

## EYE, EAR, NOSE AND THROAT

### THE ROLE OF ABNORMAL TEETH IN THE PRODUCTION OF SYMPTOMS REFERABLE TO THE EARS, NOSE AND THROAT\*

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The role of diseased teeth in the causation of antrum trouble has long been generally recognized, but there are other pathologic possibilities in abnormal teeth which have not received the recognition by the general profession that their importance would seem to merit.

Brandt<sup>1</sup> has called attention to diseased pulps in the production of suppurative inflammation in the nasal cavities.

Kallibay<sup>2</sup> has stressed the part of aberrant teeth and dentigenous cysts in the production of neuralgia in and about the nasal area.

Weeks<sup>3</sup> has recently revived the question of causal relationship between nasal obstruction and dental malocclusion.

Pollock<sup>4</sup> has reviewed the literature of suppurative perichondritis of the nasal septum resulting from alveolar periostitic abscess of the incisors, finding eight cases together with one of his own. He likewise found in the literature 106 cases of arthritis resulting from diseased incisors.

Baldwin<sup>5</sup> has called attention to the role played by erupting teeth in the production of tonsillitis and earache.

Allport<sup>6</sup> mentions myringitis, deafness, furuncles and eczema as frequently resulting from dental disorders and he urges the careful examination of the teeth in all cases of aural discomfort.

Bennett<sup>7</sup> reports a case of obstinate deafness of a middle-aged woman from unknown cause relieved by extraction of roots of the second and third molar teeth.

Scarlsbrick<sup>8</sup> directs attention to the frequent association of enlarged tonsils with carious teeth in school children. He reports examination of some 4,000 children

and concludes that enlarged tonsils are found with greater frequency in those having dental caries than those with perfect teeth. The incidence of enlarged tonsils is greater among children having many bad teeth than in cases with only two or three carious teeth. Marked enlargement of the tonsils is much more frequent even than moderate tonsillar enlargement among children with caries as opposed to children having perfect teeth.

Peglar,<sup>9</sup> Richards,<sup>10</sup> Grason,<sup>11</sup> Cryer,<sup>12</sup> Douglas,<sup>13</sup> Farlow,<sup>14</sup> Huschart,<sup>15</sup> McKenzie,<sup>16</sup> Patton,<sup>17</sup> Ollagnier,<sup>18</sup> Pont,<sup>19</sup> Ritter,<sup>20</sup> and Makuen<sup>21</sup> have likewise called attention to the general relationship between dental disease and conditions in the ear, nose and throat. One of the most recent and interesting contributions was from Dr. Thomas J. Harris<sup>22</sup> in the *New York Medical Journal* of the current year—a report of 6 cases of dysphagia and dysphonia of dental origin, all of which are said to have been permanently relieved by proper treatment of the teeth. In May, 1912, the writer heard Dr. W. H. Haskin, of New York, read a paper before the American Rhinological, Otological and Laryngological Society, at Washington, in which he called attention to the role of latent apical abscesses in the production of pain in and about the face. The unrecognized possibilities for evil of painless concealed abscesses seemed so great that he returned home and immediately sought an association with a dentist carefully trained in radiographic work; and since that time has made studies of the teeth in all private eye, ear and nose cases presenting obscure symptoms, or symptoms not readily explained by pathologic findings in these areas. The following cases embrace brief extracts from the histories of only a few that have been recognized and relieved through the aid of a consulting dentist, Dr. C. W. Lokey, of Birmingham, Ala. About sixty-five individual cases have been studied—some thirty or more gave chief symptoms referable to the eyes, about thirty-two complained of symptoms in the nose, face, ear and throat. Only eight of

\*Presented as Thesis for Membership in the American Laryngological, Rhinological and Otolological Society, November, 1917.

these are reported at length. Several others, especially one of edema of the larynx, were of unique interest, but owing to the difficulty of establishing a definite causal relationship some of the most interesting cases are not given.

The cases detailed below have been selected for this report because most of them were under observation for some months (either by the writer or other physicians) before attention was called to the teeth as a possible factor in their etiology. Most of the cases have been carefully watched for a year or more to note a possible return of former symptoms.

