

not occasioned by changes of temperature, as is often the case with inflammation of the pulp. The tooth upon pressure feels sore in the socket, yet during the first stages of the inflammation a grinding of the affected tooth against its antagonists gives some relief. The inflammatory process sometimes stops at this point, but very often goes on to the formation of an alveolar abscess.

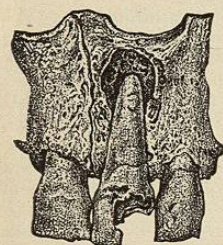


FIG. 4630. — Absorption of Bone, produced by an Alveolar Abscess at the Tip of the Root of a Left Superior Incisor.

Alveolar abscess forms about the tip of the root. As pus collects, the neighboring bony tissue is absorbed, and a cavity is formed varying in size according to the severity of the inflammation. Like abscesses in other parts of the body, it seeks an outlet at the point of least resistance. There are several ways in which the pus may make its escape. It may penetrate the bony alveolus in a line which is, roughly speaking, at a right angle to the root of the affected tooth, and thus make its escape into the mouth, or, in some cases, upon the face. Or it may pass down the length of the root, either between the peridental membrane and the cement, or between the peridental membrane and the bony socket, in both cases discharging about the neck of the tooth. When an alveolar abscess occurs in connection with the six anterior teeth and bicuspids of the upper jaw, it usually discharges on the labial surface of the alveolus, at a point about opposite the tip of the root of the affected tooth. In rare instances an abscess connected with these teeth may discharge on the outside of the front part of the face or into the nasal cavity, and in the case of the bicuspids, into the antrum Highmori. An abscess occurring in connection with the upper molars most commonly discharges on the buccal surface of the alveolus, about opposite the tips of the roots affected. It may, however, discharge in the neighborhood of the hard palate, when proceeding from the palatal root. Besides these usual points of discharge, the abscess may open into the antrum or upon the outside of the face, near the union of the malar and superior maxillary bone. Abscesses formed about the lower anterior teeth usually open on the labial side of the alveolus, within the mouth. They may, however, open on the outside of the face, below the horizontal portion of the jaw. Abscesses in connection with the lower bicuspids usually open on the buccal side of the alveolus, though they may discharge on the face, along the body of the jaw. Abscesses connected with the lower molar teeth usually find exit upon the buccal side of the alveolus, but sometimes on the outside of the face, adjoining the inferior maxillary bone. Cases are reported in which the abscess has opened in the neck, and even as low down as the infraclavicular region. Alveolar abscesses usually assume a chronic condition, and keep up a discharge of pus from their fistulous opening as long as the root in connection with which they have been formed remains in the mouth, or until the pulp canal of the root has been properly cleaned and filled. The opening of an alveolar abscess upon the face or neck has oftentimes been mistaken for the discharge from necrosed bone. A case coming under the observation of the writer, while in charge of the Dental Infirmary of the Harvard Dental School, will illustrate the point. A farmer, from the western part of Massachusetts, came to the Massachusetts General Hospital to be treated for a fistula opening at the symphysis of the lower jaw. The fistula discharged more or less, and was thought to be due to necrosis of the lower jaw. The condition had existed for about two years, and had been treated by injecting the fistula with various medicaments. At the hospital they declined to operate till his teeth had been examined. Such an examination showed a lower incisor which, though not carious, was believed to contain a dead pulp

and to be the origin of the fistula. The tooth was extracted at the Dental Infirmary, and the patient advised to return home and report in a month's time. In due time the patient reported that the fistula had completely healed. While not all cases of fistula about the face are due to dental abscess, yet the teeth should always be examined when such a case presents itself.

The clinical symptoms attendant upon alveolar abscess are well marked and of peculiar severity. Since alveolar abscess starts with simple inflammation of the peridental membrane, the first symptoms are the same as those described under that affection. As the condition advances, however, the pain becomes more intense, the tooth is farther protruded from its socket, and is exquisitely sensitive, the touch of a finger often being sufficient to produce great agony. Sometimes the formation of pus is marked by a chill and rise of temperature. This formative stage may last from twenty-four to forty-eight hours; meanwhile the pus has been working its way through the surrounding bone into the soft parts. When this has occurred the face in the neighborhood of the affected tooth becomes swollen, and there is a marked remission of pain. The mucous membrane of the gum about an alveolar abscess is much congested and swollen, besides being sore to the touch.

