

TERATOMA OF THE NECK IN THE REGION OF THE THYROID GLAND
A REVIEW OF THE LITERATURE AND REPORT OF FOUR CASES *

GEORGE F. BALE, M.D.

(From the Department of Pathology of St. Luke's Hospital, Kansas City 2, Mo.)

Teratoma of the neck in the region of the thyroid gland is a rare and usually benign neoplasm. A number of tumors of this region were reported during the seventeenth, eighteenth, and first one-half of the nineteenth centuries. Undoubtedly, many of these were teratomata. However, because of lack of microscopic description, it is believed that these cases should not be accepted and they will not be discussed here. Abstracts and complete bibliographies may be found in the dissertations of the early 1900's, especially that of Pellegrini in 1913, and in the more recent papers of Saphir in 1929 and Pusch and Nelson in 1935.

The first proved case of teratoma of the neck was published by Hess in 1854, and was restudied microscopically by Wetzel in 1895. Since the time of Hess, 60 cases have been added to the literature. The individual cases are listed in the two accompanying tables. Table I includes the tumors reviewed by Saphir, and Table II contains all other probable teratomata of the neck in the region of the thyroid gland. (Style of tables after Saphir.)

Five probable teratomata of this region are placed in Table II, and in the bibliography, upon rather scanty evidence of their true nature, for neither the originals nor abstracts were available. The instance of Munker in 1898 is classed here because of its suggestive title. Hagenbach-Burckhardt's case in 1899 is proposed because of its title, and also because it was found in v. Khautz's report in 1910 of teratomata of this nature. Weyl's case in 1900 is also in the list because Ewing mentions it as a teratoma in his "Neoplastic Diseases." The reports of Magnin in 1942 and Marescot Iglesias in 1945 are included because of their titles. It is hoped that the incorporation of these 5 cases may be of some value to future investigators. Eliminating the above 5 cases leaves a total of 56 tumors collected from the literature which will be discussed in this communication.

Early extensive accounts were presented by Poult in 1905, Hunziker in 1909, Pellegrini in 1913, and Ehlers in 1914. Ehlers pointed out that the first case described by Flesch and Winternitz in 1905 was not a teratoid tumor. Subsequent restudy proved the correctness of Ehler's statement. More recent extensive compilations are those of Saphir in

* Received for publication, June 27, 1949.

TABLE I
*Additional Information About the Tumors Reviewed by Saphir in 1929.
 The Statements of the Various Authors Concerning the Presence
 of Thyroid Tissue in the Tumor, and Concerning the
 Relationship of the Tumor to the Thyroid Gland,
 Are Presented*

No.	Author	Year	Thyroid tissue present in tumor	Displacement of thyroid gland	Hydranios present at birth	Operation performed	Thyroid arteries entering tumor
1	Hess	1854	Thyroid gland separated by fibrous capsule from tumor	Displaced right lobe	No ref.	No	No ref.
2	Zahn	1886	Described "follicles" of embryonic thyroid tissue in tumor	Displaced	No	No	No ref.
3	Schimmelbusch	1894	None	Yes	No	Yes	No ref.
4	Wetzel	1895	Same as case 1	Displaced right lobe	No	No	No ref.
5	Pupovac	1896	None	Left lobe contained tumor	No	Yes	No ref.
6	Swoboda	1896	Same as case 1	No ref.	No	Yes	No ref.
7	Bostroom	1896	None	Displaced right lobe	No ref.	No	No ref.
8	Dentler	1902	Part of cysts and lumina in tumor called degenerated primitive thyroid tissue	Entire gland replaced by tumor	Yes	No	No ref.
9	Carter	1903	No ref.	No ref.	No	No	No ref.
10	Wiesinger	1904	No ref.	No ref.	No ref.	Yes	No ref.
11	Poult	1905	Fetal and adult thyroid tissue in tumor	Displaced	No	Yes	No ref.
12	Flesch and Winternitz; first case	1905	None	Displaced left lobe	No ref.	Yes	Superior thyroid artery tied in removing part of tumor
13	Herb	1906	Thyroid follicles in capsule and compressed just beneath capsule in tumor	Displaced left lobe	No ref.	Yes	No ref.
14	Lurje	1908	One colloid-filled cyst in tumor	No ref.	No ref.	No	No ref.
15	Niosi	1908	No ref.	No ref.	No ref.	Yes	No ref.
16	Hunziker	1909	None	Displaced right lobe	Yes	No	Superior thyroid artery on right entered tumor

