in culture media is attended by a copious evolution of gas. It multiplies and produces a fatal result only when subcutaneously inoculated. The spores are found plentifully in the superficial earth of fields (Charrin). The morphological characters of the bacillus are identical with those of the bacillus found in the present case. An occasional complication of wounds, both surgical and accidental, seen chiefly by continental observers, and apparently much more common abroad than in England, has been described under the names of "progressive gangrene," "invading traumatic gangrene," "emphysematous gangrene" (Rosenbach), and "septicémie gazeux" (Arloing and Chauveau), and it is characterised by its severity and fatality, by the swelling, tension, and bronzing of the skin of the part affected, and especially by the emphysema, which is perceptible on palpation, and due to the production of gas in the subcutaneous tissue. Arloing and Chauveau referred an outbreak of this affection occurring at Lyons to the agency of a bacillus which they considered identical with that of malignant œdema. Rosenbach also found the same organism in two similar cases, one following a compound fracture and one a wound on the arm. The present case must also be referred to the same category, and is indeed almost like an experimental inoculation. A large wound which opened up freely the subcutaneous tissue and contused seriously the skin in its neighbourhood, conditions most favourable to the growth of this micro-organism, was inoculated with a considerable quantity of earth derived from the cart-wheel and presumably containing numerous spores. A short incubation period was followed by a train of symptoms which a comparison between the clinical history and the description of the artificial disease will show to be almost identical in the two cases. The post-mortem appearances were equally typical, and microscopical examination showed the presence of organisms which were morphologically indistinguishable from those of malignant œdema. Complete identification is, however, wanting, owing to the failure as yet to cultivate the bacillus. Unfortunately, the attempt to cultivate the organism occurring in the human disease seems generally to have failed, the conditions attaching to post-mortem examinations not being favourable to success. Rosenbach's attempts ended in failure in one case, and in the second to growth, as in the present instance, of micrococci. The only cure for the disease appears to be the radical one of amputation. According to Arloing and Chauveau the organism is peculiarly resistant to antiseptics, a solution of corrosive sublimate, 1 in 500, being ineffective even when allowed to act for twenty-four hours. Sulphurous acid seems to be the most active antiseptic. The bacilli resist a temperature of from 60° to 70°, but are killed at 100°.

I am indebted to Mr. Rouse for leave to publish the case, and to Mr. Higgins, his house surgeon, for some clinical details.

A RECORD OF SIXTEEN CASES OF ORBITAL TUMOUR; WITH REMARKS.

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OF all the cases that present themselves to the ophthalmic surgeon, the most interesting, and certainly the most important in a surgical point of view, are the various kinds of tumours which invade the orbit. I do not here refer to those growths which, originating in the globe of the eye, by a gradual process of extension invade the orbital tissues, or reappear in them after the original disease has been extirpated. Their pathological characteristics are confined to comparatively narrow limits, and their diagnosis is usually easily made at an early date of their history. I allude (1) to those growths which originate in the orbit, but unconnected with the globe of the eye; (2) those which originate either in the periosteum or bony walls of the orbit; (3) those which, commencing in structures or cavities in close proximity with the orbit, make themselves eventually manifest by some change in the relation or function of the organs which it contains; and (4) that important group of cases which originate in some vascular disease deep in the cavity of the orbit or closely adjoining parts of the cranium, and whose leading symptom is usually but not invariably