#### CASE REPORTS

##### CASE I—APICAL ABSCESS SIMULATING ACUTE MASTOIDITIS

Mrs. W. was complaining of a severe pain of three weeks' duration radiating from the right mastoid. She was referred by her family physician for a mastoidectomy and was eager for the operation. Examination of the ear was negative; the hearing normal. There was some redness and great tenderness over the mastoid, especially over the antrum. There was marked contraction of the right sterno-cleido-mastoid muscle and tenderness along its anterior border. Beyond this there was nothing of interest in the examination. The nose and throat seemed negative. The second upper right molar was carious and the gums were red, swollen and tender. She was referred to a dentist, who extracted the tooth with an attached apical abscess. He curetted the cavity and packed it with iodoform gauze. Forty-eight hours later all symptoms about the mastoid had entirely disappeared. After four years she has suffered no recurrence.

##### CASE II—APICAL ABSCESS ON RETAINED MOLAR ROOT PRODUCING ECZEMA AND FURUNCULOSIS OF CANAL, MYRINGITIS AND FACIAL ERYSIPELAS

Mrs. N., age 35, healthy, had been treated by me several times at intervals for eczema and



Case 2—Radiograph represents condition of retained tooth root in Case 2. The picture, however, is not from Case 2, the original radiograph being lost. In this picture one notices abscess at the roots of the remaining molar teeth.

furunculosis of left external auditory canal. She had frequent attacks of inveterate eczema of the canal on the left side, never any discomfort in the right ear. On two different occasions she had attacks of left myringitis. In the spring of 1912 she had an attack of facial erysipelas beginning at the lobule of the left ear. During the time her temperature reached 105°. It was just after this attack that the writer heard Dr. Haskin's paper and immediately upon returning home had radiographs made and found a root of the left third molar remaining in the jaw. Her dentist had removed the tooth four years previously, assuring her that the broken root would "become encysted and never cause trouble." The radiograph showed an apical abscess or granuloma at the end of this root. Under gas anesthesia her dentist removed the root, curetted the abscess cavity and after five years there has been no return of the discomfort in or about the ear.

##### CASE III—SEVERE FACE-ACHE AT ROOT OF NOSE BETWEEN EYES, OF LONG STANDING DUE TO APICAL ABSCESS OR GRANULOMA OF FIRST LOWER MOLAR

Mrs. L., age 35, healthy, had headaches for several years. Sometimes they seemed worse from mere use of the eyes. Sometimes they are worse on waking and disappear after 9 to 10 o'clock in the morning. The eyes were refracted and the headache made better, but not completely relieved. The sinuses were negative as to any inflammatory condition, but there was definite contact between the septum and the left middle turbinate. The anterior half of the middle turbinate was removed. There was no recurrence of the morning headache, but the patient felt frequent and severe discomfort about the root of the nose. Careful and repeated examination



Case 3—X-ray showing conditions in Case 3. No definite abscess visible on either tooth root. When extracted each root was found to have large abscess attached to first molar.

failed to elicit any cause for this remaining pain. She was the wife of a prominent dentist, himself an expert radiographer and he made careful studies of her teeth and found no possible cause for the reflex pain and as is so often the case the patient was regarded as hysterical. One peculiarity of this pain was that it recurred with increased intensity for two or three days preceding each menstrual period. After several months of careful and unavailing study it was decided to have radiographs made by two other men, one a

dentist and the other a general roentgenologist. These pictures were likewise negative, that is, they were not definitely positive, and there was some difference in opinion between the consultants as to what was present at one of the roots. About this time the husband of this lady was confined to his bed at home for several weeks recuperating from appendicitis and had occasion to witness the great suffering of his wife. The pain was limited largely to the root of the nose and between the eyes, occurring at any time and worse after worry or fatigue. After several consultations it was decided to remove the only tooth having a dead nerve and, to our great surprise, when it was extracted each of the three roots brought away a definite apical abscess granuloma. This has been a rather disconcerting experience. As will be seen from the radiograph, there was no definite indication of an apical abscess; there seems to be some abnormality of tissues between the molar roots; but nothing comparable to the usual abscess. Until this time we felt that a negative radiograph was definite proof that there was no abscess present, but we have since learned from other cases that findings of the x-ray (like every other test in medicine) are of conclusive value by their presence and never by their absence. Within a week this pain entirely disappeared together with some rheumatic discomfort in one hand which had been present on several occasions. After a lapse of two years there has been no recurrence of pain.

