

Staff Meeting Bulletin
Hospitals of the » » »
University of Minnesota

Carcinoma of Oral Cavity

INDEX

	<u>PAGE</u>
I. LAST WEEK	224
II. MEETINGS	
1. SCIENTIFIC MEETING OF THE ST. PAUL SURGICAL SOCIETY	224
2. ANATOMY SEMINAR	224
III. NEWS	224
IV. CARCINOMA OF ORAL CAVITY	
. Richard H. Beiswanger	225 - 252
V. GOSSIP	253

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during the school year, October to June, inclusive.

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William A. O'Brien, M.D.

I. LAST WEEK

Date: March 5, 1943
Place: Recreation Room,
Powell Hall
Time: 12:15 to 1:30 P.M.
Program: "Posterior Herniation of
the Intervertebral Disc"
W. T. Peyton
Jules D. Levin
Horace Scott

Discussion
Clarence Peterson
A. B. Baker

Attendance: 108

Gertrude Gunn,
Record Librarian

II. MEETINGS1. SCIENTIFIC MEETING OF THE ST.
PAUL SURGICAL SOCIETY

Thursday, March 18 at
7:30 p.m. at the Minnesota Club.

"Precautions in the Use of Spinal
Anesthesia"

Ralph Knight, Minneapolis

Discussion: E. M. Hammes, St. Paul

"Radiographic Aids in the Diagnosis
of Intervertebral Disc"

Harold Peterson, St. Paul

Discussion: W. T. Peyton, Minneapolis

2. ANATOMY SEMINAR

Tuesday, March 16, at
8:00 p.m. in Institute of Anatomy.

"The Healing Process in Wounds of the
Brain"

A. H. Baggenstoss

"A Case of Boeck's Sarcoid Followed for
Ten Years"

J. F. Noble

"Roentgenological Findings in Boeck's
Sarcoid"

L. G. Rigler

- - -

III. NEWSLife Story

"Blessed babyhood,
Carefree childhood,
Tender Teens,
Teachable twenties,
Tireless thirties,
Fiery forties,
Forcible fifties,
Serious sixties,
Sacred seventies,
Aching eighties,
Nodding nineties,
Shortening breath,
Death.
Sod.
God."

Author?

- - -

IV. CARCINOMA OF THE CHEEK, ALVEOLAR PROCESSES, FLOOR OF THE MOUTH, AND PALATE

Richard H. Boiswanger

500,000 people in the United States have cancer, and 30% of this group will die of this disease within 12 months.

As a cause of death, cancer ranked 7th, 25 years ago. Today it is second to heart disease only. 13 of every 100 white women will eventually die of cancer and 10 of every 100 white men. Of all fatal cancer in men, 7% are located in the oral region.¹

There should be fewer deaths from cancer of the oral cavity. These are lesions which can be readily detected and, when seen early enough, are not too difficult to cure. Yet, as will be shown later, most of these patients, when first seen, present lesions which have extended beyond their original confines. As a result, the 5-year cure rate remains discouragingly low, despite definite advancements in therapy.

History

For an extensive review of the history of this subject the reader is referred to Albright's² article in Radiology, 1935, vol. 25. Only some of the more important points will be reviewed here.

In 1746 William Hunter by using mercurical injections demonstrated that the lymphatics were independent of the arteries and veins. After Sappey, in 1874, made anatomic charts of the lymphatic areas, surgeons realized the importance of lymphatic drainage for cancer. In 1896, Gerota improved Hunter's method by using a suspension of Prussian Blue in turpentine and ether, which did not rupture the finer lymphatics. Gerota's technique enabled Kuettner in 1890 to demonstrate in detail the lymphatics of the tongue, floor of the mouth and cervical region. He advised early and wide excision of the cervical lymphatics.

This was followed by Crile's block dissection technique in 1906, the work on which he had begun in 1898.

Radium was first used for treatment in 1903.

In 1907, Dominici used filtration to stop the softer and more caustic rays. In 1910 he announced his method of implanting radium needles for carcinoma of the tongue. Regression of the tumor, followed by less pain and less hemorrhage, resulted. Further development was then halted in France by the World War.

