SWELLINGS OF THE FACE, JAW, AND NECK IN ORAL DIAGNOSIS

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WHEN one considers the enormous amount of traffic, moisture, and the many varieties of bacteria besides the necessary dental manipulation in the oral cavity, the intimate anatomic arrangement of its tissues with the face, jaw, and neck, we can readily appreciate the relationship of swellings in these parts, and why such a variety of pathology can occur.

However, a careful examination will assist us in eliminating a number of things, as swellings and edema from dachryocystitis (inflammation of the tear duct) and other eye conditions, like styes, chalazions, orbital abscesses, etc., or involvement from the nasal sinuses especially when a severe ethmoid infection occurs with rupture at the inner corner of the eye surrounded by edema, or when benign and malignant tumors of the maxillary antrum extend beyond their confines and present a swelling on the face in the canine fossa. All of these conditions may be mistaken for some type of pathology, acute or chronic, associated with the teeth, but can readily be excluded by their local signs and symptoms, and by x-rays.

Frequently we note swellings due to local benign, specific, or malignant growths on the skin of the lips, face, and neck which may be recognized by their usual characteristics, and when edema from nephritis, heart disease, or other constitutional conditions appears, their bilateral pale waxy picture may make one suspect the necessity of a physical examination. Glands which may be primarily involved, thyroglossal cysts and bronchial cysts in the neck may be differentiated from swellings resulting because of acute skin infections and their complications from boils, wounds, hematomes and traumatic injuries by the history or by aspiration; but chancres, gumma, actinomycosis, mumps, suppurative parotitis, and other conditions like anthrax, tuberculous glands, Hodgkin's disease, acromegaly, and angioneurotic edema require various blood, bacteriologic, biopsy, or other physical tests.

On the other hand we may encounter cases in which pathology in the oral cavity accounts for the swellings of the face, jaw, or neck, as for instance:

1. Benign growths such as mucous cysts, adenomas, and lymphangiomas of the upper or lower jaws which have expanded the adjacent skin and tissue. These are recognized by the history, individual appearances, and aspiration besides x-ray examination.
2. Odontogenic tumors. The phenomenon of these new formations is sufficiently interesting to describe. In the second month of fetal life, the gingival epithelium folds inward to form the dental ridge, buds of enamel organs push into its mesoderm and at four months are invaginated by it to form a bell-shaped structure, with an interspace of mucoid material. The invaginating mass of connective tissue is known as the dental papilla, its

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outer cells becoming specialized to produce dentine, and the central portion becomes the pulp of the tooth. A single layer of epithelial cells next to the crown portion of the dental papilla produces the enamel, and the inner and outer tunics of the enamel organ over the root portion of the dental papilla make a loop around the forming root, known as the sheath of Hertwig. During this process small masses of epithelial cells become detached to become imbedded in the surrounding connective tissue. These, together with persisting remnants of Hertwig's sheath or other portions of the enamel organ, make up the epithelial debris of Melassez, whose theory that certain cysts and tumors of the jaw arise from this debris is widely accepted. Tumors and cysts of the jaws which arise from the embryonic dental remnants are called odontomas, the type depending on the type of cell from which they originate and also on the degree of differentiation.

Although there are various classifications, I think the simplest is that of Havens, who has outlined for clinical consideration the cystic odontomas and benign cysts of the jaw, as follows:

I. Cystic odontomas:

A, Follicular, or dentigerous cysts.

1. Those containing an associated tooth—where, because the proliferation of tissue is superficial to the tooth, it interferes with its eruption and forms a cyst surrounding the tooth.

2. Those not containing an associated tooth—because the process begins alongside the tooth, permitting it to erupt, and the cyst lies below or partially around the tooth. In either case resorption of bone occurs when the cyst enlarges, usually a tooth is absent from its normal position and seen in the cyst.

B, Adamantinomas are in this class.

II. There are also cysts of inflammatory origin, or radicular cysts which result from infection at the tip of a pulpless tooth and are often adherent to it. If the tooth is not pulpless and the cyst large, it may be difficult to distinguish it from a follicular cyst.

