

swelling of the soft parts, extending about an inch above the orbit, in which strong pulsation could be felt. Pressure upon the left carotid stopped all pulsation, and the tumor became soft and could be pressed back into the



FIG. 3708.—Congenital Aneurism by Anastomosis of Orbit.

orbit. The supra-orbital and frontal arteries were much distended and pulsated strongly, and this aneurismal condition extended down the angular branch of the facial on the right side. A vascular tumor, formed by engorgement and hypertrophy of the inferior conjunctival fold, almost concealed the cornea, and had several times bled quite freely; this was removed by constriction with silk ligatures. Some months later, the patient presented himself with violent acute inflammation of the contents of the orbit. The tumor was increased to twice its former size, the exophthalmus was enormous, the eye could no longer be covered by the lids, and the cornea sloughed. In a few weeks the tumor had completely consolidated and was rapidly diminishing in size. In this case the congenital origin, the hypertrophy of the whole side of the face, the involvement of the external vessels, and the evident extension of the disease beyond the orbit to the subcutaneous tissue of the brow point to aneurism by anastomosis, or cirroid aneurism. The only other possible supposition is a rupture of an aneurism of the carotid in the cavernous sinus and consequent aneurismal varix of the orbit, but the history of the case makes this more than improbable.

Vascular malignant growths of the orbit may produce the symptoms of pulsating exophthalmus, and in at least two such cases the carotid artery has been tied for the cure of orbital aneurism. The bruit in these cases may be very decided, but is not likely to be so loud; the tumor shows more tendency to extend toward the temporal side of the orbit, and is less reducible after compression of the common carotid than in cases of pulsating exophthalmus dependent upon the causes that we have been considering. Of course, multiple tumors and other indications of malignant disease should be carefully looked for.

*Treatment.*—The long continuance of some cases without material change, and the recovery of a few without interference, or with only hygienic care and medical treat-

ment, should discourage resort to serious surgical procedure when there is no immediate danger or decided suffering or deformity, though these conditions may, perhaps, be considered exceptional. Milder remedies should, at least, be given a trial first.

In a very decided traumatic case reported by Dr. Holmes, of Chicago (*Am. Jour. Med. Sci.*, July, 1864), complete cure followed the exhibition of veratrum viride and extract of ergot for two months; and Dr. Freeman, of Canada (*ibid.*, 1866), reports the cure of a spontaneous case, in a few weeks, by application of cold, direct pressure on the swelling, and the use of digitalis. In a few cases, digital compression of the carotid artery has effected a cure.

Compression of the common carotid has been frequently tried. In my own traumatic case (*Trans. Am. Oph. Soc.*, 1875) the patient himself kept up intermittent compression for several hours daily. At the end of six months there was decided improvement, in two years all prominence of the eye had disappeared, and some months later he was entirely cured. Of course, this case is open to the suspicion of spontaneous cure, but the patient always experienced great immediate relief from the compression, and was confident that it was the cause of the final cure. It is almost impossible to apply instrumental compression effectually, and it has never been successful. According to Sattler, of twenty-nine cases treated by compression, continued or intermittent, permanent cure can be claimed in only four, though more or less improvement followed in five others.

Galvano-puncture has been tried in two cases unsuccessfully (Pétriquin, *Gazette Médicale*, 1846, and Bourguet, *ibid.*, 1855). In Pétriquin's case the patient died.

Acupressure, with hot needles, has failed in one case. Injection of ergotin has been tried once without success.

Injection of coagulating fluids has effected a cure in three cases (Bourguet, *loc. cit.*; De Sormeaux, quoted by Rivington, *Med.-Chir. Trans.*, vol. lviii.; and Brainerd, *Lancet*, 1853). Bourguet and De Sormeaux used tincture of the chloride of iron, and Brainerd used the lactate.

Ligature of the common carotid has proved by far the most efficient means of treatment, and a number of brilliant successes have been reported. It must be remembered, however, that it is not without its chances of failure and its dangers of a fatal issue. Sixty-three ligations of the common carotid, performed on 61 patients, in the treatment of pulsating exophthalmus, have been compiled by Sattler. In 17 cases (26.98 per cent.) the operation had little or no permanent effect; in 8 (12.70 per cent.) it resulted fatally; and in 38 (60.30 per cent.) the result was favorable.

