Any rule for the passage of a catheter into the sphenoidal sinus must necessarily be imperfect if for no other reason than that the nasal turbinates vary greatly. Added to this is the liability of variation of the sinus opening. Adding the minimum distance from the anterior superior nasal spine to the shortest antero-posterior sinus I get as a result 57 mm. ($2\frac{1}{8}$ inches). This will give the least distance from the anterior nasal spine to the posterior wall of the sinus, and furnish a conservative distance to which an instrument may be inserted without fear of entering the cranial cavity.

I would point out, in conclusion, that clinically this sinus is analogous to the tonsils in that it stands in such a position that it is prepared to receive and transmit infection primarily entering by way of the nose or nasopharynx.

I desire to express my thanks to Dr. A. T. Kerr, of Cornell University, Ithaca, for the loan of a series of nine specimens; also to Dr. J. F. Fairbairn, of Buffalo, for a similar loan of nine specimens, as well as to others who have loaned single specimens for use in this work.
170 Mariner Street.

THE PRESENT STATUS OF THE RADICAL OPERATION FOR EMPYEMA OF THE SPHENOID SINUS,

WITH DEMONSTRATION OF A NEW INSTRUMENT.*
ROSS HALL SKILLERN, M.D.

PHILADELPHIA.

Rhinologists concur in the opinion that when pus is being secreted by one or more of the accessory sinuses of the nose giving rise to symptoms, in spite of continued conservative treatment, a radical operation is imperative for a permanent cure. By the term radical I mean an operation which not only opens the sinus, establishing free communication with the nasal cavity, permitting thorough inspection and treatment, but which also prohibits, so far as we are able, a reinfection, or, in case a reinfection occurs, which allows the sinus to heal of its own accord with no discomfort to the patient other than the symptoms of an ordinary acute rhinitis.

The surgical relations of the sphenoid sinus from a rhinologic point of view embrace naturally those structures which are encountered during an operation in this region. We know if a straight line is drawn from the anterior inferior nasal process over the exact center of the middle turbinate it will strike the anterior wall of the sphenoid sinus (Zuckerkindl's line). While a number of German rhinologists¹ have taken exception to this line leading to the ostium of the sphenoid, nevertheless it will invariably strike either the anterior wall of the sphenoid, as Zuckerkindl himself states, making no mention of the ostium, or the wall of a sphenothmoidal cell, which to all intents and purposes may be reckoned as a sphenoidal sinus divided by a horizontal partition.² The distance between these two points, ac-

cording to Grünwald³ and Hajek,⁴ rarely exceeds 8 cm.; indeed, if one has passed a sound in this direction, 7.5 cm. in small heads or 8 cm. in large heads, measuring from the anterior inferior nasal process, the ostium and the sphenoid sinus are almost certain to have been penetrated.

The position of the ostium in the wall of the sphenoid sinus determines largely the possibility of sounding without more or less injury to the middle turbinate. The opening usually lies in the upper third of the anterior wall, the seat of predilection being deep in the sphenothmoidal fissure. The closer it lies in proximity to the septum (sphenoid rostrum) the more favorable the locality for sounding and the lower the ostium is situated in the anterior wall the deeper the sound will penetrate the sinus.