**CASE IV—PAIN IN LEFT ANTRUM AND LEFT PAROTID REGION OF TWO YEARS' STANDING DUE TO IMPACTED THIRD MOLAR**

Miss V. S., age 20, in good health and free from all evidence of disease in or about the nose or ears, had had frequently recurring pain radiating from the inner canthus of the left eye through malar bone toward the external auditory canal for two years. The pain was sometimes so severe



Case 4—Impacted lower third molar.

as to interfere with sleep. Careful examination by internists was negative. A Wassermann was negative. Refraction of eyes gave no aid—patient accepting + .50 D. S. for each eye. The teeth were in perfect condition; the third molars unerupted. Radiograph showed impaction of the left third lower molar. Removal of this impacted tooth relieved all pain and after a year's time there has been no return.

**CASE V—TINNITUS, STUFFINESS AND FULLNESS OF EACH EAR WITH PAIN IN EXTERNAL AUDITORY CANAL OF THREE YEARS' STANDING RELIEVED BY REMOVAL OF TWO LOWER IMPACTED THIRD MOLARS**

Mrs. P., age 25, in excellent general health, had had ringing in the ear, a sensation of "stopped up" ears, together with fullness off and on for five years. She suffered much pain in malar region on each side and in the brow above each eye. She had noticed that she was particularly worse around menstrual periods. Her tonsils



Case 5—Impaction of lower third molar.

had been removed and the inferior tubridates had been cauterized and the Eustachian tubes had been inflated five or six times each spring, but these measures failed to bring any definite relief. She said she would have been worse probably without the treatment. On examination of ears they appeared normal and the whispered voice test gave 12/20 for the left ear and 10/20 for the right. Rinne was positive in each ear. Weber negative. There was no change in the test after use of the Eustachian catheter. Radiograph showed impaction of both lower third molar teeth.

Dr. Lokey removed the left wisdom tooth and the patient was so nervous and frightened that she declined to have the right tooth extracted at the first sitting. A week later she returned, saying that she had had complete relief of all symptoms in the left ear and left side of face. There was now no noise and no sensation of fullness on that side, but that the symptoms of the right side were quite unrelieved. For some reason it was impossible to remove the right tooth for a full month after extraction of the left and during that period her discomfort was limited to the right side, disappearing within four days after the extraction of the right wisdom tooth. Six weeks later her hearing was normal. She has been well two years.

**CASE VI—PAIN IN RIGHT ANTRUM EXTENDING INTO AND AROUND THE RIGHT EYE BALL RELIEVED BY THE EXTRACTION OF THE FIRST AND SECOND LOWER MOLARS, EACH WITH APICAL ABSCESS**

Mrs. L., age 40, good general health, had been refracted twice for headache aggravated by all near work. Lenses had given definite relief, but in spite of glasses has suffered frequent pain in right eye and right antrum greatly increased when she was weary; and during the three days preced-

ing each menstrual period so severe as to interfere with sleep. There was contact between the septum and middle turbinate on the right side, and radiograph showed slight cloudiness of the right antrum. She gave a history of having had acute inflammation in this right antrum which was relieved by washing through a canular introduced beneath the lower turbinate. The antrum was



Case 6—Ill-fitting crown. Definite abscess at two roots of the anterior molar and the anterior root of the second lower molar.

washed out with negative result. The anterior half of the middle turbinate was removed. Patient felt sure that this operation afforded relief for several months, but the pain never entirely disappeared. A radiograph of the teeth by a dentist showed apical abscess at the root of the second upper bicuspid. It was extracted with some amelioration of all symptoms. After three or four months she returned complaining of a gradual increase in severity of pain, and I then had her dentist for a second consultation. I now learned for the first time that she had declined to have other teeth extracted at the former consultation, although the dentist at that time had discovered latent abscesses at the roots of the first and second molars in the upper jaw. The bicuspid was easily recognized as having the largest abscess and the patient reluctantly consented for its removal but declined to have the molars drawn. The patient was now urged to have these teeth drawn, but again declined and suffered more or less of her usual symptoms for another three months before consenting to extraction. Within a week after the removal of the teeth all symptoms disappeared and have not recurred after one year.

