each side (Fig. 4). The gland surrounded the trachea but no definite compression was evident. The heart weighed 13 gm., and the left ventricle was somewhat compressed transversely by a narrow band of pericardial thickening. The other viscera were within normal limits for weight and appearance except for atelectatic lungs and a tentorial tear of 1 cm.

Microscopically, the thyroid gland was composed of follicles lined by high-cuboidal to columnar epithelium (Fig. 5). The cytoplasm was faintly acidophilic and the nuclei were round, uniform, fairly large, and hyperchromatic. Papillary infolding was present. A considerable number of follicles contained pink colloid. Scalloping of the edges of the colloid was not seen. Hyperemic perifollicular capillaries were present and connective tissue was minimal. Marked extramedullary hematopoiesis was present in the liver. A minute focus of polymorphonuclear cells was present in the pancreas. The endocrine organs and other viscera showed no unusual features.

Discussion

Anatomically, the congenital goiter does not differ greatly from the adult goiter. Fundamentally, the same cell types and arrangements are present, although marked vascularity and deficiency of colloid are more characteristic of the fetal gland. The microscopic appearance of the gland in most cases is that of a hypersecreting organ, but there has been no clinical evidence that hyperthyroidism is present. Symptoms and signs of reported cases are limited to those caused by the enlargement of the thyroid gland *per se*.

The thyroid glands in cases 1 and 2 each presented parenchymatous hyperplasia. The gland in case 1 was described as having a desquamated appearance. This feature of certain congenital goiters has bothered pathologists for over 50 years. Staemmler [21] believed that this is an intravital regressive change, in that the number of cells in a follicle are far too numerous to arise simply from desquamation of the lining epithelium, and in addition in a series of 24 fetuses he failed to find a relationship between the delay of autopsy after death and the degree of "desquamation." Unfortunately, since case 1 was autopsied 18 hours post mortem, it does little to clarify the issue even though other organs failed to show significant post-mortem changes.

Cretinism of the endemic variety is seen in the same regions as is congenital goiter and in European reports the two are commonly associated. This has suggested the thesis that prenatal iodine deficiency in the mother is the basis of each condition. Sporadic cretinism, on the other hand, is much less often associated with congenital thyroid enlargement, and athyreosis or aplasia is thought to be the usual basis for this variety of cretinism.

Summary

In two autopsied cases of congenital goiter the thyroid glands showed parenchymatous hyperplasia. The cause of most of these goiters is obscure although a disturbance in iodine metabolism appears to be the most prominent factor.

Grateful acknowledgment is due Miss Stella Zimmer and Mr. Louis Georgianna for the illustrative material.

Since submitting this manuscript, an additional autopsied case of congenital goiter has been reported (Seligman, B., and Pescovitz, H. Suffocative goiter in newborn infant. *New York State J. Med.*, 1950, 50, 1845–1847.) This case is of particular interest as the mother received propylthiouracil during her pregnancy for the control of hyperthyroidism. The newborn infant had a goiter weighing 16 gm., which caused asphyxia.

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DESCRIPTION OF PLATES

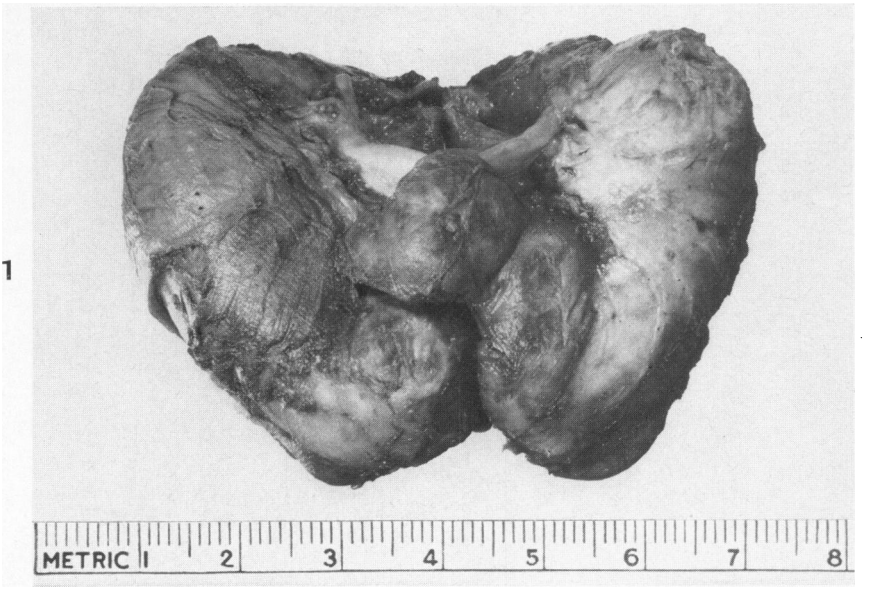
PLATE 17

FIG. 1. Case 1. Anterior view of thyroid gland.

