CHAPTER 11

SOFT TISSUE CALCIFICATIONS

Pathologic calcification of soft tissues occurs when calcium and other mineral salts are deposited in a tissue or in a passage. There are three types of pathologic calcifications: 1) Dystrophic calcification is that which occurs in degenerating and dead tissues. Calcification of the larval stage of tapeworm (cysticercus) is an example of dystrophic calcification. 2) Metastatic calcification is that in which calcium (and other) salts are deposited in previously undamaged tissue as a result of an excess of salts in the circulating blood. Hyperparathyroidism is an example of metastatic calcification which occurs in kidneys and blood vessels. 3) Calcinosis is calcification that occurs in or under the skin. Scleroderma, myositis ossificans, and multiple miliary osteomas are examples of calcinosis.

SIALOLITH

A sialolith is a stone (salivary calculus) within a salivary gland or duct. The formation of a sialolith is called sialolithiasis and occurs as a result of precipitation of calcium and phosphate salts around a nidus of mucous or bacterial debris. Sialoliths occur as single or multiple stones and can cause swelling and pain. The pain is experienced during salivary stimulation and is intensified at mealtimes. The accumulation of saliva in the gland produces swelling and the gland becomes enlarged and firm. The pain is produced as a result of the buildup of pressure due to the accumulation of saliva behind the stone. The pain gradually subsides and the swelling diminishes because the stone usually does not completely block the flow of saliva. If a sialolith is small or does not obstruct the flow of saliva, there may be an absence of pain and swelling. Most stones are found in the submandibular duct (Wharton's) and gland than in the parotid duct (Stensen's) and gland

because of the viscous consistency and mineral content of the saliva from the submandibular gland and the long, irregular length of the Wharton's duct.

The best radiographic projection for visualizing sialoliths in the submandibular duct and gland is the standard mandibular occlusal view. Occasionally, sialoliths are seen incidentally on periapical radiographs, in which case they may be misdiagnosed as osteosclerosis. To differentiate a sialolith from an osteosclerosis, use the Clark's rule of tube-shift technique to localize objects, that is, to find the bucco-lingual relationship. Stones in the parotid duct and gland are best demonstrated by placing a periapical film in the buccal vestibule and x-radiating them with a reduced exposure time. Approximately 20% to 40% of all sialoliths are radiolucent. When this is suspected, sialography (injection of a radiopaque dye into the ductal opening and then x-radiating them) must be undertaken to visualize the stones. The duct or gland injected with the radiopaque dye shows the radiolucent sialolith as a non-filling defect. A sialolith must be differentiated from other soft tissue calcifications, especially from a calcified lymph node. The latter is usually asymptomatic and sialography may be required to distinguish the two lesions.

Fig 11-1 Mandibular occlusal projection shows a sialolith (salivary calculus) in the duct of the submandibular gland (Wharton's duct). The patient has a history of pain and swelling in the salivary gland which is intensified at mealtime when saliva flow is stimulated. The pain gradually subsides and swelling diminishes because the stone usually does not completely block the flow of saliva.

Fig. 11-2 On periapical radiographs, the radiopacity may be misdiagnosed as osteosclerosis. To differentiate an osteosclerosis from a sialolith, take two radiographs using different vertical (or horizontal) angulations of the x-ray beam. If the radiopacity changes its position in relation to the adjoining teeth, as shown here, the radiopacity is a sialolith in the floor of the oral cavity (Clark's rule: same lingual, opposite buccal). Another method to identify a submandibular sialolith is to take an occlusal projection.

Fig. 11-3 A sialolith on a panoramic radiograph may be misdiagnosed as a calcified lymph node. In the absence of clinical signs and symptoms it is difficult to differentiate the two types of calcifications unless a sialogram is made.

Fig. 11-4 Sialogram showing an obstruction in the Wharton's duct preventing the flow of the radiopaque dye into the submandibular salivary gland. The stone (arrow) is blended with the radiopaque dye.