	Kimura	1910	Embryonic thyroid gland-like tissue in fibrous tissue lamellae of capsule	Displaced entire gland	No ref.	No	No ref.
17		1910	Embryonic thyroid gland-like tissue in fibrous tissue lamellae of capsule	Displaced entire gland	No ref.	No	No ref.
18	Schönberg	1911	None	Left lobe taken with tumor, but not mentioned again	No	No	No ref.
19	Russell and Kennedy	1913	Atypical large cystic areas, supposedly thyroid tissue	Tumor in place of thyroid gland	Yes	No	No ref.
20	Ehlers	1914	Lumina lined with cuboidal epithelium and filled with red material—thought to be thyroid tissue	Attached by a fibrous tissue stalk to right lobe	No ref.	Yes	No ref.
21	Dorner	1915	Necrotic glandular tissue, thought to be thyroid gland	Displaced	Yes	No	No ref.
22	van Rey	1916	None	No ref.	No ref.	Yes	No ref.
23	Fritzsche	1920	No thyroid tissue but glial tissue present in tumor*	Tumor in left lobe	No ref.	Yes	Left superior thyroid artery tied during removal of tumor
24	Hadda†	1921	Yes	Tumor fastened to left side of trachea by cord of tissue, apparently thyroid gland	No	Yes	No ref.
25	Koerner†	1922	None	No ref.	No ref.	Yes	No ref.
26	Hördemann Tammann	1925 1925	None Strands of thyroid tissue in capsule separated from tumor by fibrous tissue	No ref. Yes	No ref. No	Yes Yes	No ref. No ref.
27	Custer	1926	Thyroid tissue in fibrous capsule of tumor	Yes	No	Yes	Left superior thyroid artery cut in resection of tumor
28	Lecène and Mouchet (a)	1928	None	Yes	No ref.	Yes	No ref.
29	Lecène and Mouchet (b)	1928	None	Tumor originating from isthmus of thyroid gland	No ref.	Yes	No ref.
30	Saphir	1929	None	No thyroid gland present in fetus—tumor in its place	No	No	Superior thyroid arteries entered tumor

* See text of article.
 † Both authors reported the same tumor. See text.

TABLE II
 Summary of Cases Reported Since 1929 and Additional Earlier Cases Not Included in Saphir's Review

No.	Author	Year	Age	Sex	Thyroid tissue present in tumor	Brain present in tumor	Displacement of thyroid gland	Hydranmios present at birth	Operation performed	Thyroid arteries entering tumor
31	Munker	1898								
32	Hagenbach-Burckhardt	1899								
33	Weyl*	1900	10 mos.	F	No	No ref.	Yes	No ref.	No	Superior and inferior thyroid arteries
34	Schneider†	1903	Stillb.				Yes	No ref.	Yes	Two arteries entered capsule; branch of lingual or facial artery(?)
35	McGregor and Workman	1906	3 wks.	F	No	No	Yes	No ref.		
36	Ficheaux‡	1908	4½ mos.	No ref.	No	No ref.	No ref.	No	Yes	
37	v. Khautz (jun.)	1910	4 mos.	No ref.	No	Yes	Yes	No ref.	Yes	
38	Pellegrini†	1913	Stillb.	No ref.	No	Yes	Yes	Yes	No	
39	Ribbert†	1916	No ref.	No ref.	No ref.	Yes	No ref.	No ref.	No	
40	Satanowsky†	1922	1½ mos.	No ref.	No	No	Yes	No ref.	Yes	Vascular pedicle
41	Fessler	1924	Newb.	M	No	No	Yes	No ref.	No	
42	Bell, J. W.†	1926	Stillb.	M	No ref.	No ref.	Yes	Yes	No	
43	Brokate	1928	2 days	No ref.	No	Yes	Yes	No ref.	Yes	
44	Bell, L. P.	1930	9 mos.	M	No ref.	Yes	Yes	No ref.	Yes	
45	Fèvre and Pavie	1931	25 days	F	No ref.	Yes	Yes	No ref.	Yes	Vascular pedicle
46	Tavares and Gonçalves de Azevedo	1932	Newb.	M	Yes	Yes	No	Yes	No	No ref.
47	Collorid†	1933	5 hrs.	M	Yes¶	Yes	Yes	No ref.	No	No ref.
48	Petersen	1933	Stillb.**	F	No	Yes	Yes	Yes	No	No vascularity
49	Krech	1933	13 mos.	No ref.	No ref.	No ref.	Yes	No ref.	Yes	No ref.
50	Simões and Auvray	1934	Newb.	No ref.	Yes#	No ref.	No ref.	Yes	No	No ref.
51	Pusch and Nelson	1935	Stillb.††	No ref.	No	Yes	On left side of thyroid gland	No ref.	Yes	No ref.
52	Tomassini	1938	3½ years	M	No	Yes		No	Yes	No ref.
53	Potter	1938	Stillb.	F	No	Yes	Yes	No	No	Small vessels entered capsule
54	St. George Wilson	1939	Stillb.	F	No	Yes	Yes	Yes	No	No ref.
55	Trillat and Nottter	1939	Newb.	No ref.	Yes	Yes	Yes	No	No	No ref.
56	Peter	1940	Newb.	M	Yes	Yes	No connection	No	Yes, at 10 wks.	No ref.
57	Chapman	1941	9 days	M	No	Yes	Yes	Yes	No	No ref.
58	Magnin	1942								
59	Sutton and Gibbs	1944	3 mos.	F	Yes	Yes	Yes	No	Yes	No ref.
60	Munro and Waldapfel	1944	4 wks.	M	Yes	Yes	Yes	No	Yes	No ref.
61	Marescot Iglesias	1945								

* From Ewing's "Neoplastic Diseases."