III. Other cysts are of traumatic origin—which may be likened to bone cysts secondary to traumatic hematoma. These have no epithelial lining; x-rays reveal a bone cavity near the inferior dental canal not associated with a tooth root. A history of injury and aspiration will reveal blood, straw-colored fluid, or cholesterol crystals depending upon its age.

IV. Cysts developing from nondental embryonic rests are:

A, Median anterior palatine canal cysts, occasionally seen in the region of the tips of the upper incisors and are proliferations of remnants of epithelium of the canal.

B, Facial cleft cysts, due to persistent epithelium at the point where both lateral portions of the upper jaw join at the upper lip (if these do not join completely, we get cleft palate). These cysts are usually found under the upper lip at the vestibule of the nose and may enter the floor of the nostril.

All of these require an x-ray examination for their diagnosis, as do teratoma and osteoma.

3. Malignant swellings, along the inner side of the upper or lower jaws, which are hard, firm and adherent, but noninflammatory.

They may be epithelioma, osteosarcoma, or sarcoma. Here x-ray or biopsy is necessary.

4. Metastasis from cancer or sarcoma of the tongue, palate, mouth, cheeks, nasopharynx, or throat, involving usually a unilateral cervical gland. This is hard, firm, and does not suppurate unless secondarily infected. May I urgently suggest that any hard, large, nontender unilateral deep cervical gland should always inspire a thorough search somewhere above for a possible malignancy, and particularly do not neglect the region of the nasopharynx, and do not incise it until this is excluded.
5. Secondary involvement of a chain of enlarged but small, noninflammatory cervical glands from syphilis and tuberculosis of the oral cavity. Their diagnosis may be assisted by other signs and symptoms, with the aid of x-ray, blood examination, or biopsy.
6. Enlarged glands from Vincent's angina (whether from teeth, tonsil, or throat involvements) often produce tender swellings at the angle of the jaw. The diagnosis by buccal smears is self-evident. However, one must appreciate that frequently Vincent's angina occurs as a mixed infection especially in cases of cancer and syphilis.
7. Instrumental trauma could also cause swellings because of a hematoma, edematous reaction, novocain reaction, or fracture, but the history and x-ray findings are usually sufficient to make a differential diagnosis.
8. While swellings because of bone necrosis from chemical poisoning with phosphorus, mercury, etc., are comparatively rare nowadays, it may be thought of, and here the history helps.
9. Calculi of the salivary glands occur which produce swellings in their respective regions, which are not acutely inflamed and not tender unless infected, at which time pus can be seen exuding or stripped from its ducts. The diagnosis in cases of calculi can be verified by probing the duct, and x-ray examination with or without lipiodol injection. In this manner they may be distinguished from sublingual or submaxillary infected tender glands.

SWELLINGS CAUSED BY INFECTION

The most important and frequently most severe acute swellings, however, may arise from oral infections, and could occur as:

1. A suppurative periostitis beginning at the site of the lesion from a mucosal, submucosal, or bone involvement, such as may be caused by Vincent's infection, ulcers, dentoalveolar abscess, infection in a pocket covering an unerupted lower third molar, trauma from a foreign body or necessary dental manipulation, etc. These spread downward and backward or forward along the side of the mandible then breaking through into the deeper struc-

ture of the neck or floor of the mouth; and if in the upper jaw, into the face or antrum.

2. Oral infections may also begin locally as a soft tissue cellulitis and be carried from there to the contiguous and even sometimes to distant structures by way of venous or lymph channels, causing sepsis.

When either type of infection occurs in the maxilla, the acute swelling may be considerable, is painful, tender with or without abscess, or occasionally it may produce necrosis of bone or osteomyelitis with their concomitant signs and symptoms. Not infrequently the maxillary antrum is involved with or without swelling. X-rays are of unquestionable value for diagnosis.

When the mandible is affected swelling from local abscess or osteomyelitis may occur with the usual signs and symptoms of raised temperature, pain, redness, tenderness and x-ray findings; or if a lymphatic gland only is involved under the chin, alongside the jaw, or in the neck, then the painful tender swelling is localized to that particular region.

At this point I again wish to call your attention to the occasional non-tender swelling which may be mistaken for these when alongside the jaw and adherent to the alveolus inside or outside the cheek, which is firm and immovable and which may be due to malignancy. This should be excluded by x-ray, etc., before incising.

