

nearly always can withstand serious hemorrhages. The opposite is the case, on the other hand, in advanced and complicated cases of exophthalmic goiter. As for the danger from injury or removal of the parathyroids, *care to preserve the posterior capsule*, especially if in colloid goiter, both lateral lobes of the gland are operated on, is the chief prophylactic requirement.

Other possible causes of danger or death in thyroid surgery are acute thyroidism, collapse of the trachea due to absorption of cartilage through pressure, and such more general conditions as shock, air embolism, hemorrhage, pneumonia, infection, and anesthetic intoxication.

The author of the present work is not of the opinion, however, that the belief that "acute thyroidism" actually occurs when collapse follows thyroidectomy is well grounded. He ascribes the collapse to shock and has saved life, where "thyrotoxicosis" had been thought to exist by the surgeon, by at once resorting to hypodermoclysis and the simultaneous injection, into the rubber tube of the saline solution apparatus, of drop by drop of 20 minims of 1:1000 solution of adrenal chloride. Recovery is almost immediate under these conditions.

Acute inflammation of the thyroid, with or without adjoining structures, contraindicates thyroidectomy for the time being, incision and drainage being required as in other local infective conditions.

The useful results of radical treatment in simple or malignant goiters consist in the removal of a source of discomfort, physical deformity, dyspnea, hoarseness, and frequently of danger to the patient's life. In simple goiters with bilateral thyroid enlargement, removal of one lobe and the isthmus will generally be followed by shrinkage of the remaining lobe. In malignant tumors of the thyroid, a cure, if effected, will usually be obtained only where the condition is incipient and has not been suspected before operation.

MALIGNANT GOITER.

Malignant goiter is found, as shown by the records of the Mayo clinic, in less than 1 per cent. of cases of goiter subjected to operation. It may occur as a primary growth, or, as in most

instances, appear as a complication of a simple goiter of long standing. Both carcinoma and sarcoma are witnessed, the latter being much rarer than the former. Diffuse malignant adenoma of the thyroid is a rare form which, owing to its lobulated surface, resembles simple colloid. It differs from the latter, however, in recurring after removal.

Malignancy is suggested by the occurrence of pain in a pre-existing goiter, when this symptom cannot be traced to strumitis, *i.e.*, inflammation of the goiter *per se*, especially if the cachectic facies is present.

The surrounding lymph glands are apt to be involved early. Metastases seem to show a predilection for the osseous system, but the morbid process tends gradually to involve neighboring organs, including the trachea and esophagus and to entail perforation of these structures. Suggestive of cancer, in addition to those due to pressure by a sufficiently enlarged or nodular gland, are radiating pain, hemoptysis or hemorrhage, traceable to congested pharyngeal vessels or tracheal or esophageal ulceration, or both, where there is a tracheo-esophageal fistula, and the regurgitation or expectoration of pus and detritus. Sarcoma may present itself as a smooth tumor, while a carcinomatous goiter is usually nodular.

TREATMENT.—Early operation is indicated in thyroid cancer, the whole gland being removed, but respecting the capsule whenever possible. In late malignant disease of the thyroid with lymphatic involvement, operation except for the relief of pressure symptoms is hardly to be recommended, as the development of the tumor may be hastened thereby. The immediate results are likely to be good, but recurrence is almost certain.

Goitrous accessory glands, especially those lying between the trachea and esophagus or behind the esophagus, may become the seat of malignant tumors and cause correspondingly grave pressure symptoms. Others lying between the hyoid bone and aortic arch, and which resemble lymph-glands, may also be the seat of goitrous development, occasionally malignant.

Enlarged accessory thyroid bodies can be identified only with difficulty if the enlargement corresponds, as to location, with one of the thyroid. As a rule, however, their abnormal location suggests the presence of accessory-gland goiters.

CONGENITAL GOITER, OR GOITER IN THE NEWBORN.

Contrary to the prevailing opinion, this form of goiter is not infrequent and is often fatal, owing to pressure on the trachea, nerves, and blood-vessels of the cervical area. According to Gonnet,⁶⁸ Demme, in 642 cases of goiter, found 37 in the newborn and 59 in infants from 2 to 12 months of life. Diethlin, in 2292 cases of goiter, observed the condition in 25 cases during the first year. Richard found 43 cases of really congenital goiters. Thévenot reported 130 cases.