The position or condition of the middle turbinate also plays an important rôle in the procedure. Under normal circumstances the convexity of the posterior half hides the anterior wall of the sphenoid completely from view, and not until this has been removed and the pars nasalis of the anterior sphenoidal wall brought to view can an operative procedure be carried out in the neighborhood of the posterior olfactory fissure with any degree of safety. On the contrary, an atrophied middle turbinate or one which is strongly rolled inward certainly contributes to the difficulty of the operation. Deviated septums, septal spurs and ridges, polypi, etc., may add considerably to the difficulties previously mentioned. Suppose, then, under some favorable circumstance, we were able to see most of the anterior wall or pars nasalis by means of anterior rhinoscopy, the only remaining structure which might prevent the ostium from being visible would be the superior turbinate, and then only in the event of a deep sphenothmoidal recess, the ostium lying laterally and deep in the pars ethmoidalis. It is by no means necessary to have the ostium in view while endeavoring to pass the sound, but to my mind it is absolutely demanded when operative measures are about to be undertaken;⁵ the anatomic relations of the superior wall to the optic nerve and pituitary body and the lateral walls to the sinus cavernosus and carotid artery, to say nothing of the brain itself, makes this region of operating one of extreme danger unless the operator has perfect vision of the entire field. Chiari⁶ states that it rarely happens that one is required to open the sinus when the ostium is invisible. The various radical operations performed by operators at the present time have the same end in view, i. e., complete removal of the anterior wall of the sinus. This prevents any return of the disease, so far as retention symptoms are concerned, thus making the sinus practically continuous with the lateral wall of the nasal cavity. The ways and means employed, however, are many and varied. The operation is best performed under cocaine, although some English writers⁷ prefer chloroform. Operations may be divided into: 1. Extra-nasal, (a) frontal, (b) maxillary, (c) oral. 2. Endo-nasal, (a) indirect, (b) direct.

* Read in the Section on Laryngology and Otology of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.

1. Zuckerkindl, E.: Normale u. patholog. Anat. d. Nasenhöhle. 1893, i, 338; Hansberg: Die Sondirung d. Nebenhöhlen d. Nase. Monatschr. f. Ohrenh., 1890; Zarnico, Carl: Die Krankheiten d. Nase u. d. Nasenrachens. 1894, 276.

2. This condition is present in every fourth case, according to Hajek. Sounding will establish an opening above the sphenoidal ostium, the measurement from the point of the sound to anterior inferior nasal spine being also over 8 cm.

3. Die Lehre d. Nasenerkrankungen. Munich, 1896.

4. Pathologie u. Therap. d. entzündl. Erkrank. d. Nebenhöhlen d. Nase, 1903, 2d ed., 259.

5. Compare Coakley, G. C., who does not advocate operative measures unless the region is plainly visible to the eye. An Easy Method of Entering the Sphenoidal Sinus for Diagnostic Purposes. Laryngoscope, 1904, 271.

6. Die Krankheiten d. Nase, 1902, 258.

7. Tilley, H.: The Symptoms, Diagnosis and Treatment of Chronic Suppuration in the Sphenoidal Sinus, Brit. Med. Jour., 1905, ii, 1198. Discussion Thomson, St. Clair.

THE EXTRA-NASAL OPERATIONS.

Frontal.—Opening the sphenoid through the frontal sinus is not performed unless the frontal is diseased and is but a step in that operation.⁸ Opening through the ethmoid from the internal angle of eye. This operation was first suggested by Grünwald,³ later by Kuhnt,⁹ and is only to be recommended in those rare cases of ethmo-sphenoid disease where there is present bulging of both lamina papyracea and nasal wall, with severe ocular symptoms, the endo-nasal operation having already been carried out with no relief to the patient.

Jansen's Method.—Jansen,¹⁰ of Berlin, makes a large opening in the canine fossa through the mouth, resects the medial wall of the maxillary sinus, together with the middle and inferior turbinate. The ethmoid and finally the sphenoid sinuses are now opened. The sphenoid is curetted and the entire cavity tamponed from the maxillary sinus, the oral opening being closed after the second or third tamponade. Berens¹¹ uses Jansen's method when there is marked deflection of the septum toward the diseased side, especially at its posterior end, even when the antrum is not diseased. Furet's¹² method is the same as Jansen's, except that the ethmoid cells are not opened. The disadvantages of these operations are:

1. Needless opening a healthy sinus.
2. Danger of wounding structures situated in the fossa-ptyrgo-palatina and causing profuse hemorrhage and subsequent disturbance of the sensibility of the face.
3. Danger of injury to the optic nerve.

The objections to Beren's procedure are: 1. Owing to the great tendency of the sphenoidal sinus to contraction, it must be treated locally for at least six weeks after the operation. It is not a wise plan to keep the fascial wall of the maxillary sinus open for that length of time.

