Distension of the frontal sinus / by Charles Higgens.

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DISTENSION OF THE FRONTAL SINUS.

By CHARLES HIGGENS.

Case 1.[1]—George W—, æt. 32, admitted July 10th, 1877. Twenty-five years ago suffered from abscess at inner canthus of right eye (lachrymal sac?). The abscess formed during recovery from scarlet fever. Eighteen years ago, he received a blow on the forehead from a bar of iron, but was not much hurt. Two years later some pieces of diseased bone were removed from the inner angle of the orbit. Patient has been at sea for the last sixteen years, as steward and cook. Has enjoyed fairly good health, but was never very robust. Has had typhoid fever and smallpox; no venereal disease.

Since the removal of bone, sixteen years ago, he has had no trouble about the orbit until eight months back. He then noticed a small lump at the inner angle of the orbit, which he attributed to cold taken during night watches. He noticed that the lump varied in size, being always much smaller in the morning, after a good night's rest, than at other times. Soon after the lump appeared he began to experience pain in the forehead, described as a kind of stretching and bearing down. The pain was constant, and has continued up to the present time. The swelling has gradually increased, and is still increasing, but varies in size at different times, being always much smaller in the morning, after rest, than in the evening, when he has been about all day.

[1] Reported in 'Guy's Hosp. Rep.,' ser. iii, vol. xxiii, 1878.

On admission.—There is a tense fluctuating swelling situated at the inner angle of the orbit, above the position of the lachrymal sac. The skin over the swelling is normal. There is no displacement of the eyeball. An incision was made into the swelling, when a large quantity of opaque yellow and rather tenacious fluid escaped; indeed, the quantity was so large that there seemed to be no end to the flow. A probe introduced through the wound passed for two inches upwards and somewhat backwards, and its extremity could be freely moved about, showing that it had entered a considerable cavity. The large end of a Webber's sound (about the size of No. 5 urethral catheter) was passed with but little force through the thin septum which intervened between the floor of the cavity and the nasal fossa.

July 16th.—Incision healed. No refilling of cyst. Discharge escapes in considerable quantity into nose, and passes backwards into pharynx; it is in no way offensive and gives no inconvenience.

At the end of August, there was no return of the swelling; the discharge had ceased running into the nose for some time.

Case 2.—William T—, æt. 13, admitted March 7th, 1879. Six months ago, first noticed swelling at the inner angle of the left orbit; about the same time the eye began to water. The swelling has gradually increased and is still getting larger; the increase has been continuous, and there has been no variation of the swelling in size at different times of the day. Never had any pain. No history of injury. Knows of no cause for commencement of tumour.

On admission.—Hard, rather irregular growth, projecting from inner margin of left orbit; it is attached to bone by a broad base, extending from inner extremity of upper margin of orbit almost to level of inner canthus; it passes backwards into the orbit. The eyeball is pushed outwards; its movements are perfect; sight normal, there is no diplopia; nostril quite free; no teeth missing. Tumour looked upon as an exostosis from the inner wall of the orbit.

March 10th.—Patient placed under the influence of an anæsthetic. Incision made over tumour; cutting forceps applied to growth crushed through it at once, there being only a thin

shell of bone; a quantity of grey, opaque, tenacious mucus escaped. The finger, passed through opening made by forceps, entered a large cavity, which extended for some distance upwards and somewhat backwards. A drainage tube was passed through the floor of the cavity into the nose, and its upper end fixed by strapping to the forehead. Cavity to be syringed out daily with solution of carbolic acid, 1 to 40.

June 3rd.—Drainage tube removed.

16th.—Fistulous opening at inner angle of orbit; discharge escapes into nose. No air escapes through fistula on forced expiration with the nostrils and mouth closed. Still considerable thickening of bone.

July 21st.—Fistula smaller, but otherwise the same.

October 6th, 1879.—Swelling much contracted, small fistulous opening admitting a probe, which passes backwards nearly two inches; cavity quite small; epiphora; still some discharge into nose.

