LECTURES ON CERTAIN DISEASES OF THE JAWS.

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LECTURE I.—ON CYSTIC DISEASES OF THE JAWS.

[Concluded from page 1261.]

Cysts in connection with undeveloped teeth, or Dentigerous Cysts (coronary cysts of Magitôt), may occur in either jaw. These, as already mentioned, may suppurate and give rise to abscess, which may be confounded with suppuration within the antrum, or may project into the antrum, filling the cavity or communicating with it.

Dentigerous cysts arise in connection with teeth which from some cause have remained within the jaw, and have undergone a certain amount of irritation. They are almost invariably connected with permanent teeth, though Mr. Salter mentions a case in connection with a temporary molar occurring in the practice of Mr. Alexander Edwards, late of Edinburgh; and in a remarkable specimen belonging to Mr. Cartwright, which will be afterwards referred to, the tooth is a supernumerary one. I have also myself met with an example of cyst connected with a temporary tooth in a boy aged 4, brought to me by Mr. C. J. Fox. In this case the temporary right canine tooth was wanting, and there was a cyst developed in its situation, on cutting into which I extracted seven small irregular nodules of dentine and enamel, but no complete tooth, this being, therefore, an example of the odonto-plastic cyst of Magitôt.

Mr. Tomes explains the formation of cysts in connection with retained teeth by referring to the fact that, when the development of the enamel of a tooth is completed, its outer surface becomes perfectly detached from the investing soft tissue, and a small quantity of transparent fluid not uncommonly collects in the interval so formed. This fluid ordinarily is discharged when the tooth is cut; but when from some cause the eruption of the tooth is prevented, it increases in quantity, gradually distending the surrounding tissues in the form of a cyst.

For further microscopic details and for a full discussion of Magitôt's views, I may refer to Mr. F. Eve's very able lecture on Cystic Tumours of the Jaws, delivered in this theatre, and published in the BRITISH MEDICAL JOURNAL, January 6th, 1883.

When dentigerous cysts occur in the lower jaw, they form more isolated and prominent tumours than in the case of the upper jaw, and in some cases the projecting bony wall has been removed. In St. Bartholomew's Museum is a specimen of the kind (I. 119), consisting of a portion of a bony cyst, which was removed by Mr. Earle from the external and lateral part of a lower jaw. The cyst is lined with a thick and soft membrane, which has been in part separated from it. The cavity of the cyst was filled with a glairy fluid, and at the bottom of it a canine tooth of the second set was adherent to the lining membrane. The case is referred to by Stanley, who gives an accurate drawing of the preparation. In the Museum of the College of Surgeons there is a very similar preparation (2196), showing a bony cyst of oval shape, one inch in its long diameter, lined with a thick, well-formed membrane, containing an imperfectly-formed bicuspid tooth, which was removed by Mr. Wormald from the lower jaw of a female, aged 17, whose case will be found in the *Lancet*, June 22nd, 1850.

Cases of dentigerous cysts may be mistaken for solid tumours. Thus Gensoul, of Lyons, has recorded the case of a girl aged 13, whose antrum was distended with a large collection of yellow fluid, and contained a canine tooth attached to its wall, in whom he had made the incisions necessary for the removal of the tumour before he discovered its nature. Mr. Syme also has related the case of a woman aged 31, on whom he operated for a tumour of the upper jaw, of four months' standing, by laying open the cheek and removing the tumour with the bone-forceps. "The tumour was found to consist of a dense cyst, lined throughout with earthy matter in a crystalline form, and containing a clear, glairy fluid, together with the crown of a tooth, apparently the lateral incisor." In a cavity beyond the tumour was found a fully-formed canine tooth, encrusted with a thin plate of bone. The teeth are said to have belonged to the temporary set.

