

American Journal of Public Health

and THE NATION'S HEALTH

Volume 35

May, 1945

Number 5

Vincent's Infection—A Wartime Disease

Preliminary Considerations on the Epidemiology
of Ulcerative Gingivostomatitis *

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FOLLOWING the last war the colloquial reference to Vincent's infection as "trench mouth" developed a tendency in the minds of many to associate it particularly with World War I, but the history of ulcerative stomatitis may be followed back with relative certainty to the end of the 18th century. According to Bergeron^{1, 2} the report of Desgenettes—a view concurred in by Hirsch³—citing the outbreak occurring in 1793 and 1794 in the French Army during the Italian campaign, constitutes the first article dealing specifically with this condition. Prior to that time it is Hirsch's opinion that whatever had been written of the disease is more or less hidden from view, being confused under such general headings as malignant aphthae, noma, "stomacace," or other broad designa-

tions used by older writers covering various diseases of the mucous membrane of the mouth. A recent review by Hirshfield, et al.⁴ credits John Hunter with clearly differentiating ulcerative stomatitis from periodontoclasia and the oral manifestations of scurvy as early as 1778.

For those interested in 19th century literature on the epidemiology of ulcerative stomatitis, recourse may be had to the work of Bergeron^{1, 2} and Hirsch.³

RECOGNITION OF THE DISEASE (DIAGNOSIS)

Ulcerative gingivostomatitis is known by a number of synonyms: ulcerative stomatitis, necrotic gingivitis, ulceromembranous gingivitis, phagedenic gingivitis, Vincent's infection, "trench mouth," and "putrid mouth" (Mundfäule).

The characteristic syndrome of ulcerative gingivostomatitis is: pain, necrosis,

* Presented before the Dental Health Section of the American Public Health Association at the Seventy-third Annual Meeting in New York, N. Y., October 5, 1944.

pseudomembrane formation, salivation, and a characteristic fetid odor. The onset is rapid, pain being often the only prodromal symptom. The interdental papillae become acutely inflamed, stand away from the teeth, bleed easily on the slightest touch, and are exquisitely painful. Necrosis occurs, beginning with the tip of the interdental papillae, with subsequent development of a characteristic greyish-white pseudomembrane which is easily removed, leaving a raw, profusely bleeding surface. The characteristic odor is a diagnostic point of importance.

This condition may be limited to the interdental papillae of a few adjoining teeth or become generalized, spreading along the festoon of the labial, buccal, and occasionally lingual gingivae, and may at times involve all of the interdental papillae. The anterior (incisor-cuspid) region is the most common site of origin. While ulcerative stomatitis commonly confines itself to the gingiva, it may at times extend to the other parts of the oral mucosa. These secondary lesions are largely confined to the mucous membrane of the cheeks and lips, originating at some area where the mucous membrane is in direct contact with the ulcerated gingiva when the mouth is closed.

Differential diagnosis should exclude: marginal gingivitis, hypertrophic gingivitis, suppurative periodontitis, forms of gingivitis associated with metallic poisons, and certain systemic diseases such as scurvy, pellagra, blood dyscrasias, and the mucous patches of syphilis.

Although the fuso-spirochetal organisms are found to be the predominating bacterial types in this condition, microscopic demonstration of these organisms should not be interpreted independently of clinical findings. Diagnosis rests basically on the clinical syndrome: pain, fetor, pseudomembrane formation and necrosis. In the ab-

sence of this symptom-complex, a positive bacteriological diagnosis serves little purpose.

EPIDEMIOLOGIC CONSIDERATIONS

In dental epidemiology an example of a condition permitting the quantitative measurement of the causative factors and the rate of change in the consequent effects as these factors change is endemic dental fluorosis. In the short space of thirty years its basic epidemiology was written, the etiological agent determined, and its complete prevention under mass control conditions demonstrated. But few problems in stomatology possess the inherent requisites for such objective measurement of its factors as does this simple affection of the dental enamel.

In sharp contrast stands ulcerative gingivostomatitis. After a century and a half and much accumulated experience most of its basic epidemiology is still enshrouded in almost as much uncertainty as in the days of Bergeron and Hirsch.

Consider for example the all-important question of communicability. In 1886 after commenting that the etiology of ulcerative stomatitis among bodies of troops was for the present unsolved, Hirsch³ wrote:

The opinion that putrid mouth is *contagious* or communicable which was expressed by Payen, Léonard, Brée, Bergeron, and Guépratte (and formerly adhered to by me) is not borne out by the experience of Cafford, Colin, Perrier, Laveran, Mourson, Catelan, and Maget, the two last named more especially having made experiments on themselves which produced no effect.