January 19th, 1880.—Thickening of nasal bone, nasal process of superior maxilla, and internal angle of frontal bones; situation of wound marked by small puckered cicatrix, in centre of which is an opening admitting No. 1 lachrymal probe; the probe can be passed for 1½ inches backwards, but in no other direction. There is some epiphora.

Case 3.—Elizabeth S—, æt. 19, admitted March 10th, 1879. For the last eight months has noticed a lump at the inner angle of the left orbit, and watering of the eye. The lump gradually increased in size, but has always been larger when walking about than when lying down. About four months ago an abscess formed and was opened, the wound never closed, and a constant thick yellowish discharge issued from it. Patient knows of no cause for the swelling; does not remember having received any injury in its neighbourhood.

On admission.—There is a large dusky swelling at the inner angle of the left orbit; a constant discharge of thick yellowish semi-purulent looking fluid takes place from an opening in its centre; a probe introduced through the opening passes downwards towards the lachrymal sac; there is expansion and apparently thickening of the bones about the inner angle of the orbit; no displacement of the eyeball. The swelling, though

not in the position of the lachrymal sac was thought to communicate with it.

The fistula was laid open, the upper and lower canaliculi slit, a probe passed down the nasal duct; there appeared to be no stricture. Three weeks later the fistula was closed, and the swelling had greatly diminished.

May 19th, 1879.—Fistula has reopened; swelling as large as ever. Patient readmitted. A free incision made into swelling opened a large cavity, evidently the distended frontal sinus. Some of the bone was chipped away, and a quantity of thick, tenacious, muco-purulent fluid allowed to escape. A probe introduced into the cavity passed across the middle line to the other side of the forehead. The cavity was thoroughly cleared out, a strong iron probe pushed through its floor into the nose, a drainage tube passed through opening thus made, and left with one end protruding from the left nostril, the other from the incision. Some small polypi were found in the left nostril, which might possibly have caused obstruction, leading to distension of the sinus; they had up till now escaped observation. Cavity to be syringed daily with carbolic lotion.

September 8th, 1879.—Drainage tube removed. A quantity of thick mucus is still escaping; swelling has diminished; air passes freely through the opening on expiration with the nostrils closed.

October 6th, 1879.—The swelling has greatly diminished. A cicatrix and small fistula mark the spot where the opening was made; probe passes about an inch through fistula; its end can only be moved about to a limited extent, showing that the cavity is much contracted.

January 12th, 1880.—The fistula has entirely closed; nothing now remains but a little drawing back of the inner canthus. Some thickening of the bones and slight epiphora.

The disease under consideration cannot be so very uncommon, for I have myself treated three cases, and have seen four others the subjects of which declined operative interference; in one of the latter the tumour was very large indeed, and had existed many years.

Yet in many of the text-books, no mention is made of "distension of the frontal sinus" or anything equivalent to it. Thus, in the surgical works of Holmes, Bryant, and Erichsen,

and the ophthalmic writings of Carter and Stellwag—so far as their indices are concerned—the subject is not touched upon.

I suspect that this omission may be partly due to the fact that such cases come indiscriminately under the care of both the general surgeon and the specialist; and in their writings the former have left the description to the latter, and *vice versâ*.

In 'Holmes's System of Surgery,' the disease (if it be the same) is dismissed as follows:—"I would, however, just mention a very singular tumour spoken of by MM. Bérard and Denonvilliérs, formed apparently by distension of the frontal sinus, producing intense pain, displacement of the eye, and a large accumulation of gas in the superficial parts of the face, communicating with the neck."

In the following works the disease is treated of under the various names of Distension of the Frontal Sinus, Encysted Tumour, Chronic Abscess or Mucocele, Enlargement of Frontal Sinus, and Hydatid.

Mackenzie, 'On Diseases of the Eye,' under "Encysted Tumours or Hydatids of the Frontal Sinus," says:—"Professor Langenbeck has published two cases of pressure on the orbit from disease in the frontal sinus. He speaks of them as cases of hydatid, a term much misplaced by German pathologists. Ringer would probably have regarded them as cystic or encysted tumours. Perhaps the one was nothing more than a collection of mucus and the other of thick matter. The situations of the protrusion of the outer table of the bone are amongst the most remarkable circumstances of these cases."

