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## CANCER OF THE TONGUE: A PREVENTABLE DISEASE\*

JOSEPH COLT BLOODGOOD, M.D.  
BALTIMORE

In this paper, evidence will be submitted which seems to prove that cancer of the tongue is largely a preventable disease. On this point, a brief preliminary communication<sup>1</sup> has been published.

### TEACHING MORE IMPORTANT THAN SURGERY

Tables 1 and 2 illustrate the changes in the type of the lesion observed in 265 cases in men, in the four decades between 1889 to 1921.

In Table 2 the percentage of benign lesions has increased from 3.7 in the first decade to 55 in the first two years of the last decade. The majority of benign lesions from 1900 to 1910 did not come under observation until 1906, after my first communication. There is a tremendous increase after 1910—from 24 to 48 per cent.

In reading the 105 histories of benign lesions of the tongue one observes that, with hardly an exception, the patient sought advice because he had read something in the daily press or in magazines or heard a lecture about the danger of cancer developing in an innocent, painless area of irritation in the mouth.

TABLE 1.—SUMMARY OF MALIGNANT TUMORS OF THE TONGUE IN MEN

	1889-1899		1900-1909		1910-1919		1920-1921		Totals	
	No.	%	No.	%	No.	%	No.	%	No.	%
Early malignant...	9	33	37	33	9	21	1	3.5	56	22
Advanced cancer...	3	10	37	33	22	51	13	50	75	27
Hopeless cancer...			15	20	5	12	2	7	22	14
Inoperable cancer...	3	10	7	10	7	16	10	38	77	27
Totals.....	15		76		43		26		160	

In addition, early malignant lesions have increased from 3.7 per cent. in the first decade to 23 per cent. in the fourth, or as shown in Table 1 to 60 per cent. of the total number of cases of cancer.

Advanced, but still operable, cancer continued to increase until 1910, but did not show marked decrease until 1920.

Hopeless and inoperable cancers show a steady decrease in each decade.

\* Owing to lack of space, this article is abbreviated in THE JOURNAL by the omission of several illustrations and detailed discussion of the cases. The complete article appears in the appendix, a copy of which may be obtained on application to the author.  
<sup>1</sup> Illustrated, J. C. Cancer of the Tongue & Preventable Disease, Correspondence, I. A. M. A. 77:220 (July 16) 1921.

In studying the histories of cancer of the tongue, I found that patients came for surgical treatment earlier after the beginning of the malignant disease through the education of the public and the profession.

The study of the ultimate results in cancer of the tongue shows that, after five years, 62 per cent. of the patients with early malignant cancer are well, and 12 per cent. of those with advanced cancer, while all those

TABLE 2.—SUMMARY OF ALL LESIONS OF THE TONGUE IN MEN

	1889-1899		1900-1909		1910-1919		1920-1921		Totals	
	No.	%	No.	%	No.	%	No.	%	No.	%
Benign lesions.....	19	37	71	48	34	21	1	3.7	125	46
Early malignant...	9	33	37	22	9	16	1	3.7	56	22
Advanced cancer...	3	11	37	25	22	29	13	18	75	27
Hopeless cancer...			22	16	11	21	12	11	65	24
Totals.....	31		117		76		27		251	

with hopeless and inoperable cancer are dead. The total operative mortality of the early malignant cases is 5 per cent., and of the advanced cases is 30 per cent.

### DANGER OF DELAY

Delay in proper treatment after the onset of the malignant lesion reduces the chances of a cure in operable cases from 62 to 12 per cent., and increases the chances of postoperative death from 5 to 30 per cent. Further delay means an inoperable condition for which, at present, we have no treatment that promises a cure.

The educational propaganda has therefore increased the number of operable cases from 53 to 80 per cent. and decreased the number of hopeless and inoperable cases from 47 to 20 per cent.

**Warning.**—I have the evidence to show that men who develop cancer of the tongue have been warned by definite local lesions.

There is, first, the warning from a lesion that is not cancer. These precancerous lesions are leukoplakia, bad teeth, areas of irritation, ulcers, syphilitic gummas, warts, fibromas and smoker's burns. I will describe these in detail later. If the man seeks and obtains good advice, he should be protected from cancer. This has happened now in 105 patients, or 40 per cent. of the total, and, as has been stated before, the number of these informed patients that have been protected has increased from 3.7 per cent. in the first decade to 55 per cent. so far in the fourth decade.

