The cases quoted demonstrate that disturbance of the voice due to pressure upon the laryngeal nerves is apt to be mistaken for a primary laryngeal affection. This is an accident which occurs in practice more frequently than is generally believed; it cannot, therefore, be too strongly urged that in all cases where the voice is altered and imperfect without structural disease in the larynx, but especially when the dysphonia is associated with imperfect cough and dyspnoea, aneurysm should be suspected. The absence of other symptoms and of the physical signs of aneurysm is not sufficient to justify one in abandoning the suspicion that the laryngeal disturbance is the result of pressure upon the laryngeal nerves, for it is an acknowledged fact that very small aneurysms may give rise to symptoms of laryngeal obstruction. The laryngoscopist may be led astray by relying upon the absence of symptoms, and be induced to pronounce the paralysis neurotic in its origin. When the laryngoscope reveals, or the symptoms indicate, the characteristic lesion of paralysis, due to pressure on the vagus or recurrent laryngeal nerves, in absence of the phenomena usually associated with aneurysm, the case should be treated as one of aneurysm, and kept under close observation until the diagnosis is complete.

Paroxysmal or constant dyspnoea, attended by other laryngeal symptoms, but without structural disease of the larynx, cardiac or pulmonary lesions, to account for the symptom, should always lead one to suspect the presence of aneurysm, involving either the innominate artery or the posterior and inferior aspect of the arch. When the spasm or paralysis of the vocal cord is limited to one side, the probability is that the recurrent laryngeal on that side is alone compressed, and in neither of these instances is dyspnoea a dangerous symptom, although, in the former, it may be a prominent one. If spasm be present, the pressure is probably slight and of short duration; if paralysis, the pressure is either great or prolonged. When the paralysis or spasm is bilateral, one of two conditions may exist: (1) pressure upon both recurrent laryngeal nerves, or (2) pressure upon the trunk of one vagus. In both of these cases, but especially in the latter, dangerous dyspnoea is to be looked for.

As regards treatment, it will be acceded by all that early diagnosis and successful treatment go hand in hand. Therefore any, even the smallest, indication which will lead to the suspicion of an aneurysm, and thereby cause a critical examination to be made of the facts of the case, must be a great assistance to the practical physician. Cases III and IV exemplify this.

Spasm or paralysis involving only one side of the larynx very rarely causes serious difficulty in breathing in adults, but by direct pressure the original disease may diminish the lumen of the larger air-passages, and give rise to tracheal dyspnoea. It is bilateral paralysis of the abductors, or spasm of the adductors, that causes serious impairment to respiration, for which surgical interference may be required.

There is only one point in the treatment to which I shall allude. It is with reference to the question of tracheotomy in cases of aortic or innominate aneurysm. It is impossible to deny that the paroxysms of dyspnoea not only act very deleteriously upon the aneurysm by causing increased strain upon the walls of the sac, but are also an immediate danger to life. Therefore placing a tube in the trachea will perform a double service—it will permit of rest, and relieve the patient of the danger of death from asphyxia or rupture of the aneurysm during a paroxysm. It may be said that such a proceeding can only give temporary relief; but when the dyspnoea is a consequence of laryngeal obstruction, and not a result of direct pressure of the aneurysm upon the trachea or the lungs, under these circumstances it would be very difficult to draw a limit to the advantages which might accrue from enabling the patient to breathe freely.

If, on examination, the lungs are found to admit air abundantly, and to be free from physical signs of disease, the sooner tracheotomy is performed the better, should the laryngeal obstruction become threatening. The question may be asked—What is the benefit of performing tracheotomy on a patient suffering from thoracic aneurysm, a disease in which the tenure of life is very precarious? In reply, I may say that, as a clinical observer, and as pathologist to the Glasgow Royal Infirmary, experience has taught me that in a large number of cases of aneurysm death from hæmoptysis is preceded by threatenings of laryngeal suffocation; and in many cases I have been convinced that the rupture of the sac has been directly caused by the spasmodic attacks of dyspnoea. It is not only when the patient is suffering from suffocating agony, and all the circumstances indicate that no time is to be lost, that tracheotomy should be performed. The operation, which, in itself, is not attended with danger, should be resorted to whenever it is evident that the patient's life may be placed in jeopardy by laryngeal dyspnoea, or when the laryngeal impediment to respiration

is clearly causing enlargement of the sac by undue strain upon the circulation.

The tracheotomy tube should have an opening on its convex aspect, and be provided with a valve so as to enable the patient to breathe by the mouth and speak with occluding the tube with his finger. Such a tube may be worn without danger, or even much inconvenience. Intubation of the larynx is not applicable in such cases, but should be reserved for cases of laryngeal stenosis arising in the course of acute disease, and the removal of the paralysed cord, as proposed by Dr. G. B. Hope in cases of paralysis of the abductor muscles, is only mentioned, not recommended.

LECTURES

ON

CERTAIN DISEASES OF THE JAWS.

Delivered at the Royal College of Surgeons of England, June, 1887.

By CHRISTOPHER HEATH, F.R.C.S.,
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LECTURE II.—TUMOURS OF THE JAWS.

(Concluded from Vol. i, page 1579.)

Osteoma.—The simplest form of osseous tumour of the upper jaw is an hypertrophy of the whole or of some portion of the bone. In October, 1883, I had under my care in University College Hospital a young woman, aged 25, in whom a painless enlargement of the right upper jaw had been noticed for ten years, encroaching upon the palate and bulging out the cheek. I successfully removed the whole upper jaw, and on section the tumour was found to be simple bone, very dense, but otherwise healthy. One half of the specimen is in University College, and the other in the College of Surgeons' Museum (2211 A).

Besides this form of bony tumour, due apparently to an increase of the cancellous structure of the bone, specimens of tumour as hard as ivory have from time to time been met with. Perhaps the most remarkable of these is one described by Mr. Hilton in the *Guy's Hospital Reports*, vol. i, p. 493, from the fact that the tumour separated spontaneously from the face. The patient was a man, aged 36, who, twenty-three years before Mr. Hilton saw him, noticed a pimple below the left eye, close to the nose, which he irritated, and from that spot the tumour appears to have originated. The tumour, in its growth, displaced the eyeball, giving rise to excruciating pain, which subsided

Fig. 13.

on the bursting of the ball. It began to loosen by a process of ulceration around its margin six years before it fell out, which event was unattended by either bleeding or pain; the tumour weighed 14½ ounces. It was tuberculated externally, and an irregular cavity existed at the posterior part. A section presented a very hard polished surface resembling ivory, and exhibited lines in concentric curves, enlarging as they were traced from the posterior part. The huge cavity left by the tumour was bounded below by the floor of

the nose and antrum, above by the frontal and ethmoid bones, internally by the septum nasi, and externally by the orbit, which had been considerably encroached upon by the tumour. This patient was alive in 1865, thirty years after the prolapse of the tumour.

A case, in many respects resembling Mr. Hilton's case, was under the care of Sir William Fergusson, whom I had the opportunity of seeing operate upon it. The patient was a young man, aged 21, who had first noticed the swelling on the left side of the face twelve years before. It grew for six or seven years, and then remained stationary. Two years before he had consulted a quack, who attempted to destroy the growth with caustic, and produced the large hole, seen in the lower part of the tumour (Fig. 13).