† Collected by Pusch and Nelson.

‡ From Pellegrini.

§ No trace of thyroid tissue found in neck.

|| Actually called "embryonic endocrine tissue" by the authors.

¶ "Incompletely developed thyroid."

"Embryonal thyroid."

** Six month fetus.

†† Seven month fetus.

1929 and Pusch and Nelson in 1935. In these later articles there are several minor points that might be clarified. In Saphir's analysis the cases of Hadda in 1921 and Koerner in 1922 were presented as two separate tumors. However, Koerner stated that the tumor he was presenting was first published by Hadda in 1921 after which the tumor was given to Koerner for histologic study by Mathias of Breslau. It should be mentioned that although these two authors wrote about the same tumor, they differed as to whether it contained microscopic thyroid tissue. Hadda discerned its presence, while Koerner found no trace of this type of glandular tissue in the tumor. Saphir, in one of his charts, stated that the teratoma of Fritzsche (1920) did not contain brain-like tissue, whereas the latter's original article asserted the reverse. Bell, in 1926, and Pusch and Nelson, in 1935, mentioned a thyroid teratoma reported by Gardner in his "Iconograms" of 1913. Search of that volume has revealed mention of only one teratoma, which proved to be described and pictured as a teratoma of the side of the face above the level of the mandible. Pusch and Nelson, also, included in their review as a probable teratoma of the thyroid gland, the tumor reported by Bell in 1926. Bell's histologic description is rather indefinite, but the photographs and photomicrographs shown would seem to warrant its acceptance as a probable teratoma of the neck in the region of the thyroid gland.

Since these tumors seemingly have their origin from totipotent cells, no one tissue can be used as a label of their individuality, as was suggested by Saphir in regard to thyroid tissue. Hence, for naming these tumors, we must rely on anatomical position as well as on admixture of tissues. One feature that may be employed for this purpose is the relationship of the thyroid arteries to the tumor. However, since only 6 of the 56 tumors have been recorded as supplied by the inferior and/or the superior thyroid arteries, this relationship is of small significance. These vascular connections suggest, at least, that the tissue in these individuals that should have become thyroid gland, developed into the teratomata. It would seem that these cases were true teratomata of the thyroid gland itself. A broader, if not quite so striking, basis for recognition is the more constant tumor-thyroid relationship as noted in the literature. In 44 of the 56 cases all or part of the thyroid gland was replaced by the tumor. In the other 12, save one, no reference was made to the thyroid gland or to other positive relationships. This replacement of thyroid tissue is not pressure displacement of the gland, as is seen in the other tissues of the neck; on the contrary, there is an actual absence

of part or all of the thyroid gland with tumor occupying its place. It may be surmised that the tumor grew from embryonic tissue destined to become thyroid gland, or at least from immature tissue closely associated with the developing gland. Since other teratomata of the body, for example sacral and testicular teratomata, are named by their anatomical relationships, the 38 tumors which displaced the thyroid gland but are not supplied by the thyroid arteries may be captioned teratomata of the neck in the thyroid region.

Three classifications thus emerge, teratomata of the thyroid gland (6 cases), teratomata of the neck in the region of the thyroid gland (38 cases), and teratomata of the neck probably in the region of the thyroid gland (12 cases).

The identification of adult thyroid tissue in these tumors is unusual, for only 6 of the 56 writers stated it to be present. This is somewhat at variance with Saphir's impression, since he accepted several more of the tumors which he reviewed as containing thyroid tissue. The observations of the various authors collected by Saphir as to the appearance of thyroid tissue in their tumors are offered in Table I.

A surgical procedure had been performed in 29 of the 56 recorded cases. Schimmelbusch, in 1894, carried out the first operation of this type and the patient apparently was cured. The follow-up period in that case, as in the majority of the later cases, was quite short: 25 of the operations resulted in presumed cures, and 4 of the surgically treated patients died. Thus, Pupovac's patient (1896) died suddenly the afternoon of the day of operation. The other fatalities noted were those of van Rey (1916), Fritzsche (1920), and Hadda and Koerner (1921). The cause of death in these cases was either unknown or unmentioned except by Fritzsche. His case was that of a 41-year-old female who died 1 month following operation of widespread metastatic sarcoma, probably originating from the teratoma. So, 25 of the patients treated surgically were relieved of their tumors (44 per cent of cases). A survey of the remaining 27 cases shows the following: (1) 2 dead born fetuses, (2) 10 still-born infants, (3) 13 newborn children dead within the first few days of life, and (4) 2 cases alive beyond the newborn period. In the last category were Carter's patient (1903), who died at 1 month of age of suffocation produced by progressive enlargement of the tumor, and Lurje's patient (1908), a 53-year-old woman, who died of metastatic sarcoma from a probable malignant proliferation of the teratoma. Thus only one patient in this group who lived long enough to be a fair surgical risk was not treated surgically. The majority of the newborn, class 3 above, died before surgical treatment could be instituted. It might, therefore, be

considered that if the patient is a fair surgical risk this tumor can be removed with a good result.