There is, second, the warning from the definite cancer developing in the precancerous lesion; but this may be insidious and the infiltration of the cancer may be slow or rapid. The uninformed person, with rare,

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if any, exceptions, will not seek advice until cancer is in an advanced stage, when he has only 12 per cent. chances of cure and 30 per cent. chances of post-operative death. It is true that in recent years, with operations under local anesthesia, we have reduced the postoperative mortality; but I have been unable to demonstrate that we have increased the five-year cures in this advanced stage.

Some cases of cancer of the tongue infiltrate so rapidly that the condition is hopeless or inoperable within two months after the onset of what we might call the secondary warning of cancer.

The great increase in the percentage of benign lesions of the tongue and in the early malignant stage, and the decrease in the percentage of advanced and hopeless cases is distinctly shown in Tables 1 and 2, and I attribute this to a continuous and persistent educational propaganda among the public and medical and dental profession within the zone of my personal influence.

If other large clinics cannot show this improvement, it is not the fault of their method of treatment, but is the result of their failure to teach.

Improvement in the cure of cancer of the tongue is very much the same problem as in appendicitis. Failure to cure appendicitis is not the fault of our treatment of peritonitis and abscess, but is the result of our failure to instruct the public and medical profession how to recognize appendicitis before abscess formation or peritonitis sets in.

This study of 265 lesions of the tongue in men and thirty-three in women convinces me that our only hope of decreasing the deaths from cancer depends on the educational propaganda among the public and the profession.

**Delay After the Onset of Cancer.**—Table 3 shows the danger of even one month's delay after the onset of a definite local cancer of the tongue. Within this

TABLE 3.—DURATION OF CANCER OF THE TONGUE IN MEN

	Up to 1 Month	1 to 3 Months	3 Months to 1 Year	More Than 1 Year
Early treatment.....	12	15	3	1
Delayed treatment.....	4	4	9	8
Hopeless cases.....	..	23	9	8

total, 33 per cent. have become advanced, with only 12 per cent. chances of cure. This alone should be sufficient to justify the detailed description of the precancerous lesions which appear in this article with illustrations. After one or two months and up to six months, twenty-five cases, or 29 per cent., had become hopeless and inoperable.

It is true that cancer may grow so slowly that it still is in the early stage even after six months, but this is rare.

I will now discuss in detail the etiologic factors and the primary warnings in 160 cases of cancer of the tongue.

#### COMMENT ON TABLES 1 AND 2

For the purposes of this study the malignant cases classed as early are those with a small lesion on the tongue or the floor of the mouth, which can be easily removed through the mouth. In some of these cases, the glands have been removed, in others they have not.

Cases have been classed as advanced when the local lesion has been more extensive and has indicated a more radical operation on the tongue, and the floor of the mouth and glands, and in many cases it was removed with a piece of the lower jaw.

Hopeless is a group in which before operation the surgeon is rather of the opinion that the diseased tissue could be removed, but at operation it is distinctly demon-

strated that the condition is inoperable.

In the inoperable group there is no question from the clinical picture that the disease cannot be eradicated by operation.

Every patient in the inoperable and hopeless groups has died or is dying of the disease. In these groups, we have not a single case in which any other method of treatment has given any definite results.

#### ETIOLOGIC FACTORS

Tobacco, rough and dirty teeth and improperly fitting

plates predominate as causes of cancer of the tongue.

**Tobacco.**—Among 160 cases of cancer of the tongue, it is distinctly stated in the history in only two cases that the man did not use tobacco, in any form. In both, there is a history of bad teeth for years, producing an area of irritation. In one, an ulcer formed later from the ragged tooth; and in the other a definite wound was produced by the ragged tooth.

In all the old complete histories and in all the recent records, it is distinctly stated that the men had used tobacco in one form or in another, usually to excess. In a number of the older histories with very incomplete data, no mention is made of the use of tobacco. The evidence, therefore, is overwhelming that the continuous and prolonged irritation from tobacco in some form is the chief factor in producing a lesion which may later develop into cancer.