On admission into King's College Hospital there was a swelling on the left side of the face about the size of an apple, extending from the eyebrow to a line less than one inch above the mouth. Internally it encroached upon the nose, displacing it a little, the nasal bone being pushed forwards and the left ala flattened on the columna; the mass was felt by the finger in the mouth above the gums. The nostril on the same side was perfectly blocked up, the patient being totally unable to breathe through it; the right nostril, however, was quite free. Outwards, the tumour extended to the angle of the orbit; the arch was, however, not displaced, but the tumour extended slightly above it. The floor of the orbit seemed displaced. The eyeball was seen imbedded in the most prominent and central part of the tumour, and removed more than an inch from its natural position in the orbit, which was entirely blocked up by the mass. There was no extension into the pharynx. The tumour was everywhere hard, with a slight blush over the surface. In its centre was a round opening, produced by the caustic applied two years previously, of about the size of a shilling, deep, and displaying in its floor black necrosed bone, and discharging pus. The patient said he had suffered neither headache nor pain in the tumour since its commencement twelve years before, and that his sight had been unaffected. Sir William Fergusson operated upon this patient on November 30th, 1867, and succeeded in removing the whole of the prominent tumour, weighing 10½ ounces, which consisted, in all its anterior part, of nodulated bone as hard as ivory, and posteriorly, of very dense ordinary bone mixed with a small amount of cartilage. A section showed an ivory-like mass closely resembling Mr. Hilton's specimen, connected with a mass of very much condensed bone. The tumour sprang apparently, as in the former case, from the upper part of the maxilla, and had invaded the antrum, orbit, and nostril. The palate was in no way involved in the growth, and was preserved entire at the operation, Sir William Fergusson sawing horizontally immediately above it. Unfortunately the patient sank rather suddenly from inflammation of the lungs on the fourth day.

At the *post-mortem* examination, after removal of the brain, it was found that the affection of the bone involved the base of the skull, there being a projection of the size of a hazel nut from the sphenoid near the optic foramen. This involved the foramen and extended along the sphenoidal fissure, the optic, third, and fourth nerves passing through the condensed bone of which it was composed. The brain was unaffected (*vide Lancet*, February 8th, 1868).

This specimen was exhibited to the Pathological Society of London, and was reported upon by a committee. The report of this committee, drawn up by Mr. Hulke, which will be found *in extenso* in vol. xix of the *Pathological Transactions*, expresses an opinion that "the hard part of the tumour has been directly formed by the exogenous growth of successive layers of dense bony tissue under the periosteum, which opinion is confirmed by the absence from the hard tissue of the regular Haversian systems so characteristic of secondary bone."

In both these cases the tumour appears to have taken its origin in the upper wall of the antrum, and to have grown forwards; but tumours of the same kind have been found completely within the superior maxilla, the anterior wall of which has been merely expanded by the growth behind it. Of this, two cases reported within the last few years by M. Michon and Dr. Duka are good examples.

Dr. Duka's case is reported in the *Pathological Society's Transactions*, vol. xvii, and occurred in a female native of Bengal, aged 26, and on the right side of the face, which was not much deformed. There was a discharge from the right nostril, which was obstructed, and, on examination, a hard tumour was found within it, which was movable, but could not be extracted, and which had existed six years.

Dr. Duka, failing to extract the tumour by laying open the nostril, resorted to the somewhat unusual proceeding of cutting a wedge out of the hard palate, and thus, after an operation of three-quarters of an hour, without chloroform, succeeded in removing the growth. The patient recovered. The tumour (3497) is preserved in St. George's Hospital Museum. It has an oblong shape, and is not unlike a

middle-sized potato, with depressions and elevations passing irregularly over it. The whole bony mass, which is of a compact ivory-like character, weighs 1,060 grains; its long diameter is nearly three inches, the short one an inch and two lines, and the longest circumference seven inches. The microscope gives evidence of structure closely resembling that of M. Michon's tumour. There are no distinct Haversian systems, but abundance of lacunæ arranged around vascular canals. In some parts of the tumour the characters are very much those of simple ossified cartilage, clusters of large ossified cells being packed closely together. This case is remarkable from the fact that the attachment of the tumour had given way, and that it was therefore loose in the antrum.

Osteoma affects the lower jaw in two forms: the cancellated and the ivory exostosis. The former is, no doubt, in many cases the result of ossification of enchondroma, as, for instance, a specimen (C, 203) preserved in St. Thomas's Museum, which is of a spongy texture, and which is stated by Sir Astley Cooper to have been removed by Mr. Cline. Occasionally, however, a conversion of the whole thickness of bone into a lobulated mass of spongy bone is met with, of which an excellent example is preserved in St. George's Hospital Museum (II, 185). In this case the tumour, which was of the size of the fist, had been growing for five years, and had been on one occasion partially removed. Mr. Tatum successfully removed the entire portion of jaw affected. A case in which a circumscribed bony tumour, measuring from two-thirds to three-fourths of an inch in diameter, and composed of hard, finely-cancellous bone, was lodged in the interior of the angle of the jaw, is given by Sir J. Paget in the *Medico-Chirurgical Transactions*, vol. liv.

Ivory exostosis appears to affect by preference the angle of the jaw. Of this a good specimen is preserved in St. George's Hospital (II, 191); and O. Weber figures a section of a large ivory exostosis in the same region removed by Chelius. The best example of the kind, however, is in the College of Surgeons (2212), having been presented by Mr. J. F. South. The preparation (*post-mortem*) shows part of the right side of the lower jaw, with sections of a large bony tumour at its angle. The angle of the jaw rests in a deep groove on the middle of the upper surface of the tumour, and in some situations their respective substances are continuous. The tumour projects both below and on each side of the jaw, is of irregular shape, measures nearly three inches in its chief diameter, and is deeply nodulated. It is composed throughout of bone, uniform in texture, and as hard and heavy as ivory.

In the Museum of St. Bartholomew's Hospital is the lower jaw of a young person (I, 3257), with two symmetrical eburnated exostoses springing from the inner surface of the alveolar portion of the bone on either side of the symphysis, corresponding in position to the bicuspid and first molar teeth. The markings and slight lobulations of the bony outgrowths are more or less symmetrical. The rami of the jaw are unusually widely separated.

In May, 1870, I removed an ivory exostosis from a young woman, aged 32, a patient of Mr. Ceely, of Aylesbury. There had been a painless enlargement of the left side of the lower jaw for five years, and there was also a smaller enlargement of the right side. A small exostosis also existed on the left pubes. I made an incision behind the jaw and sawed off the growth level to the bone, removing a dense ivory growth measuring two inches in length by one inch in width, and three-eighths of an inch thick in the centre (University College Museum, 635). The exterior of the growth presented a finely reticulated appearance, and at the upper part was a small depression filled with cartilage in the recent state. Two years after the operation, I was informed by Mr. Ceely that there had been no reappearance of the growth, and that the other exostosis remained *in statu quo*, and four years later I saw the patient, who continued quite well.

When the exostosis forms a distinct and circumscribed growth, whether it be of the cancellous or ivory character, it should be sawn off the bone at the level of the healthy surface, and will in all probability not recur. When, however, the whole thickness of the bone is involved, as in Mr. Tatum's or Mr. South's case, it will be necessary to remove a portion of the bone. Should the tumour be imbedded between the plates of the jaw, it should be enucleated, if possible, without any external incision, as in Sir J. Paget's case already mentioned.