Hydramnios is commonly associated with teratoma of the neck. This was first observed by Dentler in 1902. Since then, 10 other writers have mentioned it, an incidence of 19.6 per cent, whereas the natural occurrence is 0.5 per cent (DeLee and Greenhill). However, hydramnios is not infrequent with many types of congenital anomalies.

Of all 56 tumors only 3 (Pupovac, 1896; Lurje, 1908; Fritzsche, 1920) proved to be clinically malignant.

With reference only to the teratomata not found in Saphir's study, 19 of the 26 were composed partially of nervous tissue. The sexes were represented nearly equally, and all of these neoplasms were discovered at birth.

The 4 cases follow.

Case 1

Baby girl O., a 7 months premature white infant, was delivered at St. Luke's Hospital, Kansas City, on July 18, 1948. The mother was a 20-year-old primipara who had had a normal pregnancy. The past and family histories were without note. Labor was unusual only in its early onset, the estimated date of confinement being October 25, 1948, and in the discovery of hydramnios at birth, the fluid being estimated at 5 l.

A large, soft, irregularly lobulated, cystic mass, measuring 12 by 10 cm., was seen to occupy the anterior right side of the neck (Fig. 1). The child did not respond to stimulation and died 7½ hours after birth, apparently of respiratory failure.

Gross Description. Significant necropsy findings consisted of partial atelectasis of both lungs and the tumor of the neck. This was a large mass in the anterior cervical region. It extended from the chin downward and outside the anterior thoracic wall to the level of the xyphoid bone. On the right it reached to the ear and on the left for 3 cm. beyond the midline. Posteriorly, the tumor rested on and partially surrounded the larynx, trachea, and esophagus. It was overlaid by skin which was easily dissected away, and was well encapsulated. The band muscles of the neck were stretched over the anterior and lateral surface of the tumor, and some were very firmly attached to the capsule of the mass. The left lobe of the thyroid gland was loosely attached by fibrous tissue to the posterior surface of the teratoma. The isthmus and right lobe could not be found. Careful dissection revealed that the right superior thyroid artery which was some five times the size of its mate, ended in the superior posterior capsule of the tumor. No other definable vessels were seen to enter the mass. Nerves associated with the tumor were those innervating the band muscles of the neck. The vagus and other large nerves and vessels traversing the neck were displaced laterally. The thymus was not involved in the tumor.

The tumor measured 12 by 12 by 10 cm., and consisted of a large, roughly pear-shaped, nodular, partially cystic and partially solid mass. Section revealed multiple, irregular, cystic spaces varying from 3 mm. to 3 cm. in diameter, with intervening irregular masses of soft to firm grayish white tissue. Some of the cysts contained a clear yellow, water-like material and others contained blood-stained fluid. Several polypoid masses of grayish white soft tissue projected into two of the larger cavities. Cartilaginous and bony areas were found in the center of the tumor.

Microscopic Description. This tumor presented a ground substance of stellate cells of various sizes and shapes, surrounding numerous cystic structures lined by various types of epithelia. The types found were squamous epithelium, simple and stratified, the latter showing in one area skin-like structure with an embryonic hair shaft; simple columnar epithelium of goblet type; pseudostratified ciliated columnar epithelium; simple cuboidal epithelium, a portion pigmented and part ciliated; and transitional epithelium, some of which appeared to be ciliated. In some of the cysts the epithelium showed a rapid transition from one type to another. Both striated and smooth muscle cells were present in the tumor plus many areas of cartilage and bone, some of the latter appearing to be developing from cartilage. The fairly well developed bone showed bone marrow. Definitive glandular organization appeared in the tumor, with bands of smooth muscle surrounding lumina lined by columnar epithelium of goblet type. Considerable quantities of what appeared to be embryonic mesenchyme were present, and there was well developed fat. Elastic and collagenous connective tissues could be seen scattered throughout the tumor.

The van Gieson and Masson trichrome stains demonstrated many areas of stellate cells which had the characteristics of neuroglia. Several areas of the tumor, separated from the surrounding connective tissue by fibrous bands, showed slit-like spaces bordered by many layers of small dark-staining cells giving the appearance of neuro-epithelial canals. Filamentous folds of pigmented and unpigmented cuboidal epithelium which enclosed connective tissue cores containing wide capillary-like vessels were found in the tumor. These areas had the appearance of epithelium of the ciliary body and choroid plexus. Another area took the form of ependyma. Adult multipolar neurons were recognized in one of the sections. Capillaries and arterioles were noted.

Thyroid tissue was not observed.

Case 2

Baby girl F. was a 6 months stillborn fetus delivered on June 5, 1929, at St. Luke's Hospital in Kansas City. The mother of this infant was a 30-year-old white primipara. The past and family histories were without note. The last menstrual period had been November 20, 1928. The patient was admitted in labor and was delivered without difficulty by breech assist on the second hospital day. A large amount of amniotic fluid was noted.