The rarity of cancer of the tongue in women is additional evidence. In the few cases of cancer of the tongue in women, the patients have used tobacco, usually in the form of snuff by the mouth.

When we study the histories with the idea of determining which is the most dangerous form of



Fig. 3 (Pathol. No. 22760, (C. B. 4381).—Extensive leukoplakia with stomatitis, fissures, and benign warty growth; Wassermann reaction, positive; well after three years.

using tobacco—pipe, cigaret, cigars, chewing tobacco or snuff by mouth, we find numerous examples of cancer in patients who have used tobacco in only one form; many who have used it in all forms. The striking feature is the excess, not the form, the constant presence of tobacco juice in the mouth, and careless smoking, so that there is repeated burning of some one area, producing either an area of irritation, or a definite burn, or leukoplakia.

It seems quite reasonable to conclude that men can be educated to use tobacco moderately and in such a manner as to reduce the danger to a minimum, and to be instructed on the warning which would influence them to discontinue, at least temporarily, the use of tobacco in any form, and to keep the teeth clean and smooth.

**Leukoplakia.**—Among 160 cases of cancer of the tongue in men, leukoplakia had been observed by the patient for years before the appearance of cancer in forty-one cases. In twenty-seven of these cases, more than 50 per cent., there was a distinct history of local irritation from rough, dirty teeth, or improperly fitting plates. In fourteen cases, the leukoplakia alone seems to have been responsible for the development of cancer.

**Leukoplakia and Syphilis.**—There was a history of syphilis and a positive Wassermann reaction in nine cases, about 21 per cent. This is higher than the normal incidence of syphilis, which is from about 6 to 7 per cent.<sup>2</sup>

**Bad Teeth.**—In the records without a history or evidence of leukoplakia, there is a distinct history of ragged, dirty teeth producing a local area of irritation, present for months or years before the development of cancer, in forty-seven cases.

**Good Teeth.**—In three histories there is a definite notation that the teeth were in good condition, with no evidence of pyorrhea, roughness or dirt. These patients had no leukoplakia. One, however, had observed an area of irritation for seven years on the middle third of the lateral surface of the tongue which impinged on the teeth. This is very suggestive that the note on "good teeth" may be incorrect. In the remaining two cases, the patients smoked a pipe, and one had observed an ulcer for six months; the other an ulcer, for one year, on the tongue where the end of the pipe rested against the tongue. These histories are suggestive that the primary lesion was a burn, and the patients may have had their warning longer than six months and one year.

**Area of Irritation.**—In twelve cases in which there was no definite leukoplakia recorded, the condition which had warned the patients for months or years was a local area of irritation. From the histories, it is

difficult to tell whether this was due to a burn from smoking, or to irritation from bad teeth.

**Ulcer.**—In forty-three cases, the patients were aware of the presence of a definite local ulcer on the tongue or floor of the mouth for months before the development of cancer. In these cases, there was no record of leukoplakia, and the exact etiologic factor of ulcer was sometimes difficult to determine. In a number of cases, there was evidence that the ulcer was due to a definite burn, in others to the fact that the patient kept chewing tobacco over the area; in others, again to bad teeth; in a few to a definite wound from a foreign body or from biting the tongue—a wound which never healed.

Irrespective of the factors which caused the ulcer, the important fact remains—that forty-three patients had definite ulcers for months which could have been treated and cured before the development of cancer.

**Syphilitic Lesion.**—In only one case was the lesion on the tongue apparently syphilitic in origin, and in this case the cancer developed in a gum.

It is true, that in a number of instances the local lesion was treated for syphilis, many, in spite of a negative Wassermann reaction; without positive evidence in favor of syphilis, and with the only result that proper treatment was delayed.

**Wart.**—In four cases prominent precancerous lesion was a definite wart—two and ten months, and two years, respectively. The warts at operation were found to be malignant, excised, and the patients have remained well.

In only one instance of a fully developed cancer there a history of a wart; this patient had been warned for years by leukoplakia, the wart was an example of hypertrophy of the epidermis

which now and then develops in the area of leukoplakia.

**Fibroma.**—This is a subepidermal nodule, apparently a scar tissue tumor. There were four cases of the condition. This is an uncommon precancerous lesion, because during the same time we had six examples of benign fibromas removed from the tongue, the duration of the lesion varying from two weeks to fifteen years.