Extirpation of the orbital tumor is a bold procedure and has a brief but favorable record. In his report of a successful case of this operation Knapp (*Arch. of Oph.*, vol. xii., No. 2) makes the following reference to three others: "Among the different methods recommended and practised, I chose the one, extirpation, which I find mentioned in Sattler's compilation of one hundred and six cases only three times, namely: (1) Morton's case (Sattler, No. 70), excision of the whole contents of the orbit, excessive hemorrhage arrested by glowing iron and compression, recovery; (2) Frothingham's case (Sattler, No. 80), ligation of common carotid, retardation of increase for three years, then rapid growth, extirpation with very considerable hemorrhage; (3) Hanson's case (Sattler, No. 106), ligation of common carotid, return of symptoms as early as the second day, three weeks later extirpation of the tumor with preservation of the globe, profuse hemorrhage arrested by perchloride of iron."

**VASCULAR PROTRUSION, WITHOUT PULSATION.**—As has already been stated, in thrombus of the cavernous sinus, though more or less exophthalmus is almost invariable, pulsation and bruit may be absent; and this is, perhaps, the rule. *Cavernous tumors* of the orbit have been met with in a few cases. A typical one is described by von Graefe (*Arch. für Ophthal.*, t. vii.), in which the

whole mass was removed with the eyeball. Wecker ("Maladies des Yeux") extirpated a somewhat similar tumor without removing the ball. In each of these cases the tumor consisted of spongy tissue encysted in a dense capsule. There has never been pulsation in any well-established case of cavernous angioma of the orbit. The only remedy is extirpation. The exophthalmus in goitre may be considered of the nature of vascular protrusion without pulsation.

**SIMPLE ANGIOMA (TELANGIECTASIS)** sometimes extends into the orbit from the skin of the lids, forming a soft, slightly compressible tumor. The best treatment is extirpation or electrolysis. Simeon Snell has lately reported several successful cases of the latter, and considers it especially applicable when the disease extends deeply into the orbit (*Lancet*, July, 1886). Frequent repetition of the operation is usually necessary.

**ENCEPHALOCELE.**—Though encephalocele, or meningocele, of the orbit is extremely rare, it is important to bear in mind the possibility of its occurrence. This is well illustrated by a case described by Guersant ("Maladies des Enfants," p. 246). The patient was examined by a number of the fellows of the Surgical Society of Paris, who all agreed in considering the case one of vascular tumor, and in advising treatment by setons. The patient died with cerebral symptoms, and a post-mortem examination showed that the tumor consisted of brain substance, covered by membranes, which had passed through the fronto-ethmoidal suture. It may be extremely difficult to distinguish such a tumor from a vascular swelling, particularly as, if of considerable size, it would be likely to pulsate; and, if situated behind the ball, it would cause exophthalmus. Its congenital character should excite strong suspicion; it would be increased in size by forced expiration and much diminished by pressure. If the contained fluid, obtained by acupuncture, is found to be not coagulable, it is probably cerebro-spinal. Other congenital defects would be likely to occur in connection with it. In a case in which Oettingen (*Klin. Monatsblatt*, February, 1874) diagnosed a speno-orbital meningocele associated with some angiomatous tumor, there was also a small occipital meningocele, which bulged out when the orbital tumor was pressed upon; and tapping the latter with the finger communicated an impulse to the former. Even here, however, the author could not feel quite sure of his diagnosis, and suggested the possibility of a vascular tumor communicating with the intracranial cavity by means of absorption of the orbital wall.

**TUMORS OF THE ORBIT.**—The remaining tumors of the orbit may be classed as cystic and solid. The most prominent symptom, and one that, in greater or less degree, is necessarily constant when the tumor is situated behind the ball, is exophthalmus, which will vary in extent and direction with the size, position, and character of the tumor. If the latter is situated outside the muscular pyramid, it will cause the ball to protrude in a direction opposite to its own position; if within the pyramid, it will press the eye more directly forward, and will participate more in its movements. Diplopia is a frequent and sometimes an early symptom. The motion of the ball is not necessarily affected by a small tumor, but is limited by a large one; and, if this is outside of the muscles, the limitation will be chiefly in the direction of its site. Complete immobility of the eye suggests malignant growths, as their well-known tendency is to involve and include the neighboring structures. Paralysis of the orbital muscles often causes squint, ptosis, etc., and compression or stretching of the optic nerve may produce blindness in an otherwise sound eye; or, the nerve may be involved in a morbid growth. Injury to the ciliary nerves may be shown by dilatation of the pupil, or may result in sloughing of the cornea from neuroparalytic keratitis. Finally, the eye may be destroyed by ophthalmitis resulting from interference with its nervous and vascular supply. Pain is a very variable symptom, being sometimes severe and sometimes absent. It is in some cases referred to the bottom of the orbit, in some it

appears as frontal or ciliary neuralgia, and in others as general headache. The ophthalmoscopic appearances are sometimes negative, but often show some signs of pressure upon the optic nerve, such as venous congestion and arterial contraction, retinal hemorrhage, "choked disc," or optic atrophy.