As peridental inflammation and alveolar abscess are very common causes of toothache, it is necessary to distinguish between the toothache so caused and that due to irritation of the pulp. Toothache from irritation of the pulp is started by the pressure of food against the pulp, by a sudden variation of temperature, or by sweet or salty substances. The pain is violent, but intermittent, and no soreness of the tooth in the socket, as a rule, exists. Toothache from inflammation of the peridental membrane or alveolar abscess is started by the death and decomposition of the pulp. The pain is continuous; it is increased by the application of heat, diminished by the application of cold. The tooth is sore in the socket, and if the crown is tapped with an instrument the patient will flinch. The tooth is protruded from the socket, the gums are inflamed, and the face is swollen.

The treatment of peridental inflammation or alveolar abscess is, first, to remove the cause of the irritation. If the tooth is without value to the individual it should be extracted. This is the quickest way out of the difficulty. If, however, it is desirable to preserve the tooth, its pulp cavity should be at once opened and cleansed from all decomposing material. If this is done in the first stage of the difficulty it is usually sufficient, and, the source of irritation being removed, the inflammation subsides. If the case be one of alveolar abscess the cleansing of the pulp cavity is of advantage, not only in removing the source of irritation, but also in giving a vent to the forming abscess through the root canal. In many cases, however, the abscess will open through the alveolus in spite of treatment. Such an opening can sometimes be hastened by incising with the lance over the affected root. Whether pus can be reached with the lance or not, the incising of the gum gives relief by diminishing the congestion of the part. The use of leeches upon the gum is an old and often effective remedy. The tincture of iodine painted upon the gum is of

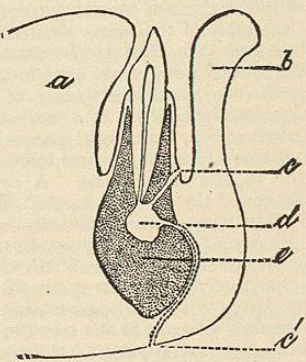


FIG. 4631. — A Vertical Section through a Lower Incisor and Surrounding Parts, Illustrating two Ways in which an Alveolar Abscess may find Vent. The first, and more common way, is by the fistula opening at *c*; the second, and less common way, is by the fistula opening at *e*. *a*, the tongue; *b*, the lower lip; *d*, the abscess cavity; *e*, the inferior maxillary bone.

common use; also the application of capsicum plasters, slippery-elm poultices, and roasted raisins. A poultice should never be applied to the outside of the face, on account of the danger of causing the abscess to discharge externally and leave a scar upon the face which is a permanent disfiguration.

*Pathological Affections of the Peridental Membrane dependent upon, or associated with, Calcareous Deposits on the Teeth.*—Calcareous deposits are of two classes: those originating from the saliva, and called salivary tartar or salivary calculus, and those originating apparently from a serous exudation from the peridental membrane, and called serumal calculus. The salivary tartar or calculus is composed mainly of phosphate of calcium, which is contained in the saliva and is precipitated upon the teeth. It is found in greatest abundance on the buccal sides of the upper first molars, near the opening of the parotid gland, and on the lingual side of the lower anterior teeth, near the opening of the submaxillary and sublingual glands. Salivary calculus is first deposited at the neck of a tooth, and, if not removed, spreads both toward the cutting edge and in the opposite direction up the root. In its progress along the root it presses away the gum from the neck of the tooth and separates the peridental membrane from its attachment to the cement. If allowed to rest in contact with the peridental membrane, it destroys its life, and also that of the adjacent bony alveolus, thus largely diminishing the natural support of the tooth. In this way the teeth affected become loosened, and may be entirely dislodged. Salivary calculus, though, as a rule, limited to the regions described, may in much neglected mouths cover the entire lingual side of the lower teeth and the buccal sides of the upper teeth. The treatment of this deposit consists in its removal, after which the peridental membrane quickly resumes its normal character, except such portions as have been destroyed, and the gum closes around the neck of the tooth.