The four cases of fibroma in which cancer developed indicate the importance, however, of removing such lesions of the tongue, because four out of twelve, per cent., have become malignant.

In two of the cases, the histories are incomplete. One patient had observed the fibroma for nine months, the other patient for one year, more than sufficient time for its removal before the development of cancer. One patient had been warned for years by the presence of leukoplakia and had observed the nodule which suggested a fibroma for but two months. In this case the cancer was not in the fibroma, but in the mucous

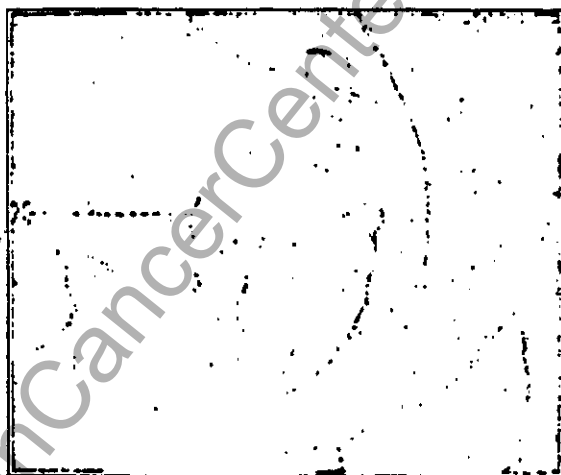


FIG. 4 (Patient No. 36116, J. C. B. 5888).—Extensive leukoplakia of tongue, stomatitis, fissures; Wassermann reaction, positive; of years' duration; small ulcer at X, of three weeks' duration, excised; microscopically, cancer; well after seven years.

<sup>2</sup> J. Cary, N. A.: Frequency of Syphilis with Cancer of the Lips, Tongue and Buccal Mucous Membrane, J. A. M. A. 76:828 (Sept. 25) 1920.

membrane covering it, in an old patch of leukoplakia, which had been irritated by a badly fitting plate.

In the fourth case, the patient had been aware of an area of irritation on the spot on which his pipe rested for years. A fibroma developed in this area, and later cancer.

TABLE 4.—SUMMARY OF PRECANCEROUS LESIONS IN CANCER OF THE TONGUE

Precancerous Lesions	No. of Cases
Leukoplakia	41
Bad teeth	47
Area of irritation	12
Ulcer	43
Exposable gumma	1
Wart	3
Fibroma	4
Smoker's burn	1

**Smoker's Burn.**—On the lip, this is a very common precancerous lesion; but on the tongue and floor of the mouth, it is one difficult to determine. I am of the opinion that a localized area of leukoplakia, of irritation, or a definite ulcer or fibroma may be due to the repeated burning from hot smoke. But in our records, I can find but one definite notation of a smoker's burn.

**Pain.**—Pain before the appearance of any other symptom has not been recorded as the symptom of onset.

**Comment.**—Therefore, in 154 out of 160 cases of cancer of the tongue we have a previous definite history of a precancerous lesion. In the remaining six cases, the histories are too incomplete for any data. In the forty-three cases of ulcer, the histories are incomplete as to the lesion which preceded the ulcer.

There is not a lesion here that the ordinary individual could not recognize himself. All that the patients need to know is that it is a warning which should be immediately heeded by seeking the advice of a competent physician, who, with the aid of the dentist, should immediately remove the cause, and, if the lesion does not promptly disappear, refer the patient to a competent surgeon for proper treatment.

PREVIOUS TREATMENT IN ONE HUNDRED AND SIXTY CASES OF CANCER OF THE TONGUE

**Excision of Piece for Diagnosis.**—From my experience, this is unnecessary and may be dangerous. When the lesion is early and small, it is no more difficult to excise the area, with a good margin of mucous membrane and muscle, with the cautery; then a sufficient local operation has been performed, irrespective of the microscopic finding. This has always been my own rule, and I have never mutilated a patient with a benign lesion and never given a malignant lesion an insufficient margin. In advanced, hopeless and inoperable carcinoma, the excision of a piece for diagnosis is unnecessary.