*Diagnosis* between tumors of the orbit and periostitis or phlegmon, vascular protrusion and disease of the neighboring cavities often presents serious difficulties. The mode of onset of the disease, whether sudden or slow, and whether accompanied or not by acute inflammatory symptoms, is an important consideration, but will not always be a safe guide in case of chronic periostitis or chronic abscess (p. 399). Vascular protrusion may generally be distinguished by the fact that the ball can be pressed back, by the effect of compression of the common carotid, by the dilatation of vessels beyond the margin of the orbit, and by the existence, in some cases, of pulsation and bruit. It must be remembered that pulsation and bruit have led to mistakes in cases of highly vascular malignant growths. Careful inquiry should be made as to predisposition to syphilis or malignant disease. Valuable information is obtained by careful exploration with the finger pressed well back behind the ball. Osseous growths and solid tumors attached to the walls of the orbit, if not too deep in the cavity, can usually be distinguished in this way with a considerable degree of certainty, though periostitis will sometimes simulate the latter closely. An effort should be made to decide, by palpation, whether the tumor is hard, elastic, or fluctuating, whether fixed or movable, and whether situated outside of or within the muscular pyramid. Enlargements of the lachrymal gland, on account of their position, can generally be recognized with comparative ease. It may sometimes be necessary to determine the character of the contents of a supposed cyst by puncture. The nasal cavities and the vault of the pharynx should be explored with the mirror.

**CYSTIC TUMORS.**—The most common true retention cysts found in this locality are the *sebaceous*. They probably arise from the skin, though their connection with this point of origin may not always be traceable.



FIG. 3709.—Congenital Cyst of the Lower Eyelid with Microphthalmus.

Cysts of the lachrymal gland ("dacryops") are rare. They are due to retention of the tears from obstruction of the ducts. The swelling enlarges with increased secretion of tears and its character is not usually difficult to recognize.

DROPSY OF TENON'S CAPSULE has been described as a form of exudation cyst, but its pathology is somewhat doubtful, and its occurrence is, to say the least, extremely rare. *Serous cysts* have been attributed to dis-



FIG. 3710.—Orbital Sarcoma.

ease of the bursa in the trochlea of the superior oblique muscle, or of those sometimes found on the levator and superior rectus; and Wecker considers it probable that most serous orbital cysts arise in this way. This view is probable, but lacks proof in pathological anatomy. Congenital *dermoid cysts* are found more frequently in the orbit than elsewhere. It is generally stated that their usual seat is near the external angular process of the frontal bone, but of 51 cases collected by Berlin 27 were on the nasal side, 12 on the temporal, 8 below, and 4 above. Their walls are of a cutaneous structure, and contain sebaceous matter and sometimes hair. Teeth have also been found in them. Wecker (*loc. cit.*) says that serous cysts may form voluminous tumors, which enlarge the orbit by excessive pressure, and extend through foramina into the cranial cavity. He, however, gives but one instance, quoted from Delpech. The cyst was prolonged into the cranial cavity through the optic foramen, which was sufficiently enlarged to admit the index finger. Inflammation of the sac, induced by incision and exploration, extended to the brain and resulted in death. It was found that a diverticulum of the cyst, three inches long, had encroached upon the under surface of the cerebral lobe, and had contracted firm adhesions with the meninges. This case, which is also quoted by Mackenzie as one of hygroma, Berlin thinks must have been a meningocoele. If serous tumors of very large size have ever existed in the orbit, it is not likely that they originated in diseased bursae, which are never known to produce such tumors elsewhere, but it is more probable that they were *cysts of new formation*, similar to the so-called hydrocele of the neck, whose pathology is not well known. A rare form of cyst is usually described as "congenital orbital cyst with anophthalmos or microphthalmos." In a few cases there has been entire absence of the eye, but generally there has been a rudimentary ball. In the latter case the tumor appears beneath the lower lid and is described as "lower-lid cyst." The lower lid is bulged forward by an incompressible but tensely fluctuating cyst, the bluish color of which is evident through the thin and distended skin. Fig. 3709

shows a typical example. Behind the cyst was a rudimentary ball, hardly larger than a pea (Harlan, *Trans. Am. Oph. Society*, 1893 and 1902). The pathology of these cysts is obscure, but it is generally believed that they are formed of embryonic elements intended for the development of an eye. *Hematoma* of the orbit has already been referred to in discussing hemorrhage. *Echinococci* and *cysticerci* have been found in the orbit. Though some of the text-books refer to them as if not very infrequent, they are, in fact, extremely rare. Berlin says that, with an experience of forty thousand eye patients, he has not met with a single case of either, but that thirty-nine more or less reliably reported cases of the former are to be found in literature, while he has been able to find reports of only three rather doubtful cases of cysticerci in the orbit, though they are comparatively frequent in the eyeball and its appendages. Furnaget has collected eight cases. (*Archives of Ophthalmology*, xvi, p. 6.)