When the cyst occurs in the lower jaw, and is less prominent than in the two cases already mentioned, giving rise rather to a general expansion of the bone than a distinct tumour, the disease may be mistaken for a solid tumour of the lower jaw. A case of this kind

occurred to that excellent surgeon, the late Mr. S. W. Fearn, of Derby, who had the courage and honesty to publish the case (BRITISH MEDICAL JOURNAL, August 27th, 1864), and to whom I was indebted for the very valuable preparation (College of Surgeons' Museum, 2195), from which the drawing (Fig. 11) was made.

Fig. 11.

Mr. Fearn's patient was a girl aged 13, who had a large resistant tumour of the left side of the lower jaw, which had been growing six months. There was some enlargement also of the right side, and the teeth there were very irregular. The teeth on the left side had been extracted, with the exception of the second molar and a temporary molar. No opening could be detected in the tumour, though there was a constant offensive discharge from its surface. Mr. Fearn removed the left half of the jaw from the symphysis to the articulation, and on division of the bone with the saw, a quantity of fetid pus escaped. The tumour proved to be a bony cyst, formed by the expansion of the two plates of the jaw, which extended for some distance to the right of the symphysis—a very unusual occurrence. The cavity is lined with a thick vascular membrane, and at the bottom the canine tooth will be seen projecting from the wall. The case was evidently, therefore, one of dentigerous cyst, due to the non-development of the canine tooth, the contents of which had, from some cause, become purulent. The mental foramen, with the nerve emerging, is still visible in the preparation. The patient made a good recovery.

A very similar case is recorded by Dr. Forget in his essay on *Les Anomalies Dentaires et leur Influence sur la Production des Maladies des Os Maxillaires*, 1859. Mr. Underwood has allowed me to have the accompanying drawing (Fig. 12) taken from the model of a prepara-

Fig. 12.

Fig. 13.

tion which he possesses, showing very beautifully a cyst of the lower jaw, which was removed by M. Maisonneuve by sawing through the bone at two points. The canine tooth is seen lying horizontally at the bottom of the cyst. The patient, aged 56, had a swelling in the lower jaw near the chin, and an opening formed behind one of his

front teeth, from which a saline fluid escaped. The man made a good recovery from the operation.

Dentigerous cysts, like other cysts, may undergo alteration, not only of the contents, but of the cyst-wall. The opportunities for recognising such changes are exceedingly rare, and the only known specimen of the kind is one in the possession of Mr. Samuel Cartwright, which shows calcification of the cyst-wall. The preparation (Fig. 13) is one of the right superior maxilla, which, having been opened, shows a bony cyst within the antrum and attached to its floor, but unconnected with it elsewhere. The cyst has been opened, and contains a supernumerary tooth loose in its cavity, though no doubt originally attached to its base. This is clearly a case of dentigerous cyst which has undergone calcification, and which, had it been expanded to a greater degree before this change took place, would in all probability have been inseparably united with the walls of the antrum.

The diagnosis of dentigerous cysts from other cysts is exceedingly difficult until they are opened, as, indeed, is the recognition of any form of cyst. A careful examination of the mouth may reveal the absence of a permanent tooth, or, as in one of Mr. Salter's cases, may show a temporary tooth occupying a permanent position, and this would direct the mind of the surgeon to the possible existence of a dentigerous cyst. On the other hand, however, it must be remembered that teeth may be wanting without being connected with any disease; thus I am acquainted with a family who have the hereditary peculiarity of a single bicuspid tooth on each side. When a cyst is sufficiently expanded for the wall to yield under the finger with the characteristic parchment-like crackle, there can be no difficulty in its recognition, but without this it is impossible in all cases to distinguish between a cyst and a slow-growing, solid tumour. Under these circumstances, it is well to insist upon the propriety of making an exploratory puncture in all cases which are not obviously solid growths, and have sprouted so that their nature can be certainly recognised. The puncture being made within the mouth will be of no moment should a more severe operation subsequently be necessary.