The safest rule in excising a piece for diagnosis, if it is to be done at all, is to have it done by the surgeon who is to be responsible for the treatment and not by one inexperienced in the diagnosis and surgery of can-

TABLE 5.—PREVIOUS TREATMENT

Treatment	Cases					Total
	Early Malignant	Not Malignant	Hopeless	Inoperable		
Excision of piece for diagnosis	4	3	5	1		13
Extraction of teeth	2	10	5	1		18
Restling	4	2	2	3		11
Röntgen rays	1	3	1			5
Cautery			1			1
Cancer	1	15	9	5		26
Antisyphilitic	7	13	6	1		27
No treatment and no note						41
						160

cer of the tongue. Unfortunately, as a rule, in these sixteen cases, the piece was excised by one who was unwilling and untrained to assume the responsibility of further treatment after the diagnosis of malignancy had been made from the piece excised.<sup>2</sup>

PREVIOUS EXAMINATION BY PHYSICIANS OR DENTISTS

In going over the histories, I have recorded as a previous examination by a physician only those cases in which the examination was not followed by immediate appropriate treatment; that is, a member of the medical profession was a party to the dangerous delay. Of these fifty-four physicians, twenty-seven gave antisyphilitic treatment, others caustic treatment, or radium or roentgen rays.

The thirty-three dentists noted are those who extracted teeth or did some dental work without recognizing the malignant lesion of the mouth, and who were, therefore, through their inexperience, parties to the delay. I take the position that it is not the fault of the dentist, but of the members of the medical profession in the great clinics throughout this country who

TABLE 6.—PREVIOUS EXAMINATIONS

	Cases					Total
	Early Malignant	Not Malignant	Hopeless	Inoperable		
Consulted physician	15	23	7	9		54
Consulted dentist	7	16	6	8		37

have not published their data and thus given the members of the dental profession an opportunity to become familiar with the various types of the local lesions of the oral cavity which may develop into cancer, or which are cancer when they come under the observation of the dentist because of some required dental work.

2. Further data are given in the reprints.

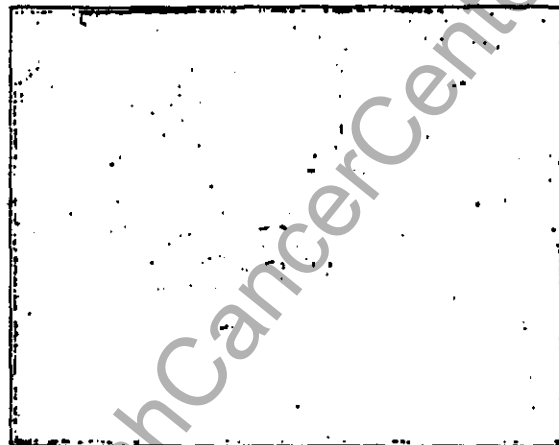


Fig. 11 (Pathol. No. 8374, JCB, 2092).—The ulcer on the under surface of the tip of the tongue had been present three months; history, tobacco and irritating teeth; Wassermann reaction, negative; very little induration; complete carcinoma; microscopically no tuberculosis or cancer; death eight years later of tuberculosis of the lungs.

To a large extent, the decrease in the number of deaths from cancer of the oral cavity is in the hands of the dental profession.

BENIGN LESIONS OF THE TONGUE AND FLOOR OF THE MOUTH

The types and numbers of benign lesions of the tongue of which I have records are: leukoplakia, 27; fibroma, 8; warts, 14; ulcer, 15; hypertrophied papillae, 8; cysts, 3; area of irritation, 12; tuberculosis, 15; syphilis, 4; geographic tongue, 2; angioma, 0; pellagra, 1; general stomatitis, 8, and fissures (cracks), 5.

The eight cases of general stomatitis and the five cases of fissured tongue are in combination with other lesions. The total number of benign lesions is 109. Four cases have been observed since Table I was made, recording 105 lesions.

**Leukoplakia.**—There were thirty-three cases of leukoplakia first observed in the benign stage. In nine of these, the Wassermann reaction was positive (27 per cent.). I have already noted that among 160 cases of cancer, leukoplakia was noted in forty-one cases, with nine positive Wassermann reactions (21 per cent.). Leukoplakia, therefore, is the most common benign lesion of the mouth that has come under observation. As a precancerous lesion, it ranks second to bad teeth (leukoplakia, forty-one cases; bad teeth, forty-seven cases).