The second form of calcareous deposit, called the serumal, has nothing to do with the saliva, nor is it limited to certain localities in the mouth. It is supposed to be due to a deposition from serum exuded from the gingival margin of the gum and peridental membrane; this deposition taking place in consequence of irritation. It may affect any of the teeth, and is located at the margin of the gum, often hidden from sight. In color it varies from yellow to brown, and even black. It often encircles the root of the tooth, but may be deposited in patches. It increases slowly, but is destructive to the peridental membrane, which becomes separated from the root. The alveolar bony processes about the neck of the tooth are in time absorbed, and the natural support of the tooth is diminished.

In connection with this deposit there may be a flow of pus, due to irritation of the peridental membrane. To this condition the name pyorrhœa alveolaris has been given. While salivary calculus causes the loosening and falling out of the lower front teeth, the serumal deposit may effect the loosening and falling out of any of the teeth, and is the most common cause of that result.

There remains to be described an affection of the peridental membrane which is very destructive to that tissue. It is usually associated with a deposit of serumal calculus, and may be very similar to the affection just described. The calcareous deposits are, however, more likely to be in patches, and to advance more rapidly to the apex of the root. By this means pockets are formed along the side of the root, due to a separation of the peridental membrane from the cement of the root. In the first form of serumal deposit the peridental membrane is separated from the tooth around the entire circumference of the root, and from its neck as far up as the deposit reaches; the tips of the root meanwhile being firmly attached to the peridental membrane until the tooth falls out. In the second form, however, the root may be separated from its peridental membrane on one side up to its apex, and in other parts firmly attached. At the apex the root is often entirely separated

from its surrounding membrane, though at its neck there may be a fairly good union. Whether the deposit of calculus is due to the inflammation of the peridental membrane, or the inflammation is due to the deposit of calculus, is not decided. This form of calculus is associated with a flow of pus and rapid destruction of the peridental membrane. This membrane having been destroyed, the tooth loses its hold in the socket, and in time drops out. There is some reason to suppose that this disease is due to a special micro-organism, and that it is infectious. On this account it has been called infectious pericementitis. The term pyorrhœa alveolaris is commonly applied to this as to the preceding condition. The treatment of both kinds of serumal calculus with associated inflammation of the peridental membrane is to remove the deposits of calculus and to keep them removed. To this must be added thorough cleanliness of the teeth, and a washing out of all pockets produced by the separation of the root from its membrane. The use of antiseptic and astringent fluids in such pockets is a desirable and effective treatment, especially in that form of deposit last described. In people of middle or advanced life calcareous deposits are more destructive to the teeth than is caries.

*EXTRACTION OF THE TEETH.*—The extraction of the teeth may be called for by various conditions, of which the more common are:

1. A crowded condition of the teeth which threatens or has caused irregularity. Teeth may be placed entirely outside or inside of the dental arch. The extraction of such teeth is often advisable. It may, however, be laid down, as a rule, that the superior canines and central incisors should not be extracted to correct irregularity; nor should the inferior canines, except in rare instances. For example, it often happens that when the superior canines make their appearances through the gum there is no room for them between the superior lateral incisors and first bicuspids. As the canines descend they in consequence take a position outside of the arch and are a deformity. They are not on this account, however, to be removed, because by their position and size they give character to the expression of the face. A bicuspid, or sometimes a first molar, should be extracted instead, and thus room gained for the canine. In many such cases, however, there is no need for extraction, inasmuch as the enlargement of the dental arch, either by nature or by mechanical appliances, will furnish the required room.

2. The existence of a few teeth in the mouth which interfere with the adjustment of an artificial plate. This is a very common cause for extraction, inasmuch as a more satisfactory plate can, as a rule, be made for a mouth having no teeth than for one having a few scattered teeth.

3. The existence of pain due to:
  - (a) Congestion or inflammation of the tooth pulp.
  - (b) Inflammation of the peridental membrane.
  - (c) Alveolar abscess.

More teeth are extracted to relieve pain than for any other cause. Where teeth, however, by treatment can be relieved of pain and made useful organs, they should not be extracted.

4. The existence of diseased conditions of the tissues in the neighborhood of the teeth.

An inflammation of the antrum is sometimes best treated by extracting an upper first molar or second bicuspid and making an opening through the end of the root socket into the antrum. By this process the antrum can be thoroughly cleansed and good drainage established. There are tumors of the jaw, and cases of caries or necrosis of the maxillary bones, which necessitate a removal of teeth.