The accompanying engraving (Fig. 14) shows a cyst of the lower

Fig. 14.

jaw occurring in a man aged 34, who was under my care in 1878. The swelling began nine years before, and was of the size of an ordinary orange, round, very hard, and fixed to the angle of the lower jaw on the right side. Its edges were well defined, there was no fluctuation nor pulsation, except that of the facial artery, which was stretched over the tumour. Externally the tumour appeared to be solid, but, examined from the mouth, the anterior part of the wall yielded slightly to firm pressure. On puncturing from the mouth through the bony wall, I entered a large empty cavity lined with soft tissue, which on microscopical examination showed portions of hyaline cartilage and cartilage with a faintly fibrous matrix, surrounded by and gradually passing into oval and spindle cells. The bony walls of the cyst were broken down and partially cut away, and this proceeding

was repeated a fortnight later. The tumour gradually diminished as suppuration went on, several pieces of bone being removed, and, six weeks after the cyst had been opened, a tooth was felt fixed at the bottom of the cavity, and on being extracted proved to be a bicuspid with a perfect crown and two small fangs. After this the cavity closed, and the swelling entirely disappeared. The case is remarkable both for the age of the patient and also for the fact that the cyst was empty, the fluid which must have been present at one time having become absorbed. A careful search for a tooth was made at the time of the operation, but one could not be found, and its discovery at a later date was probably due to the destruction by suppuration of the lining membrane of the cyst, which had completely enveloped it.

In the Museum of the Royal College of Surgeons is a preparation (2194) of the right side of the body of the lower jaw, completely and uniformly dilated into a large spherical cyst. No tooth or rudiment of a tooth can be discovered in the cyst, but its inner surface is lined by a layer of small epithelial cells, and is thrown, in places, into thick projecting folds. Mr. Eve considers it probable that the cyst originated in the enamel-organ of an abortive wisdom or supernumerary tooth, and hence would consider it an example of the follicular cyst developed in the embryonic period (Magitôt).

Treatment.—The treatment of dentigerous cysts is the same as for ordinary cysts, namely, a free incision and the subsequent extraction of the contained tooth. For the cure of many of these cases simple puncture will not suffice, and it will be necessary to remove a portion of the front wall of the cyst, and to fill the cavity with lint, so as to induce granulation and gradual obliteration. This may be accomplished in most instances without any incision of the integuments, and in a few more extensive cases by simply dividing the lip, and carrying the incision into the nostril.

During the last few years very considerable light has been thrown upon the clinical history and pathology of certain cystic tumours of the jaws, both by cases occurring in my own practice and by the careful microscopic investigation of these and others by Mr. Frederick Eve, who embodied his results in a lecture given at the College of Surgeons in 1882, and published in the *BRITISH MEDICAL JOURNAL* of January 6th, 1883. Mr. Eve believes that, so far from multilocular cysts having a dental origin, they are produced by an ingrowth of the epithelium of the gum. They have frequently followed some form of injury, irritation by decayed teeth, or long-continued inflammation, which have induced an increased supply of blood to the parts. The multilocular cystic tumours are slow of growth, they have very little tendency to implicate surrounding parts or the neighbouring lymphatic glands, and if completely removed rarely recur and still more rarely become disseminated through the system. Their comparative innocence is probably explained by the bony capsule forming their boundary, by their low degree of vascularity, and by the remarkable tendency of the epithelial cells composing them to undergo degenerative changes.

