case, in which Strohmeyer made the diagnosis through logical deduction. The case was doubtful. Strohmeyer diagnosed empyema of the frontal sinus by the severity of the onset, the violent pain on one side of the head, and the dry condition of the same side of the nose. The diagnosis was confirmed when blood and pus spontaneously discharged from the other nostril, for rupture had taken place into the sinus of the healthy side.

CHAPTER VII

DISEASES OF THE MAXILLÆ AND OF THE TEMPORO-MAXILLARY ARTICULATION

Traumata of the inferior maxillæ are so readily open to inspection that it is rare for any difficulty in diagnosis to arise. Inspection alone is sufficient, and even the laity, as a rule, know whether the bone is fractured or not.

In dealing with a *fracture*, the steplike interruption in the continuity of the teeth, the abnormal mobility, the tear in the gum and mucous membrane, and the inability to bite, are so evident that any problem of differential diagnosis need not be considered.

In reference to *dislocations* of the temporo-maxillary joint few points require discussion. This injury, which is caused by opening the mouth too wide, is the only traumatic dislocation which occurs without rupture of the capsule. The condyle, still within the capsule, is displaced in front of the eminentia articularis, and is unable to return. A symptom, which is seen only in this injury, at once results, the patient is unable to shut his mouth. This is pathognomonic.

The sudden inability to bring the jaws together renders the recognition of this dislocation so easy that a Bohemian surgeon was wont to jump up and rush with threatening fist toward any patient entering his office with his mouth characteristically open. The sudden

fright caused the patient's dislocation to reduce spontaneously.

The dislocation may be unilateral or bilateral. In either case it is readily recognised. If the dislocation is bilateral, a vertical line dropped between the first incisors of the lower jaw will fall in the median line of the body. If it is unilateral, the upper end of the line will incline toward the affected side. If the patient has lost his incisors, or has no teeth, we notice that the affected side of the lower jaw is farther removed from the upper jaw than the healthy side; or, in other words, that a plane drawn through the edge of the maxilla is not horizontal, but inclined downward toward the diseased side. Examining the neighbourhood of the joint, we find a hollow at the site of the joint, and the condyle is found located anteriorly. At the same time the dislocated jaw is protruded, the chin appears longer than normal, the patient salivates, and speech is interfered with.

Dislocation of the jaw is characterized by inability to close the mouth, and this, as already stated, is pathognomonic of this condition. The opposite condition, inability to open the mouth, *Lockjaw* (ankylostoma), is a symptom common to several diseases. An uncommonly rare condition, as yet not verified by autopsy, but well authenticated on the living, is a backward dislocation of the condyle, which presupposes certain structural abnormalities in the articulation. It occurs in female subjects, and manifests itself in a sudden and unexpected inability to open the jaws. The patient makes various, often forcible, efforts to open her mouth. Some sudden jar occurs, and the jaw is again movable. Most commonly lockjaw appears as a symptom in periostitis

of the lower jaw resulting from caries of the last molars. Violent toothache, swelling of the cheek, and then lockjaw—this is the typical, recurring picture seen in thousands of cases. Observation shows that the pain ceases when the swelling appears. The same picture may be due to the eruption of a wisdom tooth. Consequently, in individuals of the proper age, this process must be kept in mind. Phlegmonous inflammations of different kinds occurring in the neighbourhood of the articulation, or even in the region of the ramus, can cause lockjaw; for instance, a phlegmonous angina. In all these cases we deal with an acute process which can be deduced by its other symptoms. The cause of the trouble is readily recognised if due to cicatrices, inside the mouth, resulting from a former stomatitis. Quite as simple are the cases in which cancer, extending from the upper to the lower jaw, or vice versa, acts as an inelastic band and impairs movement.

It is evident that lockjaw can result from inflammations of the masseter. I saw such a case due to a stone striking the cheek. The muscle is not only tense and hard as a board, but also painful, even in the spots not covered by the outer contusion, especially to palpation from within the mouth.