Sarcomatous Tumours.—Under the term sarcoma, modern pathologists include all tumours composed of tissue, which is either purely embryonic, or is undergoing one of the primary modifications seen in the development of adult connective tissue (Erichsen).

In connection with the jaws, various forms of sarcoma are found, many of which have hitherto been known by other names, and many recurrent growths formerly called cancers come properly into this class.

The spindle-celled sarcoma is of frequent occurrence in the upper jaw, forming many of the specimens formerly indiscriminately named "osteosarcoma." It is usually of a yellowish colour than the fibrous tumour, and of softer consistence, and on section it exudes a serous fluid. The spindle-shaped cells are often of great length and size, and each cell contains one or more oval nuclei, the intercellular substance being homogeneous.

Under the name of "albuminous sarcoma," Mr. Liston has described a case which appears to be of this kind, in the *Lancet*, November 26th, 1886, which proved fatal after removal of the tumour. The patient was 24 years of age, and the disease appeared to have originated in a blow, and grew with tolerable rapidity. The tumour, which is preserved in the College of Surgeons' Museum (2202), is oval in form, its chief diameters being about three inches by two inches, and contained spaces in which was a glairy fluid, coagulable by heat.

Spindle-celled Sarcoma frequently attacks the lower jaw, and may prove fatal, by obstruction either to respiration or deglutition, if allowed to grow unchecked for many years. Some of the earliest removals of portions of the lower jaw were for growths of this description which had attained a large size, and the names of Crampton, Cusack, and Syme are connected with these operations. The Museum of the College of Surgeons of Ireland is especially rich in tumours of this class, and possesses also a cast of the head of a patient who died with a large tumour of the lower jaw, which has been injected and divided.

The spindle-celled sarcoma will, if its surface be irritated by caustics, etc., throw out fungous masses, which bleed, and may be mistaken for malignant fungus. Mr. Cusack (*loc. cit.*) gives an example of this result occurring from sloughing of the skin of the face, due to over-distension by the tumour, and I had under my care some years back an extraordinary instance of the kind, where quack applications had produced similar results. Occasional hæmorrhage from such surfaces led to these cases being massed together with cancer as examples of *fungus hæmatodes*, and doubtless Sir William Fergusson's observation is correct, that the rarity of fungus hæmatodes in the present day, is due to the early treatment to which cases of this kind are submitted.

The portrait of the patient formerly under my own care, to whom I have alluded, is shown in Fig. 14, taken from a photograph. The enormous size of the tumour can be best appreciated by the figure, the measurements being as follows: from the lobule of one ear round the chin to the lobule of the other was 19½ inches; from the edge of the lower lip over the chin to the *pomum Adami*, 13 inches; and the width of the face was 14 inches. The circumference of the lips was 9½ inches. The patient was only 32, and the disease appeared to have commenced eleven years before in a

Fig. 14.

swelling below the right canine tooth, but the whole of the large growth had taken place within four or five years. The fungous pro-

trusions were, as has been mentioned, the result of the application of quack remedies. The patient, when he came under my notice, was in a miserable condition, being nearly starved, owing to the tumour forming a projecting mass within the mouth, which completely concealed the tongue, and was nearly in contact with the palate. I succeeded in removing the tumour by sawing in front of the left angle and disarticulating on the right side, with very little loss of blood; but the patient died exhausted on the sixth day. The tumour weighed 4 lb. 6 oz., and is now in the Museum of the College of Surgeons (2234). A section has been made to show its structure, which is precisely that described by Sir P. Crampton, the mass being made up of fibro-cellular tissue of different degrees of density, with here and there small nodules of bone, and a few small cysts interspersed through its structure. The tumour evidently commenced in the interior of the jaw, the outer plate being considerably expanded and destroyed in parts, while the inner remains perfect, and can be seen in the condition in which it was left at the operation. The mass, in growing, has carried up the teeth with it; and they project from it at irregular intervals, a considerable portion of the growth, and probably the most recently formed part, being posterior to them, occupying as it did the mouth, and lying among the muscles beneath the tongue. The fungoid masses are covered with granulations, but otherwise differ in no way from the rest of the growth.

Mr. Eve has recently re-examined this tumour, and has found scattered throughout it masses and cylinders of epithelial cells, resembling the epithelial elements of the cystic tumours of the lower jaw described in my first lecture. They were composed of large irregularly shaped or branched masses, and of small columns composed of round epithelial cells, with a layer of peripheral elongated cells. (For drawing, see lecture by Mr. Eve, *BRITISH MEDICAL JOURNAL*, Jan. 6, 1883.)

Under the head of Spindle-celled Sarcoma must be included the cases which have hitherto been classed as "recurrent fibroid," of which Mr. Lawson's is a good example. The preparation is in the College Museum (2230 A.)

Myeloid Sarcoma is found in the upper as well as in the lower jaw, in which latter position the specimen first described by Sir J. Paget arose. The occurrence of myeloid cells in specimens of epulis has been already referred to, and it might naturally be expected, therefore, that the same characters might be discovered in tumours of the jaw. In fact, Dr. Eugène Nélaton, in a valuable treatise published in 1860, *Des Tumeurs à Myélopaxes*, says "le siège d'élection des tumeurs à myélopaxes est, sans contredit, dans les os maxillaires, particulièrement au niveau de leur bord alvéolaire," and supports his statement by quoting twenty-nine cases of the disease in this situation.

The diagnosis of myeloid tumours of the jaw is by no means easy, since the bone is slowly expanded, much as it would be by a cyst or by any benign tumour. If the disease originate on the exterior of the bone, or, when springing from the interior, if sufficient absorption of the bone have taken place to allow the tumour to appear beneath the mucous membrane, the characteristic dark maroon colour of the tumour may be perceived. Cysts occasionally form in the substance of a myeloid tumour, and an exploratory puncture of these may yield fluid in which the characteristic myeloid cells may be discovered microscopically.

Myeloid disease occurs mostly before the age of 25. Sir J. Paget (*Surgical Pathology*, page 524) quotes two cases of Sir William Lawrence's, occurring in the upper jaws of women of 21 and 22 years of age, the latter of which illustrates extremely well the recurrence of myeloid growths (of which there can be no question), and also the very curious fact that a tumour on the opposite side to that removed, and which presented appearances exactly corresponding to it, spontaneously subsided. The specimen is in St. Bartholomew's Hospital Museum (L. 459).

Fig. 15 shows a patient from whom Mr. Canton removed a myeloid tumour in 1864. She was 35 years old, and the tumour appeared to have followed a blow. It had been twice removed before she came under Mr. Canton's care, and that gentleman successfully removed the left superior maxilla with the tumour, a portion of which hung down into the pharynx.

The subsequent history of this patient is given as follows in the *Lancet* of January 26, 1872, and it is remarkable that the tumour on one side should have had a character differing from that on the other: "In June, 1871, she again presented herself at the Charing Cross Hospital with a large tumour filling up the antrum of the right upper maxilla, and extending forwards, causing a projection of the upper lip. Mr. Canton accordingly removed the remaining upper maxilla. The operation was perfectly successful, and presented in itself no

points of particular interest. The edges of the incision were brought together with silver sutures, and no dressing of any kind was used, the mouth being simply kept perfectly clean and sweet by the frequent use of Condy's fluid. Within a week of the operation she left her bed, and within three weeks she was discharged from the hospital. Five months later the patient wrote to say that she had enjoyed perfect health since she had left the hospital. On microscopic examination the tumour proved to be simply fibrous. It had been growing for a year before removal. Notwithstanding that a great part of the framework of the face had been taken away, and that a portion of the orbital plate was removed at both operations, there was remarkably little deformity of the face. The patient had lost all power of muscular expression, but beyond this there was nothing to attract attention, except a slight falling in of the upper lip on the right side. There was no falling in of the nose, the raphe of what was the roof of the mouth deriving great support from a firm pseudo-palate, which had formed of cicatricial tissue after the first operation. The cicatrices of the incisions were scarcely noticeable, as they followed the natural lines of the face."