Gross Description. At necropsy complete lack of pulmonary aeration and the tumor in the neck were the only significant findings. A large, irregularly lobulated mass was seen to lie in the left anterior region of the neck (Fig. 2). It extended from the zygoma to the clavicle, and from the trachea to the posterior border of the mastoid process. The tumor was loosely covered by skin which was necrotic over an area measuring 2 cm. in diameter on the summit of the tumor. The tumor was well encapsulated, and posteriorly it rested upon the inferior surface of the floor of the mouth and the deep structures of the neck which were displaced as if by expansile growth. It protruded superiorly and anteriorly over the external surface of the mandible and elevated the left ear and the skin of the cheek. The band muscles were reduced to thin ribbons attached to the fibrous tissue capsule of the tumor. The teratoma was fastened firmly only at its medial border to the left side of the tracheal cartilages. The right lobe and isthmus of the thyroid gland were identified, but the other lobe was absent. On the left the common carotid artery was approximately four times the length of its counterpart, and appeared to be stretched over the lateral surface of the tumor. The inferior thyroid artery from the thyrocervical branch of the left subclavian artery and the superior thyroid artery from the common carotid arose in their usual places and entered the tumor on the medial and lateral aspects, respectively. The nerves crossing this side of the neck were pushed lateralward. The thymus was not associated with the tumor.

The tumor measured 10 by 12 x 8 cm., and consisted of a semioval, partly solid, partly cystic, grayish black mass. Multiple cuts through it revealed a heterogeneous parenchyma with cystic structures measuring up to 2 cm. in diameter, lined by smooth and papillary membranes.

Microscopic Description. Only a limited number of blocks were available for study. Here again, however, were seen the great diversity of tissues, the background of loosely knit stellate cells bordering many cyst-like spaces of various sizes, shapes, and epithelial linings, these last being squamous, simple and stratified; simple columnar; cuboidal; and transitional. Both smooth and skeletal muscle fibers were seen, and there were considerable embryonic and adult cartilage and collagenous

connective tissue. Neuroglia was demonstrated with Masson and Bielschowsky stains.

No thyroid tissue was seen in the tumor.

Case 3

Case 3 was a stillborn, somewhat macerated infant. No additional history was available.

Gross Description. The teratoma replaced almost all of the structures of the neck. The relationship of the tumor to the thyroid arteries could not be determined because of the deterioration of the tumor, and a separate thyroid gland could not be identified. The position of the tumor made it seem most likely that it was derived from the thyroid gland. No further gross description was obtained.

Microscopic Description. This tumor was similar to the ones just described and contained nearly the same types of epithelia as in case 1. Here again were seen smooth and skeletal muscle; cartilaginous, myxoid, collagenous, and elastic connective tissues; and capillaries and arterioles. A rather markedly different type of epithelium appeared here than had been seen in the other tumors. It consisted of an inner simple cuboidal epithelium overlaid with a syncytium of a single cell thickness, the whole having the characteristics of trophoblastic epithelium. Throughout the sections there were clumps of deep-staining polygonal cells with a finely granular cytoplasm and vesicular nuclei. Groups of small alveolar structures lined with cuboidal epithelium were crowded together to appear like glands of the mucous type. Organoid structures were better developed here than in the other tumors studied, one cystic structure presenting an epithelium of columnar cells with well formed thick bands of smooth muscle lining the cyst walls. Neuroglia-like tissue was identified with special stains.

No evidence of thyroid tissue was found in the sections studied.

Case 4

J. M. was a 2-months-old white male who was admitted to the University of Kansas Hospital in Kansas City, Kansas, on February 25, 1940, for removal of a tumor of the neck. The mother of the child was a young primipara who had no difficulty with her pregnancy or delivery. The child weighed 7 lbs. at birth, and at that time a large mass was noted on the left side of the neck. The mass produced dysphagia and had been aspirated repeatedly for the relief of this symptom prior to admission. During the first 2 months of life the tumor spread anteriorly and downward toward the right side. The child gained slowly and weighed 9½ lbs. on admission. Physical examination at that time revealed a tense, multilocular, cystic mass, 12 by 12 cm. in diameter, overlying the anterior left cervical area and extending across the midline to the right for a short distance.

On February 29, 1940, the tumor was removed by the late Dr. Earl C. Pagett.

He commented in the operative note that ". . . a line of cleavage was found in the fascia of the neck and the tumor shelled out with the finger." The child recovered from the operation without undue difficulty and was discharged on March 20, 1940, without symptoms.

Nothing is known of the later course, for contact with the family has been lost.

Gross Description. The tumor was an irregular mass measuring 15 by 9.5 by 5 cm. and weighing 310 gm. (Figs. 3 and 4). The external surface was bosselated, well encapsulated, and roughened by numerous fibrous tags. On sectioning, the surface was cystic and showed a variegated appearance, there being numerous, friable, light gray, cellular areas intermingled with cystic structures containing a viscid clear or bloody fluid and small areas of cartilage. A few calcific deposits were scattered throughout.