If no extra-articular causes are present to account for the lockjaw, an inflammation of the joint itself should be looked for. Sometimes, after scarlatina, inflammation of the articulation takes place. Occasionally caries of the petrous bone advances close to the joint. In such cases sensitiveness in the neighbourhood of the joint can be demonstrated. This, combined with the contracture of the muscle, and the absence of other causes, is sufficient to assure a diagnosis.

The jaws are greatly exposed to *acute inflammations*, because they form the bed of the teeth, which are so often carious. But among operatives engaged in the manufacture of phosphorus matches the jaws are even more exposed to insults. The direct influence of the phosphorus fumes upon the jawbones is marked by a peculiar periostitis. It is characterized by the growth of a thick callus (due to rapid proliferation of the connective tissue) on the outer surface of the periosteum; on the inner surface new bone is produced in scattered spots of considerable extent. Pyogenic cocci make their entrance at the same time, so that an ossifying and suppurative periostitis go hand in hand, but at different spots. The lower jaw soon necroses. It then appears embedded in a capsule which is roughened externally and bony in spots internally, yet separated from this capsule by surrounding masses of pus. The teeth drop out at the beginning of the process, the gums then retract, so that the alveoli are laid bare, and appear like cavities filled with pus. The thick callus is perforated here and there by fistulæ which allow the pus to escape. Naturally these changes take place only slowly, and accompanied by great pain. Sinuses at the lower margin of the jaw result, discharge pus freely, and lead directly to bare, necrotic bone. In the upper jaw no discharge toward the exterior occurs, as far as I know; nor is the swelling as extensive as in the lower jaw. At the boundary of the visible necrosis the teeth are loose, and this symptom shows how the outer swelling and the necrosis advance hand in hand.

Diagnostically, PHOSPHORUS NECROSIS is distinguished from phlegmonous periostitis of the jaw, following caries of the teeth, by the whole symptom-complex.

I consider it of importance that in phlegmonous periostitis, which often follows the extraction of a tooth, the necrotic bone is never visible to such an extent, nor the gums so retracted, as in the variety due to phosphorus.

Beginners might be embarrassed by a large ulcer, which primarily involves the cheek, spreads to the floor of the mouth, and then attacks the lower jaw. In such cases, a necrotic part of the lower jaw may be visible at the centre of the ulcer; for instances are on record in which an epithelioma takes its origin from the cheek or floor of the mouth, and then, advancing to the jaw, involves the bone, producing a sequestrum. I have seen several such cases. Beginners are, as a rule, hasty in advancing a judgment and diagnose necrosis. But in necrosis much pus is produced; there is increased periosteal bone production, which forms an involucrum about the sequestrum. The break in the continuity of the tissues is not large, and the granulations are soft. In epithelioma the ulcerating surface is extensive and has hard edges and an indurated base; production of pus is lacking, and no lockjaw occurs. Necrosis is, of course, also present, but epithelioma is the primary disease.

Another trade disease was first noticed and described in Vienna. This is the so-called mother-of-pearl-workers' ostitis, or CONCHIOLIN-OSTITIS, which spares the upper but not infrequently attacks the lower jaw, and many other parts of the skeleton. It is characterized by an enormous thickening of the bone, which gradually disappears in the course of a few weeks without leaving any trace of its presence. Suppuration very rarely occurs. As a rule, the thickening is unaccompanied by any change in the soft parts, the skin is not reddened, and the adjacent soft parts look normal. On the lower jaw the process travels downward from the neighbourhood of the articulation, but spares the joint and the coronoid process. Lockjaw (ankylostoma) is absent. From the above it follows

that the diagnosis can lie only between some central bone tumour, which enlarges the bone, and the above disease.

But conchiolin-ostitis is accompanied by severe pain, is more rapid in its course than a benign neoplasm, and extends downward along the bone.