**SOLID TUMORS.**—As almost every form of tissue is represented in the orbital cavity, almost all kinds of tumors are possible there. In addition to the vascular and cystic tumors referred to above, the following forms of more solid growths have been described by authors: Lipoma, fibroma, enchondroma, carcinoma, osteoma, neuroma, and sarcoma. A discussion of the histology and pathology of these various diseases is, of course, beyond the scope of the present article. Epithelioma may extend into the orbit from the skin of the lids. Enchondroma and carcinoma are very rare, and fibroma and neuroma not much less so. Lipoma is frequently referred to in a general way, but only a few cases have been recorded. Osteoma is, comparatively speaking, not very uncommon. The larger proportion of solid tumors met with in the orbit belong to some of the numerous forms of sarcoma. Berlin (*loc. cit.*) says: "When we perceive in any part of the orbit a solid tumor with a nodulated surface, which does not fluctuate or pulsate, is not compressible or stone-hard, is not in probable connection with the brain, and does not arise from the lids, the ball, the lachrymal gland, the optic nerve, or the neighboring cavities, we may decide on the diagnosis that we have to do with a sarcoma of the orbit."

Some of the most extensive growths that attack the orbital tissue originate in the eyeball. By far the most common intra-ocular tumors are retinal glioma and choroidal sarcoma, and these, when they have once passed the fibrous envelope of the ball, extend rapidly in the orbit. The former generally ends fatally by direct extension to the brain, or by metastasis to that or some other organ. Orbital sarcomata sometimes grow to an enormous size and make terrible ravages upon neighboring parts. Fig. 3710 is from the photograph of a patient nine years of age at the Wills Eye Hospital. (Harlan, *Trans. Am. Oph. Society*, 1894.)

*Enlargements of the lachrymal gland* may be due to acute or chronic inflammation. In the case of the former there are redness and swelling of the upper lid, congestion of the conjunctiva, and considerable pain. It frequently ends in suppuration, which is sometimes followed by fistula. In the chronic form the inflammation is usually indolent, and the swelling may be mistaken for a neoplasm.

Simple hypertrophy of the lachrymal gland is rare. It is said to result from repeated attacks of inflammation, and to occur sometimes spontaneously or even congenitally. Exact observations in regard to it are wanting.

Various forms of degeneration of the gland have been met with, the most frequent of which, according to some authorities, is the adenoid. There are a few well-established cases of sarcoma and carcinoma. I exhibited a sarcomatous lachrymal gland as large as a hen's egg, at the meeting of the American Ophthalmological Society, in 1882, and Dr. Knapp referred to one nearly as large, which he had recently removed. There were no adhesions in either case and the tumors were easily enucleated. The prognosis as to the probability of a return of the disease is favorable.

The position of such tumors makes their diagnosis comparatively easy. The ball is usually forced downward, forward, and inward; but in the case referred to above its direction was decidedly outward. This exceptional symptom, which is probably unique, may be accounted for by the unusual size of the tumor and its development toward the inner side of the orbit (Fig. 3711). The ball resumed its normal position in a few weeks after the operation.

*Tumors of the optic nerve* have been reported in thirty odd cases, and have consisted of glioma, myxoma, sarcoma, endothelioma, and carcinoma. (Knapp, *Trans. Internat. Med. Congress*, 1876, Berlin, Graefe-Saemisch.) Graefe reported several cases and gave the following symptoms as diagnostic: Progressive protrusion of the eyeball, parallel to the axis of the orbit, or a little outward; preservation of the mobility of the eye; preservation of a layer of connective tissue between the eye and the tumor, and the integrity of the centre of rotation; soft consistence of the tumor; absence of pain; absence of subjective luminous sensations, and rapid abolition of vision. In some cases more recently reported there was more loss of mobility of the ball than von Graefe seems to have met with, and in several there was severe pain in the eye and orbit, and the tumors have not always been of soft consistence. Valuable assistance in diagnosis can be obtained by palpation—pressing the finger deep into the orbit behind the ball.

*Osteomata* may grow immediately from the diploë of the bone, or originate in inflammatory exudations from the periosteum. In the former case they are likely to extend at the same time into the orbit and into one of the neighboring cavities. They vary in size from a mere nodule to a mass filling the whole orbit, and may be of cancellous structure or of ivory-like density. The latter is much the more common form. They have, in a few cases, occurred in both orbits at the same time. The etiology of orbital osteoma is very obscure. Syphilis, which might naturally be thought a frequent cause, is an extremely rare and even doubtful one. Bony tumors of the orbit are of slow growth, and are injurious only by their mechanical effects, which, however, are sometimes serious enough. A few cases are reported in which a cure resulted from necrosis and spontaneous separation. (Lediard, *Trans. Oph. Soc. United Kingdom*, iii., p. 23.)