**CASE VII—GENERAL FACEACHE, HEADACHE, VERTIGO AND NAUSEA, DISAPPEARING AFTER EXTRACTION OF DECIDUOUS TOOTH, RELIEVING PRESURE FROM UNERUPTED CANINE**

Mrs. T., age 34, had had headache almost daily for six years. She wore glasses for compound hyperopic astigmatism and careful refraction under a miatriatic suggested little change in lenses. There was a left hyperphoria, two degrees, for which a prism was incorporated in the new lenses. The patient felt some relief from the headache and a great improvement in the dizziness from these glasses, but she returned in three or four months insisting that the headaches were unbearable. Careful examination failed to reveal any trouble with the sinuses. A radiograph of the sinuses was negative. There was marked deflec-

tion of the nasal septum, producing contact with the middle turbinate of the right side and the lower turbinate of the left. Under ether anesthesia I did a submucous resection of the septum and secured satisfactory and comfortable breathing. (A unique complication followed this operation—an alarming hemorrhage on the fifth day and recurring at successive seven-day periods for four weeks, necessitating careful packing of both nares each time.) After recovering from this operation the patient was relieved for almost a year of all vertigo with its attending nausea and had few headaches except at the menstrual periods. One year later, after strenuous overwork attending some social service activities, there was a recurrence of a peculiar agonizing faceache and headache, and not until this time did it occur to me to employ the assistance of dental radiograph. The negative showed an unerupted canine and I advised its immediate removal. Her dentist, however, declined to remove



Case 7—Unerupted canine tooth pressing on deciduous tooth below.

the tooth, but extracted the baby tooth below it, assuring her that the tooth would grow in its proper position, replacing the one he extracted. Much to my surprise, there was almost instantaneous relief from pain, and it has not recurred after an interval of sixteen months. There is no indication that the unerupted canine will come down into its proper place. She suffered great inconvenience from vertigo about six weeks later, and it was then found she had a perfect balance of the external eye muscles. The prisms were taken from her glasses, giving immediate relief from her vertigo. She has been free of all discomfort for a year.

**CASE VIII—PAIN AND TENDERNESS IN LEFT ETHMOID, LEFT EYE AND FRONTAL SINUS OF EIGHT MONTHS' DURATION PROMPTLY RELIEVED BY DRAINAGE OF APICAL ABSCESS AT ROOT OF UPPER LATERAL INCISOR**

Mrs. W., age 44, good health, and a rather negative history, complained of severe pain in the left ethmoid, left eye and left frontal sinus. She felt sure that a change of lenses would correct her discomfort. These were given and she seemed better for two months—certainly the "pain is not aggravated by near work as formerly—but it has been so bad between 10 P. M. and 5 A. M. for the past three nights it has been necessary to take an opiate." A radiograph of the frontals, ethmoids, antra and sphenoid was negative. Trans-

illumination was likewise negative. On examination of the nose there was an ovoid mass projecting from the left side of the nasal septum into the left lower meatus. It was soft, painless, easily indented with a probe. There was no redness nor other sign of inflammation. Patient had felt that the nose had been obstructed. It had the appearance of a hematoma. Under co-



Case 8, Radiograph 1—  
Abscess on end of upper lateral incisor.



Case 8, Radiograph 2—  
'Shows the tooth has been amputated and the canal refilled from its upper end.

caine anesthesia this sack was punctured with a hypodermic needle and an ordinary syringe of pus was removed. The cavity was then freely cleansed and drained. It was impossible to discover the source of infection. There was complete relief from the pain for several days when it recurred with its former intensity. A radiograph showed that the root of the left upper lateral incisor had not been filled to its end and there was probably some thickening of the peridental membrane, but no definite dissolution of the bone. Dr. Lokey amputated this root, draining the abscess cavity and packing it with gauze. This afforded instant and permanent relief.

It is to be regretted that there was no thorough pathological study of the tissues and bacteria of these cases, and yet it would seem that from clinical experience alone one would be justified in drawing some conclusions.

1. Dental abscesses and granulomata rarely produce local symptoms in or about the gums.

2. Latent abscesses and impacted teeth may produce pain suggesting eye strain, chronic and acute otitis media.

3. Headache, vertigo, face pain, stuffiness and fullness within the nose or ears may be produced by unerupted teeth.

4. There may be definite latent dental abscesses producing discomfort and these may escape detection even by most careful radiographic examinations.