Another peculiar disease also has its favourite site in the region of the jaw, especially of the lower one. This disease is ACTINOMYCOSIS. Undoubtedly the ray fungus gains entrance next to the teeth, or through an empty tooth-socket, and from there works into the soft parts. Once established, it spreads and causes a labyrinth of sinuses in the soft parts. It also attacks the bone, producing fistulæ and necrosis. Externally, while the process is developing, we see abscesses, ulcers, and sinus formation. Its spontaneous appearance, absence of all pain, and frequently the violet hue of the overlying parts, remind us of tuberculosis. Actinomycosis was, as a rule, mistaken for tuberculosis (scrofula) as long as the disease was not understood. The trouble is diagnosed by means of the following symptoms: The foci are very numerous, but appear only on the cheek and one side of the neck, although no tuberculous processes can be found in the rest of the body. Swelling of the lymph glands is prominent by its absence. The healthy appearance of the patient, absence of hereditary taint, and the peculiar yellow granules found in the pus speak against tuberculosis. Finally, the microscope confirms the diagnosis by demonstrating the fungus (Fig. 3).

At times an acute form of actinomycosis is found, and presents the picture of a phlegmonous inflammation. In such cases the diagnosis can be made only by examination of the pus.

In dealing with *Neoplasms* of the jaws, the upper and lower maxillæ require separate discussion.

In the lower jaw the different course of periosteal and myelogenic (central) tumours is often striking.

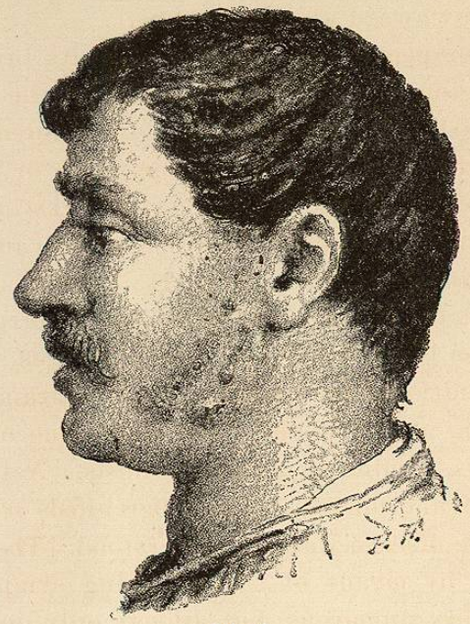

FIG. 3.

The central tumours expand the bone, the surfaces of the maxillæ become convex and the edges rounded off. As the expansion continues, the tumour not only grows prominent externally, but also in the direction of the oral cavity. The bone, which has attenuated and softened, becomes a mere shell, which produces a parchment crackling on palpation. Even this shell can disappear in spots, so that gaps are to be found. The tumours which give rise to these changes, as a rule, are soft sarcomata. They develop rapidly in the course of

a few months in young adults and children. The lymph glands are involved comparatively late. The presence of a perforated or partially destroyed bony shell is conclusive. *Periosteal tumours* rest upon the bone. They are consequently prominent only on the outer surface, while that part of the surface of the maxilla which faces the oral cavity shows no bulging. The lower margin of the jaw may retain its sharp edge until the tumour advances to it or begins to extend over it. The case is less clear if the edge of the bone is involved by the growth, and consequently appears rounded. Here the absence of swelling on the inner surface is a strong, or rather a decisive, argument in favour of a periosteal tumour. But a periosteal growth may involve both the outer and inner surface, and the edge of the bone, so that the bone is all but surrounded by the growth, yet remains intact in its centre. The lack of the egg-shell crackling on the surface of the tumour and the absence of any trace of a bony shell are conclusive.

In the upper jaw we must distinguish between *tumours of the antrum* and of those of the *maxilla.* A tumour of the antrum grows in the direction of least resistance. It consequently penetrates into the nasal fossa, presses the thin wall of the canine fossa forward, raises the floor of the orbit upward, and thus crowds the bulb upward and outward. After occupying the nasal fossa, the growth may proliferate and appear through the choanæ, though the thick lower wall of the antrum still remains intact.

In distinction to antral tumours, bone growths involve the alveolar process, destroy the teeth, and form an ulcerating mass of considerable size upon the surface of the maxilla. In addition, they attack the hard palate, causing it to arch forward, while the bulb retains its normal position and the canine fossa is not obliterated.

Cases in which all the signs and symptoms of an antral tumour were present, but in which sections of the extirpated maxilla showed that the tumour originated from the bone, do occur. Here the growth started in the thin diploic layer found between the two bony lamellæ of the anterior wall of the antrum. During its growth the tumour penetrated the antrum, and then continued to grow unhindered, with all the symptoms of a true antral tumour.