In 1914 Stevenson, working at the Radium Institute of Dublin, first made needles charged with radon emanation. In 1916 he inserted give glass capillary tubes filled with radon, and no further filtration, into a lesion of the tongue. Failla, Janeway and Quick, at the Memorial Hospital in New York, have since developed this method further. In 1934, Quick stated that the unfiltered glass radon seeds used from 1916 to 1925 saved more cases, even at the expense of great suffering because of necrosis, than any other form of radiation. Since 1925, largely through the work of Failla, radon, sealed in capillary gold tubes and filtered with 0.3 mm. thick walls of gold popularly known as radon implants, has been used. This additional filtration lessens the necrotic action of the radon and increases tissue tolerance.

This study includes carcinoma of the cheek, alveolar processes, floor of the mouth, and hard and soft palate.

160 cases of carcinoma, arising at the aforementioned sites, were referred to the Section of Radiation Therapy, University of Minnesota Hospitals, during the years 1926 to 1940 inclusive, for treatment. All cases referred for treatment are included. All had follow-up studies at the Out-Patient Clinic, and when they failed to return to the Clinic, were followed by letters to their family doctor or relatives. Only one was lost track of.

One hundred twenty seven of the 160 cases had biopsies positive for carcinoma. The

remaining 33 either had no biopsy taken, or the report of the biopsy, if biopsy was done, is missing. The 2 groups will be treated separately as far as results of treatment are concerned.

Anatomical Classification

In Table I, the cases are divided into 6 sub-groups according to location.

Upper alveolar process	21	cases
Lower alveolar process	34	"
Cheek	58	"
Floor of mouth	27	"
Hard palate	12	"
Soft palate	8	"
Total	160	cases

Clinical Classification

In Table II the lesions have been divided according to their extent, into the following clinical groups:

Table II

Oral Carcinoma* Classification of Lesion
According to Involvement

<u>Stage</u>		<u>Cases</u>	<u>Per Cent</u>
I	Under 1.5 cms. diameter	2	1
II	Over 1.5 cms.; no local extension	34	21
III	Local extension	54	34
IV	Metastases on admission	70	43
	Total	160	

*Cheek, Alveolar Processes,
Floor of Mouth, Palate.

Howes and Bernstein,³ using a somewhat similar classification, report 9% Stage I, 33% Stage II, 9% Stage III, and 57% Stage IV. It will be noted that in 43% of our cases, metastases were present at the time of admission and in 77% the disease had extended beyond its original confines either by local extension or metastases, or both.

Table III (Cont.)

Average age	65
Youngest	36
Oldest	88

Sex Incidence

Females	- 19	(12%)
Males	- 141	(88%)

Etiology

Table III gives the distribution by Age and Sex.

Table III

<u>Age Groups</u>			
30 - 39	2	60 - 69	51
40 - 49	8	70 - 79	47
50 - 59	35	80+	12
		Age unde-	5
		terminated	

The table shows that cancer of the oral cavity is predominantly a disease of old age. Martin and Pflueger⁴ report an average age of 59 in 99 cases of cancer of the cheek at Memorial Hospital. The average age for all

intra-oral cancer at Memorial Hospital was 57 years, according to Martin and Sugarbaker.⁵

Chronic irritation is an obvious etiological factor. Most common irritants are dental sepsis, sharp or broken teeth, ill-fitting dental appliances, syphilis and the stronger forms of tobacco, such as chewing tobacco or snuff, pipe-smoking and cigar smoking.

Charles C. Lund⁶ discussing the cause and prevention of buccal cancer states: "Normally the mucus membrane of the mouth is comparatively resistant to the development of cancer as shown by the fact that women, who very largely do not chew tobacco or smoke pipes and whose mouths average much cleaner in other ways than men's do, have buccal cancer but 1/8 as frequently as men."

Davis⁷ attributed the prevalence of carcinoma of the cheek in the Philippine Islands to the chewing of buyo, which is a combination of buyo leaf, betel-nut, slaked lime and tobacco -- a habit more common among Philippine women than men. The incidence of carcinoma of the cheek in the Philippines is greater among women than men.

Quick⁸, discussing leukoplakia and allied mouth conditions, states "Local sepsis of chronic character is also underrated in its probable relation to cancer. Tissue specimens from chronically infected gum margins show all the changes from simple hypertrophy to beginning downgrowth of the basal layer in an irregular papillary manner and ultimately to fully developed cancer."