5. Radiographic studies of the teeth are

essential in any scientific effort to locate the cause of the pain in or about the face or head.

6. It is wisest to have these radiographs made and interpreted by a dentist who has made a thorough study of these conditions.

7. Isn't it about time to say that all teeth with dead nerves should be extracted since it is well-nigh impossible to be sure the roots are properly disinfected and filled and if not so treated they become a menace to all future health?

#### BIBLIOGRAPHY

1. Brandt, L.: Ueber die Beziehung zwischen Zahn-, oberkiefer-, und Nasenleiden, Verhandl. d. Gesellsch. deutsch. Naturf. u. Aerzte, 1907, (1908) pt. 2, 2. Hälfte, 414-417.
2. Chavas, M.: Mycosis benigna des voles respiratoires superieures. Ses relations avec la carie dentaire. Lyon, dissertation, 1898.
3. Kollman, G.: Ueber den Zusammenhang von Zahn- und Nasenleiden, Deutsche Monatsschr. f. Zahnhe., 1909, XXVII, 873-899.
4. Weeks, S. M.: Relation Between Abnormal Breathing and Malocclusion, Arch. Pediat., 1913, XXX, 46-51. Discussion, 63-66.
5. Pollak, E.: Folgekrankheiten der Nase und der Kieferhöhle nach peripapillären Eiterungen der oberer Schneidezähne. Monatsschr. f. Ohrenh. (etc.), Berl. u. Wien, 1913, XLVII, 305-318.
6. Baldwin, Kate W.: The Teeth as a Cause of Pathological Conditions in the Throat, Nose and Ear, Jour. Amer. Med. Assn., 1905, XI, 301-305.
7. Barclay, R.: Dental Irritation as a Factor in Diseases of the Ear, Nose and Throat. Dental Brief, 1906, XI, 223-226.
8. Allport, E.: The Relation Existing Between Ophthalmology and Otolaryngology and Dentistry, Medical News, N. Y., 1904, LXXXIV, 730-734.
9. Bennett, F. J.: Deafness Dependent on Dental Lesion. Trans. Odont. Soc. Gr. Brit., 1906-1, LXXXIII, 161-166.
10. Scarsbrick, W.: Association of Dental Caries With Enlarged Tonsils in School Children. Medical Officer, London, 1912, IX, 183.
11. Pegler, L. H.: Ulceration of the Pharynx Due to Pyorrhea. Proc. Roy. Soc. Med., Lond., 1910-11, IV, Laryngol. Sect., 109.
12. Richards, G. I.: Aural Neuritis of Dental Origin. Laryngoscope, 1905, XV, 289-291.
13. Graven, C. P.: The teeth in Relation to Ear and Throat Diseases, Dental Cosmos, Phila., 1907, Vol. XLIX, pp. 533-555.
14. Cryer, M. H., and Ivy, R. H.: Pathologic Significance of Impaction and Retarded Eruption of Teeth. Phila. Gen. Hosp. Rep., 1910, VIII, 191, 229-232.
15. De Ford, W. H.: Necrosis, Involvement the Alveolar Process, Superior Maxillary Bone, Antrum on Both Sides, Hard Palate, and Nasal Bones, Resulting from Alveolar Abscess. Dental Cosmos, 1900, XI-II, 723-729.
16. Douglass, R.: Oral Sensibility from the Standpoint of the Rhinologist. Post-Graduate, N. Y., 1914, XXIX, 313-315.
17. Duckworth, T. G.: The Effect of Adenoids on the Dental Arch. Internat. J. Orthodontia, St. Louis, 1915, Vol. I, 247-250.
18. Farlow, J. W.: On Some Relations of Diseases of the Nose and Throat to Dentistry. Internat. J. Dent., N. Y., 1894, XV, 491-494.
19. Hirsch, J. H.: The Relation of Diseases of the Teeth Bear to the Eye and Ear. Dental Brief, 1907, XII, 799-803.
20. McKenzie, D.: Some Points of Common Interest to the Rhinologist and the Orthodontist. Internat. J. Orthodontia, St. Louis, 1915, Vol. IX, 17.
21. Patton, W. T.: A Few Conditions of Common Interest, Both to the Dental Surgeon and the Nose and Throat Specialist. Dental Cosmos, Phila., 1916, LVIII, 386-389.