In the removal of orbital tumors antiseptic precautions should be carefully carried out. If there is useful vision, or even a sound eye, the eyeball should be preserved whenever possible, unless its retention renders impracticable the thorough removal of tissues involved in malignant disease. It will usually be possible to retain the ball when the growth is outside the intramuscular space, and sometimes even when it is within it. This has been done, with satisfactory results, in the case of tumors of the optic nerve, by Knapp and by Grüning. (*Arch. of Ophthalmol.*, iv., p. 323, and v., p. 508.) To avoid the deformity of the resulting cicatrix, it is usually better, when practicable, to operate through the conjunctiva, and this will, of course, be necessary in the case of tumors within the muscular space. To gain room, the external canthus may be freely incised, the upper lid may be dissected back, or the external wall of the orbit may be temporarily resected, and replaced after the removal of the tumor, by the method devised by Krönlein. (Knapp in Norris and Oliver's "System of Diseases of the Eye," viii., p. 918.) In removing tumors situated well forward or attached to the orbital walls, or of large size, it may be necessary to make the incision through the skin of the lid. The handle of the knife will often be found of more use than its edge in freeing the growth from its attachments, and much of the operation can most conveniently be performed with a strong pair of blunt-pointed scissors, curved on the flat. Extensive malignant disease sometimes necessitates the removal of all the contents of the orbit, and the application of the chloride of zinc paste to its bare walls. Though such cases are extremely discouraging, in a few that were apparently desperate the operation has succeeded at least in securing some years

of comfort to the patient. According to Bull, surgical interference in malignant orbital tumors is almost invariably followed by recurrence, the growth of the secondary tumor is more rapid, and repeated operations shorten the life of the patient. (*Trans. Am. Oph. Society*, 1896.) It may be necessary to resort to the actual cautery to check hemorrhage, though this can usually be accomplished by hot water and compression. When extension of the disease to neighboring cavities renders its complete removal impracticable, the operation should never be undertaken. Exostoses may be removed with comparative safety when situated on the floor or on the inner wall of the orbit, but the attempt is rarely justifiable when the deeper parts of the roof are involved. Of sixteen cases collected by Berlin, in which exostoses of the orbital roof were operated on, in six the patients died of meningitis. Knapp reports several cases in which osteomata of the roof, situated peripherally, were successfully removed. (*Trans. Fifth Internat. Oph. Congress.*) It has occasionally been found possible to cut these bony tumors with the pliers or to wrench them from their bases with the forceps, but usually the chisel and mallet will be found more efficient. The use of the dental engine has been suggested and may be applicable to some cases. The attachment of the base to the orbital wall is less firm than the structure of the tumor, and in operating this should be made the point of attack. The difficulties of the operation are greatly increased when the growth originates in the diploë and extends on both sides of the bone. Knapp (*Arch. of Oph.*, ix., p. 464) describes a method of shelling out such tumors within their periosteal envelope, by cutting, with the chisel, the orbital wall encasing them and removing them entire. He thinks the operation may be performed with success even though the exostosis project into the cranial cavity.

**INJURIES OF THE ORBIT** derive their greatest interest and importance from the fact that only a thin plate of bone separates this cavity from the brain. Punctured wounds of the roof of the orbit may very easily penetrate the intracranial cavity. Such injuries were formerly sometimes inflicted by the sword, while in more modern times the umbrella-stick has figured most promi-

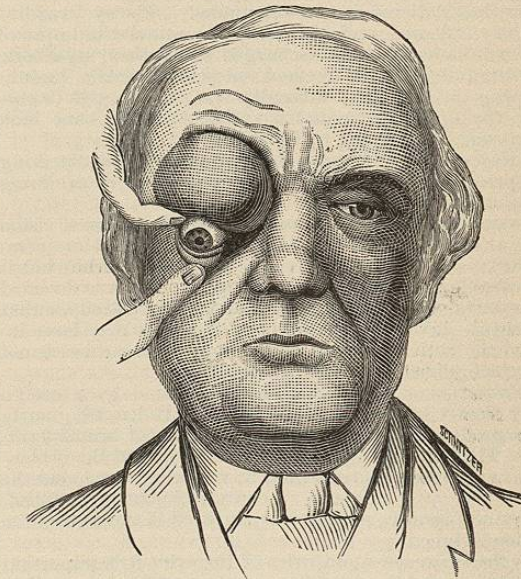


FIG. 3711.—Sarcoma of the Lachrymal Gland.

nently as the offending instrument. These, of course, are very fatal wounds. Out of fifty-two cases of perforation collected by Berlin (Graefe-Saemisch, vol. vi.) the patients survived in only eleven, and of these five suffered from subsequent effects. Great caution should be used

in the treatment and prognosis of such cases, as the surgeon is liable to be misled by the innocent appearance of the external wound and the absence of immediate symptoms of an alarming character. Mackenzie relates several cases in which the patients walked considerable distances after receiving the injury and then fell dead.