Figi⁹ states that carcinoma of the mouth often develops adjacent to carious teeth and ill-fitting dentures. On the other hand, such growths are encountered infrequently in edentulous persons and when they do occur, are almost always of an inactive type. He says the role of tobacco is still debatable.

Fraser¹⁰ of Edinburgh, writing in "Annals of Surgery" 1932, states the case for sepsis quite clearly: "Mouth infection is the most constant and prevailing associated influence, and we have no doubt that it plays a highly significant part in the production of the malignant error. An analysis shows that at least 50% of the cases were infected with pyorrhea alveolaris prior to the development of the cancer, and from what we have seen, we are satisfied that this influence is one of the most significant in the etiological picture, that it is the most common and constant factor, and that its influence is increased when it is combined with other irritant factors, such as alcohol, tobacco, syphilis, or direct local irritation."

Table IV gives our figures for possible causes of cancer in this series. These figures are necessarily low since, in a good many cases, no record was made of possible causative factors. However, in 95% of all cases, dental sepsis was present. By use of tobacco, we mean only the use of the stronger forms for a long period of time. By irritation of denture, we mean irritation over a long period, 10 to 20 years in most cases, none under 5 years. In this connection, it is interesting to note that of 19 females, 6 or 31% gave an ill-fitting dental plate as the causative factor.

Table IV

Site	No.Cases	No.Using Strong Tobacco	Leukoplakia	Ill-Fitting Denture	Sharp Teeth
Alveolar processes	55	11 (20%)	10 (18%)	12 (21%)	2 (4%)
Cheek	58	15 (26%)*	16 (27%)	4 (7%)	6 (10%)
Floor of mouth	27	7 (26%)*	4 (15%)	6 (22%)	0
Palate	20	2 (10%)	3 (15%)	2 (10%)	0

*13 of 15 chewed tobacco

* 4 of 7 chewed tobacco or used snuff

In 69 cases no possible cause was recorded except sepsis. (The information was lacking in some of the charts and it is probable that the incidence of tobacco habit was considerably larger.)

The incidence of syphilis in this series is low -- 8 cases or 5%. Syphilis is a more important factor in cancer of the tongue.

Intra-oral leukoplakia occurs most commonly on the cheek, 27% in this series. Its incidence parallels the use of strong tobacco closely. Martin and Pflueger⁴ report leukoplakia present in 22% in carcinoma of the cheek.

Histology

The tumors, except for two adenocarcinomas of the hard palate, were all of squamous cell origin.

Symptoms

The average duration of symptoms before beginning treatment was 8.6 months. Carcinoma of the oral cavity, like all carcinoma is symptomless in the first stages. One half the cases complained of pain as the first symptom, which indicates the lesion had been present for some time, the other half complained of an ulcer, local swelling or enlarged cervical glands.

More malignant lesions first appear as small, indurated ulcers or fissures in the mucosa. As the lesion penetrates, pain increases and finally becomes continuous. The more benign lesions usually appear as a papillary mass often developing on an area of leukoplakia. This lesion is slow in growth and does not show the early tendency to invasion or spread by cervical metastases of the ulcerative lesion.

In time, the lesions grow deeper and become necrotic. Lesions of the cheek are stretched, and lesions elsewhere in the mouth are irritated by the ingestion of

food and the movements of mastication. These lesions may perforate the cheek, or if they invade the pterygoid or temporal muscles, will cause trismus. Lesions of the floor of the mouth remain infected because of poor drainage. Infection is followed by pain and swelling. Hemorrhage by erosion of an artery may occur. Death results from several causes: infection, hemorrhage or malnutrition.

Differential Diagnoses

The differential diagnosis is not too difficult. A biopsy should be taken in every case. Other diseases which may form ulcers on the intra-oral mucosa are syphilis, tuberculosis, superficially ulcerated or fissured leukoplakia, herpes and simple granulomas such as caused by trauma, Vincent's angina, etc.

Only after repeated negative biopsies for carcinoma may some syphilitic lesions be differentiated from carcinoma. Then, if the Wassermann reaction is positive, and the lesion responds to two or three weeks of intensive anti-syphilitic treatment, carcinoma may be ruled out. The two diseases commonly co-exist.