2. The deviation of the septum is so great as to require correction. The operation on the sphenoid could easily be carried out after the preliminary submucous resection was done.

Reichelt¹³ reported a case in which he removed the anterior and inferior wall of the sphenoid sinus through the mouth. The objections to this operation are that the sinus is not always present, and the sinus often assumes sizes and shapes which make the method impracticable.

THE ENDO-NASAL OPERATIONS.

Indirect.—Killian's¹⁴ method consists in resecting the anterior third of the middle turbinate; the bulla is then opened and the instrument pushed through the basal lamella of the middle turbinate and continued

through whatever ethmoid cells are found in the way, finally reaching and opening the sphenoid sinus. This method can be carried out in those cases where the pars ethmoidalis of the anterior sphenoid wall is sufficiently broad, but the instrument must make a passage from the ethmoidal bulla to the posterior ethmoidal cells, as well as the superior nasal passage and the sphenoidal recess, before it can penetrate the sphenoidal sinus.

This procedure can easily miscarry when an unusually large posterior ethmoid cell is present, for, according to Onodi,¹⁵ the sphenoid sinus is small in these cases and can easily be missed. The principal objection to this operation, to my mind, is the fact that one is always working in the dark, and on account of the many anomalies found in this region, no matter how proficient one may be in the regional anatomy of the part, the operation is dangerous.

Fig. 1.—Author's modified hook for opening the ostium sphenoidale.

Fig. 2.—Author's modification of Hajek's bone forceps.

Shadle, of St. Paul, operated on the anterior wall of the sphenoid under control of a mirror held in the choanæ.

Direct.—This operation is preceded by a resection of the middle turbinate and often the posterior ethmoidal cells, the entire operative field being in plain view. Hinkel¹⁶ breaks through the anterior wall with a sharp spoon, subsequently making the opening sufficiently large with a drill.

Schaffer¹⁷ opens with an instrument similar to a sound and curette combined and apparently operates entirely by the sense of touch, for he says: "When one feels by raising and depressing the handle of the sound that the sphenoidal sinus lies fairly deep at its posterior end, after thorough cocaineization, one introduces the spoon-shaped sound and presses the anterior wall of the floor until it breaks through, then removes the depressed splinters with bone forceps."

8. Killian and Krause: Die Killiansche Radicaloperation chron. Stirnhöhlenentzündungen, Arch. f. Laryngol., 1902, xlii; Killian, G.: Bemerkungen z. Radicaloperation chron. Kiefer- u. Stirnhöhlenentzündungen, Elft. Vers. des Ver. süddeutsch. Laryng., 1904; Winkler, E.: Zur Therapie d. Entzündungen d. Siebbeinzellen u. d. Kellbeinhöhle. Neunt. Vers. Deutsch. Otol. Gesellschaft, 1900.

9. Ueber d. entzündl. Erkrank. d. Stirnhöhle u. ihre Folgezustände. 1895.

10. Zur Radicaloperation chron. combinirter Empyem der Nase. Internat. Med. Cong., 1897.

11. The Sphenoid Sinus, Trans. Amer. Laryngol. Assn., 1905.

12. Cited by Onodi.

13. Ein Fall v. latenter Kellbeinhöhlenkaries mit Abduzenslähmung, etc., u. Behandlung vom Rachen her., Monatschr. f. Ohrenh. 1903.

14. Ueber d. Therapie d. Entzündung d. Siebbeinzellen u. d. Kellbeinhöhle. Neunt. Vers. d. deutsch. Otol. Gesellschaft. 1900.

15. Die Behandlung d. Krankheiten d. Nase u. d. Nasenrachsens, 1906, 357.

16. Symptoms and Treatment of the Sphenoidal Sinus, 1902.

17. Ueber acute u. chron. Erkrankung d. Kellbeinhöhle. Deutsche med. Wochschr., 1892, 1062; Die Krankheiten d. Kellbeinhöhlen, Heymanns Handbuch, 1900, III, 1173.