18. Ollagnier, P.: Des troubles oculaires et auriculaires dans des cours des affections dentales. Lyon, dissertation, 1899.
19. Pont, A.: Troubles oculaires et auditifs dans les affections dentales. Lyon Med., 1898, LXXXIX, 221-229.
20. Ritter, E.: Ueber die mit kranken Zähnen in Verbindung stehenden pathologischen Veränderungen der oberkieferund Nasenhöhle. Tagebl. d. Versammlung. deutsch. Naturf. u. Aerzte, 1888 (1889), LXI, 292-301.
21. Makuen, G. H.: The Faucal Tonsils and the Teeth. Jour. Amer. Med. Assn., 1909, LII, 1988.  
Myer, D. W.: The Relationship Between Rhinology and Orthodontia. Intern. J. Orthodontia, St. Louis, 1915, I, 86-93.
22. Harris, T. J.: Report of Six Cases of Dysphagia and Dysphonia of Dental Origin. N. Y. Med. Jour., 1917, 105-21-975.

**THE TREATMENT OF PNEUMOCOCCUS ULCER OF THE CORNEA WITH THE THERMOPHORE (METHOD OF DR. W. E. SHAHAN)\***

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The value of moderate heat as a therapeutic measure in various ocular diseases has long been recognized. Applied in the form of a compress (dry or wet) it is useful in bringing a sty to a head, in alleviating the pain of a keratitis, iritis or glaucoma. Warm saline or boric acid douches are often grateful in conjunctivitis, or after the removal of a foreign body from the conjunctiva or cornea. Heat thus applied induces hyperemia and tends to relieve lymphatic stasis.

Higher degrees of heat have been used to combat ocular infections in the hope of destroying the organisms concerned in the process. If the lesion is accessible, e. g., an ulcer of the cornea, the superficial organisms can be incinerated quickly by the use of the actual cautery. Inevitably, sublying and adjacent tissue is also destroyed, so that, even if the ulcerative process is brought to a standstill, the resultant scar is dense and often much larger than the area ulcerated. Radiant heat (by means of a heated metal ball held close to the eye) and hot air and steam (forcibly projected against the diseased area) are methods of undoubted value, but have the

great disadvantage that neither the intensity nor quantity of heat can be controlled or measured.

In 1916, Shahan<sup>1</sup> presented the results of animal experimentation to determine the physiologic limit of heat tolerance, which he defined as the "maximum temperature at which tissues may be held for stated lengths of time without permanently harmful effects." It was his aim to determine whether the organisms responsible for certain infective processes could be killed by a degree of heat not exceeding the physiologic limit of heat tolerance for the tissue infected. The study was prompted by a realization that many pneumococcus or serpiginous ulcers of the cornea went on to destruction of the eye despite the unremitting application of accepted therapeutic measures.

A means of applying constant, measured quantities of heat directly to the corneal surface was not at hand, so Shahan was compelled to devise an instrument for this purpose. This so-called thermophore "consists of a metal tube containing a thermometer, and surrounded by a resistance coil to generate heat, while within the latter is placed a zinc-iron sensitive strip to permit the temperature to be kept at any constant point. Into one end of the metal tube are inserted applicators of various shapes, to be applied directly to the cornea."<sup>2</sup> He soon found that different tissues of the eye have different limits of heat tolerance. Thus the corneal epithelium was found to withstand an application of 116° F. for ten minutes, whereas 117° F. for ten minutes produced after twenty-four hours a desquamation of the epithelium. Experiments showed that the substantia propria had "no sharply defined limits of physiologic tolerance to heat," but 130° F. was thought to be as high as it was safe to go. A transient miosis was produced by 116° F. for ten minutes. The temperature in the anterior chamber was elevated 15 to 22° F. by the application of different degrees of heat. The vitreous was apparently unaffected.

Experimental pneumococcus ulcer in rabbits was subjected to 130° F. for ten

\*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Eleventh Annual Meeting, Memphis, Tenn., Nov. 12-15, 1917.

<sup>1</sup>Shahan: Jour. A. M. A., August 5, 1916.

<sup>2</sup>Shahan and Lamb: Amer. Jour. of Ophthalmology, August, 1916.