The result of a gunshot wound of the orbit will depend upon the direction that the ball takes. In a large proportion of cases the brain is injured and death ensues; but a ball passing obliquely through the temporal region may destroy one eye only, and cases are reported in which sight was entirely destroyed, without other injury, by balls crashing through both orbits behind the eyes. I met with one such case, during the civil war, in which very little deformity resulted, and the external appearance of the eyes was not affected.

Fractures of the base of the cranium frequently extend into the walls of the orbit, generally the roof. In the post-mortem examination of eighty-six cases of fracture of the base, von Hölden found fracture of the orbit in seventy-nine. (Berlin, *loc. cit.*) Blindness may result immediately from rupture of the optic nerve, or from hemorrhage in its sheath, or it may be subsequently induced by neuritis. Intracranial hemorrhage and hemorrhage and emphysema of the orbit, as results of fracture of the orbital walls, have already been referred to.

It is important to remember that foreign bodies, even of considerable size, may easily escape detection in the orbit. A number of striking instances of this have been recorded. Mr. Carter has reported a case in which a piece of iron hat-peg, nearly three inches and a half long, remained concealed in the orbit for several weeks, without the knowledge of the patient. It was removed, and the eye remained uninjured. Hennen found a flattened musket ball which had lodged in the orbit, without injury to the eye. Shot from fowling-pieces and chips of iron driven with force by the hammer or lathe sometimes pass through the ball and lodge in the orbit. Shot may become encysted and cause no irritation, and even larger and rough substances may give little indication of their presence. A man presented himself at the Wills Hospital, in Philadelphia, with a wound near the corneosclerotic junction, but he was very positive that the foreign body that inflicted it had rebounded. The eye was but slightly inflamed, and the patient continued to improve and would have been discharged if a little sympathetic irritation of the other eye had not been noticed. In enucleating the ball great difficulty was experienced in cutting the optic nerve, and a splinter of iron, one inch long, was found lying by its side.

X-Ray examination may be made useful in detecting the presence of a foreign body and even in determining its location.

Cases were formerly reported in which impaired vision was attributed to injury of the supra-orbital or infra-orbital nerve by blows upon the edge of the orbit, but it is probable that the ophthalmoscope would have revealed some intra-ocular lesion produced by concussion, or that a fracture involving the apex of the orbit may have injured the optic nerve. Contusion of these nerves is not now recognized as a cause of amblyopia.

Dislocation of the eyeball may be caused by a foreign body thrust into the orbit behind it. It has frequently been produced by the "gouging" thumbs of brutal fighters. The ball lies upon the malar bone and the orbicularis muscle contracts behind it, retaining it beyond the lids. The optic nerve is, of course, violently stretched, but is not usually permanently injured if the dislocation is soon reduced.

In the treatment of injuries of the orbit it is important to bear in mind the dangerous character of its anatomical relations, and the serious mischief that may easily be inflicted by probing. It is better to treat many trivial cases with unnecessary caution than to underestimate the danger of one that may have a serious or even fatal termination. Complete rest, cold applications, and sometimes leeching will be required in the early stages, and if pus forms subsequently it should be allowed prompt and

free escape. If incisions are necessary for the removal of foreign bodies, they should be made through the conjunctiva rather than through the lids, to avoid the danger of ectropium or other deformity that might follow the contraction of cicatrices. In reducing dislocation of the eyeball, the upper lid should be stretched and drawn forward, while the ball is gently pressed back. It may be necessary to divide the external commissure. A compress bandage will be required to retain the eye in position for a few days.

DISEASES OF THE NEIGHBORING SINUSES may seriously affect the orbit by pressure upon its walls or by extension into its cavity.