But for the names, this statement has a familiar ring. One would have little difficulty in substituting for these 19th century workers the names of present-day writers. The number of proponents of the communicability assumption and those who reject this supposition would show little change in this division of opinion. The critical

analysis of the existing evidence made a few years ago by Rosebury⁵ in a paper entitled: "Is Vincent's Infection a Communicable Disease?" provides a fitting sequel to the quoted passage from Hirsch of sixty years ago.

Until a few consistent and indisputable facts are clearly demonstrated, an effort to outline the epidemiology of ulcerative gingivostomatitis must proceed with extreme caution. Either we have failed to perceive the significance of what little we know of this syndrome or do not know what is significant in the discordant contradictory literature of the present. The need of a long term searching epidemiological inquiry is so obvious that further comment would be purposeless.

An opportunity recently presented itself to study the dental admission records at the 33 chair Dental Clinic of the U. S. Public Health Service hospital, Sheepshead Bay, New York. This dental clinic serves the officers and men of the U. S. Coast Guard Training Station, Manhattan Beach, and the U. S. Maritime Service Training Station, Sheepshead Bay. While these two populations are located on two contiguous reservations and the personnel of each is either in training for or has experienced sea service, the two groups are completely separate administratively. The Coast Guard, in time of war, is a part of the U. S. Navy; the Maritime Service is concerned with training of personnel for the operation of the merchant marine. Approximately 75,000 men went through these two stations in 1943.

All admissions to the Dental Clinic during 1943 passed through the Clinic's examination unit, two dental officers ordinarily being assigned to this unit for a two months' tour of duty. Beginning May 1, 1943, one dental officer was assigned to the Coast Guard induction center and one dental officer to the Maritime Service induction center for

cursory dental inspection of all men arriving at each station. This system has continued without interruption. All cases tentatively diagnosed as Vincent's infection, questionable Vincent's infection, or gingivitis other than Vincent's and which in the opinion of the inspecting dental officer required immediate clinical treatment* were sent from the induction center to the Clinic's examination unit for a complete dental examination. Other admissions for gingivitis, all forms, were those sent direct to the Clinic's examination unit following the organization's daily sick call. Personnel diagnosed as having one or the other of the gingival disturbances listed were sent to the Clinic's Periodontia Department for treatment.

All dental examination schedules for 1943 were inspected † critically by one of us (D.E.S., Jr.) and the records of all 1943 new admissions for ulcerative gingivostomatitis (Vincent's infection) questionable Vincent's infection, or gingivitis (other than Vincent's infection) were transferred to punch cards for subsequent analysis. For the calendar year 1943, the records thus transferred totaled 3,385. During the first quarter of 1944, new admissions for Vincent's infection totalled 404. These, too, were transferred to punch cards for use in computing the annual rate for the month for this period.

The data which will be presented later is based upon diagnoses made by U. S. Public Health Service dental

* In all probability the amount of non-Vincent's gingivitis reported in this paper considerably understates the actual prevalence in these two commands.

The prevalence of gingivitis (all types) would naturally include not only those admitted to the Clinic for treatment but likewise those milder cases not sent to the Clinic for treatment on initial inspection or not reporting on subsequent sick calls because of the minor nature of the gingival disturbance.

The over-all prevalence of gingivitis could only be determined by a random sampling of each command, but it was not felt that such interference with training programs was justified.

† Study began January, 1944.

officers. In a broad statistical analysis of morbidity data from clinic or hospital records there is always a considerable factor of uncertainty difficult to appraise. The criterion of diagnosis of Vincent's infection doubtless varies among different dental officers; as is well known the nosology of gingivitis is highly imperfect.

These data, therefore, are largely of the nature of an "epidemiological case report" indicating the frequency of these various types of gingivitis in these particular populations during the period of time specified according to the diagnostic criteria of the U. S. Public Health Service dental officers admitting the patient to the clinic.

AGE DISTRIBUTION

The age distribution of the personnel admitted during 1943, for one or the other of the previously mentioned types of gingivitis was determined for Coast Guard, Maritime Training Service, and others (USPHS, USN, and dependents). During 1943 there were admitted to the Clinic 1,578 cases of Vincent's infection, 311 cases of questionable Vincent's infection, and 1,496 individuals with gingivitis (other than Vincent's).