Microscopic Description. In structure this tumor was much the same as the other three. It showed most of the same types of epithelia, and here again were seen fatty, bony, cartilaginous, collagenous, and fibrous connective tissues; smooth and skeletal muscle; and capillaries and arterioles. In one portion of the tumor were seen closely arranged acini lined with columnar cells with basally located nuclei and granular red cytoplasm, and in another was a well defined area of enchondral ossification. Organoid spaces lined by various types of epithelium were seen, surrounded by walls containing smooth muscle bundles. Here again the epithelium of these lumina changed rapidly from one type to another. In another portion of the tumor there was an area, set aside from the usual type of tissue by fibrous capsule, which was made up of adult neuroglial cells containing numerous well defined ganglion cells plus a few, rounded, dark purple, laminated, calcified spherules which had the appearance of psammona bodies. An ependyma-like structure bordered one edge of this section.

Thyroid tissue was not identified in this tumor.

DISCUSSION

The first two tumors (cases 1 and 2) are definitely teratomata of the thyroid gland because of their anatomical relationships and blood supply. A fibrous tissue capsule separated each tumor from what remained of the thyroid gland.

The last two tumors (cases 3 and 4) are not so well defined, for proof of their anatomical relationships could not be obtained. It can only be supposed that they were in the thyroid region, a supposition which in fact cannot be defended. Therefore, these two can be designated as teratomata of the neck, probably in the region of the thyroid gland. Tissue that appeared to be neural in origin and form was found

in all four tumors, but no adult thyroid tissue could be made out. No evidence of malignancy was observed.

The birth of the first two infants was attended by hydramnios, but it is not known whether this occurred in the latter two cases. Case 4, J.M., underwent operation and was relieved of his tumor. Two infants were stillborn and one was not operated upon because of its extremely poor condition.

SUMMARY

Fifty-six cases of teratomata of the thyroid gland and teratomata of the neck in the region of the thyroid gland have been assembled from the literature and summarized. Only 6 of the tumors can be called true teratomata of the thyroid gland, being the ones in which the thyroid arteries supplied the tumor. Thirty-eight more were definite teratomata of the neck in the region of the thyroid gland because they replaced all or part of the gland. The remaining 12 are called teratomata of the neck, probably in the region of the thyroid gland, because of their general appearance. Twenty-nine of the tumors have been removed surgically, 25 apparently with good results. Hydramnios is commonly found associated with this abnormality. The presence of brain tissue, the sex and age incidence, and the malignant properties of these tumors have been reviewed. Two new cases of teratomata of the thyroid gland and two cases of teratomata of the neck, probably in the region of the thyroid gland, are added to the literature.

I wish to express my gratitude to Dr. H. R. Wahl, of the University of Kansas, for the use of case 4; to Dr. Druery Thorn of Kansas City, Mo., for case 1, and to Dr. Stanley K. Davis of the Iowa Methodist Hospital, Des Moines, Iowa, for supplying the third tumor. Also, I am indebted to the late Dr. F. C. Rumsey of Kansas City, Mo., and to the late Dr. J. L. Smith of Norcatour, Kansas, for their initial recognition of tumors 2 and 4, respectively.

REFERENCES

- Bell, J. W. Embryonic mixed tumor of thyroid. *J. A. M. A.*, 1926, **86**, 1616.
 Bell, L. P. Tumors of the neck simulating thyroid disease. *West. J. Surg.*, 1930, **38**, 584-594.
 Bostroem. Ueber die Teratome am Halse. *Deutsche med. Wchnschr.*, 1896, **22**, 66-67.
 Brokate. Über ein Teratoma embryonale der Schilddrüsengegend. *Zentralbl. f. Chir.*, 1928, **55**, 826-827.
 Carter, F. B. A case of teratoma of the neck. *Lancet*, 1903, **2**, 1499.
 Chapman, F. D. Teratoma of the neck in the newborn. *Arch. Path.*, 1941, **32**, 217-221.
 Colloridi, F. Contributo alla conoscenza dei tumori congeniti del collo nel neonato. *Ann. di ostet. e ginec.*, 1933, **55**, 387-424.
 Custer, H. Zur Kenntnis des Teratoms der Schilddrüse. *Frankfurt. Ztschr. f. Path.*, 1926, **33**, 125-140.
 DeLee, J. B., and Greenhill, J. P. Principles and Practice of Obstetrics. W. B. Saunders Co., Philadelphia & London, 1947, ed. 9, p. 521.