The cases are briefly as follows:

Case 1.—A female, æt. 17, when eight years of age, in 1802, fell and struck right temple against sharp corner of table. Soon after a hard swelling appeared in region of right frontal sinus. Swelling painless; extended gradually till it involved whole of right side of frontal bone. The right eye became displaced downwards and outwards, vision gradually decreased.

In 1818[1] the swelling was opened. Through the opening there was discharge of clear, ropy, lymphatic fluid, escaping

[1] There appears to be some mistake about the date or age of the patient at the time of operation. She is said to have been eight years of age in 1802, but presumably the report was taken about the same time that the operation was performed; if such were the case she would have been twenty-four, not seventeen.

from a white shining cyst, which filled the whole frontal sinus, and had been penetrated by the perforator.

The cyst or hydatid, as the narrator of the case styles it, was laid hold of with forceps and partially extracted. Measurement of the cavity showed it to be three inches across, and three and a half inches from before backwards. The sinus was filled with lint; injections of willow bark and myrrh, and subsequently of corrosive sublimate, were used.

When the patient left the hospital the swelling had subsided but little. The following year she returned, with the swelling in much the same condition, the discharge of matter being abundant. Two setons were passed through the sinus, by which means the discharge and swelling diminished.

Case 2.—Male, æt. 20. Eleven years before admission received a stroke with a racquet on the left side of nose and left eye, the consequence of which was a great degree of swelling, which after a time completely subsided.

Two years later he began to have pain, and noticed some protuberance at the inner angle of the eye.

When the patient came to the hospital, vision was unaffected; the eyeball was pressed outwards and downwards by a considerable swelling at the inner angle of the orbit. The swelling had exactly the appearance and situation of a greatly distended lachrymal sac, but was considerably bigger, could not be emptied, nor could any fluid be made to escape from the tear puncta on pressure.

Tumour was cut down on; a white glistening sac came into view. On opening the sac a greyish-white, tenacious fluid escaped; depth of cavity was three inches; finger introduced into it reached as far as the floor of nostril. Termination of the case is not given.

Walton, 'Practical Treatise on Diseases of the Eye,' says, under "Disease of Frontal Sinus:"—"Encysted tumours may be a real dropsy of the cavity or merely a collection of pus or hydatids."

He gives a case of distension of the right frontal sinus by mucus, in a girl æt. 20; the bony wall of the sinus had become absorbed. The swelling was punctured and a small drainage tube introduced; the cavity was frequently syringed out; a fistulous opening remained for a long time.

Gant, 'Science and Practice of Surgery.' "Chronic abscess or mucocele may result when the communication between the ethmoidal cells is closed up and muco-purulent matter accumulates in the sinus." "The swelling may be mistaken for a solid tumour or growth within the sinus, but at a later stage the wall of the sinus becomes thinned and points, and the fluid character of its contents can be felt with the finger."

He recommends that the communication with the ethmoidal cells and nose should be re-established, care being taken to maintain the communication for some days whilst dilute astringent injections are used; that the cavity should be closed as soon as possible, lest a fistulous opening remain, forming with the nasal passage an aerial fistula which would be difficult to close. "A cyst, hydatid or fatty, is sometimes produced in the frontal sinus, giving rise to similar symptoms, and requiring the same treatment."

Soelberg Wells, 'Treatise on Diseases of the Eye.' "Diseases of the frontal sinus may produce considerable dilatation of this cavity, which then encroaches on the orbit, giving rise to contraction and malformation of the latter, and consequent protrusion of the eyeball." Diseases mentioned are—acute and chronic inflammation of the lining membrane, giving rise to purulent or muco-purulent discharge. Polypi, cystic tumours, entozoa, and exostoses are also mentioned. A blow is given as the cause. The treatment recommended: a free incision, thorough evacuation of the contents, a seton passed through between sinus and nasal cavity, and left in for several weeks.

Hulke, 'Royal London Ophthalmic Hospital Reports,' vol. iii, pp. 152, 153, gives two cases of distension of the frontal sinus. One is apparently the same as that reported by Walton. No cause is given. In the other there was a history of injury twelve years before. It was treated by incision; the discharge became purulent; purulent character and quantity of discharge diminished, and at the end of the following month (about six weeks from the time of operation) only a few drops of mucus escaped morning and evening from a small fistula, which the wound had then become.