5. The persistence of the temporary teeth when the permanent teeth are about to erupt.

It may be laid down, as a rule, that the temporary teeth should not be removed until the permanent teeth are ready to take their place. When this condition exists, the roots of the temporary teeth have been for

the most part absorbed, and the crowns have become loose. While the above rule should be adhered to as far as possible, yet there are cases in which severe inflammation connected with the temporary teeth requires their premature extraction.

*The Process of Extraction.*—The process may be divided into three stages.

1. Seizing the tooth with the forceps.
2. Loosening its connection with its surroundings.
3. Removing the tooth from its socket.

The process of extraction and the instruments employed vary greatly with the different teeth in the mouth. A knowledge of the number, shape, and size of the roots of the teeth is necessary to insure success in their removal. To extract the teeth of the upper jaw, the patient should be placed with the head thrown well back, and the operator should stand at the patient's right side. With the left hand the lips and cheeks should be retracted and the upper jaw firmly grasped.

The upper central incisors are extracted with a forceps whose beaks are made to adapt themselves to the nearly conical neck of this tooth. The forceps should be applied with one beak at the labial surface of the neck of the tooth, and the other at the lingual surface. The beak of the forceps should be carried well up between the margin of the gum and the root of the tooth. When the tooth has been thus grasped, it should be gently but firmly rotated, in order to loosen it from its socket. A forward-and-back motion may with advantage be combined with the rotatory motion. When the tooth is felt to have been loosened, it should be removed by a steady pull in the direction of its long axis.

The superior lateral incisors are extracted in a manner similar to that of the central incisors, and with the same forceps. Inasmuch as their roots are somewhat compressed laterally, the rotatory motion is not so important as with the central incisors.

The superior canines are quite difficult to extract, owing to their very long roots. The upper incisor forceps are usually employed for the canines. The tooth should be grasped as high up on the root as possible. To loosen the tooth from its socket the rotatory motion must be combined with the forward-and-back motion. When loose, a straight pull in the line of its long axis is necessary for its removal. It must be borne in mind that the root of the canine is decidedly flattened on its sides, and therefore offers considerable resistance to rotation.

The upper bicuspid is extracted with the upper incisor forceps; or they may be conveniently extracted with the alveolar bayonet-shaped forceps. The upper bicuspid should be grasped well up on the root and loosened by a side-to-side motion. Their roots being long and slender, great care is required to prevent their fracture. If the first upper bicuspid has a bifurcated root, it is often impossible to remove the tooth without breaking off the tip of one of the roots.

The first and second upper molars are extracted by a forceps whose inner beak is fashioned with a single concavity, it is thus fitted to embrace the inner buccal root of the first or second upper molar. The outer beak is divided by a longitudinal ridge into two concavities, while the tip of the beak is pointed in the middle. It is so made in order to embrace the two buccal roots of the first and second upper molars, and to conform to the depression between these roots. These forceps should be grasped in the palm of the hand, the thumb being brought into position between the angle formed by the two handles and the joint. The third and fourth fingers should be closed over the curve of the left handle. Owing to the divergence of the three roots of the upper first and second molars, considerable loosening is necessary before they can be extracted. This is effected by a side-to-side motion; as the outer alveolar plate is thinner than the inner, the main force should be applied in an outward direction. When the tooth is thoroughly loose in its socket, it can be removed by a downward and outward motion.

Upper wisdom teeth are not usually difficult to extract, as their roots are commonly fused together. In order to loosen them they should be turned firmly outward. By this movement their attachment to the socket can be readily broken up and the tooth removed.

In case the crowns of the upper teeth are badly decayed or entirely lost, the alveolar or root forceps should be used. With this instrument any root of the upper jaw can be extracted; the rules for the extraction of roots being substantially the same as those for teeth with crowns. It is necessary, however, to carry the blades farther up into the alveolus than when the crown is present. Great care should be taken not to crush the root by too firm a grasp. With the first and second upper molars it often happens that the three roots must be extracted separately.

In extracting the inferior teeth the patient should be situated much lower down than for extracting the superior teeth. The operator should stand at the patient's right side, oftentimes well to the back. The lower jaw should be grasped by the left hand, and supported from beneath by the palm and last three fingers, while the thumb and forefinger are placed within the mouth to retract the lips and tongue from the tooth to be operated on. The lower incisors, owing to the lateral compression of their roots, cannot be rotated in the process of loosening them. This must be accomplished by a forward-and-back movement.