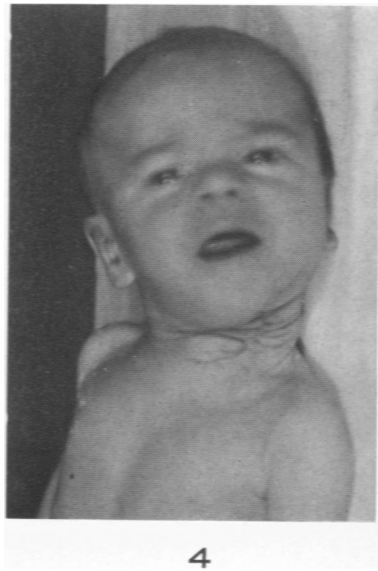
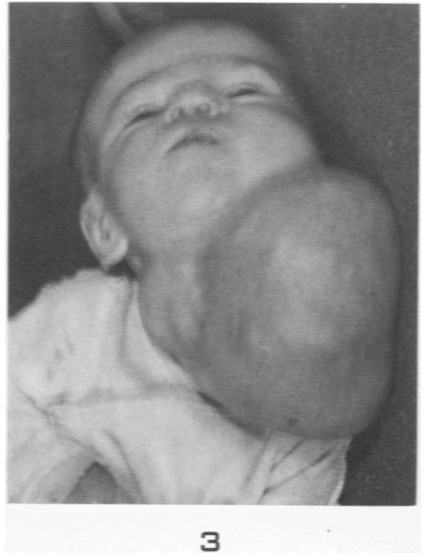
- Dentler, W. Ueber congenitale Tumoren der Schilddrüse. Inaugural Dissertation, C. Wolf & Son, München, 1902, 30 pp.
- Dorner, H. Congenitales Teratom der Schilddrüsengegend mit Hydramnion kompliziert. [Erlangen.] Inaugural Dissertation, R. Lange, Giessen, 1915, 33 pp.
- Ehlers, H. W. E. Über ein Teratoma embryonale der Schilddrüsengegend. *Beitr. z. path. Anat. u. z. allg. Path.*, 1913-14, 57, 46-56.
- Ewing, J. Neoplastic Diseases. W. B. Saunders Co., Philadelphia & London, 1940, ed. 4, p. 793.
- Fessler, A. Einen teratoiden Tumor an der Vorderseite des Halses eines Neugeborenen. *Wien. klin. Wchnschr.*, 1924, 37, 885.
- Fèvre, M., and Pavie, P. Un cas de tératome de la région cervicale. *Ann. d'anat. path.*, 1931, 8, 1245-1251.
- Ficheaux. Thèse de Lille, 1908. (Cf. Pellegrini.)
- Flesch, H., and Winternitz, A. M. Über Teratome der Schilddrüse und ihre operative Behandlung. *Jahrb. f. Kinderh.*, 1905, 62, 410-416.
- Fritzsche, R. Ueber ein malignes embryonales Teratom der Schilddrüsengegend. *Arch. f. klin. Chir.*, 1920, 114, 317-331.
- Gardner, F. E. Iconograms. Rebman Co., New York, 1913, 252 pp.
- Hadda. Kongenitales Schilddrüsenteratoma. *Berl. klin. Wchnschr.*, 1921, 58, 1084.
- Hagenbach-Burckhardt, E. Teratom der rechten Hals- und Submaxillargegend. *Jahrb. f. Kinderh.*, 1899, 49, 113-114. (Cf. v. Khautz jun.)
- Herb, I. C. Teratoma of the thyroid gland. *Am. J. M. Sc.*, 1906, 131, 1015-1020.
- Hess, W. Beitrag zur Casuistik der Geschwülste mit zeugungsähnlichem Inhalte. Inaugural Dissertation, M. Merck, Giessen, 1854, 24 pp. (Cf. Wetzel.)
- Hördemann, R. Ein Fall von Teratom der Schilddrüsengegend. *Frankfurt. Ztschr. f. Path.*, 1925, 32, 245-258.
- Hunziker, H. Die Teratome der Schilddrüsengegend in pathologisch-anatomischer und klinischer Beziehung. *Beitr. z. Geburtsh. u. Gynäk.*, 1909, 13, 448-474. von Khautz (jun.). *Wien. klin. Wchnschr.*, 1910, 23, 790.
- Kimura, K. Ueber die Teratome des Halses. Inaugural Dissertation, O. Kindt, Giessen, 1910, 47 pp.
- Koerner, J. Ein Teratom der Schilddrüse. *Centralbl. f. allg. Path. u. path. Anat.*, 1921-22, 32, 483-485.
- Krech. Teratom am Hals. *Zentralbl. f. Chir.*, 1933, 60, 2572.
- Lecène, P., and Mouchet, A. Deux nouvelles observations de tératomes de la région cervicale. *Ann. d'anat. path.*, 1928, 5, 953-962.
- Lurje, M. Ueber ein Teratom der Schilddrüse. Inaugural Dissertation, J. J. Meier, Zürich, 1908, 27 pp.
- Magnin, P. Le tératome du cou du nouveau-né. *Rev. franç. de gynéc. et d'obst.*, 1942, 37, 210-219.
- Marescot Iglesias, E. Tumores teratoides del cuello. *Rev. españ. cir.*, 1945, 2, 382-383.
- McGregor, A. N., and Workman, C. A large teratoma of the neck successfully removed from an infant three weeks old. *Lancet*, 1906, 1, 433-435.
- Munker, H. Teratoma colli ritka esete. *Gyógyászat*, 1898, 38, 683-687.
- Munro, E. H., and Waldapfel, R. Congenital teratoma of thyroid. *Am. J. Surg.*, 1944, 64, 271-275.
- Niosi. Teratom des Halses. *Zentralbl. f. Chir.*, 1908, 35, 1181.
- Pellegrini, R. Un rarissimo caso di tridermoma della regione tiroidea. *Riv. di clin. pediat.*, 1913, 11, 161-183.
- Peter, R. Ein Fall von angeborenem Halsteratom. *Chirurg*, 1940, 12, 298-300.
- Petersen, E. Un cas de tératome du cou. *Acta obst. et gynec. Scandinav.*, 1933, 13, 1-12.
- Potter, E. L. Teratoma of the thyroid gland. *Arch. Path.*, 1938, 25, 689-693.