The base of the ulcer in tuberculosis is yellowish, as compared to the coarse beefy appearance of the cancerous lesion. A tuberculous ulcer occurs most commonly on the tongue. In this case, biopsy fails to reveal cancer and tuberculosis can almost always be found elsewhere.

Fissured leukoplakia may be diagnosed by biopsy and treated by cautery or radiation. Any ulcer persisting more than 2 weeks should be biopsied.

Metastases

One hundred four (70%) of 146 cases had palpable nodes on admission -- in 14 the presence or absence of palpable nodes was not recorded. Of the 104 with palpable nodes, 73 or 70% were proved to be malignant either by the subsequent clinical course or by the microscope.

Of the cases with positive biopsy, there were 70 who had no metastases on admission of 129 cases, or 54%. Nine of these developed metastases later. There

were 46% with metastases on admission.

Table V gives the number with metastases at the time of admission according to site.

Table V

<u>Location</u>	<u>No. of Cases</u>	<u>Metastases at time of Admission</u>	<u>Per Cent of Metastases</u>	<u>Developed Metastases After Admission</u>
Upper alveolus	18	7	40	1
Lower alveolus	23	8	35	0
Cheek	49	27	55	4
Floor of mouth	21	9	43	2
Hard palate	10	3	30	2
Soft palate	8	5	73	0

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Treatment

Treatment consisted of radiation with subsequent surgery, or surgery with post-operative radiation or radiation alone.

It is well to decide whether treatment is to be an attempt at cure or merely palliative. There are 3 distinct problems: (1) Hygienic care of the oral cavity before, during and after treatment; (2) Treatment of the primary lesion; (3) Management of cervical metastases.

General Hygienic measures: In the type of patients we receive for treatment, the mouth is generally in a very poor condition. All broken, jagged, infected teeth, as well as all teeth in the proposed field of radiation, should be immediately extracted. Daily mouth washes or saline irrigations are advised, and the patient should learn how to use a tooth brush. Necessary vitamin therapy should be prescribed. Use of tobacco should be discouraged.

Primary lesion: The primary lesion was treated by excision in some cases followed by external radiation and/or implantation of .3 mm. gold filtered radon implants. In other cases external radiation and radon implants were used. Radium molds plus external radiation were used for lesions of the alveolar processes,

cheek and palate when possible, the radium being placed in a properly fitted dental mold and from 3,000 to 4,000 gamma ray roentgens given. It was found that larger doses with gamma radiation increased the chances of producing a radiation necrosis of neighboring bone.

The period of treatment extends from 1926 to 1940. Naturally there have been changes made in the form of treatment. However, throughout these years, even at the beginning in 1926, radon has been used extensively. Most cases had radon and in fairly large doses. Doses of radon only, figured to the center of the tumor, ranged from 3,000 to 10,000 gamma ray roentgens. Few had radon alone. Most had either surgery or external radiation in addition.

From 1926-1936 external radiation was given at 200 KV, 30 M.A., usually 60 CM distance, with either .5 mm. or 1 mm. Copper + 1 mm. Aluminum filter. Usually 1400 tissue roentgens were given to each side of the face and neck in from 7 to 10 days. In almost all cases, the cervical region was included in the field. After 1936, treatment was prolonged to 14-21 days, and in some instances up to 28 days. Daily doses of 200 to 300 r in air were given. After 1938, more fields were used. Each field was given as much as the skin would tolerate. Usually

treatment was stopped before vesiculation occurred. Where fields did not overlap, about 2750 tissue r were given to each side of the face and neck. When fields overlapped, the dose to each field had to be reduced accordingly. In the later years, an attempt was made to get at least 7000 to 10,000 gamma ray roentgens to the center of the tumor, external radiation being supplemented by radon seeds or radium. Martin, Quimby and Pack¹¹ have shown that it takes 7,000 to 10,000 gamma ray roentgens delivered in 10 - 20 days to destroy epidermoid cancer. Recurrences were either given more radiation, or removed surgically.

The treatment of the cervical glands, as well as special treatment to the different sites, will be discussed more fully later.

Different clinics favor different methods of getting the lethal dose to the center of the tumor. Regaud¹² prefers to use intra-tumoral radium needles, arguing that these give a more constant source of radiation. Berven¹³ at Radiumhammet (Stockholm) uses telurium with later electro-coagulation, or surface radium to the primary tumor and as a preoperative measure to dissection of cervical nodes, if they are involved. Grier¹⁴ does not like to use radium needles, since he believes they introduce infection. He uses them only in the tongue and tonsils and then for only a short period.