When there is infection in the floor of the mouth or the deeper structures of the neck, then the swelling and complications may be quite serious.

I would like to describe very concisely their anatomic arrangements so that the pathology can be readily understood. The floor of the mouth is enclosed by the firm mylohyoid muscular pouch which is stretched across as it is attached on the sides to the mylohyoid ridges about one-half inch behind and just below the gingival margins of the last lower molars, then dips downward and forward to join the sides and inner edges of the chin about 1½ inches below the gingival margin in front. It meets its fellow in the midline and both are attached posteriorly by a strong fibrous band reaching to the hyoid bone where the only open space of the pouch exists. This is at the submaxillary fossa where the deep portions of the submaxillary glands lie and its ducts come forward, all of which makes drainage very difficult. Above it is the tongue and behind it the epiglottis near which is the larynx and esophagus.

You can readily see how infections in this pocket may cause a swelling which cannot expand except against the tongue and toward the throat, epiglottis, and larynx, with subsequent edema, difficulty in breathing and swallowing and with trismus of the jaws from inflammatory spasm causing Ludwig's angina and possibly fatal results, especially if some of the infection spills over this posterior border into the neck causing added pressure and infections. You can see, therefore, how this space is hemmed in on the floor by these firm muscles, on its side and in front by the bony wall of the mandible, its posterior wall the base of the tongue and deep portion of the submaxillary gland and on the roof by the tongue and the mucosa of the mouth. Being limited in this manner the infection is localized in a definite space.

The origin of an infection of this space is generally found within the lower gingival borders usually around the teeth and within the floor of the mouth. When the infection is confined to one side, it forces the tongue upward, backward, and to the opposite side, and when both sides are involved the tongue is pushed toward the palate and backward. Frequently the mucosa of the floor in front of the tongue is so swollen and edematous that it looks like a second tongue. Another feature is that a boardlike swelling appears externally under the chin, with no fluctuation since there is no pus, although some pus may occasionally be found in small quantities later. This condition should not be mistaken for infection in the submaxillary region.

Experiments have repeatedly shown that injections of dye indicate the courses which infections around the mouth might be expected to pursue. Those arising around the inner side of the mandibular teeth and gums, except at the front, enter the tissues of the sublingual pouch, where an inflammation begins and may develop into a sublingual phlegmon or Ludwig's angina. Not all infections, however, take this course. Some enter the deep cervical glands involving the submaxillary fossa, the carotid sheath, etc., or produce general septicemia. Infections inside the mouth near the lower front teeth, or in the gums and around the teeth on the external side or outside the midgingival border, produce infections outside the floor of the mouth, that is, under the chin and in the superficial submaxillary region. However further extension and even septicemia may occur, depending upon the type and virulence of the bacteria, and the patient's resistance. Appropriate surgical procedure inside or outside the oral cavity is a matter of judgment. As a matter of fact, it is frequently necessary to perform a tracheotomy especially in some cases of Ludwig's angina.

Oral infection may pursue another route, namely by entering directly into the neck instead of into the floor of the mouth. This may occur by contiguity or by way of the submaxillary fossa, retropharyngeal fossa, then the periesophageal and mediastinal regions and other cervical fascial planes, or by way of the associated lymphatic chains.

The deep cervical fascia is of interest. It may be likened briefly to a large tube around the neck attached above to the base of the skull and below to the clavicles and acromion in which there are a series of smaller tubes attached to each other to envelop muscles, viscera, the carotid artery with the jugular vein and vagus in a tube called the carotid sheath with deep cervical lymph glands alongside it. This sheath because of its contents, extends above into the skull and below into the chest and may be considered the main highway, particularly because all the other tubes and spaces formed by the splits of the fascia like the submaxillary, pharyngo-maxillary, retropharyngeal and periesophageal spaces lead directly or indirectly into it. Therefore, it is pathologically and surgically of greatest importance in oral infections, because any spillover from the floor of the mouth, the maxillary fossa, pharyngo-maxillary fossa or lymph channels can be reached by way of this main highway or carotid sheath, along which it may have become localized or have traveled upward toward the skull or downward toward the mediastinum and result fatally, or also become localized therein.