We frequently find the canine fossa pushed outward by a rounded swelling, which is sharply circumscribed and painless. It enlarges but slowly, and fluctuates. Formerly, physicians were satisfied to diagnose *hydrops antri Highmori.* To-day, we know that we have to deal with one of three conditions: with a dentigerous cyst, chronic periosteal abscess, or cystic polypus of the antrum. A hydrops of the antrum, in the strict sense of the word, does not occur. Only a muco-purulent or purulent collection of fluid (empyema) can accumulate. If the above-mentioned symptoms occur a different condition exists.

In all of these conditions the bony wall, which bounds the swelling anteriorly, may grow so thin that it can be pressed inward like parchment.

Dentigerous cysts develop toward the upper jaw by an abnormal growth of the permanent teeth from the enamel sac, which then often incloses the unerupted tooth. There are also dental cysts which arise from the root of the tooth without any abnormality of development.

Chronic subperiosteal abscesses are still rarer. After they exist

for a long period (I saw one case of thirteen years' duration) they assume an appearance which in no way resembles an ordinary abscess, for the periosteum, which covers the abscess, is stimulated to bone formation, and the newly formed lamellæ are then thinned out. The parchment crackling is wrongly ascribed to the anterior wall of the maxilla. In these abscesses the contents usually is serous, at times mucous. The swelling is not painful.

The diagnosis of dentigerous cyst is justified if one or more of the permanent teeth have failed to develop and a slowly growing cyst occupies the resulting gap.

If these signs are wanting, the diagnosis can be made only at the time of operation, for after the swelling has been split open, in the case of a mucous polyp, polypoid masses are encountered; in case of a dentigerous cyst, the unerupted tooth; in the subperiosteal abscess, pus. In none of the conditions does fluid injected into the cavity of the cyst flow out of the nostrils. In former days such findings would have led to the diagnosis of hydrops of the antrum. If fluctuation and parchment crackling were present the diagnosis was supposed to be assured. Their conception of the condition was, that in hydrops the outlet of the antrum was blocked, and that the secretions therefore accumulated. Such a condition has never been verified by unmistakable anatomical findings.

Professor Zuckerkandl's exhaustive researches demonstrate that cysts of the maxilla show great diversity in their behaviour. In general we distinguish between external and internal. The external cysts crowd out the anterior, at times the posterior, or even lower wall of the bone. They project into the vestibule or into the oral cavity. If the cyst grows as far as the floor of the antrum, it raises this upward, and thus encroaches upon its cavity. In a similar manner the floor of the nasal fossa can be raised up and thinned out. Such cysts have been known to burst. Cysts of the intermaxillary bone show an especial tendency to grow toward the nasal fossa or toward the gums. Empyema is due either to affections of the teeth and periosteum or to a purulent rhinitis. Consequently the anamnesis varies greatly. In regard to cysts, Zuckerkandl emphasizes the following: Arching forward of the anterior portion of the alveolar process or of the outer wall of the alveolus, together with parchment crackling, speak for cyst. If the internal wall of the antrum bulges in the middle meatus of the nose without distortion of other parts, the symptom indicates empyema. If the *inferior* and the *middle* meatus of the nasal fossa are encroached upon, the diagnosis of empyema still holds good.

Analogous conditions likewise arise on the lower jaw, except that mucous polyps are naturally excluded. The case may either be dentigerous cyst or chronic subperiosteal abscess. With these two alternatives kept in view, the reasoning is similar to that employed in like conditions of the upper jaw.

The direction in which *retro-maxillary tumours* enlarge is peculiar. They advance around the outer surface of the upper jaw, make their appearance below the masseter, below the zygoma, in the temporal region, even in the mouth, and in the orbit, where they may crowd the bulb out of place. But the walls of the antrum do not bulge, the alveolar process is not thickened, and the gum not crowded downward. On examining the swelling we are forced to the conclusion that it is soldered upon the jawbone, if this expression is permitted. It may be, and has been, mistaken for a tumour of the parotid.