Treatment of Cervical Metastases

There is a considerable difference in the incidence of metastases from the various regions of the oral cavity. According to Nathanson and Taylor¹⁷ increased mobility of the part appears to be a factor in the production of cervical metastases. Thus the mobile tongue, floor of the mouth and soft palate show a higher incidence of metastases than the comparatively rigid hard palate and gingivae. It is possible that the continuous massaging of the primary cancer in these areas favors dissemination. In carcinoma of the cheek the incidence of metastatic

spread is less from the anterior 1/3 of the cheek than from that part of the cheek which overlies the masseter muscle, where the movements of mastication continuously massage the lesion. The stage of the disease as well as the extent of the growth influence the occurrence of metastases. If all cases were left untreated, no doubt ultimately all would develop metastases. When the carcinoma spreads to neighboring structures it not only may spread to a part of the oral cavity from which metastases are more apt to occur, but it also gains access to a greater number of lymphatic channels. The grade of malignancy of the lesion as well as the type of growth, ulcerative and invasive or papillary, are of course extremely important factors in the incidence of metastases.

Distant metastases are rare in mouth cancer, the disease rarely extending below the clavicles. Usually relatively few nodes are involved unless the disease has reached an inoperable stage. Bilateral metastases, however, are not uncommon.

Duffy¹⁸ has given the indications for neck dissection in cases of intra-oral carcinoma. "For a case to be operable, all the indications must be present. Any one contraindication completely excludes radical dissection."

Table VI

Neck Dissection

<u>Indicated</u>	<u>Contraindicated</u>
1 - Primary lesion is controlled	1 - Primary lesion is uncontrolled
2 - Primary lesion is limited to one side of oral cavity	2 - Primary lesion extends to or beyond the midline of oral cavity
3 - Primary lesion is shown to be of highly differentiated cell type	3 - Primary lesion is shown to be of undifferentiated cell type
4 - Cervical metastases are present and limited to one group of nodes or nodes in two contiguous cervical triangles	4 - No metastatic nodes are present
5 - Capsule of node is not infiltrated by carcinoma	5 - Capsule of node is infiltrated by carcinoma
6 - Opposite side of neck is free of metastases	6 - Cross or bilateral cervical metastases are present
7 - No distant metastases are present	7 - Distant metastases are present
8 - Patient is in good general condition	8 - Patient is in poor general condition

- - -

Control of the primary is the first requisite in the treatment of cervical metastases, since recurrence of the primary lesion will surely result in recurrence of metastases to the neck, either on the same or opposite side. Furthermore, if there are no metastases present, control of the primary will prevent any subsequent development of metastases and prophylactic neck dissection will not be necessary.

Lesions which extend to or beyond the midline are usually large and of high malignancy and are therefore hard to control. However, small lesions may extend across the midline and this fact should not alone contraindicate neck dissection.

If the cancer is highly malignant, there are usually other contraindications to neck dissection present, however, a high grade of malignancy alone should not necessarily exclude dissection.

In general, we agree with Duffy that dissection is not indicated unless metastases are actually present. However, some cases harbor metastases in which the clinical diagnosis cannot be made. Others appear to have involvement of the cervical nodes, but at operation they are found to be hyperplastic. The percentage of error in this regard as given by Duffy¹⁸ varies from 15 to 35%, i.e., 1/6 to 1/3 of nodes appearing to have signs of cancer are found to be hyperplastic. If all are subjected to neck dissection many unnecessary operations will be done and there will be some postoperative deaths among these. The disadvantage of subjecting all to neck dissections must be weighed against the fact that some with actual, but not clinically evident, involvement will have the benefit of early neck dissection.

It has been our practice to defer

dissection, but to follow these cases very closely, once every 4 weeks for 6 months, and every 2 months thereafter for 2 years. Cases which cannot be followed closely should be referred for neck dissection.