Two years later the eye was still slightly in advance of its fellow, the orifice of the sinus had become almost capillary, and only occasionally discharged a few drops of clear mucus; some

enlargement of upper part of nasal process of superior maxilla and internal angular process of frontal bone remained.

Lawson, 'Diseases and Injuries of the Eye,' describes "Distension of the frontal sinus" very fully. He gives injury at some time—perhaps very remote—as the most common cause. Two cases are reported: one in a man, æt. 58, in whom the disease was traceable to a kick from a horse fifty-four years before; the other in a woman, æt. 21, in whom the swelling had been first noticed six years before consulting Mr. Lawson, and was attributed to an attack of erysipelas fifteen years before.

The treatment in both cases was by introduction of a drainage tube, and syringing with astringent and disinfectant solutions. Mr. Lawson says the drainage tube should be worn for five or six months, or until all discharge from the nose has ceased.

Bader, 'The Human Eye, its Natural and Morbid Changes,' says: "Most commonly the sinuses are enlarged by accumulation of thick transparent or partly opaque mucus, or by muco-pus, rarely by pus; this may be fetid and mixed with blood." "In rare instances solid bony tumours, exostoses, and polypi attached to the walls of the sinus, or encroaching from neighbouring centres, have been found." Injury was found to be the cause in eight out of nine cases.

The treatment recommended is incision and introduction of a seton through the sinus into the nose. The seton may be removed four weeks after introduction, but in some cases has been left in for several months. In one case the seton, a wire one, set up so much irritation that it had to be withdrawn. The patient daily passed the handle of a cataract knife through the nose into the opening, and "finally succeeded in restoring the normal dimensions of the sinus, and its communication with the nose."

Bader alludes to a case in which some insect had become lodged in one of the sinuses, and caused irritation of the mucous membrane. Benefit was derived from smoking cigars impregnated with arsenic.

Distension of the frontal sinus appears to be caused, in many instances, by a blow about the inner angle of the orbit, causing fracture of bone and subsequent closure of the communication between the sinus and middle meatus of the nose. The blow may have been received at a period very remote from the first appearance of the tumour. In the first of my cases the injury

was more than seventeen years before, and in one of Mr. Lawson's, when the patient was first seen by him, fifty-four years had elapsed since the injury; the report, however, does not say when the tumour was first noticed; it was very large and had probably existed some years.

The great length of time between the cause and its visible effect may be accounted for by supposing that the distension gives rise to no very marked symptoms until the orbital wall of the sinus begins to bulge, or, indeed, until the bone having become absorbed the contents of the sinus point beneath the integuments. The secretion of the sinus is probably only sufficient to keep the surface of its cavity moist, and—providing no inflammatory action was set up—would take years before its quantity was sufficient to cause distension. Moreover, before bulging the external walls the secretion might make room for itself by destroying the partitions between the various cells, not only frontal, but ethmoidal, or by passing across the middle line, and in part discharging itself into the opposite nasal cavities. Thus, in my third case there was evidently a communication between the two sinuses, for a probe could be passed from the incision quite over to the other side of the forehead. In this case, as in Case 2, there was no history of injury, nor could any cause be assigned by the patient for the appearance of the tumour. It is possible that the polypi found in the nose may have blocked the opening of the sinus; they were, however, so small that they had given rise to none of the ordinary symptoms of nasal polypus. If they were the cause of the obstruction they must have grown quite close to, or in, the opening of the infundibulum itself.

Distension of the frontal sinus has probably no early symptoms. There is at no time severe pain, nor indeed any, until the disease has far advanced. In my first case the patient had no pain until after the lump appeared at the inner angle of the orbit, though in all probability the sinus had been gradually filling for sixteen or seventeen years. The pain was described as stretching and bearing down, and was constant. In the other two cases no pain was complained of.

The first symptoms noticed by the patient are swelling about the inner angle of the orbit and perhaps epiphora, the latter being dependent on the former.