These data distributed according to age are shown in Table 1.

DISTRIBUTION IN TIME

There have been a number of references in the literature to seasonal distribution in the incidence of Vincent's infection. However, these distributions seemingly follow no consistent pattern. Speaking of seasonal distribution, Frost⁶ states:

The seasonal fluctuations in rates of prevalence which are characteristic in many diseases can usually be explained, if at all, only in the light of fairly definite knowledge of other associated epidemiological features; hence, considered by themselves, these fluctuations must be interpreted most cautiously.

Until certain basic facts in the epidemiology of Vincent's infection have been made clear it would seem prudent to heed this cautionary admonition with respect to interpreting data of this nature.

In attempting to interpret fluctuations in monthly morbidity rates in a military population the problem is further complicated by the "flow factor" or the amount and type of movement of the personnel through the organization or camp. For instance, a

TABLE 1

Age Distribution of 3,385 Cases Admitted to the USPHS Dental Clinic, Sheepshead Bay (N. Y.), During the Calendar Year 1943 for Ulcerative Gingivostomatitis (Vincent's Infection), Questionable Vincent's Infection, or Gingivitis Other Than Vincent's Infection According to Branch of Service

Age	Ulcerative Gingivostomatitis (Vincent's Infection) (a)				Questionable (Vincent's Infection) (b)				Gingivitis (Other than Vincent's) (c)				All Conditions (a+b+c)			
	CG	MTS	Others*	Total	CG	MTS	Others*	Total	CG	MTS	Others*	Total	CG	MTS	Others*	Total
17	52	69	0	121	15	13	0	28	96	65	0	161	163	147	0	310
18	72	148	0	220	19	22	0	41	86	118	0	204	177	288	0	465
19	50	95	2	147	11	18	0	29	59	88	1	148	120	201	3	324
20-24	244	381	16	641	38	69	6	113	154	262	4	420	436	712	26	1,174
25-29	94	185	5	284	14	45	1	60	114	208	2	324	222	438	8	668
30-34	32	77	1	110	7	22	0	29	52	107	6	165	91	206	7	304
35-39	8	18	1	27	3	2	2	7	14	23	4	41	25	43	7	75
>39+UNK	4	19	5	28	2	1	1	4	7	20	6	33	13	40	12	65
Total	556	992	30	1,578	109	192	10	311	582	891	23	1,496	1,247	2,075	63	3,385

* USPHS, USN, and dependents.

station or camp may have a relatively constant mean strength and population density but the rate of change of the population and the rapidity with which recruits pass through a training center or other type of shore establishment may be factors of importance. At the Maritime Service this factor was seemingly relatively constant; recruits continued to pass through that station for 7-8 weeks' training* during the period covered by this study. On the other hand, changes at the Coast Guard station presented an interesting epidemiological contrast, a transition in type of population.† From January, 1943, through November, 1943, this station was largely engaged in recruit training (a population drawn from civil life), the training period being of 3 months' duration. In November recruit training rapidly tapered off and a number of school courses for men of more extensive service followed. Then early in February, 1944, another transition occurred, the station becoming largely a reassignment center for men of relatively longer service than the previous population. Many of the latter had extended sea duty oftentimes in small vessels where living conditions were markedly dissimilar to those prevailing on shore establishments. With such abrupt population shifts—particularly in populations which in themselves may be characterized by markedly different prevalences—efforts to interpret monthly morbidity rates on a seasonal basis would seem unwarranted.

The annual rate for the month of the 1,952 admissions of ulcerative gingivostomatitis (Vincent's infection) for the period January, 1943, through March, 1944, divided according to U. S.

Coast Guard and U. S. Maritime Training Service is shown in Table 2.

NUMBER OF CASES OF VINCENT'S DISEASE (IN-PATIENTS) ADMITTED TO THE EAR, NOSE, AND THROAT DEPARTMENT OF THE HOSPITAL DURING 1943

For an estimate of the ratio that the throat types of Vincent's disease bear to the more common form of the gingival involvement, the number and classification of all Vincent's cases admitted to the Ear, Nose, and Throat Clinic of the Hospital during 1943 was obtained from the hospital records. These data are given in Table 3.

Inspection of these data indicates that:

1. A relatively small percentage of Vincent's cases involve the throat.
2. From the standpoint of medical and dental care, treatment of Vincent's disease in general is almost wholly an out-patient dental problem.