The lower canines, owing to their very long roots, are often quite difficult to extract. They are to be loosened by a forward-and-back movement, to which a slight rotary motion may be added. When loose, they are removed by being pulled straight up from the socket.

The lower bicuspid should be grasped well down upon the root and loosened by an in-and-out motion. The alveolar plate being much thinner on the outer than on the inner side, it will yield more readily outward. When loosened, the lower bicuspid is removed by being pulled straight up from the socket.

The lower molars are extracted by a forceps whose beaks are divided by a median ridge, and are terminated by a pointed tip; it is thus able to embrace the two roots of the lower molars, and to engage the depression between them. To extract the lower first and second molar teeth, they should be rocked from within outward till loose, using more force when turning them outward than in the opposite direction. When loose, they may be removed by an upward-and-outward pull. The lower third molar often gives great difficulty in extraction, owing to the curve of its roots, which hook backward toward the ramus of the jaw. It must be loosened by a side-to-side rocking. Owing to the backward curve of its roots it cannot be lifted from its socket by a force exerted directly upward.

Elevators are often useful; they are straight and curved levers, with which a tooth is pried out of its socket, a neighboring tooth being used as a fulcrum.

The extraction of the temporary teeth is performed after the same manner as that of the permanent teeth. The operation is, however, much simpler, especially if performed at a time when the teeth are about to be shed by nature. In the premature extraction of the temporary molars there is always the possibility of bringing away the crown of the developing bicuspid, which is located between the roots of the molar tooth. Diminutive forceps are made for the temporary teeth, but temporary teeth can be readily extracted by the root forceps made for the permanent teeth.

*ACCIDENTS OF EXTRACTION.*—In the extraction of the teeth certain accidents may occur; they may be unavoidable or due to unskillfulness or carelessness. The following are the more common:

*Fracture of the Tooth.*—This often happens, and is due usually to an excess of force, or to misdirected force, or to an insufficient grip upon the tooth. Cases occur, however, in which fracture of the tooth is unavoidable; this is especially the case when the roots are misshapen and locked into the jawbone. When the tips of roots are, as

the result of fracture, left in the maxillary bones, it is not always wise to remove them. Nature will usually expel them in due time.

*Fracture of the Alveolus.*—This occurs, to a limited extent, in every tooth extraction, and produces, as a rule, no troublesome symptoms. By unskillfulness, however, a large portion of the alveolus surrounding a tooth may be crushed or fractured, and necrosis sometimes ensues.

*Fracture of the jaw* may result from tooth extraction. The fracture may be in the upper jaw, or in the body of the lower jaw. It may or may not imply fault on the part of the operator.

*Dislocation of the Lower Jaw.*—This usually happens with people whose jaws are loosely hung, and are in the habit of slipping out of the socket. If this tendency is known to exist, it is well to apply a roller bandage over the head and under the jaw before operating.

*Removal of the Wrong Tooth.*—This accident happens, as a rule, only to inexperienced or careless operators.

*Removal of Two or More Teeth Instead of One.*—This may happen from a hypertrophy of the cement uniting adjoining roots below the gum. It may happen when the tooth to be extracted is overlapped by an adjoining tooth. It may happen also by the slipping of an extracting instrument, whereby a loose tooth is knocked out.

*Laceration of the Mucous Membrane of the Gum.*—This occurs to a limited extent in every extraction, but, through carelessness or unskillfulness, may be very extensive.

*Falling of the Tooth into the Esophagus or Air Passages.*—A tooth will sometimes escape from the grasp of the forceps and be swallowed. From this accident no serious results are to be expected. Cases are now and then reported in which a tooth falls into the larynx. This constitutes the most serious accident that can attend extraction. Such a tooth may be coughed up from the larynx, or it may enter the bronchial tubes, causing symptoms which are always serious and often fatal.

The inferior dental nerve has been crushed in the extraction of the lower wisdom teeth. In such cases a loss of sensation has occurred in the lower part of the face. Usually this passes away, though it may be permanent. In attempting to extract the roots of the upper bicuspid and molars they have been pushed into the antrum. When this happens, the opening into the antrum should be enlarged and the roots removed.