A tumour having formed, its nature is not so very evident. In the first of my cases I formed no opinion beyond that there was a collection of fluid pointing above the inner canthus .I did not think it was a distended sac; an incision, followed by the introduction of a probe, showed plainly what it was.

In the second case I diagnosed an exostosis of the orbit, and in the third an abscess connected with the lachrymal sac.

The diagnosis between bony tumour and distension of the frontal sinus—before perforation of the bone has taken place—is not easy. We have, as in Case 2, an irregular tumour projecting from the inner margin of the orbit, hard, and apparently connected with the bone. The tumour feels like bone, grows slowly and painlessly, as bony tumours do, so that both in their physical characters and history the two agree. Later on, however, in distension of the frontal sinus, the bone, already thin enough, becomes thinner, and on pressure upon the tumour a crackling sensation is communicated to the fingers. No such thinning takes place in the exostoses found about the orbit; they are very hard and dense, and feel so.

A correct diagnosis is easily arrived at by cutting into the tumour.

When the bone has become absorbed and the contents of the sinus point, a rounded, fluctuating swelling is formed, which may be mistaken for a distended lachrymal sac. There are, however, certain marked differences between the two. Thus, the position of the swelling in distension of the frontal sinus is different; it is high up at the inner angle of the orbit, above the tendo oculi, instead of beneath it; it cannot, like the distended sac, be emptied by pressure, nor can any of its contents be squeezed out through the canaliculi. At this late stage the tumour caused by distension of the frontal sinus has one marked peculiarity, *it varies in size at different times of the day.* Patients tell us that swelling is much less when they get up in the morning than at other times. This is probably due to the fluid becoming—when the patient lies down for some time—evenly diffused throughout the sinus, whilst it gravitates to the lowest part after the erect position has been maintained for a few hours. In this stage, as in the earlier ones, an incision into the tumour will clear up any doubt.

Displacement of the eyeball, diplopia, and impairment of

vision may occur or not, according to the size the tumour has reached.

Distension of the frontal sinus is, I think, best treated by drainage. My first case did well with simply an incision through the integuments, clearing out of the sinus, and a counter-opening into the nose. The patient, however, dis appeared before sufficient time had elapsed to allow of refilling of the cavity.

The other two cases have been seen occasionally up to the present month (January, 1880). In one the operation was performed ten months, in the other eight months, ago; the drainage tube was left in rather less than three months in Case 2, rather less than four months in Case 3. The result in both is in every way satisfactory, but more especially in Case 2. In Case 3, a small fistulous opening still remains, and there is some thickening of the bones about the inner angle of the orbit.

Since my paper was sent in the following case has been operated on:

Z. P—, æt. 36, first came to me in April, 1876. Had always enjoyed good health; never had any venereal disease. For eight years he had been at sea; for five years subsequently he was a "seaman's labourer;" during the next five years he was employed as a clerk, working long hours in a dark office. When about fourteen years of age patient had a kick above one of his eyes, but he does not remember which. Seven years ago had a blow above one orbit (is almost sure it was the left) from an iron rod connected with a steam hammer. Always enjoyed good sight until he became a clerk (five years ago). Soon after commencing his duties he first began to notice a dull pain at the inner angle of the left orbit, extending up the forehead in the course of the supra-orbital nerve, and along the inner side of the nose; this pain was always worse after he had been engaged for some hours in writing. One day, while in great pain, he covered up his right eye, and then found that the sight was defective in the left. He had some drooping of the left upper eyelid at this time, but is not sure when it first began. His wife had noticed a difference in his eyes for a year or more previously.

When first seen he complained of pain in the left eyeball and orbit, which had been almost constant during the last twelve months; the right eye had become rather painful in the last fortnight. He had ptosis; the note does not say on which side, it was probably the left.

The right eye could read Snellen 40 at twenty feet, and Snellen 30 at the same distance, by the aid of a convex glass of twenty-four inches focus. The left eye could read Snellen 50 at twenty feet without aid, with a convex lens of forty inches focus Snellen 30 at twenty feet. The ophthalmoscope showed hypermetropia in both eyes. He was ordered to use convex 24 for all near work.