CALCIFIED LYMPH NODE

A calcified lymph node is indicative of a prior chronic infection involving the node. A history of successfully treated tuberculosis is often associated with this calcification. The condition is asymptomatic. It may involve a single node or a chain of submandibular or cervical nodes. The calcified superficial lymph nodes are palpable as bony, hard, round or linear masses with variable mobility. They are often observed on a panoramic radiograph, where they may appear below the inferior border of the mandible and near the angle of the mandible. Calcified lymph nodes are often found incidentally on radiographic examinations. Some may be radiographically projected over the mandibular bone and may be misdiagnosed as osseous lesions.

A calcified submandibular lymph node may be difficult to distinguish from a sialolith. The former is invariably asymptomatic whereas the latter is frequently accompanied by pain and swelling at mealtimes. Sialography may be required to distinguish the two lesions.

Fig. 11-5 Calcified lymph nodes located inferior to the angle of the mandible. Prior chronic infection of the lymph nodes may result in calcification of the nodes. A history of successfully treated tuberculosis is often associated with this calcification. This asymptomatic condition may involve a single node or a chain of nodes.

Fig. 11-6 A lateral cervical radiograph shows a chain of calcified lymph nodes.

PHLEBOLITH

Phleboliths are calcified thrombi that occur in veins or sinusoidal vessels of hemangiomas involving the soft tissues adjacent to the jaws. On a radiograph they appear as round or oval bodies which may exhibit concentric calcific rings similar to the cross section of an onion. Phleboliths may occur singly or as multiple calcifications. On periapical radiographs, calcifications may be superimposed on the mandible and thus misdiagnosed as osseous lesions within the jaw or as sialoliths.

Fig. 11-7 Multiple phleboliths superimposed on the mandibular ramus. Phleboliths are calcified thrombi. These calcified masses in blood vessels are associated with hemangiomas found in the cheek.

Fig. 11-8 Multiple phleboliths of various sizes in cavernous hemangioma of the face. The radiograph is of the patient's cheek.

CALCIFICATION OF ARTERIES

Calcification of the walls of arteries occurs in arteriosclerosis and in secondary inflammatory conditions involving arteries. The calcium salts are deposited within the medial coat of the vessels. Calcification can occur in a number of arteries of the body (iliac, femoral, abdominal aorta, etc.), however, in the facial region the facial artery is the one that is often involved. Calcified arteries of the cheek and oral cavity may appear as faint images on periapical radiographs. In the Sturge-Weber syndrome (capillary hemangiomas of the face, oral mucosa, and cranium), the cranial hemangiomas often show marked calcification of the blood vessels.

Fig. 11-9 Calcification of the facial artery. It may occur in arteriosclerosis and represents an inflammatory process.

Fig. 11-10 Calcification of the facial artery. The radiopacity of the artery is the result of deposition of calcium salts within the medial coat of the vessel.

ANTROLITH

A calcified mass in the maxillary sinus is called an antrolith. It is produced by calcification of a nidus which may be a bone chip, root fragment, foreign object, or stagnant mucus in sites of previous inflammation. Most of the antroliths are asymptomatic and are detected incidentally on radiographic examinations. However, on rare occasions when an antrolith continues to grow and become very large, it may be associated with sinusitis. Antroliths must be differentiated from root fragments in the maxillary sinus. A root fragment will show the root anatomy such as the presence of a pulp canal in a cone-shaped (root-shaped) radiopacity. When calcification comparable to an antrolith occurs in the nasal fossa, it is called a rhinolith.

Fig. 11-11 Calcified mass in the maxillary sinus is called an antrolith. A foreign object, bone chip, root fragment or stagnant mucus acts as a nidus for calcific deposits. It is usually asymptomatic.

Fig. 11-12 Antrolith (stone in maxillary sinus) on the floor of the sinus. It is asymptomatic.

MULTIPLE MILLIARY OSTEOMAS OF SKIN

(Osteoma cutis, calcinosis cutis)

Multiple milliary osteomas of skin, also known as calcinosis cutis, are situated in the cutis and subcutis. Some of these calcifications are associated with acne or some other form of dermatosis. They are found incidentally on radiographic examinations. They appear as doughnut-shaped radiopacities with radiolucent centers which represent the central marrow cavities. Multiple miliary osteomas are imaged better by placing a dental film in the vestibules and against the inside surface of the cheek and using a reduced exposure time.