Ingals and Spiess¹⁸ bore through the middle turbinate with a trephine. Douglass¹⁹ says: "The best, safest and more rational method of opening the sphenoidal sinus is through the posterior ethmoidal cell. Stacke²⁰

Fig. 3.—Probe passed into sphenoid sinus through natural ostium. Showing portion of middle turbinate to be removed.

uses an electric drill, a procedure which is simple and easily carried out, but requires a steady hand and an exact topographical knowledge; otherwise there is great danger of causing serious injury to the dura, optic nerve, internal carotid or sinus cavernosus. Zarniko¹ and Gmeinder²¹ use a specially constructed chisel which is considered to be particularly adapted to those cases in which the posterior olfactory space is very narrow. Halle²² uses a chisel and hammer to open the sinus, followed by an electric fraise to enlarge the opening. Stoeckel²³ also uses an electric fraise, but has had a special handle constructed similar to that of a pistol. He controls the current by means of the trigger and claims the operation can be performed easier than with Hajek's hook. The burs on the fraise are made with the cutting edges on the side.

Hajek's Method.²⁴—Noting that the posterior ethmoidal labyrinth covered about two-thirds of the anterior wall of the sphenoid sinus (pars ethmoidalis) and that only one-third remained free (pars nasalis), Hajek conceived the idea to clear away first the posterior ethmoidal cells in conjunction with whatever part of the middle turbinate was necessary, which would leave the entire anterior wall in sight. He says:

After complete anesthesia (local or general), I introduce my ethmoid hook into the posterior part of the rima olfactoria against the anterior wall of the sphenoid sinus as high as possible without using the slightest possible force. Since the point of the hook is always directed inferiorly in an injury to

the lamina cribrosa is absolutely excluded. I then turn the hook so that the point penetrates the internal wall of the ethmoid labyrinth. When I now press the handle of the hook against the septum I am sure that the hook has penetrated deeply into the ethmoidal labyrinth. The internal (nasal) wall of the labyrinth with that portion of the middle turbinate which lies beneath is torn through by means of a strong pull on the hook. The pieces which remain hanging can easily be removed with a pair of good nasal forceps or the conchotomes of Grünwald or Hartmann. The advantage of the hook in this procedure is not to be underestimated. It is so slender that its point can be easily seen and followed during every phase of the operation, while the curette hinders the light and requires too much room. . . . The bleeding is usually trivial and is almost always controlled by wiping with sterile gauze.

. . . I now proceed to resect the anterior wall of the sphenoid sinus.²⁵ To this end I use my bone forceps, but the ostium sphenoidale must have a definite width before we can introduce them into the sphenoid sinus. This I accomplish by means of my hook tearing the inferior edge of the ostium piece by piece until the opening is sufficiently large to permit the passage of the bone forceps.

This operation, with a few minor details, has always appealed to me on account of its practical soundness in keeping the operative field always before the eye. One phase of the operation I believe, however, susceptible to

improvement, viz.: opening the ostium sphenoidale with a hook. As Zuckerkandl,¹ Onodi²⁶ and others have pointed out, the superior and lateral walls of the sphenoid sinus, so far as thickness and position are concerned, are in direct relation with vital structures and, indeed, it is not uncommon to find dehiscence of either of these walls where the cavity of the sinus is only separated from the cavernous sinus by a thin wall of mucous membrane. Holmes²⁷ and Onodi²⁸ report a number of sections where the optic nerve was contained within the sinus.

I noted, while experimenting on the cadaver, that in many instances it required considerable

Fig. 4.—After the middle turbinate has been divided by the scissors, the snare is used to remove the posterior end.

Fig. 5.—Demonstrating the position of Hajek's hook before the superior turbinate is cut through.