He did not get much benefit from the spectacles; the pain in the left eye went on increasing; he went on with his work though advised not to do so; he took iodide of potassium for some time.

On June 28th, 1876, it was noted that there was a good deal of pain about the pulley of the left superior oblique muscle.

On July 19th the refraction was tested more carefully, and astigmatism found in the left eye. Suitable glasses were ordered. He managed to see very well with these, but the pain in the left eye and orbit continued.

No note was made of any swelling about the orbit or displacement of the eyeball. Beyond the ptosis noticed at his first visit nothing but the hypermetropia and astigmatism was made out, and to these the pain and discomfort were attributed.

December 29th, 1879.—During last five months left eye has become prominent. There is now protrusion of the eyeball, which is also pressed downwards and outwards by a painful, semi-elastic swelling, projecting from the inner and upper part of the orbit. A month ago the swelling was inflamed, very painful, and much larger than at present. Vision is somewhat impaired ($\frac{20}{50}$ instead of $\frac{20}{40}$ with spherico-cylindrical lens). There is no diplopia. The ophthalmoscope shows that the inner edge of the optic disc is veiled, and its inner half very red.

Periosteal node diagnosed; ordered Pot. Iodidi gr. xx, Tr. Cinch. Co. ℿxx, Aqua ℥j, ter die.

February 5th, 1880.—Swelling more solid, decreased in size; no pain except on exposure to cold or attempting to read. Obscure fluctuation in parts. Omit iodide. The swelling is larger at some times than at others, and when patient lies down partially disappears. It was now diagnosed to be the distended frontal sinus.

12th.—Patient placed under influence of an anæsthetic. A hard, immovable tumour could be felt projecting into the orbit from its inner angle; no fluctuation could be detected. The swelling was cut down upon, and a mass of hard bone exposed, in the centre of which was a small opening, from which some thick pus escaped. Some of the bone having been broken away the finger entered a large cavity, and could be passed downwards, backwards, and inwards for about two inches and a half in each direction. A large quantity of thick, greenish, fetid discharge escaped.

A perforation was made from the cavity into the nose, and a drainage tube introduced; some sharp ridges of bone were removed with bone forceps; after this the eyeball returned to nearly its natural position. Cavity to be syringed out daily with carbolic lotion (1 to 40).

16th.—No bad symptoms; some swelling of the eyelids, subsiding. Eyeball pressed slightly outwards and downwards.

23rd.—Noticed impairment of sensation of region of distribution of supra-trochlear nerve (no doubt divided at operation).

March 25th.—No return of sensation; small abscess at upper opening for drainage tube. Optic disc still red at inner side, and margin ill defined.

May 6th.—Has had some inflammation of the upper eyelid and around entrance of tube. There is some thickening of the bone close to the inner angle of the orbit; still some discharge from the lower end of tube. Eyeball in nearly normal position; vision as good as ever. Optic disc rather red, but its outline quite well defined; patient has been at his work as a clerk for some weeks, and by the aid of glasses can write or read for any time without pain or inconvenience. New drainage tube introduced.

In this case there is a distinct history of injury. Some of the symptoms complained of were no doubt due to the hypermetropia and astigmatism, and, as commonly happens, were

first noticed when the patient began to use the eyes continuously upon near work (in his case writing).

The symptoms caused by the anomaly of refraction and those due to stretching of the wall of the frontal sinus were mixed up together; the pain was not entirely due to the former, as it was not relieved by suitable glasses, although the sight was greatly improved. This circumstance, coupled with the existence of ptosis, raised a suspicion that there might be some periostitis about the orbit, or some disease within the skull, but the true nature of the case was never suspected during the whole time that the patient was under observation in 1876.

In 1879 the displacement of the eyeball was evident enough; its cause was also plain, but not so the nature of the tumour.

Unlike the other cases, pain was a very prominent symptom here, and there was one rather sharp attack of inflammation.

Soon after this the patient noticed that the tumour varied in size at different times; this is one of the chief diagnostic signs of "distension of the frontal sinus," and cannot occur until the bone being absorbed the contents of the sinus point beneath the integument.