Multilocular cysts are more often found in the lower than in the upper jaw, and in most cases in direct connection with teeth or stumps. In the *Guy's Hospital Reports* for 1847 is the notice of a case of the kind by Dr. Wilks, in a girl, aged 18, in whom there had been an enlargement of the right side of the lower jaw for twelve years. The tumour, on removal, proved to be a cystic growth: "there being four or five large cells between the internal and external plates of bone, which appeared like expanded alveoli, all of them containing fangs of teeth. The cells contained a glairy fluid." Very considerable alteration in the form of the maxilla may be produced by growths of this kind, of which a good example is seen in the drawing (Fig. 15) from a macerated specimen in St. Bartholomew's Museum (I. 308). Here the bone is irregularly expanded in great part to form septa between cysts. These, which were independent of one another, had their origin in the interior of the bone, were lined by a highly vascular membrane, and contained thin serous, or grumous, blood-tinged fluid. The walls of some of the cysts were thin and yielding, but others were thick and resisting, and this was particularly the case with the most posterior cyst on the left side, which had pressed upon and caused absorption of the left ramus and coronoid process. The preparation was taken after death from an old man, aged 75, who had noticed the enlargement for five years when he came under Mr. Coote's care in St. Bartholomew's Hospital in 1857.

The microscopic character of the solid material found more or less in all cases of multilocular cyst is well given in the following report by Mr. Eve upon a very well-marked recent specimen of the disease, contributed to the St. Bartholomew's Hospital Museum (I. 536) by Mr. Keetley. "The solid portion of the tumour was composed of columns of cells and nuclei of the epithelial type, which, when cut transversely, presented the appearance of alveoli; similar small columns branched

out from the side of the larger. The cells in the centre of the columns had in many places undergone a colloid change, and by the complete metamorphosis of the cells the cysts were formed. From the buccal mucous membrane covering the tumour in certain parts club-shaped and branching cylinders extended down from the deep stratum of the epithelium, as in the ordinary formation of epithelial cancer." Mr. Eve has found precisely the same characters in twelve specimens of multilocular cystic tumours he has examined, one of the most marked being a tumour of the upper jaw removed by Mr. Liston in 1836, and referred to in his paper in the *Medico-Chirurgical Transactions*, vol. xx, the tumour being now in the College of Surgeons' Museum (2202).

Fig. 15.

To show the identity of the foregoing with the tumours hitherto classed as "cystic sarcomata," I may quote the description of the microscopic appearances of a tumour of the latter kind removed by myself, in 1871, from a patient aged 22, whose portrait before the operation is given in Fig. 16. "The tumour was composed microscopically of straight or tortuous columns of epithelial cells, those forming the margin being elongated or cylindrical, and radiating towards the centre. At the margin of the small ulcerated opening in the gum, papillary processes extended downwards from the deep stratum of the epithelium, and were continuous with the columns forming the tumour" (College of Surgeons' Museum, 2203). The half of this tumour, deposited in the Museum of University College, is described in the valuable catalogue by Mr. Marcus Beck as a "gland-like tumour of bone," and its structure is identical with that of a tumour described by Mr. Wagstaffe in the *Pathological Society's Transactions*, vol. xxii. Mr. Wagstaffe found that the growth was composed of innumerable cysts and a solid matrix, through which a certain amount of bone was scattered; that the cysts were lined by a layer of large globular epithelium; that into the interior of the larger cysts other smaller cysts projected, and these endogenous cysts took their origin in the epithelial lining, and not in the matrix of the growth. Other cysts were also freely scattered throughout the structure, but the endogenous formations were so marked that they could be discovered as little balls by the naked eye, and removed for examination by the point of a needle. The solid structure consisted of a very peculiar arrangement of what appeared to be acini or cylinders of closely-packed cells, supported by a fibro-nucleated matrix. These acini, or rods, in many places gave the appearance of tubes; from the arrangement of their component cells, which resembled very curiously that of columnar epithelium, or of the epithelium of gland-follicles. The cut ends, however, showed no central canal. The constituents of these rods were nuclei embedded in plastic matter, and these separated by manipulation into small tailed or so-called spindle cells of similar size and character to the corpuscles of an ordinary sarcoma.

The contents of these cysts vary in consistency and colour, in some cases being clear and limpid, in others almost gelatinous and of a dark colour.