Fig. 15.

In the Museum of the College of Surgeons are two specimens (2245 and A), the two superior maxillæ of a woman aged 21, which were given me by Messrs. Andrews and Coates, of Salisbury, who removed them. The left upper jaw has been macerated, showing a calcified tumour springing from the anterior part; the right jaw has a growth involving the anterior portion extending into the nasal fossa. The growth in these cases was regarded by the operators as an example of scirrhus, but I am enabled, by the kindness of Dr. Lush, of Weymouth, to correct this statement, by a record which he has of the microscopic details observed when the tumours were recent, showing the growths to have been really myeloid.

Myeloid sarcoma is frequently met with in the lower jaw, and it was here that the disease occurred in the case from which Sir J. Paget drew his description. The case is quoted by Mr. Stanley as an example of "tumour of bone, composed of a soft, very vascular substance, having the characters of erectile tissue," but his general description corresponds precisely to that of Sir J. Paget. Figs. 1 and 2 of Plate 13 in Mr. Stanley's atlas show the tumour *in situ* and a section of the jaw after removal. "The patient was a boy in St. Bartholomew's Hospital, and the growth occupied the symphysis of the lower jaw, and, protruding into the mouth, presented a very vascular surface of a mottled red and purple colour, resembling the exterior of some nævi. The tumour was not tender to the touch, and had not been accompanied by pain; it was once destroyed by caustic to the level of the alveolar border of the jaw, but was quickly reproduced; it was then wholly removed with the portion of the jaw in

which it originated, and the cure was permanent. The morbid substance was found imbedded in the cancellous texture of the jaw; it was soft, of a dark-red colour, closely resembling the tissue of healthy spleen." (Stanley, *On Diseases of Bone*, p. 185.)

Fig. 16.

Fig. 17.

A valuable preparation is in the College of Surgeons' Museum (421 A), of myeloid tumour of the symphysis and body of the jaw, removed by Mr. Craven, of Hull, from a young woman of 18, who made a good recovery after the operation. Figs. 16 and 17 show very satisfactorily the appearance of the specimen, which has been divided horizontally. The tumour was of between two and three years' growth, and was covered with healthy mucous membrane. Its section shows a well-marked specimen of myeloid disease imbedded between the plates of the lower jaw; its tissue is of the ordinary friable character, resembling spleen, but somewhat decolorised by immersion in spirit, and it is intersected by fibrous septa. Two cysts may be seen in the section; these being of frequent occurrence in myeloid growths. The microscopic examination of Mr. Craven's specimen was unsatisfactory, owing to its previous immersion in spirit, but there can be no question, from the naked-eye appearances, of the nature of the growth.

In the Museum of St. George's Hospital are four specimens of myeloid disease affecting the lower jaw (II. 166, 167, 168, 169), two of which have no history; the others were removed from girls of 8 and 5 years respectively, of whom the first was known to be well two and a-half years afterwards. In the Museum of University College are three excellent specimens, removed by Liston (680, 1, 2), and there are three in St. Bartholomew's Hospital, all from young persons.

A remarkable, and I believe unique, example of disease of both sides of the lower jaw, the microscopic characters of which were decidedly myeloid, was formerly under my own care, of which the following are the brief particulars:—The patient, a boy of 7½ years, whose portrait is shown in Fig. 18, presented a remarkable enlargement of both sides of the lower jaw, giving his face a very square appearance. The affection had come on gradually and painlessly from the age of a year and a-half, and at the time I operated upon him the width of the jaw, as measured with calipers, was five inches, the width of an average adult jaw being only four inches. The growths were evidently projections from the outer surfaces of the angles of the jaws, the inner surface of the bone being natural, and the mucous membrane of the mouth not interfered with. In September and October, 1867, I removed the right and afterwards the left tumour through incisions behind the margin of the jaw, and without opening into the mouth. The main part of each projection was sawn off the jaw, and are now in the College of Surgeons' Museum (2232), closely resembling large mussel-shells filled with a cartilaginous-looking sub-

stance, which, however (and especially some darker portions), gave distinct microscopic evidence of myeloid structure. A good deal of this material, which seemed to fill the interior of the bone, was gouged away, and the symmetry of the face restored as far as possible. The boy made a good recovery, and Fig. 19, from a photograph, shows his condition three months after the second operation, and there appears to have been no tendency to recurrence.

Chondro-sarcoma is characterised by rapidity of growth and by early recurrence after removal. The primary tumour is mainly enchondroma, but the recurrent growths are chiefly composed of small round-celled sarcoma, which tends to produce internal deposits through the vascular system.

Fig. 18.

Fig. 19.

The following good illustration of the disease occurred under my own care. A woman, aged 44, was admitted into University College Hospital on April 11th, 1877, with the following history:—She first noticed a swelling connected with the left side of the lower jaw nine months before. The swelling was painful, and accompanied by numbness over the chin. Twenty years before she had received a violent blow over the jaw, when attendant in a lunatic asylum. The family history threw no light on the case. The patient had always enjoyed good health.

On admission, there was a large tumour over the left side of the lower jaw, and firmly connected with the inner and outer surfaces of the bone, extending from an inch behind the symphysis to the angle. The growth generally was firm and elastic, though some parts were much softer than others. The border of the tumour was well defined, and the skin was freely movable over it. A nodule, the size of a walnut, projected between the teeth into the cavity of the mouth. The patient complained of shooting pains in the tumour, which ran along the lower lip. There was no enlargement of lymphatic glands, and no other tumour. The general health was good. The patient's appearance is shown in Fig. 20.

On April 14th I removed the tumour with the bone involved, from the left of the symphysis to an inch above the angle, and the patient made a good recovery.

Eleven weeks after discharge she was readmitted. The lower borders of the segments of the previously divided jaw had united by fibrous union, but a V-shaped notch existed at the upper border large enough to admit the tip of the finger. Recurrence of the growth had taken place in connection with both divisions of bone. There was a tumour as large as a hen's egg beneath the chin, but this could not be felt through the mouth, whilst a second and larger one caused bulging on the left cheek, and was mainly situated over the ramus of the jaw; it projected into the oral cavity and rendered articulation indistinct, although there was no difficulty in deglutition. The skin was freely movable over both masses; there was merely a linear cicatrix at the line of the old incision. The lymphatic glands were not enlarged, and the general health was good.

A second operation was done on August 1st, 1877. It being found impossible to remove the tumour by the mouth, I made an incision along the lower border of the jaw, from two inches to the right of the symphysis for a distance of six inches. The lower lip was dissected from the bone and turned upwards, and the jaw sawn through at the symphysis, which allowed a piece on the left to be removed with the growth attached. It was found that the whole of the posterior mass could not be removed, as it extended deeply into the pterygoid region, so after enucleating as much as possible, the operation was not further

proceeded with. The wound was syringed out with strong solution of chloride of zinc, and then plugged with lint.