The frontal sinus is sometimes greatly distended by the accumulation of retained muco-purulent secretion in chronic inflammation of its lining membrane. The upper and inner wall of the orbit is bulged by pressure, and the eyeball is forced downward and outward. These accumulations are sometimes very extensive, and involve the ethmoid sinus or the frontal sinus of the other side by destruction of the intervening walls. Dr. Bull (Trans. Am. Oph. Soc., 1885) reports a case of chronic abscess involving both frontal sinuses and the ethmoid sinus of one side, the result of an injury received fourteen years before. The disease may also result from direct extension of inflammation from the mucous membrane of the nose. The pus may finally escape into the nose, into the orbit, or externally, but the opening that gives it exit is not likely to be free enough to lead to a cure. The most common locality for spontaneous discharge is at the inner canthus, above the tendo oculi, and a permanent fistula is likely to result. When the bone over the swelling is very much thinned by distention and absorption it yields to pressure by the finger with a kind of crackling sensation, which has been well compared to that produced by pressure upon the lid of a tin box, and which will distinguish the case from one of solid growth. The sinus should be freely opened with a strong knife, or, if necessary, with a drill, near the inner canthus or beneath the superciliary arch, and a silver tube inserted, through which the cavity can be washed out frequently with disinfectant and stimulating solutions. It may be necessary to open the cells through the inner wall of the orbit, remove all carious bone, and establish drainage through the nose.

Similar distention of the maxillary antrum by fluid accumulation forces the floor of the orbit upward. It may result from any cause that produces chronic inflammation of the lining membrane of the cavity, but the most frequent cause is a diseased tooth. Pus may escape into the nostril, through the alveolus at the canine fossa, or into the orbit. When it enters the orbit it causes an infiltration and swelling of the lower eyelid, and finally a fistula. When there is a diseased tooth, the best plan of treatment is to extract it and puncture the antrum through its socket; or, if the abscess points in the alveolar process, an opening may be made behind the upper lip. In either case a tube should be inserted and injections used.

A few cases of retention tumor of the ethmoid cells have been met with. Dr. Knapp (Trans. Fifth Internat. Oph. Cong.) reports one in which the wall felt so dense that he took it for an exostosis and proceeded to remove it, when the chisel pierced a bony shell, and a quantity of muco-purulent discharge escaped. And a similar experience occurred in my own practice (Trans. Am. Oph. Soc., 1900).

Cysts, polypi, or solid tumors of any of these cavities, or of the nares, may press upon the walls of the orbit or destroy them and extend into its cavity. A discussion of all of these diseases would lead into too wide a field for the limits of this article, and the reader must be referred to works on general surgery and to the elaborate chapter on this subject in Mackenzie's treatise on "Diseases of the Eye." Intracranial growths sometimes involve the roof of the orbit, and in chronic exophthalmus its cavity is narrowed by pressure, and the eyeball is pushed forward. *George C. Hartlan.*

**OREXIN.**—(Phenyl-di-hydro-quinazoline hydrochlorate.) This is the trade name applied to a complex derivative of quinoline. It forms in bright, colorless, lanceolate crystals, without odor, containing two molecules of water, which effloresce on exposure. It has a bitter, pungent, and almost caustic taste. It is freely soluble in hot water. It is almost free from toxic effects, as two grains per pound weight were insufficient to cause death in a rabbit.

Orexin was introduced by Professor Penzoldt, of Erlangen (*Therap. Monat.*, February, 1890), as a stomachic, as it was found to exert a tonic influence over the digestive organs, and a stimulant action on the appetite. It possesses neither antipyretic nor antiseptic properties. Penzoldt used it in a great number of cases of anorexia in healthy individuals, as well as in others suffering from various diseases accompanied by loss of appetite. Its use is contraindicated when there are gastralgia, acute catarrh, ulcers, or any condition in which there is hypersensibility of the mucous lining of the stomach, on account of its local irritant action. The class of cases in which it proved most serviceable were those in which the stomach was not diseased, but in which the loss of appetite was due to some general condition, such as anemia, phthisis, or debility. It was said to be of special value in commencing pulmonary tuberculosis, its employment being followed by a considerable increase in body weight. The dose is from three to seven grains, once or twice a day. Within the last few years the *imnate* of this agent has been brought forward as being superior to the hydrochlorate. It is a yellowish-white, odorless, and almost tasteless powder, soluble in water.

Although favorable reports of its use appear from time to time, it has failed to gain the confidence of the profession and is rarely employed. *Beaumont Small.*

**ORGANOTHERAPY.**—(Synonyms: Histotherapy—from *ἵσθός*, tissue; cytototherapy—from *κύτος*, cell.)

**HISTORY.**—The oldest medical manuscript in existence, the "Papyrus Ebers," mentions the use of animal extracts in medicine. Among the writers of antiquity Homer, Democritus (450 B.C.), Aretaeus, Dioscorides, Galen (600 A.D.), among writers of the Middle Ages, Guido de Chauliac (1300 A.D.), John Hunter, Burton (in his "Anatomy of Melancholy") all speak of the treatment of disease with various animal products. It is interesting to note some of the bizarre preparations that were recommended, e.g. (Dr. William Salomon, "New London Dispensatory," 1677), human heart, *cor hominis*, in powder for epilepsy, human skull and human brain, *tinctura cranii, essentia cranii hominis, spiritus cerebri humani*, for a variety of disorders, chiefly "debility."