My attention was first directed to the fact that multilocular cystic

disease is not always a simple local ailment by the case of a patient who was able to give me a "thirty-five years' history of a maxillary tumour," which I communicated in 1880 to the Association of Surgeons Practising Dental Surgery (*BRITISH MEDICAL JOURNAL*, May 22nd, 1880). The patient, when he first came under my notice in 1877,

Fig. 16.

was a healthy country gentleman, who said that as long as he could remember there had been some enlargement of the right side of the lower jaw. In 1845 this enlargement increased very rapidly, and in 1847 Sir W. Fergusson removed a tumour of the right side, sawing through the ramus horizontally and the body of the jaw close to the canine tooth. The tumour was apparently of a fibroid character, having a large cyst developed in it, and is now in the Museum of King's College. He continued in good health for fifteen years, and then noticed the formation of a cyst in the incisor region, which had frequently been tapped by Sir W. Fergusson. In July, 1877, I found cystic disease of the left side of the body of the jaw extending to the molar region, and operated by extracting all the teeth, opening up the cysts freely, and clearing out some solid growth with the gouge. From this the patient made a good recovery, with considerable consolidation of the bone; but in the November following one cyst was found to have developed anew in the incisor region, and this was treated in a similar manner. A year later a fresh development of cyst had taken place, and the operation was repeated with a good result, so that in February, 1879, the jaw was completely consolidated, and the patient was advised to have some artificial teeth fitted. In November, 1879, the patient reappeared with a large solid tumour involving the left side of the body of the jaw, which, noticed first in June, had grown rapidly of late, and now involved the skin for an area of a square inch. On December 2nd I removed the tumour by sawing through the bone immediately in front of the left masseter, and also removed a piece of infiltrated skin from the left of the median line. The wound was brought together with harelip-pins and sutures, and only one artery (facial) was ligatured. The patient made a good recovery, took food with a spoon, and was able to talk intelligibly after the first week, although deprived now of the entire body of the jaw. The lower end of the wound being left open afforded a thorough drain for discharge. The patient returned early in February, when the skin near the wound was found to be increasingly infiltrated, and a tumour of the size of an orange was found beneath the right deltoid. He had strained the right arm in getting into a hip-bath, but was quite clear that the humerus had not been struck. The tumour was painful, but the bone was sound, the head moving with the shaft. A week later the patient was found to have a tumour in the pelvis, pressing upon the rectum, and springing from the interior of the right innominate bone. From this time he gradually lost strength, and died at the end of March. The second tumour was pronounced by Mr. Doran to be a round-celled sarcoma, and the same growth was found in the piece of skin that was removed. The earlier tumour

appeared to be a fibroid or a spindle-celled sarcoma. No *post-mortem* examination of the internal growths could be obtained.

The specimen is preserved in the Museum of the College of Surgeons (2204), and Mr. Eve's further examination confirms the fact that the bulk of the tumour is round-celled sarcoma, but in addition the upper portion of tumour contains isolated masses composed of tortuous closely-crowded columns of small epithelial cells.

The second case bearing upon the same question was in a woman aged 44, who was admitted into University College Hospital, on November 3rd, 1875, with the following history. About nine years before, the patient first noticed a lump of the size of a pea beneath the tongue, on the right side, which gave her some pain, and for which a tooth was extracted. From that time she had a succession of abscesses (?) in the lower jaw, some of which discharged in the mouth, and one externally, and for which she had had several teeth extracted. Dr. Parsons, of Dover, had sent her to me three years before, and I then recommended her to come into the hospital; but she declined, and went on with a steadily increasing tumour of the lower jaw on the right side. About nine months before admission the tumour seems to have begun to increase with some rapidity, and within the last two months the following characteristic event happened. While eating, the patient felt a sudden crack in the lower jaw, and this occurred twice in the same week; and upon each occasion she felt great pain in the floor of the mouth and upon moving the tongue. Upon admission there was really very little to be seen externally, and a photograph taken at the time shows that, excepting a very small projection beneath the skin in front of the angle of the jaw, there was nothing to call attention to the patient's face. On looking into the mouth, however, the tumour was at once obvious, and is seen in a cast taken from the jaw at that time (Fig. 17). The right side of the