pulsating exophthalmos. These four classes contain such a variety of possible pathological conditions as to render the diagnosis of some orbital tumours a matter requiring the greatest surgical acumen and experience. Nor is a great deal of assistance to be derived from the perusal of the standard works on ophthalmic surgery; few of them give anything but a superficial sketch of these cases. We here stand upon the borderland of special and general surgery; hence probably this neglect. He who would get an insight into the fuller details of the history and treatment of these cases must search monographs, old reports, and the records of various societies—records which are difficult of access to busy practitioners, especially if they reside at a distance from the metropolis. The following sixteen cases which have occurred in my practice within the past few years contain illustrations of the chief forms of orbital tumour which I have classified above. I regret that time and space will not allow of my giving more than a brief outline of them. Cases 1, 2, 3, 6, 7, and 9 represent the first class, or tumours growing in the orbital cavity unconnected with the globe of the eye, and having only a secondary, if any, connexion with the walls of the orbit. Cases 4, 5, and 8 are good illustrations of the second class of cases, in which the tumour grows either from the bones or their periosteal coverings. Of the third class of cases, where tumours or distension of neighbouring cavities, encroach upon the orbit, Cases 10, 11, 12, 13, 14, and 15 are good examples. Case 16 forms one of that interesting group of cases of pulsating exophthalmos which from time to time have occupied so much the attention of ophthalmic surgeons. Experience has proved that a large number of these depend upon the existence of a communication between the carotid artery and the cavernous sinus. In this case, for reasons which are set forth in the notes, I believe the case to have been one of aneurysmal dilatation of the origin of the ophthalmic artery. The one prominent feature of all orbital tumours is protrusion of the globe, and it was present in all these eleven cases. It is usually the condition which first calls the patient's attention to his disease, although the tumour may have attained a considerable size before it becomes noticeable to a superficial examination. Occasionally double vision, owing to the movements of the eye being limited in certain directions, is first noticed; on the other hand, this distressing symptom may be absent when very great displacement exists, if the displacement has been gradual or the conducting power of the optic nerve is interfered with. The diagnosis must in each case be carried out, in a great measure, by a system of exclusion. By the help of the exploring trocar cystic and solid tumours are readily differentiated, and the diagnosis thus half made. In all doubtful cases its use should never be omitted. A careful examination of the adjoining parts and cavities should always, so far as possible, be carefully made when a tumour is supposed to have its origin in structures adjoining the orbit. The history of discharges of blood or matter from, or of obstructions in the shape of polypi or other growths in, the nasal cavities should always be inquired into. Attention should be directed to the perviousness or obstruction of the nasal duct. Sometimes, a naso-pharyngeal polypus will send a prolongation into the orbit through the pterygo-maxillary fissure, but rarely before other symptoms have made the origin and nature of the disease no longer a matter of doubt.

CASE 1. *Cavernous vascular tumour of orbit (telangiectasis); removal with globe; recovery.*—A lad aged thirteen years was sent to me for advice. The left eye was projecting and displaced upwards and outwards. Its movements were much curtailed, especially downwards, and double vision was produced when looking in this direction—S = $\frac{2}{3}$; the ophthalmoscope revealed slight œdema of disc, and considerable venous turgescence. A tumour was distinctly felt below the globe, chiefly at the lower and inner angle of the orbit. It felt moderately hard and elastic, but receded somewhat under the pressure of the finger, rendering the detection of any penetration uncertain. The patient's mother thought the left globe had always been a little more prominent than the right. The boy himself had been conscious of something wrong in the orbit for several years; during the last two it had become specially noticeable. On coughing or straining the proptosis increased to a slight extent. With the stethoscope nothing abnormal could be heard. An exploring trocar gave vent to nothing but blood. Under chloroform an attempt was made to remove the tumour without interfering with the globe, but the deep parts of

the growth were found to be more extensive than was anticipated. It was found necessary to divide freely the external commissure to get more ready access to the parts, and it was then found that the growth was in the closest affinity with the optic nerve, to separate it from which, in the presence of the very alarming hæmorrhage, would have been impossible. It was consequently removed together with the whole of the growth. The tumour on removal was found to be about the size of a bantam's egg, but more flattened. Its posterior extremity extended to the bottom of the orbit, and was in close proximity to the optic nerve. It had an ill-defined fibrous capsule, and on section presented a cavernous structure. Dr. Philipson of this city kindly examined it for me, and reported that it was a good specimen of "telangiectasis." In its removal it had been wounded in several places; hence no doubt the hæmorrhage, which was of a most alarming character, and necessitated a speedy termination of the operation.

CASE 2. *Curious blood-cyst of the orbit, occurring after severe straining (whooping-cough); puncture; recovery.*—A little girl aged ten was brought to my consulting rooms. She had considerable general protrusion of the right eye. There was no well-defined tumour to be felt, but an indistinct feeling of fluctuation was communicated to the fingers on pressing the globe back into the orbit. There was no pain or tenderness, sight was normal, and there were no ophthalmoscopic symptoms. The swelling had existed five months, and had made its appearance suddenly at the time the child was suffering from a severe attack of whooping-cough. Chloroform having been administered, an exploring trocar was introduced deeply into the orbit. A jet of dark-coloured blood escaped in a free stream, and the eye almost immediately receded to its normal position. In a few weeks the child presented a perfectly natural appearance.