*Hemorrhage after Extraction.*—This is usually moderate in amount and of short duration. Such cases require no treatment. There are cases, however, in which the hemorrhage is so prolonged as to produce alarming symptoms, and in rare instances death has resulted. Great care should be taken in dealing with people having the hemorrhagic diathesis. To control hemorrhage after extraction the most successful method is to apply pressure to the bleeding parts. The bleeding usually takes place from the socket of the extracted tooth. The socket should be packed with cotton, lint, sponge, or any soft unirritating material. After packing the socket a compress of soft material, covering the socket and surrounding parts, should be superadded. Upon this compress a gentle pressure should be maintained, either by the fingers or by the opposing jaw. An effective method of applying pressure after the socket has once been plugged is to soften a piece of gutta-percha in hot water and mould it to the affected region. Enough gutta-percha should be used so that the opposing teeth or alveolus can be embedded in it by the closing of the jaws. Let the jaws be closed and a roller bandage passed over the head and under the chin, and firm and constant pressure is secured upon the bleeding area.

In severe cases care should be taken to keep the head upright and the extremities artificially warmed.

As styptics can be mentioned perchloride of iron, tannic acid, and preparations of the suprarenal capsule. Of these, perchloride of iron is the least valuable. Tannic acid is a reliable agent; the powder may be applied to the socket on a pledget of cotton. Preparations of the suprarenal capsule are especially valuable in arrest-

ing dental hemorrhage. Styptics can be used with advantage in connection with the use of pressure, as described above. Very severe cases of hemorrhage have been controlled by the use of the actual cautery. If this be used, it should not touch the parts, but be held just near enough to bake them. If the cautery touches the tissues, a fresh laceration is made by its removal.

In desperate cases of hemorrhage internal remedies are usually resorted to. They consist of tannic acid, gallic acid, and ergot.

*General Considerations.*—Haste in extracting should be avoided; the hand should never move faster than the eye can follow. The tooth should be under complete observation from the time it is grasped by the forceps till it is out of the mouth. The head of the patient should be firmly fixed, and under the control of the left hand or arm.

While considerable force is necessary to extract a tooth, the force should be so guarded and moderated as not to endanger surrounding parts. No jerks or sudden pulls are allowable.

The forceps should never grasp the crowns of teeth alone, as the crown will usually break off, leaving the root undisturbed, but should engage the tooth at its neck, or a little higher up if possible.

In extracting roots the beaks of the forceps should follow down between the root and its alveolus till a firm hold is obtained.

The cutting through of gum and alveolus with a root forceps is not a desirable procedure, but is allowable in certain cases.

An excellent substitute for a dental chair is a rocking-chair with medium high back, a pillow thrown over the back forming a good head-rest.

William Henry Potter.

#### TELANGIECTASIS; TELANGIOMA. See *Angioma*.

*TELLURATES.*—The tellurate of potassium and the tellurate of sodium are recommended as remedies for the profuse sweatings due to phthisis and other causes. They are given in doses of one-third to one-half grain daily. In some cases this quantity requires to be increased, but generally the second or third dose is followed by a cessation of the sweating. It is supposed to produce its effect by an inhibitory action on the nerves of the sweat glands. In some cases it causes a loss of appetite and nausea, and in some advanced cases the sodium salt has produced a profuse liquid diarrhoea which is very difficult to check. The most serious obstacle to its general use is the persistent garlicky smell which it communicates to the breath and to the perspiration.

Beaumont Small.

*TENDON REFLEX.* See *Knee-jerk*, and *Reflexes, Clinical*.

*TENDONS AND THEIR SHEATHS, INJURIES AND DISEASES OF.*—It is most unusual to find tendons diseased independently. Morbid conditions of the tendons are so commonly the result of disease in their sheaths that in most systematic treatises they are not separately described. Owing to their dense fibrous structure and an intrinsic blood supply that is far from abundant, they lend themselves more easily to disturbances of nutrition than to invasion by infectious processes. Arcoleo has shown experimentally (*Gaz. degli ospedali*, 1898, No. 151) that the intactness of the sheath is necessary for the perfect nutrition of the contained tendon; but, on the other hand, that the complete removal of the sheath is not followed by necrosis of the tendon.

The most frequently observed morbid conditions of tendons themselves have been in cases of the so-called "snapping finger" (*schnellender Finger*, *doigt à ressort*). This consists of a sudden interference with the movements of extension and flexion, or of either alone. It occurs always at the same period of the movement, and is overcome with a peculiar snap, either as a result of