Fig. 20.

For the first fourteen days the wound continued to heal rapidly, but at this time it commenced to fungate, and on the twentieth day sharp bleeding ensued, which required the actual cautery to arrest it. Severe pain was more or less constant, and the discharge very fetid. On the 28th the fungating mass reached the clavicle, and completely hid the left side of the neck; hæmorrhage again occurred, and the cautery was employed.

In spite of a supporting plan of treatment the general health rapidly failed, the patient fell into a semi-comatose condition, got more and more asthenic and cachectic, and died on the forty-third day after the second operation.

Ossifying Sarcoma and Osteoid Chondro-sarcoma imply the occurrence of ossification in tumours containing sarcomatous elements, and include the cases hitherto described as "osteoid cancer." A good specimen of the kind is preserved in the Museum of the College of Surgeons (1712), of which the history with an accompanying drawing is recorded in Mr. Howship's *Surgical Observations*. The specimen has been macerated, and the part which remains consists of an oval mass of light cancellous bone about five inches in its chief diameter, and very slightly connected with the remaining bones of the face.

Ossifying sarcoma, in which ossification takes place extensively in a matrix of sarcomatous tissue, occurs in the lower jaw, and, as in the following case, presents at first most of the characters of an ordinary osteoma. Fig. 21 shows the portion of lower jaw at first removed, with

Fig. 21.

a section of the tumour (College of Surgeons' Museum, 2214 A), which it is difficult to distinguish from ordinary bone, except by the striation seen best at its margins. The rapid recurrence of the disease in a

soft form showed the true nature of the case, and the patient died exhausted within a year of the first operation.

W. G., aged 50, was admitted into University College Hospital on May 9th, 1881. About five months previously he noticed a pricking pain about the left side of the lower jaw, and soon a lump appeared outside the bicuspid teeth; it grew steadily but slowly, until one month before admission. At this time the patient had several teeth extracted, and the increase in the size of the growth became rapid after this interference; there was constant gnawing pain. The patient believed exposure to cold to have been the cause of the swelling. Both his parents died of "old age," and had no kind of tumour.

On admission, the lower part of the left cheek was bulged outwards considerably by a very hard rounded swelling, which covered the outer side of the left half of the lower jaw from a short distance in front of the angle almost to the left canine; the lower edge of the bone was concealed by slight projection of the mass below it; and on pressing upwards in the submaxillary region a considerable swelling could be felt on the inner side of the bone. Altogether the impression conveyed to the fingers was that the growth was central, and that the so-called expansion of bone had occurred over it. No teeth were present on the left side behind the canine, the alveolus was widened, and presented posteriorly several low, rounded swellings, covered by mucous membrane, soft or even cystic; whilst in front lay a large crater-like ulcer, at the bottom of which no bone was bare. The tongue and floor of the mouth were normal. A small, not tender, gland could be felt behind the angle of the jaw. There was moderate constant pain in the part, much increased by hanging the head down. As regards general health there was nothing to be desired.

On May 11th ether was given, and the growth removed by an incision from the left angle to the symphysis; the jaw was sawn through to the left of the symphysis; the soft parts stripped from the growth, and then the bone was divided near the angle. The wound was closed by wire sutures, and dressed with cotton wool.

The wound was all but healed on the eighth day, quite so on the twentieth, when the man left hospital feeling quite well.

In three months, however, he was readmitted, having had a distinct recurrence for six weeks, with much constant pain. His health was still very good.

On September 6th, 1881, the whole of this mass, together with the ramus, coronoid process, and condyle of the jaw, were removed by the ordinary incision for the removal of half the lower jaw.

The patient again recovered, without any bad symptoms. The hinder part of the wound gaped widely, but it was healing steadily, and there was no obvious recurrence on October 8th, when the patient left the hospital.

On January 30th, 1882, the patient was again admitted, having noticed a recurrence of the growth two months. The left cheek was now enormously swollen, and the angle of the mouth pushed forwards by a mass of new growth, fungating into the mouth along the line of the jaw, but elsewhere covered by mucous membrane. The old wound was healed, but for an ulcer an inch and a-half by half an inch, round which there was a good deal of firm infiltration at its posterior end. The growth was firm and elastic at some points, bony at others, adherent to the symphysis, but not very firmly. The whole face was oedematous; the left temporal fossa rather full, and the seat of much pain. The man was still pretty strong.

On February 2nd the old incision was opened up, and the main part of the growth turned out; but, as it seemed to involve the tonsil and carotid vessels, and to spread into the temporal fossa, much had to be left.

Again the patient made a good recovery. The anterior part of the wound healed, but the posterior gaped widely, and he went out with a large hole here. Pain in the temporal region continued. He died at home on April 5th, having been able to walk up and down stairs to the last. The total duration of the disease would, therefore, seem to have been about seventeen months.

MALIGNANT TUMOURS OF THE UPPER JAW.

Round-celled Sarcoma and Epithelioma.—Round-celled sarcoma or medullary sarcoma is of frequent occurrence in the upper jaw, and, from its vascularity and rapidity of growth, it has often been mistaken for medullary cancer, which in its clinical history it closely resembles. In the majority of cases the disease begins in the antrum; for the protruding masses, which are found in the nose or mouth, are but secondary to a formation within that cavity. One of Mr. Liston's cases is conclusive on the point, the preparation being preserved in the College of Surgeons (1059).

Medullary sarcoma of the jaw closely resembles the same disease in other parts of the body; rapidity of growth, with softness and a tend-

ency to fungate on the part of the tumour itself, being the main characteristics. The direction which the disease takes, and the effects therefore which it produces, will vary in different examples. Frequently it forms a considerable projection on the cheek, causing epiphora from closure of the nasal duct and oedema of the lower eyelid, and in the later stages enlargement of the facial veins, without the least invasion of the hard palate, and with but slight interference with the nostril. The specimen of medullary sarcoma in the College of Surgeons' Museum, 2243, illustrates the point, a large tumour being developed externally. The patient was a man aged 34, who came under the care of Mr. Craven, of Hull, in 1863, with a large rounded tumour of the right cheek, of the size of an orange, extending from the external process of the frontal bone and zygoma above to the angle of the mouth below (almost completely closing the right eye), and from the side of the nose to the ramus of the lower jaw. The colour of the integument was natural, except at the upper part below the eye, where it presented a rather livid appearance, and several veins, not of large size. It was very firm to the touch, but elastic, especially at the outer part. Pressure and handling caused little or no pain. The interior of the mouth on the right side, from the alveolar process (which was concealed by the growth, or embraced in it) to the inside of the distended cheek, presented a large excavated sore of a greyish sloughy aspect and fetid odour. This part of the tumour was softer to the touch than that which showed itself externally. It did not encroach on the palate, which was of the natural width. There were no enlarged glands beneath the jaw. The patient seemed a pretty healthy man. The tumour had been growing seventeen weeks. Mr. Craven excised the tumour, and the patient made a good recovery, but died fifteen months afterwards from a recurrence of the disease. The tumour was rounded and lobed, especially that part which occupied the pterigo-maxillary fossa, and was firm on section. The cut surface was smooth, becoming slightly granular after prolonged exposure. To the naked eye the tumour had the appearance of a malignant growth. Under the microscope, the juice scraped off the cut surface showed no fibrous element, but simply a mass of apparently broken-up cells and granular matter.