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Table VII

Results of Treatment of Cases with Cervical Metastases

<u>Site</u>	<u>Cases</u>	<u>5-Year Cures</u>	<u>Method of Treatment</u>
Upper alveolar process	6	2	Radiation and surgery
Lower alveolar process	5	0	
Cheek	21	1*	Radiation
Floor of mouth	6	0	
Hard palate	2	0	
Soft palate	3	0	
Total	<u>43</u>	<u>3</u>	

*Clinical -

3 7% 5-year cures of 43 cases. - - -

These cases were treated with external radiation, radon implantation and block dissection of cervical glands when indicated. Far advanced cases were given palliative treatment only. Almost all cases, that is, with and without cervical metastases, received some radiation to the cervical region at the time the primary was treated. If metastases were thought to be absent, the dose to the neck was somewhat less than that given to the primary lesion. If metastases were thought to be present, block dissection was done where not contraindicated. If block dissection was contraindicated, and treatment was not palliative only, external radiation was given to the cervical region to the limit of skin tolerance, and then radon seeds were implanted around the involved node or nodes with a total dosage of 7,000 - 10,000 gamma ray roentgens.

Hayes Martin¹⁹ believes that 1 or 2 erythema doses to each side of the neck are probably of no value. He uses fractionated x-radiation including only the node and an area 1.5 cm. around it. He gives 4,000 - 8,000 r in 2-3 weeks, then 5 to 10 T.E.D. by radon. He claims radiation treatment of the entire lymph-bearing area is dangerous and better results will be obtained by treating each node separately. For small nodes, some-

times radon seeds are enough. Some authors have stated that there are no authentic cures of cervical metastases by radiation. Martin¹⁹ reports 46 5-year cures proved by aspiration biopsy.

CERVICAL METASTASES

RESULTS FROM OTHER CLINICS

Albright² quotes Mekie's figures of 268 collected cases of mouth cancer with metastases to the cervical nodes (cases of Forsell, Quick, and his own, 1932); only 8 or 3% were cured. Albright² also quotes Simmon's figures as follows: "Of 376 cases of mouth cancer with clinical metastases, Simmons reported 5% surgical cures and none by radiation, although the radiation dosage was admittedly inadequate. Forsell, also quoted by Albright, reported 72 cases with neck metastases - no cures by radiation. Judd and New,²⁰ in 1927 reported 5% surgical cures in carcinoma of the oral cavity with glandular metastases.

Complications

(1) Hemorrhage: this may occur because of erosion of the facial or external maxillary artery. Ligation of the

external carotid artery on the affected side may be necessary. (2) Healing may be delayed because of local necrosis of soft tissue. Such local necrosis is more apt to occur if the facial artery is severed during a neck dissection.

(3) Osteoradionecrosis: when extensive radiation is applied to bone, radiation-necrosis may result. It is thought that this is due to interference with the circulation.

Watson and Scarborough²¹ describe the vascular structure of bone as follows: Bone cells are derived from osteoblasts which have become enclosed in a bone space or lacuna. These bone cells receive nourishment through very fine processes known as canaliculi. The outer surface of the bone receives a large part of its nourishment from the periosteal blood vessels which enter its substance through Volkmann's canals. The blood vessels of the Haversian canals and the nutrient artery supply the deeper portions of the bone and marrow. This forms a rich vascular network enclosed in a rigid framework of bone tissue which makes it vulnerable to the effect of irradiation. They give Ewing's interpretation of the histological changes in bone produced by irradiation. Different tissue reactions are excited by the three main methods of radiation treatment; the single massive dose, the fractionated dose and the prolonged continuous dose. The first has been investigated, the other two not.

The periosteum is highly susceptible; gross swelling and thickening occurs and it strips easily from the bone. On histological examination, the inner surface of the periosteum presents a thick hyaline layer without cells. The arterioles may be strangulated by a post-irradiation swelling of all the coats comprising the walls of these vessels. Obliterative sclerosis of the nutrient vessels which supply the deeper portions of bone and marrow takes place. The bone cells show degeneration and stain poorly with hematoxylin and eosin. Canaliculi are closed, the capillary circulation is imperfect, and devitalization of the bone results. If trauma then occurs, infection enters this devitalized bone and osteomyelitis with eventual sequestration ensues. In-

fection is often introduced by extracting teeth after irradiation. It may occur years after treatment. However, any form of trauma may be the means of bringing infection to the devitalized bone.