Fig. 17.

lower jaw is seen to be greatly expanded from immediately in front of the ramus to beyond the median line, the tumour measuring two inches across at the broadest part, and reaching under the tongue. Its surface was lobulated and rounded, firm and osseous in the greater part, but yielding distinctly on pressure in two or three places. The mucous membrane was entire over the tumour, except at one point where there was an opening, from which a discharge constantly exuded. The incisor teeth of the right side were displaced over to the opposite side, and were loose. The central incisor of the left side was displaced completely in front of the other teeth. The left canine and bicuspsids were firmly fixed. Notwithstanding the size of the tumour, the outline of the lower border of the jaw was scarcely interfered with, the disease being mainly confined to the alveolar portion of the bone; and I, therefore, decided to operate from within the mouth, so as to avoid, if possible, all external scar.

On November 10th the patient was put under chloroform, and, a gag having been introduced on the left side, I first extracted the four incisors, and then made a free incision with a stout scalpel along the upper surface of the tumour, cutting easily through the thin bone and thick membrane forming its upper wall. A quantity of dark-coloured cystic fluid at once escaped, and I then cleared out the semi-solid contents with the finger and gouge. The finger introduced into

the cavity passed completely under the canine and bicuspid teeth of the opposite side without disturbing them. I next cut away a portion of the cyst-wall with scissors, and crushed together the remainder, as far as I could, with my fingers and thumb. The actual cautery was applied to one spouting vessel in the margin of the alveolus, and the cavity was stuffed with lint dipped in a solution of chloride of zinc (twenty grains to the ounce).

The patient had very little constitutional disturbance; the plugs were gradually removed from the cavity of the jaw, which was carefully syringed out frequently with Condy's fluid, and soon began to granulate and fill up. The patient was discharged a month after the operation, when the two plates of the lower jaw had come together, and the cavity was filled up almost completely by granulation-tissue, there being only a shallow cavity half an inch long still to be filled up midway between the angle and the symphysis.

This patient again presented herself in October, 1878, nearly three years after the first operation, with a recurrence of the cysts, which were treated again by gouging and crushing in. In August, 1882, she again appeared with a formidable tumour of the lower jaw, which had already sprouted through the chin at more than one point (Fig. 18).

Fig. 18.

There could be no question now of the necessity for excising the portion of jaw involved, and this I accordingly did, removing from an inch in front of the angle on the left side to the right temporomaxillary articulation. The patient made a good recovery, and has remained well.

There can, then, I think, be no doubt that under the term "multilocular cystic epithelial tumour," as proposed by Mr. Eve, we may include the old multilocular cysts and cystic sarcomata, both having a distinct tendency to be reproduced both locally and, in certain cases, to become disseminated.

Treatment.—Mr. Butcher, of Dublin, has for some years treated cases of multilocular cyst of the lower jaw through the mouth, by dividing the mucous membrane over the cyst freely, and then with gouge and bone-forceps removing the expanded external plate of the bone, with the contents and lining membrane of the cyst. In this operation, the teeth are interfered with as little as possible, and appear to remain firm. Granulations rapidly spring up from the denuded bone, and fill the wound made in the mouth; the cheek resumes its ordinary appearance, and no deformity or scar is left. In his work on *Operative and Conservative Surgery*, Mr. Butcher narrates three cases treated in this manner, and remarks that "the proceeding according to this plan is troublesome and difficult, but its value to the patient in having no deformity left is priceless." A valuable caution is here given respecting the facial artery, which might, without care, be divided from within the mouth in a position where it would be very difficult to secure it. Mr. Butcher also narrates and gives a drawing of a case in which, finding the disease too extensive to be treated from the mouth, he adopted Dupuytren's external incision, and then levelled the projection to the line of the healthy bone with the best results, the incision being completely hidden behind the bone.