- Poult, J. Ein Teratom der Thyreoidea, Beitrag zur Geschwulstlehre. *Virchows Arch. f. path. Anat.*, 1905, 181, 101-134.
- Pupovac, D. Ein Fall von Teratoma colli mit Veränderungen in der regionären Lymphdrüsen. *Arch. f. klin. Chir.*, 1896, 53, 59-67.
- Pusch, L. C., and Nelson, C. M. Congenital teratoma of the thyroid gland. *Am. J. Cancer*, 1935, 23, 791-796.
- van Rey, H. Ein Teratom der Schilddrüse. Inaugural Dissertation, H. Trapp, Bonn, 1916, 30 pp.
- Ribbert. Ein hühnereigrosses Teratom aus der Schilddrüse. *Deutsche med. Wchnschr.*, 1916, 42, 1564.
- Russell, A. W., and Kennedy, A. M. Teratoma of the thyroid in a foetus. *J. Obst. & Gynaec. Brit. Emp.*, 1913, 23, 109-114.
- St. George Wilson, J. A case of teratoma of the neck of a foetus with acute hydramnios. *J. Obst. & Gynaec. Brit. Emp.*, 1939, 46, 44-48.
- Saphir, O. Teratoma of the neck. *Am. J. Path.*, 1929, 5, 313-321.
- Satanowsky, S. Teratoide de la región tiroidea. *Semana méd.*, 1922, 29, 634-642.
- Schimmelbusch. Operative Entfernung eines Tumors am Halse eines Neugeborenen. *Berl. klin. Wchnschr.*, 1894, 31, 17-18.
- Schneider, K. Ueber ein mächtig entwickeltes congenitales Cystadenom der Schilddrüse. *Prag. med. Wchnschr.*, 1903, 28, 221-223.
- Schönberg, E. Zur Lehre des Teratoms der Schilddrüse. [Basel.] Inaugural Dissertation, G. Leemann & Co., Zürich, 1911, 25 pp.
- Simões, F., and Auvray, R. Tumeur congénitale du cou (Tératome kystique). *Bull. Soc. d'obst. et de gynéc.*, 1934, 23, 30-33.
- Sutton, P. W., and Gibbs, E. W. Congenital teratoma of the thyroid; case report. *Am. J. Surg.*, 1944, 63, 405-407.
- Swoboda, N. Teratoma colli strumam cysticam simulans. *Wien. klin. Wchnschr.*, 1896, 9, 1062-1065.
- Tammann, H. Über ein Teratom der Schilddrüse. *Beitr. z. klin. Chir.*, 1925, 134, 230-234.
- Tavares, A., and Gonçalves de Azevedo, Jr. Um caso de teratoma cervical. *Lisboa méd.*, 1932, 9, 732-745.
- Tomassini, I. Teratoma del collo a costituzione encefalica. *Ann. ital. di chir.*, 1938, 17, 417-428.
- Trillat and Notter. Tumeur congénitale du cou; un cas de tératome cervical juxta-thyroïdien. *Bull. Soc. gynéc. et d'obst.*, 1939, 28, 197-199.
- Wetzel, H. Zur Casuistik der Teratome des Halses. [Giessen.] Inaugural Dissertation, F. Schnitzler, Wetzlar, 1895, 32 pp.
- Weyl, J. Ueber einen seltenen Fall von congenitaler Mischgeschwulst (Cyst-adenoma angio-cavernosum) am Halse eines 10 Monate alten Kindes. Inaugural Dissertation, B. Heller, München, 1900, 24 pp. (Cf. Ewing.)
- Wiesinger. Faustgrosses Teratom, von dem Halse eines 14 Tage alten Kindes enukleiert. *Monatschr. f. Geburtsh. u. Gynäk.*, 1904, 19, 781.
- Zahn, F. W. Beiträge zur Geschwulstlehre. *Deutsche Ztschr. f. Chir.*, 1886, 23, 297-314.

DESCRIPTION OF PLATE

PLATE 83

- FIG. 1. Case 1. Gross photograph of teratoma of baby girl O.
- FIG. 2. Case 2. Gross photograph of baby girl F., showing the tumor in place in the neck.
- FIG. 3. Case 4. Gross photograph of J. M. with tumor before surgery.
- FIG. 4. Case 4. Gross photograph of J. M. after removal of tumor on day of discharge from hospital.



Bale

Cervical Teratoma