On the other hand, the disease may at an early period involve the alveolus and palate, or the nose, and it is these cases which are sometimes attributed to the presence of decayed teeth, or are mistaken for ordinary nasal polypi. Of this a preparation (College of Surgeons' Museum, 2248), which was also from a patient of Mr. Craven (to whom I was indebted for both valuable preparations), is an instance. Here the disease showed itself first in the gums, where it formed a fungating mass, and soon obstructed the nostril. This last symptom was due to a fungus, almost papillary in appearance, which springs from the nasal surface of the tumour. Mr. Craven removed the tumour in March, 1866, but within a year the disease returned and proved fatal.

The disease may extend across the median line and involve portions of both maxillæ, especially the palatine plates. This is not necessarily a bar to operative interference, provided other circumstances are favourable.

Round-celled sarcoma occasionally involves both upper and lower jaws, beginning, I believe, mostly in the upper, and extending to the lower. A man was under my care in 1877 with an enormous swelling of the left side of the face. I ventured, under chloroform, to introduce my finger into the mouth to explore the extent of the growth, but I found it so extensively attached to both upper and lower jaws that removal was clearly impossible. The examination gave rise to sharp hæmorrhage, due to the great vascularity of the growth, and this was checked with some difficulty with the persulphate of iron.

I met with the same implication of the lower jaw, though to a lesser extent, in a lady, from whom I removed the upper jaw in consultation with Dr. Cæsar. In this case the coronoid process was involved, and was removed with bone-forceps; but recurrence of the disease took place, and the patient did not survive the operation four months.

Round-celled or Medullary Sarcoma begins usually in the interior of the lower jaw, producing rapid expansion of it, and ultimately breaking through into the mouth, and also through the skin of the face if allowed to proceed unchecked. A specimen in University College Museum (866) is a good example of the disease. The morbid growth projects chiefly on the outer side, and its most prominent part has protruded through the skin, forming an overhanging nummular projection which has an open reticular surface. On the inner side the tumour has invaded the jaw, in places destroying its entire thickness. The growth, however, scarcely projects into the mouth. As seen on the divided surface, it is composed of a soft, granular, yellowish basis, supported and parted into small polyhedral masses by narrow lines of fibrous tissue; its limit is everywhere definable. Microscopic ex-

amination shows the tumour to have all the characters of a large round-celled sarcoma.

Many of the museum specimens hitherto described as medullary cancer are really examples of round-celled sarcoma, and the following case of Mr. Liston's in the College of Surgeons (2230) may be quoted as an instance of the size to which round-celled sarcoma may grow: Part of a lower jaw, including the left condyle, the alveolus of the right first molar tooth, and all the intermediate parts which, with an enormous tumour upon them, were removed by operation. The left ascending portion and side of the jaw as far as the canine tooth are completely enclosed by the tumour, and it covers both surfaces of the jaw as far as the right canine tooth. A round lobulated mass projects downwards and forwards, and in the opposite direction the tumour projects into the mouth with a rough fungous surface, in which a displaced molar tooth is seen. The interior of the tumour is indistinctly lobulated, composed of round masses connected by cellular tissue, and of a soft texture; it is invested by a thick capsule.

Epithelioma occurs in the upper jaw in two forms, the squamous and columnar; and the former always begins in the gum or palate. Columnar epithelioma always begins in the antrum, which it often fills, and then secondarily involves the palate; or it may attack the outer wall only of the antrum, and then protrude on the face. Occurring usually in patients over forty years of age, the disease begins very insidiously, the patient complaining, perhaps, of neuralgia or of uneasiness in the face, but of little more. When the antrum has become distended, the epithelioma is apt to involve the palate by absorption and eventual fungation, and then protrude into the nostril and orbits. In the Museum of the College of Surgeons is a preparation (2235) of the right superior maxilla with a soft white tumour filling the antrum and protruding into the nose and orbit, which I removed from a gentleman aged 51, who five years before the operation noticed "lumps in the hard palate," which were lanced, but never healed, though appearing to diminish in size. About four years later his right nostril became blocked, and there was protrusion of the eye. I removed the jaw very freely, but recurrence took place at the back of the orbit, and it became necessary to remove the eyeball in order to clear out the growth effectually, but time showed that a cure had not been effected. The morbid growth in this case is unattached to the wall of the antrum, except behind, where it extends into the substance of the gums and palate. Mr. Eve's microscopic examination shows it to consist of closely-packed and very tortuous columns of small round epithelium; a few of them had a lumen, around which the cells were arranged in a regular manner, as in tubular glands. The stroma was composed of sarcomatous tissue. This case is one of unusual duration for an example of pure epithelioma; and the fact that the tumour is a mixture of epithelioma and sarcoma probably gives the clue to it, although the subsequent history is distinctly that of epithelioma.

Epithelioma occurs in the lower jaw in two forms, the columnar and the squamous. Columnar epithelioma occurs in connection with multilocular cysts and with single cysts, and has been already fully discussed. Squamous epithelioma is the more common form of disease, and is found both in connection with ulceration of the gums and as a tumour of the jaw. The following, under my own care, is a typical case of the latter form of the disease. A man, aged 56, first noticed a swelling in his face four months before his admission; he used to have toothache, and had lost all the teeth behind the left lateral incisor in the lower jaw. When first noticed, the tumour was about the size of a small walnut, and was situated on the left ramus near the angle of the jaw. It was not painful or tender to the touch, but grew steadily. On admission to University College Hospital, there was on the left side of the lower jaw a rounded, smooth swelling, which extended from the middle of the vertical ramus of the jaw to the level of the hyoid bone below and forwards nearly to the symphysis. The swelling was firm and inelastic, and the skin over it was normal, except that it was slightly reddened over the anterior half of the growth. Inside the mouth the growth projected as a large red roundish mass, with the surface flattened and sloughy. It reached as far backward as the vertical ramus, and encroached upon the floor of the mouth. I removed the tumour, with the portion of the lower jaw implicated, by dividing the lower lip in the median line and carrying an incision beyond the angle of the jaw. The jaw was sawn to the right of the median line, between the incision and the canine teeth, and, the tongue being secured with a thread, the bone was disarticulated on the left side with some little difficulty, owing to the tumour breaking away from the upper part. Consequently the coronoid process was nipped off with bone-forceps, and left *in situ*, and an elevator was used to lift the condyle out. There was very little bleeding, and only one or two ligatures were applied. The wound was

sprinkled with iodoform, and brought together with wire sutures, drainage being provided for.

The patient made an uninterruptedly good recovery, and left the hospital in thirty days. The part removed consisted of the remains of the left half of the bone, the part between the vertical ramus and the central incisors being almost entirely destroyed by the growth, only a shell of bone remaining at each end. On section the growth was of a dead white colour where oldest, with a firm margin advancing into the surrounding tissues. It consisted of a fibrous stroma, in which were scattered numerous leucocytes and spindle cells, with large masses of squamous epithelium cells, many of which were collected into bird's-nest groups. The specimen is in University College Museum.

The general characters of squamous epithelioma of the jaw are well seen in the foregoing case. Rapidity of growth, with destruction of the bone, and fungation into the mouth are the leading characteristics, and nothing but early and free removal offers any chance of relief. In the above case the jaw in its upper part was apparently healthy, but I had no hesitation in disarticulating so as to be thoroughly beyond the disease, and I also went well into healthy bone at the point of section, so as to avoid, as far as possible, all risk of recurrence.