The logical surgical procedure consequently is to make an incision into this highway in search for pus, upward, downward or in any direction; occasionally it is necessary to make an additional horizontal incision parallel to the lower border of the mandible to get into these various bypaths.

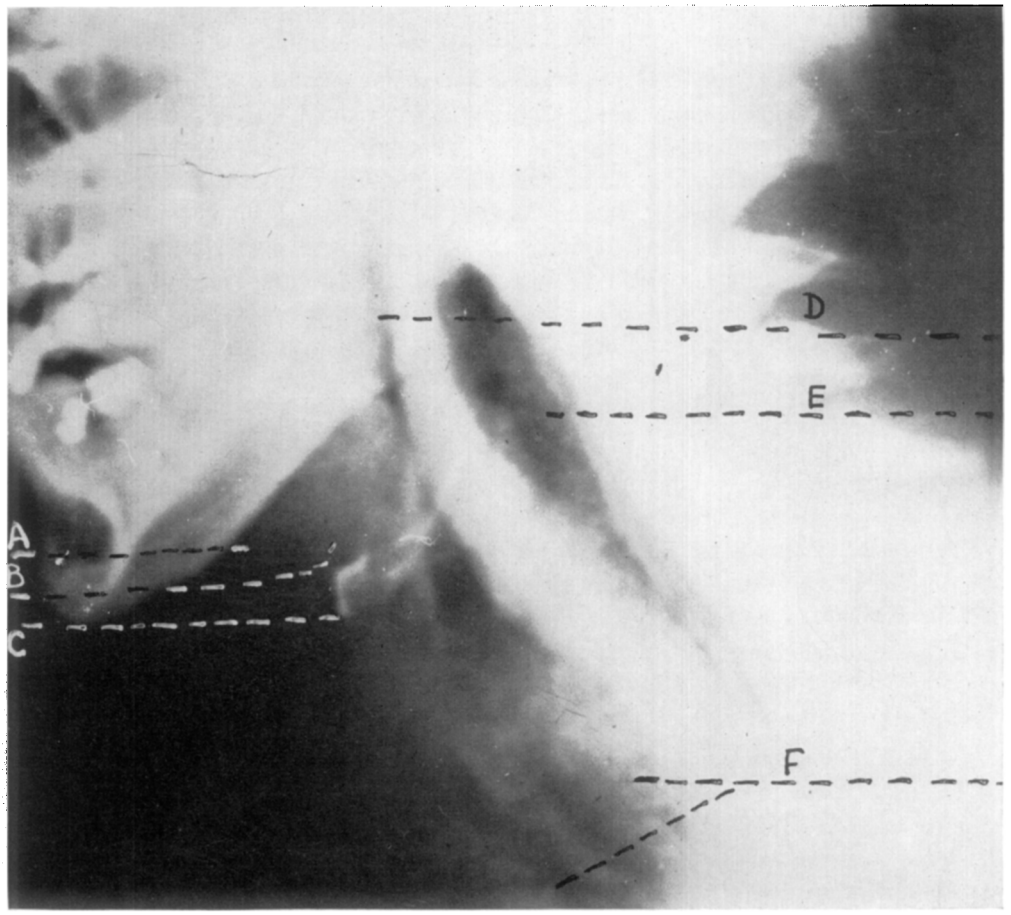

Fig. 1.—*A*, Floor of the mouth. *B*, Submaxillary space. *C*, Hyoid bone. *D*, Retro-pharyngeal space. *E*, Pharyngo-maxillary space. *F*, Peri-esophageal space.

All these were filled with pus, serum, and air which extended into the mediastinum with fatal results notwithstanding heroic medicinal and surgical treatment. (X-rays courtesy of Dr. Frederick Law.)

REPORT OF A CASE

Fig. 1 represents a very interesting case following extraction of a mandibular last molar under novocain infiltration. Three days later the patient developed a rapidly increasing tender swelling under the angle of the jaw, painful and difficult swallowing, and dyspnea successively. During this time, the swelling spread all around the floor of his mouth; his tongue was displaced upward and backward; his pharynx became red and swollen, also externally in front and around the sides of his neck down to his sternum. Crepitation was noticeable by palpation all around the front and sides of his neck. All of this swelling was due to pus and air because of a mixed bacterial infection complicated by a Welch gas bacillus.

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