In some infants the goiter is purely congestive, owing, probably, as occurs during parturition, to pressure upon the infant's neck, especially in face presentations and when forceps are used. It may also be due to persistence of the fetal circulation, but in most instances is of the parenchymatous type and is inherited. Gonnet, summarizing the cases reported by Demme, Richard and his own in this connection, states that out of 113 instances of congenital goiter 67 were in infants whose parents were goitrous. In 6 cases reported by Mooney⁶⁹ the mothers were all goitrous. This is readily accounted for by the fact that the same toxic influence which caused goiter in the parent also caused it in the offspring. In some infants the goiter encircles the trachea sufficiently to compress it and interfere with respiration, constituting a true constrictive goiter. It may also include the esophagus, in its grasp, insinuating itself behind it, even though appearing but slightly or not at all externally.

SYMPTOMS.—In a goitrous infant death may occur almost immediately after a few efforts at respiration. Many are born prematurely, or are stillborn. Or, the infant shows signs of asthma, reaching in some instances to intense dyspnea with cyanosis, the child's cry being shrill or rasping. Death may occur suddenly immediately after the cord is ligated. When the goiter is due to simple congestion of the thyroid from compression or any other cause during parturition, or to screaming or writhing, it may disappear within twenty-four hours, never to recur in some cases; more frequently, however, it reappears intermittently. Dysphagia due to pressure upon the esophagus

⁶⁸ Gonnet: *Revue Mens. de Gynécol. d. Obst. et de Pédiat. Surg. Gyn. and Obstet.*, Oct., 1909.

⁶⁹ Mooney: *Archives of Pediatrics*, Dec., 1910.

is not infrequent, the infant, in some instances, refusing to nurse.

The clinical signs, with the exception, perhaps, of a slight swelling of the front of the neck, may not appear until several weeks or more after birth. The goiter may sometimes be felt, but in most instances it is quite small, and only discernible when the head is thrown back to stretch the neck, or during deglutition. In 130 cases in literature Fable and Thévenot found that the symptoms described were practically those observed in adults.

When the goiter is due to congestion from pressure, which may be suspected after face presentation or forceps cases, the prognosis is good, particularly if measures calculated to sustain oxygenation are resorted to. In true congenital goiter prompt surgical procedures will alone save life when the growth is of sufficient size to cause pressure symptoms.

TREATMENT.—The main indication is to restore respiration and sustain it. The various forms of artificial respiration with oxygen inhalations are very helpful. If, notwithstanding efforts in this direction, dyspnea recurs and persists, section of the isthmus, or exothyropexy, should be performed. The relief is immediate. The operation also leads to retrogression of the goiter.

Tracheotomy should never be resorted to, as it is often followed by bronchopneumonia, hemorrhage, or other complications. Intubation has been recommended by some authors.

In the congestive type cold compresses to the neck and warm foot-baths or hot baths tend greatly to reduce the swelling of the gland. In parenchymatous goiter which does not threaten life thyroid gland, 2 grains (0.13 Gm.) twice daily, administered to the nursing mother, causes gradual disappearance of the goiter in both mother and child in some instances. Sodium iodide, 5 grains (0.3 Gm.) three times daily, may be given instead if thyroid cannot be taken. A weak iodine ointment, rubbed gently into the goiter daily, avoiding cutaneous irritation, is also helpful. The tincture of iodine should not be used.

Pregnant women with goiter should be treated in the same way to arrest the possible development of a goiter in their offspring, and to prevent complications.

STRUMITIS, OR INFLAMMATION OF A GOITER.

Inflammation of a goiter may be caused by the invasion of bacteria and their toxins, brought to the goiter by the circulating blood in the course of various infections, particularly those which are seemingly benign: tonsillitis, laryngitis, bronchitis, and ulcerative nasal disorders, enteritis, etc.; though, as in acute thyroiditis, the more serious disorders—typhoid fever, diphtheria, lobar pneumonia, polyarthritis, puerperal sepsis, bacillary and amebic dysentery, Asiatic cholera, and other infections—may likewise provoke it, chiefly toward their close. Pathogenic bacteria seem to have an affinity for cysts and degenerated nodules. Traumatism, punctures, even such as are practised when therapeutic agents are injected into a goiter, may also cause strumitis. It has also been ascribed to poisons, constituting the form known as "toxic strumitis."

SYMPTOMS.—Strumitis usually begins by a sensation of discomfort in the mass and a chill, soon followed by local pain, and marked sensitiveness to pressure. Then appear fever, headache, and the most distressing symptom of strumitis: dyspnea, sometimes threatening asphyxia. This is due to pressure of the swollen goiter upon the trachea, or to impaction of the mass between the sternum and the trachea, complicated often with edema of the larynx.