18. Zur Chirurgie d. Sinus sphenoidalis, Arch. f. Laryngol., vii.

19. Nasal Sinus Surgery, p. 162, Phila., 1906.

20. Ueber d. Verwendbarkeit d. Elektromotors bei Operationen inbes. b. Nasen- und Ohroperationen, Arch. f. Ohren., 1897.

21. Instrument Catalogue of H. Pfau, Berlin.

22. Berliner klin. Wchenschr., 1906, 1372.

23. Die breite endo-nasale Eröffnung d. Keilbeinhöhle mit d. Fraise, Arch. f. Laryngol., xvi.

24. Zur Diagnose u. intranasalen chirurg. Behandlung d. Entzündungen d. Keilbeinhöhle u. d. hintern Siebbeinzellen, Arch. f. Laryngol., 1904, xvi.

25. Compare, Onodi, A.: Zur Frage d. endonasalen breiten Eröffnung d. Keilbeinhöhle, Arch. f. Laryngol., 1904, xvi.

26. Die Dehiscenzen d. Nebenhöhlen d. Nase, Arch. f. Laryngol., xv.

27. The Sphenoidal Cavity and Its Relation to the Eye, Arch. Ophth., 1896.

28. Das Verhältnis d. Nervus Opticus zu d. Keilbeinhöhle u. insbes. zu d. hintersten Siebbeinzellen, Arch. f. Laryngol., 1903, xiv.

pressure to force the hook through the ostium, especially where the opening was small and situated high in the posterior olfactory space. Often the hook would break through so suddenly that one had for the moment little control as far as its striking the superior or lateral wall

Fig. 6.—Removing the debris after the hook has been used.

was concerned. In these cases had a thin wall been present the overlying structures would only have escaped injury by the merest chance. With this thought in mind I had an instrument constructed (Fig. 1) which would obviate this difficulty. It consists of two long thin branches with a half knob on each end which when closed form a small ball. On pressing the two handles together these knobs open and lock at the desired width.

This instrument, closed, is introduced into the ostium, being prevented from going through suddenly onto the superior or lateral wall²⁹ by a protector situated a few millimeters behind the knob, is opened by a slight pressure of the fingers and drawn out. The knobs are provided with a cutting surface behind which readily goes through the mucous membrane and thin bone. This procedure may be repeated until the ostium is considerably enlarged. When the bone is thick the operation can be finished by means of the excellent bone forceps of Hajek.²⁴ I have made a slight modification of this instrument (Fig. 2), having the nasal part bent to conform more with the position of the antero-inferior wall of the sinus.

THE OPERATION.

The operation in detail which I find acceptable to all cases is the following: The lateral wall of the nose, including the septum, is thoroughly cocainized with a 20 per cent. solution, a few drops of adrenalin chlorid having been added. After anesthesia has reached the point beyond tactile sensibility the posterior half of the middle turbinate (Fig. 3) is removed by means of the scissors and cold snare (Fig. 4).

29. In those cases of "shut in" empyema, where the ostium is occluded, there usually is present pulsation of that thin membranous portion of the anterior wall previously occupied by the ostium. In any case the use of the sound will demonstrate the former position of the ostium.

After bleeding is controlled by lightly wiping with gauze soaked in adrenalin chlorid, the superior nasal passage with the superior turbinate is exposed to view. Hajek's ethmoid hook (Fig. 5) is now employed after the method of the author,⁴ and with two or three strong pulls the posterior ethmoid cells are broken through, the debris being removed with a Grünwald-Hartmann conchotome³⁰ or a similar instrument (Fig. 6). The sphenoidal sinus is now either exposed to view or opened completely up, depending on the anatomical construction of the part. Should there be present a spheno-ethmoidal recess, the ethmoidal portion of the sphenoid wall will remain intact; if, on the other hand, the superior turbinate forms most of the anterior sphenoidal wall, breaking it down will naturally expose the sinus. We will suppose, however, that, after removing the posterior ethmoidal cells, the anterior wall of the sphenoid has not been injured and we are able to see the ostium with pus oozing out. It is now an easy matter to introduce the evulsor³¹ (Fig. 7), and with a few well-directed pulls to open the ostium 8 to 10 mm. in diameter (Fig. 8). The ostium is really never so small as it appears, because the mucous membrane, not only from the nasal side but from the interior of the sinus,

joins to make more or less of a diaphragm. The bone at this point is paper thin, gradually becoming thicker toward the base and basilar process. The bent forceps of Hajek are now used (Fig. 9) and as much of the bone removed as is necessary to insure a permanent opening which, in my opinion, should reach as deep as the floor of the sinus (Fig. 10).