Fig. 11-13 Multiple miliary osteomas of skin are soft tissue calcifications of skin. Some are reported to be associated with acne or some other form of dermatosis.

Fig. 11-14 Calcinosis cutis showing doughnut-shaped radiopacities.

CALCIFIED STYLOHYOID LIGAMENT AND EAGLE'S SYNDROME

Calcification of the stylohyoid ligament may sometimes be found incidentally on a panoramic radiograph and located posterior to the ramus of the mandible. It may occur unilaterally or bilaterally. In about 50% of the cases, the individuals are asymptomatic. In those cases associated with pain and discomfort, the entity is called ''Eagle's syndrome''. The syndrome includes vague pain on mandibular movements such as swallowing (dysphagia), turning the head or opening the mouth, sensation of foreign body in throat, and constant dull ache in the throat. Other symptoms include headache, earache (otalgia), dizziness, pain in temporomandibular joint area and also in the base of the tongue or transient syncope. The symptoms are probably caused by the elongated styloid process impinging on the glossopharyngeal nerve. When the jaws are closed, the pain subsides in some of the cases. It is important for the dentist to be aware that pain associated with calcified stylohyoid ligament may simulate pain associated with that of the temporomandibular joint.

On a radiograph, the calcified stylohyoid ligament appears as a thin, long, tapering radiopaque process extending downwards from the styloid process. Sometimes it may extend up to the lesser horn of the hyoid bone. The farther the mineralized ligament extends towards the hyoid bone, the more likely it is that it will be interrupted by radiolucent joint like junctions. Surgical resection is required in patients exhibiting symptoms.

Fig. 11-15A Patient with Eagle’s syndrome. The stylohyoid ligaments are bilaterally calcified. Patient complained of constant dull ache in the throat, pain on turning the head, and pain in the vicinity of the temporomandibular joints.

Fig. 11-15B Calcified stylohyoid ligament. Sometimes, this calcification may be associated with Eagle's syndrome. The syndrome produces cervical pain on turning the head, upon swallowing and on opening the mouth. The patient may have headaches, and dizziness.

Fig. 11-16 Calcified stylohyoid ligament in an asymptomatic patient.

Fig. 11-17 Bilateral calcified stylohyoid ligament in a case associated with Eagle's syndrome.

CALCIFIED THYROID CARTILAGE

Calcification of the thyroid cartilage is normal and increases with age. The thyroid and cricoid cartilages have been found to undergo a greater frequency of calcification in the female population, but a higher degree of ossification has been noted in male subjects. (In the hyaline cartilages of the larynx, calcification does not always precede ossification and there is little correlation between the two).

Fig. 11-18 Calcification of the thyroid cartilage. It is asymptomatic.

MYOSITIS OSSIFICANS

In myositis ossificans, bony structures such as lamellae, lacunae and marrow are deposited in soft tissue. The cause of this ossification in muscles, ligaments, tendons and fascia is unknown. It may be caused by trauma or heavy muscular strain that occurs in certain occupations and sports. During the healing process, the blood in the traumatized region gets organized and later calcified. The calcification takes place in the connective tissues around the muscles. The digastric, masseter, temporal and sternomastoid are usually involved. The patient finds it difficult to open the jaws when the muscles of mastication are involved. The characteristic radiographic appearance is that of strand-like calcifications along the long axis of the muscle fibers.

CYSTICERCOSIS

Cysticercosis is a helminthic (parasitic worms) disease which completes the larval phase of its life cycle in the pig. When an individual ingests eggs of the (pork) tapeworms from contaminated water or food, the larval form of the tapeworms are hatched in the gastrointestinal tract, and enter the vascular and lymphatic systems. They are then deposited in various tissues and organs of the body. At this stage, there is no radiographic evidence of their presence. After their death, the larval spaces are filled with fibrous tissue which later becomes calcified. These calcifications in muscle and subcutaneous tissue are visible on a radiograph as multiple radiopaque ovoid or elliptical objects.

Fig. 11-19 Radiograph of patient with cysticercosis. The calcified encysted larvae are seen in the soft tissues at the back of the neck and a single one is seen in the area of Wharton's duct. (Courtesy Dr. E. Cheraskin)