Dysphagia may also be marked and painful, each bolus in passing along the esophagus exerting pressure upon the inflamed gland. Radiating pains in the neighboring structures up to the occiput or down the arms, owing to pressure of the inflamed growth on nerves, is sometimes complained of. Hoarseness is frequent from the same cause, or as a result of glottic edema. If no pus be present, the inflammation tends promptly to subside.

When suppuration occurs the fever may assume the hectic type, with exacerbations and severe malaise and prostration. When this occurs in connection with a general infection, the prognosis of the latter may be markedly aggravated.

The inflamed goiter may become elastic and fluctuate if the abscess is large, which is often the case in strumitis. It may rupture into the surrounding tissues, open into the trachea,

esophagus, the larger vessels, or, again, burrow down into the mediastinum, the lungs, pleura, etc., with its attendant dangers, or upward along the sheaths of the great cervical vessels. It may, however, open externally, to the great relief of the patient. Occasionally a small abscess is absorbed.

The only condition with which the strumitis may be confused is malignant growth, when softening, suppuration, and cachexia are prolonged. The course of cancer is not as rapid, however, and cultures and examination of fragments of the growth will usually establish the identity of the condition present.

PROGNOSIS.—The progress of the morbid process is governed by the intensity of the infection. Suppuration invariably prolongs the case, but if the abscess can be reached and evacuated the acute symptoms promptly subside.

A persistent abscess or a collection of them entail the dangerous phenomena enumerated above, which may cause death. Surgical measures, therefore, are indicated to save life.

TREATMENT.—The treatment is precisely the same as that recommended for acute thyroiditis, viz., cold compresses locally, and saline solution by the mouth or rectally to reduce the viscosity of the blood coursing through the organ. Chloral hydrate or veratrum viride used with care is advantageous to reduce the congestion of the organ, the former also acting as an analgesic by favoring sleep.

If symptoms indicating suppuration occur, the abscess if single, which is more frequently the case in strumitis than in acute thyroiditis, should be carefully located and evacuated. Kocher advocates excision of the goiter in such patients, if the surrounding tissues are not involved in the suppurative process. The operation should be preceded by an exploratory puncture and examination of the fluid, pus, etc., contained in the organ to ascertain that the bacteria therein, particularly the colon bacillus or the staphylococcus albus, are non-virulent. The pus should first be removed by aspiration and an antiseptic solution injected into the cavity. When the abscess has extended to the surrounding tissues, the sphacelous areas should be opened with the galvanocautery and the pus evacuated, but excision of the goiter would not be a safe procedure. The evacuation of the

abscess should be done with due care, and the cavity washed out to remove all pus, rather than cleared with the curette or with the finger, which may provoke dangerous hemorrhage, as in a case observed by Bonney.

CHAPTER VI.

THE THYROID, THYMUS, PITUITARY, AND ADRENALS IN MENTAL DEFICIENCY.

IDIOCY AND MENTAL BACKWARDNESS IN CHILDREN.

IN treating this general subject, it will be necessary to refer briefly to a function of the adrenals which I first pointed out in 1903 and describe elsewhere in this work. I shall urge that the nerve-cell, *i.e.*, the neuron, should be regarded as an organ through which circulates, as elsewhere in the body, the albuminous constituent of the hemoglobin which I have identified as the adrenal secretion converted in the lungs into an oxidizing substance (adrenoxidase). This will be shown to react throughout the cell, with its phosphorus-laden myelin (supplied in turn with its nucleins by the thymus, as we shall see), the reaction leading to the production of nerve-energy. This energy, in turn, being the *sine qua non* of the functional activity of the neuron in so far as its efficiency as the organ of mind in the cortex is concerned, all conditions capable of interfering with the development of this energy through deficient activity of the ductless glands, or with the structure or functional efficiency of the neuron, will be introduced as so many factors capable of engendering mental deficiency.

The ductless glands being thus regarded prominent factors in the development of the brain and the maintenance of its psychic functions, it follows that toxemias, whether occurring *in utero* or after birth, especially those caused by certain infectious diseases of childhood, should, by provoking organic lesions, such as interstitial hemorrhage and its resulting fibrosis and atrophy, or by exhausting the organs, render them incapable of carrying on that nutritional function of the brain-cells and thus engender a corresponding degree of mental deficiency.

These two essential factors, added to those that have previously been established by the labors of others, seem to me to place the whole field of idiocy upon a more rational plane than