The question of the necessity for the removal of large portions of bone in cases of cancer of the lower jaw may be here referred to. Some surgeons maintain that in a case of cancer it is necessary to amputate at the joint above the disease in order to obtain immunity. But, if this doctrine is to be carried out fully, the entire lower jaw should be removed for disease of one side, for though the bone was originally developed in two halves, there is nothing to prevent malignant disease spreading across the symphysis, as was seen in the case of epithelioma under my own care. The lower jaw is liable to be invaded by epithelioma spreading to it from the tongue and lip, and may be affected by both epithelioma and sarcoma developed in the neighbouring lymphatic glands.

On more than one occasion I have found epithelioma of the anterior part of the tongue attached to and infiltrating the central portion of the lower jaw, and have been obliged to cut out the incisive region with good result. The most remarkable case was one of a man, aged 52, who was under my care in 1875 with extensive epithelioma of the front of the tongue, which was firmly fixed by its tip to the lower jaw, with great enlargement of the submaxillary glands and infiltration of the submaxillary tissues. He suffered acutely from occipital pain, which it is difficult to explain, and was willing to submit to any operation for relief. I divided the jaw on each side one inch and a half from the symphysis, and then removed the front of the tongue, the centre of the jaw, and all the sublingual structures, with the galvanic *écraseur* (University College Museum, 1023). The patient made a rapid recovery, the two portions of jaw fell together, and are now united at an angle by tough fibrous tissue, and the man, who was alive and well in 1883, has covered the deformity by growing a beard.

In January, 1879, I performed nearly as extensive an operation on a man, aged 68, removing the lower jaw from the right incisors to the left angle, for extensive epithelioma of the jaw and floor of the mouth, the patient making a good recovery and being in perfect health two years later, but dying with recurrence of the disease eventually (*Lancet*, November 20th, 1880).

In the cases of recurrent epithelioma of the lip, when the disease shows itself in the submental glands, which become adherent to and implicate the bone, it is possible to give relief, for a time at least, by sawing out the portion of bone involved, as I did in an old man in May, 1876. In two instances I have sawn off the chin only, without breaking the line of the alveolus, or opening the cavity of the mouth. Fig. 22 shows the first patient on whom I performed the operation.

Fig. 23 shows an epitheliomatous growth secondary to that of the lip, which has attained the unusual size of the tumour in the present case. It is unusual to find so extensive an involvement of the bone, as in this instance, with such slight glandular affection, the secondary growths generally appearing in the glands under the jaw, and involving the bone later and to a much less extent.

During the last few years a new disease affecting the jaws, as well as other parts of the body, has been recognised under the name of actinomycosis, and the College Museum is fortunate in possessing two specimens occurring in the lower jaw and one in the upper jaw of the heifer, which I now bring before you.

2254 B is the lower jaw of a heifer affected with actinomycosis. All that portion of the jaw containing the grinding-teeth is greatly enlarged by a growth projecting prominently from its lower border and both its surfaces. A vertical section has been made through the

jaw immediately on the inside of the teeth, and another vertical section through the growth projecting from its outer surface. The sections show that the growth is composed of a soft, pale, medulla-like substance, punctating or dotted with numerous minute cavities. It infiltrates widely, and in some places has completely penetrated the jaw. On pressure, worm-like masses of pulaceous material could be expressed from the puncta of small cavities above noted. This material, under the microscope, was found to contain large numbers of actinomyces. The mucous membrane of the gum on the outside of the teeth is thickened, and passing down through it into the substance of the bone are two sinuses, into which portions of glass rod are inserted.

Fig. 22.

The animal was 18 months old. An enlargement of the right side of the lower jaw was noticed nine months before it was killed. No disease of any other part was found.

2254 C is the right upper jaw of a heifer affected with actinomycosis. The external surface is bulged outwards, and the antrum is filled with the growth.

Fig. 23.

2254 D is the left lower jaw of the same animal, showing a rounded expansion of the bone, due to an actinomycosis growth.

The disease began in the upper jaw eight months before the animal

was killed. An enlargement of the lower jaw had only been noticed a few weeks.

These valuable specimens were presented to the College Museum by Alfred Lingard, Esq., in 1886.

These tumours have to the naked eye the appearance of ordinary sarcomatous growths, but under the microscope show at various points masses of the vegetable fungus characteristic of the disease.

For the following figures I am indebted to a paper by Dr. Markham Skerrett, of Clifton, which was published in the *International Journal of Medical Sciences*, January, 1887.

Fig. 24.

A group $\times$ A Zeiss ($= \frac{1}{2}$ inch) shows probably the earliest stage of growth: each separate collection of fungus consisting of fine filaments radiating from a common centre.

Fig. 25.

The portion of fungus marked a in Fig. 24 $\times$ D Zeiss ($= \frac{1}{4}$ inch, nearly). Under this power some of the filaments are apparently thicker than the majority, and are club-shaped.

The disease has invaded both the upper and lower jaws in man, but no case of that particular form of the disease has, so far as I am aware, been met with in this country, and my information on the subject is, therefore, second-hand.

In 1877 Bollinger first described as a new fungoid disease a peculiar affection of the jaws of cattle, which up to that time had been looked upon by some as scrofulous disease, by others as osteo-sarcoma. According to his description the affection consists in the development of a whitish tumour, which starts from the posterior part of the alveolus, or from the spongy part of the bone, distends the bone and bursts through it, generally outwards, destroying all the tissues in its course. The substance of the irregular nodulated tumour is for the most part soft and juicy, and shows on section a large number of yellow, abscess-like points. Microscopically the tumour consists of granulation-tissue with minute abscesses here and there, in which lie peculiar yellowish bodies about the size of a hemp-seed. These bodies are also found in similar tumours in the tongue, pharynx, larynx, and mucous membrane of the stomach, and in the neighbouring lymphatic glands. When examined more minutely they present a gland-like, mulberry appearance, consisting of closely-interwoven threads and club-shaped bodies. Harz suggested that they should be called actinomyces (ray fungus) and hence the disease is termed actinomycosis.

In man the organism was observed and described by Israel in 1877, but it appears that Ponfick, in 1879, was the first to recognise the true nature of the disease, and to establish its identity with the condition previously described by Bollinger as met with in cattle.

The most recent contribution to the literature of actinomycosis in jaws is by Dr. P. Moosbrugger, who has published in *Binns's Beiträge zur klinischen Chirurgie* a report on the disease as observed in the *Tübingen clinique*. He believes that in both animals and man infection takes place by inoculation of the organism on a broken surface. With most authors he holds that in animals the point of inoculation is either in the mouth, fauces, or pharynx, through abrasions due to hard food. Animals may also be infected through abrasions of the skin of the neck, produced by rubbing the part against the manger or crib. Barley seems to be suspected by several observers to be the food which contains the organism.

Moosbrugger regards it as improbable that the human subject is inoculated either directly from the beast or indirectly through using its flesh for food. He thinks it not improbable that man, like the animal, is infected through the use of grain as food, or through inhalation of the spores of the organism; perhaps, also, occasionally by chewing straws or grain infested with the latter.

Inoculation may take place through carious teeth or damaged alveoli, and thus reach the periosteum or soft parts of the jaw. It may also occur on altered mucous membrane, on a wounded cutaneous surface, or a spot breaking down from disease.

The first effect of the pressure of the organism in human tissues is the formation of abundant granulation-tissue, so soft in many cases as actually to fluctuate, but without any production of true pus. If pus

is eventually present it is due to the admixture of ordinary micrococci with the special actinomycetes.