Dr. Mason Warren has also (*Boston Medical and Surgical Journal*, 1866) written upon the treatment of cysts of the jaws, and strongly recommends a milder and even more conservative practice than that followed by Mr. Butcher, which he thus summarises: "The treatment consisted in the puncture of the sac within the mouth, evacuating its contents, and at the same time obliterating its cavity by crushing in its walls; and lastly, in keeping up, by injections, etc., a sufficient degree of irritation to favour the deposition of new bone."

I have now treated a considerable number of simple and multilocular cysts by Mr. Butcher's method, and, as has been noted, with recurrence in at least two of the latter. Mr. Butcher does not appear to have met with further trouble in his cases, and this may depend upon his "carrying out the gouging fearlessly and far wide of the disease." I should in future be guided by the age of the patient and the amount of solid material found in the cysts. In young persons with cysts having fluid contents and little growth in the bone, I should be still inclined to adopt palliative measures and to gouge very freely, carefully watching the case with a view to a more radical proceeding, should further development take place. In cases of much solid deposit in connection with multilocular cysts, and still more in cases of solid tumour with one or more large cysts, there should, I think, be no doubt as to the removal of one-half or more of the lower jaw, or of any portion of the upper jaw involved.

CLINICAL LECTURE ON HEMIPLEGIA IN CHILDREN.

Delivered at the Hospital for Sick Children, Great Ormond Street, June 1st, 1897.

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FORMERLY all forms of paralysis in children were grouped under the head of infantile or essential paralysis, and were believed to be of the same nature. Dr. Goodhart and Professor Henoch, of modern writers, are those who have most clearly recognised that a very considerable number of cases of paralysis in children own a cerebral cause; the latter writer (*Diseases of Children*, American translation, p. 100), indeed, goes so far as to say that this paralysis is much more frequently due to cerebral than to spinal disease. I suspect that this statement is nearer the truth than many might be disposed at first to believe. The causes of hemiplegia in the adult are hæmorrhage, arterial obstruction, whether from embolism or thrombosis, and tumour, and all these causes may be found in operation in childhood. Cerebral hæmorrhage in infants must be exceedingly rare, and is very uncommon in children; almost the only known causes are purpura hæmorrhagica, the hæmorrhagic diathesis, or aneurysm of one of the cerebral arteries as a result of pre-existing heart-disease, and in a very few instances a highly vascular sarcoma has given rise to a large extravasation of blood into the brain. It is conceivable, too, that massive hæmorrhage might take place in whooping-cough, but I do not know of any instance of its occurrence. Meningeal and capillary or punctiform hæmorrhages will require separate consideration.

In regard to arterial obstruction, inasmuch as heart-disease is common in early life, it is not surprising that embolism of one of the cerebral arteries should occasionally be met with; indeed, as Dr. Goodhart (*Diseases of Children*, 2nd edition, p. 471) remarks, it is a little strange that embolism from heart-disease is not more common. It is unnecessary to say more about this variety, as it presents no distinctive characters apart from those seen in adults. Thrombosis of an artery must be the result of previous disease of the vessel, and, just as in adults, syphilis probably causes hemiplegia in this way; the point will be referred to again.

Tumours are not uncommon in children, and there is no reason why they should not occur sometimes in the motor area of the cortex, or somewhere in the motor path between this and the base; they are more commonly found, however, in the pons or crus. The same symptoms are produced in the child as in the adult, and no further reference need be made to them.

It is just worth mentioning here, as the point will not be again referred to, that cases of tubercular meningitis are not infrequently first betrayed by one-sided paralysis.

We have now run through the ordinary causes of hemiplegia in the adult, but I have only accounted for a very few of the cases, some fifty in number, of which I have notes. The remaining cases may be conveniently divided into two groups, those which succeeded one of the acute infectious diseases, and a much larger group where no such cause could be assigned.