No structure of the nose shows greater tendency to granulate after operation than does this sinus and, after making a large opening, one would be surprised to find this opening, in the course of a few weeks, almost closed by these granulations³²—not the sinus itself filled, but the ostium occluded. On

Fig. 7.—Introduction of the author's evulsor into the natural ostium of the sphenoid.

Fig. 8.—Drawing the evulsor out after opening it, thereby enlarging the opening in the anterior of the sinus.

30. Atlas d. Anat. d. Stirnhöhle, der vorderen Siebbeinzellen u. d. Ductus Naso-frontalis, J. Bergmann, 1900.

31. Compare, Killian, G.: Die Probepunction d. Nasennebenhöhlen, Münch. med. Wchnschr., 1896.

32. Schmidt, M.: Die Krankheiten d. oberen Luftwege, 1897, 2d ed.

this account the operations through the bulla, posterior cells and those making small openings are not to be recommended. The condition of the mucous membrane is frequently found to be swollen, velvety and nodulated. Under such circumstances it is better to wait two weeks and observe whether this inflammation will not subside of itself. If granulations remain at the end of this time, the floor of the sinus may be gently curetted after cocaineization, but never the superior or lateral walls. Concerning the use of the curette in this sinus, authors are at variance. Hajek⁴ and Onodi¹⁵ condemn the practice, while Zarniko,¹ Schaffer,¹⁷ Stacke,²⁰ Bresgen and others carry it out, but all agree that it is dangerous, particularly on the superior and lateral walls, and should be done with all gentleness and caution. I agree with Hajek, that it is, for the most part, superfluous and may be dispensed with, except in chronic cases where localized spots resist healing.³² The bleeding which occurs is minimum and can easily be controlled.²⁴ Four cases have been reported in which postoperative bleeding from the anterior wall occurred.^{16, 24, 33, 34} This was controlled by tamponade in all except that of Myles. His, however, required ligation of the external carotid.

Fig. 9.—Hajek's modified forceps biting away the anterior wall piecemeal; last stage of the operation.

If, on the other hand, the resulting hemorrhage becomes copious, syringing with a 1 to 100 solution of citric acid or pressing a cotton tampon soaked with adrenalin in the sinus will control the bleeding. The disadvantage of the latter procedure is the tendency to secondary hemorrhage. As a precautionary measure in these cases a tampon of iodoform gauze prevents reactionary hemorrhage. The tampon is removed after 48 hours. This danger is, nevertheless, slight when one considers that the only artery standing in the way of being injured is the nasopalatine, running over the floor of the body of the sphenoid. Zuckerkandl states that this is the smallest branch of all the turbinal arteries.

The sinus cavity is now swabbed out with a gauze tampon soaked in hydrogen peroxid, a little thymol iodid (aristol) insufflated and a piece of cotton laid in the anterior nares.³⁵ Tamponing of the cavity is a personal equation with the operator. Hajek²⁴ rarely uses

one, Schaffer¹⁷ and others invariably follow this line of treatment; in any case only loosely packed iodoform gauze is used. The subsequent treatment³⁶ consists in washing out the sinus with a warm boric acid solution,³⁷ observing that the mucous membrane returns to normal and, above all, to prevent granulation tissue forming on the edges of the wound,³⁸ the object being to keep the opening permanent, thus to permit free drainage of secretion which may subsequently form.³⁹ To this end after ten days the edges should be lightly cauterized with chromic or trichloroacetic acid, continuing every week until they are fully scarred over, which usually requires about six weeks. Edematous swelling of the mucous membrane may occur after application of the acid, but they are quite evanescent and vanish without special treatment. Complete healing usually takes place in from three to eight weeks, depending on the degree of inflammation and extent of operative interference.⁴⁰

The advantages of this operation are:

1. The field of operation is always in sight.
2. The preliminary opening of sphenoid from within outward thereby incurs no danger to structures behind.
3. There is a permanent opening which lessens the danger of recurrence.