Benign leukoplakia has been seen in combination with fibroma four times, with hypertrophied papillae twice. In these six cases, the Wassermann reaction was negative. Benign leukoplakia and benign wart have been seen in combination in one case; the Wassermann reaction was positive.

As a rule, a warty growth associated with leukoplakia is very suggestive of beginning cancer.

**Duration of Benign Leukoplakia.**—The longest duration was fifteen years and was associated with a fibroma. This patient is well eleven years after observation and now has a clean mouth. The average duration of the leukoplakia in the benign group is less than one year. There are only four cases between one and five years.

It is very encouraging to note that in the last five years most of the patients with leukoplakia have sought advice and have had the causes removed within one year or six months after the onset.

In the majority of cases of cancer which have developed in areas of leukoplakia, the lesion had been present and recognized from five to thirty years. There are a few cases in which the disease was of apparently shorter duration.

Leukoplakia is a distinct lesion. It is a white patch in the mucous membrane, resembling somewhat a patch of enamel paint. On palpation, it is distinctly recog-

nized from the surrounding mucous membrane: it is harder and leathery in consistency. As long as the leukoplakia shows no tendency to crack or peel off, or form an ulcer, there is no indication for any treatment other than removal of the causes—tobacco, teeth and syphilis when the Wassermann reaction is positive. The moment a patch of leukoplakia splits, scales, or desquamates and leaves an ulcer, the area should be excised with the cautery.

In my group of thirteen cases, excision has been practiced but four times. In every case of benign leukoplakia, as well as in cancer in leukoplakia, there is a definite history of excessive use of tobacco. While in forty-one cases of cancer in leukoplakia, there is a definite note of dirty, rough teeth in twenty-seven cases; in the benign leukoplakia, a similar bad condition has been recorded in all but one.

**Results in Benign Leukoplakia.**—Practically all of these twenty-seven patients have been followed up to date. The cause of the lesion has been removed, and

none so far have developed cancer. It is interesting to note that I saw benign leukoplakia for the first time in 1911, and since then with each succeeding year, the number of cases observed by me is increasing, and, as a rule, the duration is shorter—a very satisfactory result of the educational propaganda.

**Examination of the Oral Cavity.**—As leukoplakia may be situated on any part of the mucous membrane of the oral cavity, it seems most appropriate to discuss the routine method of examination. This consists of inspection and palpation.

**Inspection:** This is best performed in a dark room with pencil hand electric light which can be inserted in the mouth. The tongue is inspected, grasped with a piece of gauze, pulled out, and the papillae of the base, especially on the sides, carefully studied. One should look underneath the tongue and at the floor of the mouth; at the mucous membrane fossae behind the molars; at the gums on both sides of the teeth, and should examine the mucous membrane at the angle of the mouth and the hard palate.

Leukoplakia, as a rule, first appears at the angle of the mouth and behind the molars, at the tip and along the border of the tongue. The presence of even a small patch of leukoplakia is an indication that the patient is sensitized to tobacco and should discontinue its use in any form, at least until the leukoplakia has disappeared. The teeth should be inspected for sharp points, cavities and pyorrhea. If a plate is worn, pressure areas should be looked for.

**Palpation:** This is of the greatest importance and often tells more than inspection, and to interpret it, one must be familiar with the normal palpation of the tongue, the floor of the mouth, the gums, and the hard



Fig. 12 (Pathol. No. 27351, J.C.R. 10267).—Area of irritation on tip of tongue; slightly elevated, smooth, red, opposite a ragged tooth; of one month's duration; on tobacco; Wassermann reaction, negative; healing after smoothing tooth.

and soft palate. Both hands should be washed; the fingers of the right hand placed in the mouth, and the patient instructed to relax the tongue as much as possible. The fingers should be passed over all areas of mucous membrane and the sense of touch of the involved area compared with that of the other areas. The tongue should be pinched between the thumb and the index finger; the floor of the mouth examined with the fingers in the mouth and below on the neck. This palpation will bring out the induration which, as a rule, is a sign of early cancer. Leukoplakia can be distinguished by palpation only.