Measles, scarlet fever, whooping-cough, and diphtheria may all be followed by hemiplegia. Four times I have known it succeed measles; in three cases the children were under 3 years of age; in the fourth the child was 5; the onset took place on the ninth day in one of the cases, in the others at about the end of a fortnight; but inasmuch as the patients often do not come under observation until some years after the onset, we must not expect too great accuracy as to dates. I have only seen one case of scarlet fever origin, and although there was no evidence of heart-disease then, one would have to bear in mind the fact that endocarditis is not uncommon during and after scarlet fever, and that it would afford a ready explanation of the paralysis, by affording facilities for the formation of an embolus. Of whooping-cough as a cause, I have also notes of only one case: a little boy just over 2 years old, was brought with well-marked hemiplegia, dating from an attack of convulsions of thirty-six hours' duration during whooping-cough about a year previously.

Diphtheria, if I may judge by my own observation alone, is a more common cause than any of the preceding, but it is often very difficult to get the necessary amount of evidence respecting the primary ailment. Thus, in one case, a little girl had been under my care for some months with hemiplegia, and all I could learn from the mother was that it had been preceded by "low fever," when one day the mother brought me another child, and told me he had never been well since he had the diphtheria, just before the child whom I was treating had been taken with her so-called "low fever." The following case is worth quoting in some detail, as I had the opportunity of watching the whole course of the affection to a fatal issue, and of making a *post-mortem* examination. G. W. (*Medical Times and Gazette*, September 23rd, 1882), aged 6, was under treatment for diphtheria, when on the fifteenth day from the onset, in the afternoon, he was seized with a convulsion which was general, and after it his mouth was drawn to the right, and he complained of right frontal headache. On the following morning he was again convulsed for twenty minutes, but on the right side only; when I saw him a few minutes afterwards there was complete left hemiplegia. He died eleven days later, no change in the paralysis having taken place. The right middle cerebral artery was found plugged by an adherent thrombus. Infarctions were found in the spleen and kidneys. There was no heart-disease, and no source for an embolus was discovered.

Of the remaining cases there was evidence of congenital syphilis in four, and there was good reason to attribute the paralysis to this cause. In three the paralysis dated from quite early infancy, having as usual been ushered in by fits. In the fourth case I made a *post-mortem* examination, and may give you the facts briefly. T. H. (*St. Bartholomew's Hospital Reports*, xvi, p. 35) came under observation at the age of 10 years 9 months. There was conclusive evidence of syphilis. At the age of 6, whilst walking in some fields, she had suddenly fallen down, and was then found to be paralysed on the right side, and that side had been weak ever since. On *post-mortem* examination a small old adherent thrombus was found in the middle of the longitudinal sinus. There was atrophy of the left hemisphere, the cortex and central parts both sharing in the atrophy; the meninges were thickened and adherent, especially over the left side and the convolutions (chiefly the ascending frontal and frontal convolutions) were sclerosed. The middle cerebral arteries were diseased.

Syphilis may have had a share in some of the other cases also, as two of the children in whom the paralysis followed measles were certainly syphilitic, and consequently may have had disease of their vessels, whilst it was a possible factor in other cases to which I shall shortly allude.

The remaining cases would seem to fall into three groups, namely, the traumatic, the congenital, and those which are neither traumatic nor congenital, and yet own none of the causes which we have been discussing. I have only seen one case where the paralysis could with reasonable probability be set down to a traumatic cause, though in some cases there can be no doubt that injury done during labour, especially when forceps have been used, has been the cause. In the case I refer to, a child at the age of 9 months, fell on to his head, causing a bruise over the right parietal bone; he was very ill for the next six months, and four months after the accident it was noticed that the left side was paralysed; when I saw him two years later there was marked left hemiplegia with rigidity.

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