CASE 3. *Extensive congenital cystic tumour of the orbit; removal of cyst; recovery.*—A lad aged fourteen was brought to me at the Eye Infirmary under the following circumstances:—The right eye is considerably displaced downwards and forwards. There exists diplopia and limited movement upwards. At the upper and outward angle of the orbit a tumour can be felt, which is evidently of considerable size. It has a decided elastic feel, and gives the impression of a tense cyst. The tumour has existed for many years, but has gradually grown. It gives no pain, and is free from tenderness. An exploring trocar, when introduced, evidently penetrates a cyst, and, on squeezing, a small quantity of the cheesy matter characteristic of congenital cysts is forced through the cannula. A few days subsequently the cyst was removed under chloroform. It was found to extend deeply into the orbit, and was closely adherent to the periosteum at the upper and outward angle of the orbit. Its removal intact was impossible, but it was dissected out piecemeal. Suppuration took place in the cavity of the wound, and it did not completely close for three months, leaving a somewhat depressed cicatrix, without, however, any displacement of the lid.

CASE 4. *Small ivory exostosis growing from the inner wall of the orbit; removal; recovery.*—A young man aged twenty-six, a cabinet maker by profession, consulted me concerning the displacement of his left eye. There was but little proptosis, but the eye seemed pushed chiefly outwards. A painless, hard, and rounded tumour occupied the inner side of the orbit; apparently it was about the size of a small Barcelona nut. It blunted the point of an exploring trocar, and its diagnosis presented no difficulty. Its growth had been of slow progress, extending over several years. Its small size and comparatively circumscribed base induced me to recommend its early removal. This was found to be a matter of considerable difficulty. After it had been exposed by a vertical incision along the inner side of the orbit, the bones round its base were cut with a chisel and hammer. The growth was now grasped by a powerful pair of forceps, and by a process of twisting and prising with a narrow chisel used as a lever it was lifted from its bed. The nasal cavities were opened and the fingers could be introduced into them. A drainage-tube was passed through the wound and brought out through the left nostril. The eye gradually resumed its normal position, and with the exception of a depressed cicatrix at the inner side of the angle of the eye, and a troublesome overflow of tears from disturbance of the relations of the lacrymal sac, little inconvenience ensued.

CASE 5. *Exostosis of orbit of considerable size; no operation.*—A chief mate of a steam vessel consulted me concerning a protrusion of the right eye, which had come on

gradually without pain or constitutional symptoms. The eye was displaced downwards, inwards, and forwards to a considerable extent. There was at least a quarter of an inch difference in the level between the two pupils; nevertheless, he said he never suffered from diplopia. Growing deeply in the superior external angle of the orbit, a hard, dense, and painless tumour of considerable size could be felt. An exploring trocar, when introduced, came into contact with bone of ivory hardness, and the diagnosis presented no difficulty. His circumstances would not allow of his undergoing an operation, which I was not inclined to press from the size of the growth and its attachments to the upper wall of the orbit, which might, during an operation, have led to the opening of the cranial cavity. The patient returned to sea, and I lost all trace of him.

CASE 6. *Hypertrophy of lacrymal gland; removal.*—A man aged forty came to the Eye Infirmary, sent by Mr. Alexander of Earsdon. There was considerable proptosis of the right eye, which was forced downwards and outwards. The upper lid sometimes slipped completely behind the eyeball, and had to be drawn forwards by the fingers. In the upper and outer part of the orbit a lobulated swelling could be felt, occupying the seat of the lacrymal gland and filling the upper part of the orbit. The outer canthus was freely divided, the orbital cavity opened, and a large encapsulated and lobular tumour found occupying the whole of the inner and upper part of the orbit and extending deeply into the cavity. It was removed with some difficulty, without injury to the globe, which immediately returned to its proper position. The tumour proved to be a hypertrophied lacrymal gland, with proliferation and condensation of the connective-tissue elements. Recovery was complete and uninterrupted.

CASE 7. *Fibro-cartilaginous tumour of orbit; removal; recovery.*—W. B—, aged fourteen, residing at Chester-le-Street, came to me on account of considerable displacement of the right eye, which was driven directly downwards, the pupil being fully half an inch below the level of the left eye. A considerable tumour could be felt occupying the upper part of the orbit. It was round, smooth, and very hard, giving the sensation of bone. A grooved needle could with difficulty be driven into it, and it was evidently cartilaginous in its structure. Its growth had occupied eighteen months, and it was still enlarging gradually. The upper lid, after division of the external canthus, was raised, and the tumour explored. It was found to have a firm and extensive attachment to the upper wall of the orbit. It was, however, to a certain extent pedunculated, the edge of a gouge penetrating to a certain distance between it and the bones. It was partly prised and partly chiseled off, and came out entire, being about the size of a horse-chestnut, though somewhat more flattened. It weighed seven drachms. On examination it proved to consist entirely of fibro-cartilage. After the removal a considerable cavity remained, with some ptosis, but recovery was eventually complete, no ptosis remaining at the end of three months.