Of the 75 cases recorded, 29 were inoculated in the neighbourhood of the lower jaw, floor of the mouth and throat, 9 in the upper jaw and cheek, 2 in the oesophagus, 1 in the tongue, 11 in the intestine, 14 in the air-passages and lung, 7 unknown; 55 were males, 21 females.

Actinomycosis of the upper jaw appears to offer a worse prognosis than that of the lower jaw. In the majority of cases the individuals affected belonged to callings which did not bring them into direct contact with diseased cattle.

The cases observed in the *Tübingen clinique* were 10 in number; to these is added 1 from Königsberg. Of these 11 the disease started in the lower jaw in 6; in the upper jaw in 1; in the cheek over the upper jaw in 2; in the lungs in 2. In 4 of the 6 cases in which the disease began in the lower jaw the onset was accompanied by severe toothache; the same was the case with 2 out of 3 of the upper-jaw cases. It started just as frequently around sound as carious teeth.

The first visible evidence of actinomycosis is always a hard, smooth, or elastic (often painless) tumour, apparently seated under the periosteum. This swelling spreads to the soft parts around, sooner or later, either by direct extension or through lymphatic channels, and forms nodular masses with white shreddy or granular foci. On incision into the swelling, serum containing little white granules escaped, but no pus in simple cases. In one simple case with sinuses the temperature was normal. In another, where sinuses had formed, there was high fever.

All the jaw cases recovered after operation except one (upper jaw), the two lung cases died.

The operative measures embraced incision and thorough scraping with sharp spoons.

When starting in the jaws the inoculation always appeared to take place around a molar tooth.

The characteristic actinomyces were demonstrated microscopically in every one of Moosbrugger's cases.

ACUTE OSTEITIS OF THE NECK AND HEAD OF FEMUR.

By C. MACNAMARA, F.R.C.S., F.C.U.,

Surgeon to Westminster Hospital.

ACUTE inflammation of the neck and head of the femur, occurring in young people, is not unfrequently met with, the severity of the disease varying under conditions which are but little understood. Osteitis in this locality, however, is always alarming, as it may lead to suppurative inflammation of the bone and synovial membrane, and so to dangerous septicæmia. In the majority of these cases the symptoms are preceded by an injury to the joint in a child or young person; the soft and growing tissues at the junction of the neck with the epiphyseal disc of cartilage of the head of the bone is bruised, and there seems reason to believe that in the injured tissues a specific micro-organism finds a congenial soil in which to grow; rapid suppuration follows, with its attendant evils. In these cases, therefore, we have not only to deal with the suppurative synovitis of the hip-joint, but also with an acutely inflamed portion of bone, and it is this complication which renders these cases so difficult to treat with success. The joint can be drained without trouble, but I have failed as yet, in disease of this kind, efficiently to drain the head and neck of the femur. The following case demonstrates the advantages attending excision of the affected bone in an early stage of the affection.

E. E., aged 14. This girl was sent into the Westminster Hospital by Dr. Ferris, of Uxbridge, on the 12th of March, 1887. Her family history was good; her parents are alive and healthy, and the patient had always enjoyed excellent health until the commencement of her present illness. A fortnight before E. E. came into the hospital she injured her right hip in jumping off a dust heap, but the pain passed away in the course of a short time, and she ran about as usual during the remainder of the day; at night, however, she awoke with violent pain in the hip-joint. The following day the pain was worse, the patient was unable to leave her bed, and was seen soon afterwards by Drs. Ferris and Davidson; she had high fever, and in the course of a few days there was great swelling of the soft parts about the hip-joint. The medical men in attendance on the patient recognised the necessity for the speedy and effectual drainage of the joint; they therefore arranged for her being removed to the hospital.

E. E. was admitted under my care on March 12th. Her temperature was 105°, the heart's action extremely feeble. She was somewhat delirious and in intense agony. The right hip was greatly swollen,

and deep fluctuation could be felt in the part. The patient was at once removed to the operating theatre, and, an incision having been made over the greater trochanter of the femur, the joint was opened. About an ounce of pus escaped outwards. On introducing the finger into the joint, the neck of the bone was found denuded. The external incisions were therefore enlarged, and the femur was divided below the greater trochanter, and the head and neck removed.

The relief of pain and other symptoms was marked from the time of the operation, and the patient has since made an uninterrupted recovery, leaving the hospital for the seaside on May 14th; but the wound had completely healed three weeks previously, and she has considerable movement in the hip; in fact there is every reason to believe that, with a properly made boot, the patient will have perfect use of the limb.

The fresh pus taken from this patient's joint was immediately examined by Dr. Hebb, and found to be crowded with micro-organisms (*staphylococcus albus*?). On making a section through the head and neck of the bone, the soft tissues within its cancellous tissue, especially those in contact with the epiphyseal cartilage, were in a state of suppuration. The fresh pus within the bone was swarming with micro-organisms. The neck of the femur was entirely denuded of soft tissues.

In several instances of this kind I have endeavoured to save the head and neck of the bone by drilling into them and draining the cancellous structure through the greater trochanter, but I have not as yet succeeded in thus effecting a cure in a severe case of acute osteitis. Sooner or later the head and neck of the femur have had to be removed, generally after the patient has gone through great suffering and danger to life. It was this consideration which induced me to excise the parts at once in this case, and the result has certainly been most satisfactory. It is remarkable that two days after E. E. was admitted into the hospital another child suffering from acute osteitis of the diaphysis of the left fibula was placed under my care. In this instance the whole of the diseased bone was immediately removed, and the patient made a rapid and satisfactory recovery. I found the pus both outside and within the bone crowded with micro-organisms. The tibia, fibula, and most of the long bones can be successfully drained in the early stage of acute osteitis; but I think, when the head and neck of the femur are affected in this way, unless the symptoms yield speedily to treatment, it is advisable to excise the diseased bone without delay.

ON SOME OF THE RARER FORMS OF RECTAL FISTULÆ.

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BEFORE entering upon the subject with which this paper more especially deals, I would like to say a few words on the diagnosis and treatment of fistula in ano generally. At St. Mark's Hospital I am constantly reminded of the fact that medical men and, indeed, hospital surgeons, do not take sufficient pains when operating upon fistula to lay open all sinuses. The one most often left is that which extends from the internal opening upwards under the mucous membrane, though I have frequently met with cases in which other tracks have been overlooked. In speaking thus I am not referring to those cases of extensive fistulæ which one now and then meets with in hospital practice where the buttocks are riddled with sinuses, resembling, as one author puts it, a rabbit warren. Here we must use our judgment as to how much cutting the patient can stand; for, as a rule, such cases are of long duration, and the patient is often much weakened from continuous discharge. It is better, under these circumstances, to lay open the main track with one complete division of the sphincter, and trust to injection of the branch sinuses with some stimulating fluid to effect a cure.

Another common error in operating is not keeping to the fistulous track, but, either owing to impatience or insufficient delicacy in manipulation, the point of the director is thrust through the sinus-wall, and is then free to roam whither the operator wills in the cellular tissue of the part. In this way I have seen a portion of the main track of the fistula left, whilst considerable incisions through skin and subcutaneous tissue have been made which were wholly unnecessary.

This accident can always be avoided by taking plenty of time over the operation, and by careful sponging of the track already laid open, which ought always to show the granulation-tissue lining it.