Watson and Scarborough²¹ have reported the incidence of osteoradionecrosis occurring at Memorial Hospital after irradiation of mouth lesions. Of 121 patients with carcinoma of the alveolar ridge, 48 (40%) developed this complication, 62 (34%) of 180 with tumors in the floor of the mouth, and 37 (25%) of 149 with carcinoma of the cheek. They say this complication may occur even $8\frac{1}{2}$ years after successful treatment. They believe that the present protracted method of irradiation is less damaging.

Continuous, dull, unrelieved pain may precede the onset of ulceration and suppuration by several months. During this period, no changes are noted on the roentgenogram except for some suggestive thickening of bone and periosteum. 9.6% of their series died because of radiation necrosis of bone alone, free of cancer.

Treatment is conservative. The patient may have to be fed with a nasal catheter because of painful swallowing, trismus, or salivary fistula. Frequent mouth irrigations are recommended. It may be necessary to inject the involved sensory nerves with alcohol. Sequestra are removed when possible. After sequestration and removal of bone splinters, pain usually disappears promptly. Resection of the mandible is dangerous if attempted late. Watson & Scarborough²¹ report 22% mortality of 51 cases in their series.

Prophylactic treatment is most important. Devitalized, loose carious teeth should be extracted and pyorrhea or recession at the gum margins treated. The mouth must be kept clean. In some clinics, sound teeth which will be in the beam of radiation are removed. When using radium in the oral cavity, protect the untreated parts with lead incorporated in a dental mold. Select portals which will cause as little damage as possible. If those cases which are most

likely to develop this complication are picked, the lesion may be irradiated and then that part of the bone which is most apt to cause trouble resected. Work in co-operation with a skilled den-

tist. Avoid strong chemicals to the scar after treatment. Decalcified teeth may be ground down to the alveolar margin and root canals filled instead of being extracted.

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Table VIII

Incidence of Osteoradionecrosis

<u>Site</u>	<u>No. of Cases</u>				<u>Developed Osteo- Radionecrosis</u>				<u>Percentage</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Upper Alveolar Process	21	18	7		2	2	2		10%	11%	29%	
Lower Alveolar Process	35	23	5	10	5	5	3	4	10%	21%	60%	40%
Check	58	49	5		4	3	1		8%	6%	20%	
Floor of mouth	26	21	1		2	2	0		8%	10%		
Hard Palate	12	10	0		1	1			8%	10%		
Soft Palate		8			0							

Column 1 represents all cases.

Column 2 represents cases with positive biopsy only.

Column 3 represents incidence in the 5-year cures only.

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Since it may be argued that those who had resection of the mandible subsequent to radiation did not have time to develop necrosis, Column 4 shows the incidence in those treated by radiation alone for lesions of the lower alveolar process.

The average time which elapsed between the beginning of treatment and the development of necrosis of bone was 8 months. The longest interval for necrosis to appear in any one patient was 2 years.

Results of Treatment

Table IX gives the results of treatment of all cases referred to the department for treatment. Table X gives the results of treatment of those cases with positive biopsy. Tables IX and X show the same 5-year survival rate, 24%, indicating that the clinical judgment as to the presence of a malignant process, in the absence of a biopsy, was accurate. However, for the results of treatment at the different sites only those cases with a positive biopsy will be included.

Table IX

Results of Treatment ----- All Cases
Carcinoma Alveolar Processes, Cheek, Floor of Mouth, Hard and Soft Palate

Years	No. of Cases	Years Survival															
		1	2	3	4	5	6	7	8	9	10	11	13	13	14	15	
1926	3	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1	
1927	7	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	
1928	4	4	1	1	1	1	1	1	1	1	1	0	0	0			
1929	9	7	2	1	1	1	0	0	0	0	0	0	0				
1930	2	1	1	1	1	1	1	0	0	0	0	0					
1931	9	3	2	2	2	2	1	1	1	1	1						
1932	16	14	10	7	7	7	7	5	5	3							
1933	19	9	7	6	5	5	4	3	3								
1934	7	4	2	2	1	1	1	1									
1935	13	7	4	0	0	0	0										
1936	9	7	3	3	3	3											
1937	13	11	10	8	3												
1938	12	8	6	4													
1939	13	10	6														
1940	24	14															
Cases	160	160	136	123	111	98	89	76	69	50	34	25	23	14	10	3	
Survival		103	58	39	28	24	16	12	11	6	3	1	1	1	1	1	
Per Cent		64	42	32	25	24	18	16	16	12	10	4					
Lost		1															