CASE 8. *Periosteal thickening in orbit resembling a tumour.*—F. S—, a young man, by occupation a hind, and residing near Belford, was admitted into the Eye Infirmary. His right eye was displaced downwards and inwards, and was considerably more prominent than its fellow. There was diplopia, but good movement in vision, and an entire absence of pain or other subjective symptoms. In the upper and outer orbital region, on deep pressure a feeling of firm resistance and an ill-defined tumour could be felt, which, it was suspected, might be connected with the lacrymal gland. Chloroform having been administered, the external canthus was divided, and the cavity of the orbit explored with the finger. The cause of the exophthalmos was found to be a considerable but limited thickening of the periosteum (and apparently subjacent bone). Occupying the upper and outer part of the orbit, it formed a smooth and rounded swelling. As its removal was impracticable without risk of opening the cranial cavity, the periosteum was freely incised in various directions and the wound closed. Although there was no history of a specific taint, iodide of potassium was administered internally, and in a few days the patient was sent home. The growth gradually subsided, and at the end of six months there was no further trace of it.

CASE 9. *Fatty tumour of orbit; removal.*—A young woman, single, aged twenty-eight, was brought to my consulting rooms on account of prominence and defective vision of the right eye. There was considerable displacement outwards, with moderate protrusion, and movement inwards

was limited, giving rise, when looking at close objects, to a divergent strabismus. The reaction of the pupil was good, and the ophthalmoscopic signs were *nil*, but the eye was extremely amblyopic—I suspected congenitally. A small elastic swelling was distinctly to be felt occupying the inner part of the orbit by deep pressure in the inner angle. It had almost the feeling of fluctuation, but the insertion of a grooved needle gave negative results. I operated in the following manner. After dividing the conjunctiva over the inner third of the circumference of the globe, the finger was inserted deeply into the orbit. A small tumour the size of a small walnut was felt; it was movable, and but slightly attached to the cellular and fatty structures in the orbit, and with a little dragging and twisting was easily drawn out entire. It proved to be a fatty tumour, with a dense fibrous matrix. Recovery was uninterrupted, and the eye resumed its normal position. The sight, however, remained unaltered.

CASE 10. *Distension of frontal sinus; operation.*—Mrs. C—, aged sixty-eight, residing at Morpeth, consulted me concerning a swelling which had gradually made its appearance at the upper and inner part of the right orbit. The swelling was smooth, hard, and had a bony feel, and was about the size of a pigeon's egg. It had all the appearance of a distended frontal sinus, and was diagnosed as such. An incision was made over the swelling, and the bone exposed and perforated with a gimlet. About one ounce of thick glairy fluid escaped. The opening was enlarged, and the end of the little finger introduced into the cavity; guided by this, a curved trocar without the cannula was forcibly driven into the meatus of the nose, and when this was withdrawn a small drainage-tube was passed, and its end protruded through the right nostril; this end was fastened by a piece of silk to the one protruding from the wound, and the cavity was syringed out two or three times a day with Condy's fluid. At the end of a month the cavity had much contracted, and at the end of six weeks the fistula leading into it was allowed to heal, the patient returning home quite well at the end of two months.

CASE 11. *Distension of frontal sinus; operation.*—This case in every feature resembled Case 8, but was much less amenable to treatment. At the end of three months a small fistula which would admit a fine probe still existed at the seat of the operation wound. Shortly after this I lost sight of the patient, but I have no reason to doubt the fistula would heal as soon as the sinus had completely contracted.

CASE 12. *Abscess in ethmoidal sinus.*—I was asked by Dr. J— to see a child who had recently suffered from a severe form of scarlet fever. The child had complained of severe headache, and had a high temperature and considerable constitutional disturbance. Coincidentally with this the left eye had become painful, and was pushed outwards and forwards, and there was considerable chemosis and other evidence of deep-seated orbital inflammation. Chloroform having been administered, an opening was made on the inner side of the globe, but no pus escaped. On introducing the finger into the orbit, it was found that the inner wall was bulging, and the bones were thinned and crackled on pressure. The scalpel driven through them gave exit to a quantity of very fetid pus, which had evidently been pent up in the ethmoidal cells. Recovery was complete and rapid.