FIG. 2. Case 1. Histologic structure of thyroid gland. Hematoxylin and eosin stain. × 565.

FIG. 3. Case 1. Subcapsular region of the thyroid gland. Hematoxylin and eosin stain. × 135.

1



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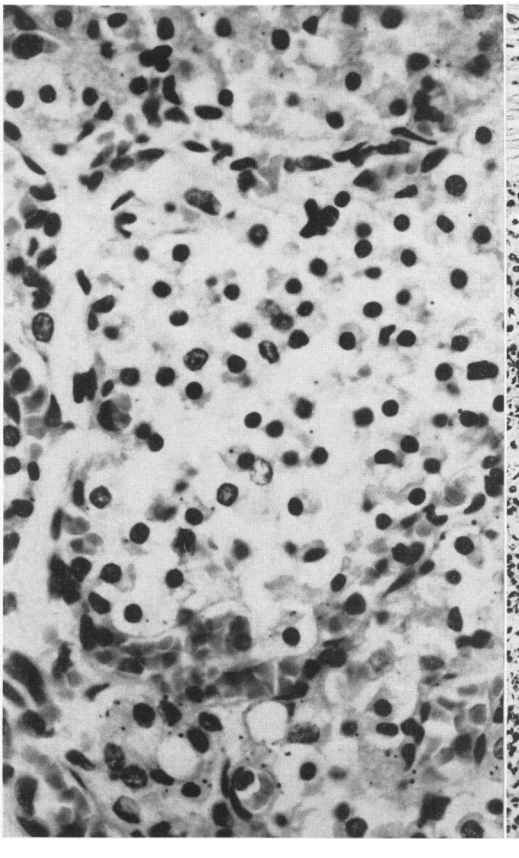

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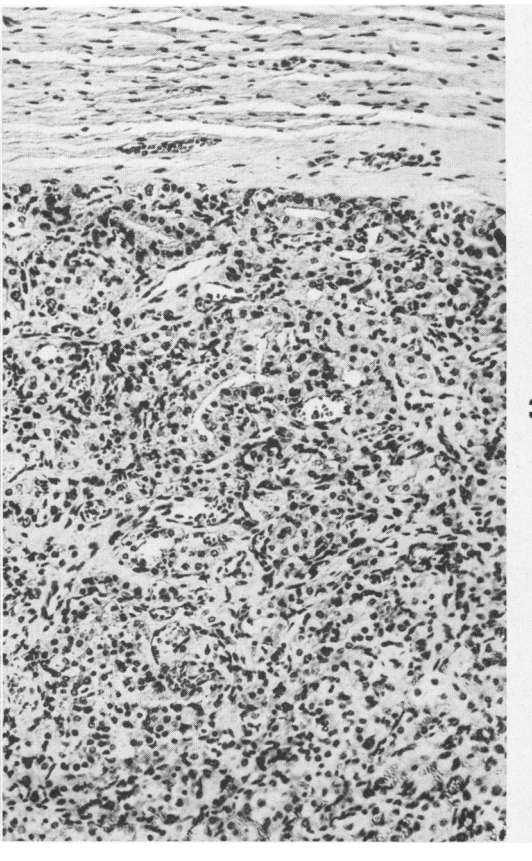

PLATE 18

FIG. 4. Case 2. Anterior view of thyroid gland.

FIG. 5. Case 2. Histologic structure of thyroid gland. Hematoxylin and eosin stain. × 135.

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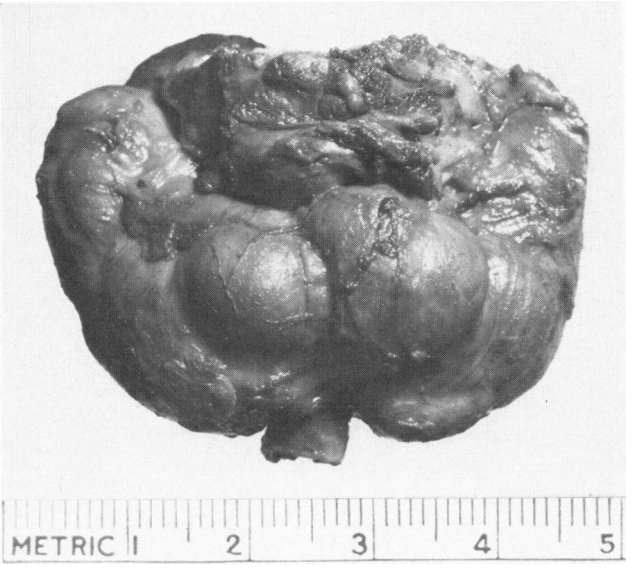

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