This thorough inspection and palpation of the oral cavity had rarely been properly done in patients referred to me.

This routine and complete physical examination of the oral cavity by palpation and inspection can be developed to a high state of perfection, just as the physical examination of the chest and abdomen.

If the results of the examination indicate a distinctly benign lesion, the patient should be referred immediately to a dentist to have any indicated dental work done. If, however, the local lesion has reached the stage in which immediate excision is indicated, the dental work should be postponed until after the operation.

**Treatment of Leukoplakia.**—One should explain to the patient why the use of tobacco should be discontinued in all forms. He should be placed under the care of a competent dentist; directions should be given to wash the mouth frequently with a solution of sodium bicarbonate. He should be required to return for repeated examinations at stated intervals, until it is well established that there is no area which requires excision.

This condition of leukoplakia will be described in greater detail in a separate article, as it is one of the most important precancerous lesions of the mouth and should be well understood by both the medical and dental professions. I am unable to find any comprehensive article on this subject.<sup>4</sup>

#### BENIGN AND MALIGNANT LESIONS OF THE TONGUE IN WOMEN

During the period that we observed 265 lesions in men, there have been but forty-five in women. While the total percentage in men is 40, the total percentage of benign lesions in women is 75.

Table 6 shows the effect of the educational propaganda. In the first decade there are four cases—all malignant. It is interesting to note that three of these were in colored patients. One example of early cancer

has been lost track of; the one with advanced cancer died within sixteen months of recurrence; two cases (50 per cent.) were hopeless and inoperable.

TABLE 7.—SUMMARY OF LESIONS OF THE TONGUE IN WOMEN

	1890-1900 Cases		1910-1920 Cases		1920-1930 Cases		Totals Cases	
	No.	%	No.	%	No.	%	No.	%
Benign lesions.....	4	100	23	82	2	46	29	75
Early malignant.....	0	0	3	11	1	23	4	11
Advanced cancer.....	0	0	1	4	1	23	2	5
Hopeless cancer.....	0	0	1	4	1	23	2	5
Totals.....	4	100	28	100	4	100	36	100

The data as to etiologic factors in these four women are incomplete.

In the second decade (1900 to 1910) the percentage of benign lesions is only 40. The two benign lesions were wart and fibroma. Of the three malignant lesions the early and advanced cancer have been cured; one was inoperable.

The third decade (1910-1920) illustrates best the results of the program of education. There are twenty-three examples of benign lesions or 82 per cent. Of the five malignant tumors two were operable.

In the beginning of the fourth decade since 1920, only benign lesions of the tongue have been observed in the female.

The types and numbers of benign lesions of the tongue in thirty-three cases in women were: leukoplakia, 2; fibroma, 3; warts, 4; ulcer, 3; hypertrophied papillae, 9; cysts, 2; area of irritation, 8; tuberculosis, 0; syphilis, 1; geographic tongue, 0; angioma, 1; pellagra, 0; stomatitis, 2, and fissures, 0.<sup>5</sup>

#### MALIGNANT DISEASE OF THE TONGUE IN WOMEN

Fifty per cent. have been inoperable or hopeless. — a somewhat worse showing than in men (31 per cent.). Of the three early malignant cases, two patients (66 per cent.) have been cured; one was lost track of. This corresponds to the 62 per cent. of cures in men. Of the three advanced cases, two patients (66 per cent.) have been cured, and one died of a recurrence. This is a better result than in men, in whom we have cured only 12 per cent.

It is yet to be proved that cancer of the tongue may develop in women who do not use tobacco in any form; but it is my opinion that one's attitude toward distinct local lesions on the tongue and floor of the mouth in women should be the same as in men whether there is a history of the use of tobacco or not.

#### CONCLUSIONS

The guiding rule should be not only the early recognition of cancer of the tongue, but the systematic



Fig. 15 (Pathol. No. 14058, J.C.B. 5742).—Early malignant; typical small cancer ulcer on base of tongue, with induration of cancer; cured with cautery; well (1921) after seven years; ulcer of three months' duration.

<sup>4</sup> Other benign lesions are discussed in the reports.

appropriate treatment of the benign lesions which precede cancer by months or years, and the recognition of the causes of these lesions—tobacco and irritating teeth.