CASE 13. *Exophthalmos of both eyes; retro-ocular abscesses communicating with each other through the base of the skull.* C. S—, aged thirteen, had a severe attack of scarlet fever, with urgent throat symptoms and frequent attacks of epistaxis, which had much reduced her. She was suddenly attacked with rigors, high temperature, and intense headache, with wandering and other cerebral symptoms. A few days afterwards proptosis of both eyes became manifest, and it was thought the sight had gone. I now saw her for the first time. Both globes were considerably protruded; pupils semi-dilated, inactive; optic neuritis well marked in both discs. The child was semi-conscious, and when roused only answered in monosyllables. On making a deep incision on the inner side of the globe and forcing a director to the back of the right orbit, pus immediately escaped, and on making pressure upon the *left* eye I noticed distinctly that it increased the flow from the *right* eye, showing that there was a communication between the two abscess cavities. An incision similar to that made in the right orbit was punctured on the left side; pus escaped freely and in considerable quantities. In the course of twenty-four hours all the urgent symptoms subsided, the child became fully conscious, and vision returned. At the end of ten months

restoration to health was quite complete, and no trace of optic neuritis or impaired vision remained.

CASE 14. *Deep-seated abscess of orbit, with extensive necrosis; secondary implication of frontal sinus; retraction of upper lid.*—Mrs. G—, a delicate woman, after exposure to cold was seized with violent pain in the right orbit. The globe was much protruded, chemosed, and vascular, and the sight considerably impaired. The disc was much congested, and the veins tortuous, showing considerable interference with the intra-ocular circulation. I was anxious to make an early opening, but the patient objected; hence a delay of a few days, during which all the symptoms considerably increased. When the matter was let out by an incision in the upper part of the orbit under the lid, it was found there was very extensive necrosis of a considerable part of the orbital cavity, chiefly its posterior and upper part. A drainage-tube was inserted, and the cavity washed out frequently. In this condition she continued for about eight weeks, when rather suddenly she had a return of acute symptoms, and it was noticed that the orbit began to bulge in the region of the frontal sinus. Chloroform having been administered, an opening was made into this cavity, which was found enlarged and full of pus. The usual operation of drainage through the nasal cavity was effected. Great improvement in the general health occurred; but, as the abscess cavity contracted, the upper lid became everted and drawn in to such an extent that the globe was permanently uncovered, the cornea sloughed, and it became necessary to enucleate the eye. This gave me a good opportunity of exploring the deep parts of the orbit. The whole of the bones were denuded and necrosed in the neighbourhood of the optic foramen and sphenoidal fissure, but were firmly attached and nothing could be removed. Since that time, now four years ago, there has been constant discharge from the orbit, and small pieces of bone have come away; but the patient is content with her condition, and will undergo no further operation.

CASE 15. *Malignant disease (encephaloid) commencing in the ethmoidal sinuses; operation; death.*—A man aged thirty consulted me concerning the following train of symptoms. He had had repeated and considerable attacks of epistaxis, which had much exhausted him and rendered him very anæmic. There had been considerable pain in the nose and left orbit, and recently a prominence had shown itself at the lower and inner angle which had displaced the eye upwards and outwards. The swelling had an elastic fluctuating feel, and the bones over it were expanded, thinned, and felt crackling. Malignant disease was suspected, and the introduction of a small trocar gave exit to nothing but blood. The patient, when much enfeebled, was admitted into the Royal Infirmary under my friend Mr. Page, who removed a large quantity of soft encephaloid matter from the cavity of the ethmoid bone and upper part of the walls. The patient died of shock in a few days.

CASE 16. *Pulsating exophthalmos; ligature of common carotid.*—Miss N—, aged forty-five, consulted me concerning a protrusion and ptosis of the left eyeball. The face was flushed and dusky. On raising the lids the conjunctiva was congested and the rectal veins much distended. The eye was motionless, the pupil contracted. The sight was good, but diplopia was present. Examined ophthalmoscopically, there was a well-marked "Staun's pupilla." A loud systolic murmur was heard over the eye and over most of the head, loudest at the left temple. The sound was also audible to the patient, and was very distressing. Pressure on the common left carotid stopped the sound and the pulsation, and reduced the proptosis. The swelling and protrusion commenced suddenly six weeks before I saw her, and the ptosis was coincident with it. Ligature of the common carotid was performed, and for some days the patient promised to do well, but subsequently right-sided hemiplegia with aphasia developed, and she died four days after the operation. No post-mortem examination was allowed.

Newcastle-on-Tyne.

INSANITARY BARRACKS.—The Clarence Barracks at Portsmouth have been ordered to be razed to the ground. They were closed a few weeks ago for inspection, and were found to be in so bad a condition from a health point of view as to be beyond repair. The Gun Wharf Barracks, in which the Royal Marines were quartered forty years ago, and which have since been used as the quarters of the Royal Artillery, have been also closed. Such sections as are not sanitarily unfit are to be retained as stores, but the greater part of the building is to be pulled down.