Fig. 10.—Result of complete resection of the anterior sphenoidal wall, after the operation.

ABSTRACT OF DISCUSSION.

ON PAPERS OF DRS. GIBSON AND SKILLERN.

DR. ALBERT H. ANDREWS, Chicago: I was interested in the measurements and averages given by Dr. Gibson, but as I listened I imagined a patient sitting before me with pus trickling down his posterior pharyngeal wall and perhaps some

36. Compare, Guye, A.: Vier Fälle v. Ausräumung d. Kellbeinhöhle b. rezidivierenden Nasen Polypen, Berlin, klin. Wchnschr., 1902.

37. Compare, Curtis, H. H.: Who reports a case in a girl of 18, who, after a simple syringing out of this sinus, was confined to her bed for two days with most violent pain and vomiting and all the symptoms of meningitis, with the exception of the temperature, Laryngoscope, 1904, 866. Undoubtedly debiscence of the superior wall existed in this case.

38. After the operation the edges of the removed portion of the sinus wall are naturally bare and must become entirely covered with fibrous tissue before the secretion ceases. This new scar tissue will consist of two layers, a ground layer of fibrous tissue and a superficial layer of epithelium. The fibrous layer is formed from the granulations which spring out of the bone, while the epithelial layer grows from the neighboring mucous membrane over the fibrous or granulating layer. A normal healing can only occur when these layers grow in harmony. Should the epithelial tissue grow slowly, the granulations from the bone will become too strong to be covered and coalesce, thus again closing in the sinus. As a gauze packing in the cavity stimulates these granulations, it should be dispensed with in the after-treatment.

39. Compare, Hajek, M.: Fall v. Empyem d. Kellbeinhöhle m. bedrohlichen Stauungsercheinungen; Endonasaloperation nebst ein. Bemerk. über Diag. u. Therap., Wien, med. Wchnschr., 1895.

40. Compare, Holmes, E. M.: Suppuration of Frontal, Ethmoid and Sphenoid Sinuses, Boston Med. and Surg. Jour., 1903, 337.

33. Gleitzmann: Trans. Am. Laryngol. Assn., 1895.

34. Myles, R. C.: Trephining and Curettage of the Sphenoidal Sinus. Profuse Secondary Hemorrhage Requiring Ligation of the External Carotid, Laryngoscope, p. 293, 1903.

35. Compare, Cordes, H.: Zur Behandlung d. Kellbeinhöhlenerkrankungen, Monatschr. f. Ohrenh., 1899, and Winkler, E.: Footnote 8.

lesion of the eye, and I wondered how much good those averages would do me when I came to consider his case. Averages are all right from the anatomic standpoint, but from the clinical standpoint—when one works with the brain immediately above, and dangerous blood vessels immediately at the side, and nerves which one must let alone in close contact with the cavity—averages are of no value. It is the individual case which is to be considered. In doing some cadaver work it occurred to me that the posterior pharyngeal wall and the back wall of the sphenoid cavity form the arc of a circle, of which the anterior nasal spine forms the center. In making measurements it was observed that the distance from the nasal spine to the posterior pharyngeal wall was practically the same as to the posterior wall of the sphenoid cavity. If one can pass a probe in the direction of the sphenoid sinus as far as he can pass it directly backward, he must of necessity be in the sphenoid cavity and no place else. It seems to me this is a better rule than any other measurements can be.