TREATMENT AS IT MIGHT RELATE TO EPIDEMIOLOGY

In general, epidemiology is not chiefly concerned with therapeusis *per se* except in so far as treatment may influence morbidity or mortality rates. However, when dealing with a disease, the etiology of which is not clear, study of a group response to different therapeutic measures may shed some light on obscured aspects of its etiology and therefore warrant epidemiologic inquiry.

Of the admissions to the Dental Clinic for Vincent's infection, a high percentage were treated under a therapeutic regimen developed by Drs. Robert A. Scroggie and James S. Miller.* In this regimen, medication was considered as playing a relatively minor rôle; restoration of a high level of mouth hygiene, at the earliest pos-

* During periods of unusual shipping demand this time may have been somewhat shortened.

† In a general discussion on Vincent's infection by Mack⁷ other circumstances and conditions peculiar to naval personnel are enumerated. In studying populations of this type many of these factors require careful epidemiological consideration.

* Executive Officer and Dental Officer in Charge of the Clinic respectively. The general therapeutic procedures followed at this Clinic were recently discussed by Brooks and Wilson.⁹

TABLE 2

Annual Rate for the Month of 1,952 Admissions for Ulcerative Gingivostomatitis (Vincent's Infection) at the Dental Clinic, USPHS Hospital, Sheepshead Bay (N. Y.), Divided According to U. S. Coast Guard and U. S. Maritime Training Service (January 1, 1943-March 31, 1944, Inclusive)

	U. S. Coast Guard		U. S. Maritime Training Service	
	Number of Cases	Annual Rate per 1,000	Number of Cases	Annual Rate per 1,000
1943				
January	30	43.5	47	46.6
February	27	40.9	41	45.7
March	28	40.7	41	43.5
April	42	64.6	36	44.2
May	32	50.8	82	103.7
June	34	55.3	65	83.2
July	45	77.2	129	139.7
August	70	118.0	138	143.3
September	79	132.8	108	125.2
October	82	124.9	111	125.6
November	54	85.1	89	107.6
December	32	52.7	105	130.8
Unknown	1	....	...	....
Total 1943	556	73.1	992	94.9
1944				
January	19	38.5	92	112.1
February	29	73.9	99	115.1
March	77	148.0	88	100.4
Total 1st Quarter 1944	125	89.1	279	109.4

TABLE 3

	Coast Guard	Maritime Service	Others	Total	
Vincent's angina	610-141	6	8	0	14
Vincent's infection of the mouth	610-1413	8	19	1	28
Vincent's infection of the tonsil	634-1413	12	20	1	33
Laryngitis due to <i>Borrelia vincentii</i>	330-1413	0	0	0	0
Vincent's infection of the tongue	612-1413	0	0	0	0
Vincent's infection of lingual tonsil	635-1413	0	0	0	0
Total admissions to E.N.T.					
All Vincent's conditions	26	47	2	75	
Total Admissions to Dental Clinic in 1943					
Ulcerative Gingivostomatitis (Vincent's infection)	556	992	30	1,578	

sible moment, a matter of primary importance. Very briefly, treatment consisted of immediate* gross scaling (removal of as much as possible of the gingival calculus) at the first sitting, use of a bland medicament (viogen),†

* The question of immediate gross scaling is not particularly novel. It has been proposed by Merritt⁹ among others for many years. Further support may be found in the recent papers of Schluger,¹⁰ Stammers,¹¹ and Leatherman.¹²

† The efforts of the patient to remove by thorough brushing the effects of a dye such as viogen (1 gram crystal violet, 1 gram brilliant green, and 50 per cent alcohol, q.s. 100 ml.) generally results in the maintenance of a high level of oral hygiene.

detailed instructions in oral hygiene, and an insistence upon a high level of patient coöperation in early attainment and continued maintenance of oral hygienics. Subsequent treatments—about 48 hours apart—consisted of further odontexesis, curettage, an application of viogen, and a careful check of the oral hygiene practices being followed by the patient. For comparative purposes this regimen will be referred to as the "Scroggie-Miller" treatment.