The message to the people is short and simple; but the message to the medical and dental professions must be in great detail, because if the people seek advice early, the profession must be prepared to recognize the early precancerous stage or the earliest stage of cancer when diagnosis is difficult and proper treatment simple.

**BRIEF RESUMÉ OF THE EDUCATIONAL PROPAGANDA**

It is strange but true that surgeons for years have been content to employ the tedious, difficult operative treatment of cancer when they knew that their operative mortality was high and their permanent results low. Surgeons must have concluded for years that the ordinary patient, without specific information, rarely, if ever, sought advice in the precancerous stage, and seldom and accidentally in the earlier and more favorable operative stage of malignant disease.<sup>2</sup>

904 North Charles Street.

**THE SURGERY OF THE TRIGEMINAL TRACT\***

CHARLES H. FRAZIER, M.D., Sc.D.

Surgeon to University Hospital

PHILADELPHIA

It is quite within the memory of most of us when J. Ewing Mears of Philadelphia, in 1884, first proposed the removal of the gasserian ganglion and when Hartley of New York, in 1891, first performed this operation

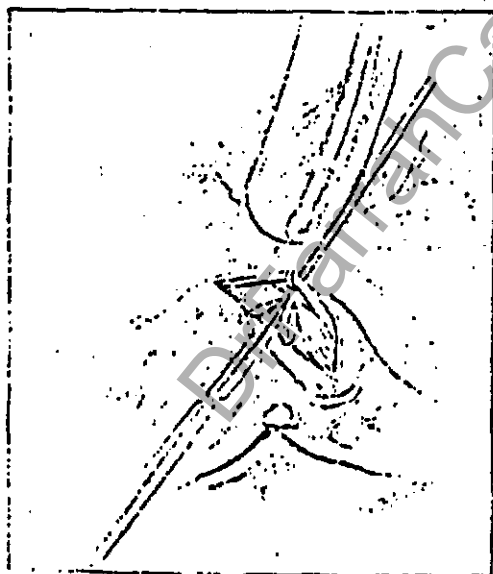


Fig. 1.—Subtotal division of sensory root according to author's technic. The most important fasciculus of the root has been isolated on a bone. The remainder of the root has been resected.

by the so-called Hartley-Krause method, at that time and for many years afterward thought to be a venturesome and hazardous bit of brain surgery. And most of us, too, will remember that paper of Tiffany's, pub-

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lished in the Transactions of the American Surgical Association in 1890, which recorded with pride, at that time seemingly justified, a mortality of 22 per cent. And then still later that contribution by the indomitable Keen,<sup>3</sup> so frequently quoted, who reported the results of eleven extirpations of the ganglion. It is a far cry from that day to this—a span of thirty years—when



Fig. 2.—Exposure of sensory root of gasserian ganglion as recommended in our technic. Note that the root is exposed throughout its entire course in the middle fossa.

the number of operations on the trigeminal tract is expressed in hundreds, and of these increasing opportunities, advantage has been taken to remove the tumors and to minimize the risks, so that today it is one of the least dangerous of the major operations. Even as late as 1914, Da Costa in his Modern Surgery places the mortality at between 10 and 17 per cent., whereas in the last 177 consecutive operations I have had but one operative fatality.

During this period of evolution from 1891 to the present, the peripheral operations of the terminal branches of the several divisions have been abandoned, and alcoholic injections have taken their place. During the same period, operations on the gasserian ganglion have been replaced, with trivial exception, by operations on its sensory root. The procedures which I have included in the title of this communication under "The Surgery of the Trigeminal Tract" are: (1) subtotal resection of the gasserian ganglion; (2) resection of the sensory root, subtotal; (3) resection or avulsion of the sensory root, total, and, (4) resection of the motor root.

**SUBTOTAL RESECTION OF THE GANGLION**

For these intracranial procedures the approach is the same. The manner of approach takes into consideration two equally important matters: (1) the cosmetic result and (2) convenience of access to the ganglion and its root. Intense as their suffering is, patients invariably inquire whether there will be any disfigurement, and their preconceived notion of disfigurement, facial paralysis and loss of sight must be set at ease. Even today this conception of the untoward effects of

1. Keen, W. W.: *Am. J. M. Sc.* 110, 1895