While the curved forceps shown by Dr. Skillern has the advantage of allowing one to cut downward a little more, it interferes with the turning of the forceps to one side, as one must do to enlarge the opening laterally, as one can not well turn a curved forceps sidewise in the nose. An anatomic arrangement which must be borne in mind in cutting away the anterior wall is this: The anterior wall close to the septum is very thick and strong, while on one side a little out, one-third or one-fourth of an inch, it becomes very thin, as suggested, sometimes only membranous. These cavities should be explored very much more frequently than they are. By using a probe with a bend it can be done in the majority of cases without the necessity of removing the middle turbinate or resorting to any other surgical procedure, and it has happened to some of us to find a great many more cases of sphenoid disease since we have made the exploration of the sphenoid a part of our routine examination.

DR. ROSS H. SKILLERN, Philadelphia: In answer to Dr. Andrews, the forceps can easily be turned when in position, and I think can be entirely rotated while in the nose. One is thus enabled to bite in any direction. The curve is not sufficient to interfere in any way with mobility.

ALVEOLITIS OR SOME PATHOLOGIC CONDITIONS ARISING FROM INEFFICIENT CARE OF THE MOUTH.*

M. H. FLETCHER, D.D.S., M.D., M.S.
CINCINNATI.

Civilization brings with it the necessity of conscious intelligent care of the body, in order that good health may be enjoyed for the allotted three score years and ten. This is particularly true in case of the teeth.

I believe it possible, by the proper selection of prepared foods, to live a moderately healthy life without teeth, yet to live under such conditions could hardly be called enjoying good health. To have good teeth and healthy gums is one of the first requisites of perfect health. The belief that everybody can secure this condition, even by proper care, may be utopian, but this ideal can be nearly attained by most persons. Not only this, but a large percentage of diseased teeth and gums can be restored to comfort and usefulness by proper treatment and continual cleanliness. If every surface of every tooth could be kept perfectly clean one would have neither decayed teeth nor diseased gums. It is rare to see a mouth as clean as it is practicable for one to be kept, yet much time, money and energy are spent

for luxuries and fads, and much is also paid to doctors and dentists for the repair of ills that could be prevented by conscious, intelligent care.

To take no care of the teeth, or inefficient care, seems to be almost a universal habit. One patient put it very nicely when she said: "I find I have been cleaning my conscience all these years instead of my teeth."

Among the most prevalent diseases, as well as the most surely preventable, is that which attacks the alveolar process, resulting in its necrosis and the loss of the teeth. This disease is known by several names, but commonly by that of pyorrhea alveolaris. In my opinion it is almost wholly brought about by calcareous deposits which can be kept off by the patient.

NOMENCLATURE.

The names by which the disease is and has been known are serving their purpose, but for simplicity and clearness the usage in other branches of surgery and medicine will be adopted. That is, the name of the organ or part involved will form the foundation or generic name,

Fig. 2.—First lower molar lost from alveolitis. Second is beyond recovery. Third has recovered.

Fig. 4.—Lower first and second molars. The first molar and bicuspid have been curetted, the second molar has not. Picture taken three months after treatment. Typical of many cases.

Fig. 3.—Superior incisors and canine after curetting. With wire splints to sustain them until recovery.

the nature of the disease being indicated by a suffix, and the stage or condition by a descriptive adjective. Under the name "gingivitis," inflammation of the gums follows the same rule.

The alveolar process being the part primarily involved in the disease under special discussion, the term "alveolitis" will be used in this paper in the sense above indicated, and the different stages of the disease distinguished as acute, chronic, suppurative and necrotic alveolitis. The adjectives "tuberculous," "syphilitic," "pyemic," etc., are also usable under this plan, and each ascribes a definite pathologic characteristic to the disease whose name it modifies.

Riggs' disease is a better term than pyorrhea alveolaris, since the latter name describes only the suppurative stage, and does not permit of use to describe other stages without producing a paradox or a contradiction. Such terms as "Bright's disease" and "Graves' disease" are, however, being eliminated from general medicine,

* Read in the Section on Stomatology of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.

* Owing to lack of space, the article is here abbreviated by the omission of parts of text and illustrations. The complete article appears in the author's reprints.