Those treated with chromic acid, silver nitrate, etc., or in some instances

TABLE 4

Comparison in the Average Number of Treatments Between the "Scroggie-Müller" Treatment and "Other" Therapy in 1,548 Cases of Ulcerative Gingivostomatitis Admitted to the Dental Clinic, USPHS Hospital, Sheepshead Bay (N. Y.), in 1943

Oral Diagnosis	Number of Cases			Treatment	Average Number of Treatments	
	"Scroggie-Müller"	Other	Total		"Scroggie-Müller"	Other
<i>U. S. Coast Guard</i>						
Ulcerative Gingivostomatitis (Vincent's infection)	354	46	400	Completed:		
	37	17	54	Uninterrupted	3.2	5.2
				Interrupted	4.6	6.3
	85	10	95	Not completed:		
	..	..	7	Incomplete	2.6	4.7
				Unknown: none recorded	...	...
	476	73	556			
<i>U. S. Maritime Training Service</i>						
Ulcerative Gingivostomatitis (Vincent's infection)	532	96	628	Completed:		
	63	21	84	Uninterrupted	3.2	4.3
				Interrupted	4.3	6.1
	227	26	253	Not completed:		
	..	..	27	Incomplete	2.3	4.0
				Unknown: none recorded	...	...
	822	143	992			

with two or more agents at different sittings are known as the "other treatment" group. Scaling of teeth during the course of treatment in this group varied.

Both groups used a solution of sodium perborate for a mouth wash.*

In respect to continuity of treatment, the several groups were divided as follows:

1. Completed cases in which there were no broken appointments and the therapeutic regime was carried through to completion without interruption.
2. Completed cases in which the therapeutic regime was interrupted by one or more broken appointments prior to discharge from the Periodontia Department as a treatment completed case.
3. Incompleted cases, or those records in which the patient failed to return for further treatment, were "shipped out," or otherwise failed to carry treatment through to completion.
4. Treatment unknown, or those schedules showing no record of treatment.

* Diluted hydrogen peroxide would have been the mouth wash of choice but problems of distribution in a population of this nature necessitated the use of sodium perborate. Only enough sodium perborate powder was given for several days' use in order to check for possible deleterious effects.

A comparison of the average number of treatments (sittings) per patient of those receiving the "Scroggie-Müller" therapy and those listed under "other" treatment is shown in Table 4.

In attempting to assess from an epidemiological viewpoint mass clinical data taken from hospital records, one naturally approaches any question of interpretation with extreme caution. Obviously it is not possible to determine whether some inherent or unconscious bias developed in the selection of the patients who fell in one treatment category or the other; however, the broad distributional differences seemingly warrant a thoroughly controlled clinical study for such light that it may shed on etiology and control.

SUMMARY

1. After a century and a half of experience and study, the epidemiology of ulcerative gingivostomatitis (Vincent's infection) is still confusing and largely undefined. A thoroughgoing epidemiological study of this syndrome is urgently needed.
2. Inspection of the clinical records at the U. S. Public Health Service Dental Clinic, Sheepshead Bay (N. Y.) disclosed:

(a) The annual admission rate for ulcerative gingivostomatitis (Vincent's infection) in 1943 for the U. S. Coast Guard was 73.1 per 1,000 strength; for the U. S. Maritime Training Service, 94.9 per 1,000 strength.

(b) Vincent's disease in general seems predominantly a dental problem. In 1943 there were 1,578 cases of Vincent's infection admitted to the Dental Clinic in contrast to 47 cases of Vincent's angina or Vincent's infection of the tonsil admitted to the hospital.

(c) Gross scaling (removal of as much as possible of irritants such as supragingival and subgingival calculus, soft debris, etc.) at the *first sitting*, and use of a bland medicament in conjunction with full patient cooperation in attaining and maintaining a high level of oral hygiene was effective in restoring gingival health.

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ACKNOWLEDGMENT—The authors desire to express their appreciation to the officers of the U. S. Public Health Service, the U. S. Coast Guard, and the U. S. Maritime Training Service who so generously cooperated in this study, and to Principal Statistician William M. Gafafer, U. S. Public Health Service, for advice and suggestions in preparing this report.

Sample Censuses in Congested Production Areas

The Committee for Congested Production Areas of the Executive Office of the President, Washington, has published a brochure entitled "Observations on the Sample Censuses in Ten Congested Production Areas." It was published in December, 1944, by the group of which Corrington Gill is the Director. Although this is only a partial answer to the population shifts which have taken place in the United States during recent years, anyone who is deal-

ing first hand with these problems will find illumination in the diagram showing the origins of the migrants, with other factors bearing on population mobility, on the distance of the move and on the implication of this most disturbing factor in our census computations. Charts are presented showing the sources of out-of-town war workers for Puget Sound, for Portland, for San Francisco, Los Angeles, San Diego, Hampton Roads, Detroit, and Mobile.