Brown-Séquard, in 1869, advanced the hypothesis of the "internal secretion" of the glands and tissues; he held that all the cells of the body manufacture specific soluble products which, entering the blood, exercise "an important if not necessary" influence on other cells. Insufficiency of this function in certain organs, he argued, produces certain definite disorders that can best be remedied by supplying the deficient secretion. The extravagant and sensational claims advanced by over-enthusiastic disciples of this "method" have done much to discredit organotherapy. Of recent years, however, many clinical and experimental data have accumulated to show that certain organs actually do manufacture internal secretions, and that these products profoundly influence metabolism. The postulates of Brown-Séquard were in part, therefore, correct and his method was not altogether irrational.

It is manifestly a precarious and an unscientific procedure to introduce substances of unknown properties into a sick organism without first determining their effect on the healthy body. Before organotherapy could be raised above the level of crude empiricism and could attain the dignity of a rational system of treatment, the power of organ extracts to influence physiological processes had to be studied. This problem was approached in two ways, viz.: on the one hand, different animal preparations were

administered to normal animals or human subjects and the effects determined; on the other hand, different organs (chiefly ductless glands) were removed and the perversions of function that followed established. The knowledge, moreover, obtained from operative ablation of organs was in many instances supplemented by clinical observations on human subjects in whom spontaneous degeneration or atrophy of these organs had occurred. In this way a fund of knowledge was acquired that based organotherapy on a rational foundation, and furnished concise indications for the administration of definite organ preparations in definite diseased states. Organotherapy was finally rendered still more exact by the discovery and isolation of "active principles" that possessed all the specific properties of the organs from which they were derived; these, it was shown, could be advantageously administered in the place of the crude extracts, of indefinite and uncertain composition, that were formerly employed.

#### I. THE DUCTLESS GLANDS.

1. **THYROID GLAND.**—The administration of thyroid gland in large doses accelerates proteid and fat metabolism, causes increased elimination of nitrogen, phosphorus, and chlorine, and leads to an increased absorption of oxygen. Clinically, polyuria, polyphagia, polydipsia, sweating, tachycardia, palpitation, tremor, emaciation, fever, and occasionally glycosuria are observed. This syndrome is called *thyroidism*, and has so many cardinal features in common with exophthalmic goitre (Basedow's, Graves' disease) that this affection is held by many to be due to excessive activity of the thyroid gland, *scil.*, *hyperthyroidism*.

Removal of the thyroid gland is followed in a few days or often after a longer time (as late as nine months) by anemia and oligemia (*cachexia thyreopriva*, if the normal gland is removed, *cachexia strumipriva* or *operative myxedema* if the diseased gland is removed); there is often an initial rise of temperature usually followed by a descent to subnormal; the growth of the bones is retarded in young animals, and various trophic disturbances develop; the rate of respiration increases; a variety of nervous phenomena are observed that may be either irritative or depressive in character, viz.: at first fibrillary twitchings of the muscles followed later by tetany and contractures, or again paresis and diminished sensibility. Other symptoms are palpitation, tachycardia, vomiting, loss of mental vigor, irritability followed by languor and lassitude, apathy, and finally idiocy.

A similar syndrome is presented in myxedema and cretinism (synonyms: infantile or foetal myxedema, myxedematous idiotism); myxedema is undoubtedly due to arrest or insufficiency of thyroid function, *scil.*, *athyroidism*. We witness the same arrest of development of bones and external soft parts, the impairment of psychic and of nearly all somatic functions. The infantile type is maintained throughout, the physiognomy is typical, there are characteristic disturbances of the organs of sense and of the intellect, the skin is bloated, the sweat glands are depressed, the heat regulation is disturbed. There are general muscular quiescence, apathy, and idiotism. Exact metabolic studies have so far not been made. In one case the oxygen absorption was found subnormal and the nitrogen excretion reduced. It is probable that metabolism becomes retarded after ablation or atrophy of the thyroid gland.

The function of the thyroid is either nutritive or antitoxic, *i. e.*, it either supplies something to the blood that is necessary to normal life or it removes something that is harmful. The most plausible theory advanced to explain hyperthyroidism and athyroidism is the following: The blood normally contains certain bodies that can inhibit metabolism: the origin of these bodies is obscure; the thyroid secretion possesses the power of neutralizing these substances and rendering them inert. Normally metabolism is regulated in this way. Hyperthyroidism causes complete neutralization of these inhibitory sub-