(Considered no survival)

Table X

Results of Treatment Cases with Positive Biopsy
Carcinoma Alveolar Processes, Cheek, Floor of Mouth, Hard and Soft Palate

Years	No. of Cases	Years Survival															Living
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1926	3	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1	
1927	5	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	
1928	3	3	1	1	1	1	1	1	1	1	1	0	0	0			
1929	5	4	1	0	0	0	0	0	0	0	0	0	0				
1930	2	1	1	1	1	1	1	0	0	0	0	0					
1931	8	3	2	2	2	2	1	1	1	1	1						
1932	10	9	5	4	4	4	4	3	2	2							
1933	15	9	6	5	4	4	4	3	3								
1934	7	3	1	1	1	1	1	1									
1935	9	6	4	0	0	0	0										
1936	8	6	3	2	2	2											
1937	11	9	7	5	4												
1938	10	6	5	3													
1939	12	11	6														
1940	21	14															
Cases	129	129	108	96	86	75	67	58	51	36	26	18	16	11	8	3	
Survival		88	46	28	23	18	13	10	8	5	3	1	1	1	1	1	
Per Cent		70	42	30	26	24	20	17	16	14	11						
Lost	1																

(Considered no survival)

Table XI

Results of Treatment Upper Alveolar Process with Positive Biopsy---18 Cases

Years	No. of Cases	Years Survival															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Living
1926	2(1)	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1*	1
1928	1(1)	1	1	1	1	1	1	1	1	1	1*	0	0	0			
1929	1-X 3(2)	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	
1931	1	0	0	0	0	0	0	0	0	0	0						
1932	1	1	1	1	1	1	1	1	1	1	1*						1
1933	3(1)	3	2	2	2	2	2	2	2*								2
1934	2(1)	1	0	0	0	0	0	0									
1935	1	1	1	0	0	0	0										
1936	1	1	1	1	1	1*											
1939	1	1	1*														1
1940	2(1)	1*															1
Cases	18(7)	18	16	15	15	15	14	13	11	8	7	6	6	3	2	2	6
Survival		15	10	7	7	7	5	5	5	3	2	1	1	1	1	1	
Per Cent		83	62	47	47	47	36	40	45	37	28	17	17				

40% had metastases on admission.

Figures in parenthesis represent cases with metastases on admission.
I-X Developed metastases after admission.

*Free of disease.

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Table XI gives the results of treatment of 18 cases of the upper alveolar process with positive biopsy. There are 7 (47%) 5-year survivals of 15 cases treated up to and including 1936. Six of the 15 cases had metastases at the time of admission. Two of the 6 with metastases are included among the 5-year survivals, 1 died with disease after 5 years, the other died after 10 years, free of disease. In the other 4, with metastases, the disease was not controlled.

Nine of those treated up to and including 1936 had no metastases on admission. One of these developed metastases and died after 2 years with disease. Five of the 9 are 5 or more year survivals and are living and free of disease. Three cases were treated since 1936, one with metastases at the time of admission. The case with metastases died with disease in less than one year, one with no metastases is living two years, free of disease, the other, one year and free of disease.

The two cases with metastases who survived the 5-year period were treated by both surgery and radiation to the primary. Both had neck dissection. The one case was first treated by excision of the primary; in 3 months the lesion recurred. It was then excised again and a unilateral block dissection of the neck done. At this operation, a portion of the upper jaw was resected. Post-operatively, he was given 2 doses of external radiation, 1 dose of 700 tissue r and 1 of 600 tissue r to the face and neck. He died 10 years later with no evidence of recurrence. This was a Stage III lesion.

The second case had a Stage IV lesion. It had been treated twice previously with the electro-cautery and had been given two x-ray treatments, dose unknown and 975 mgm. hours of radium. He then had a unilateral block dissection of the neck, followed by more local surgery. 9.4 mc. of radon were implanted in the operative field on the last occasion.

Later he was given 1200 tissue r to the side of the lesion and the cervical region in 8 days and 600 tissue r to the opposite side. One year later, 12 mc. were implanted in a recurrent lesion. He died after five years with disease.

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Table XII

Results of Treatment Upper Alveolar Process According to Method of Treatment and Stage of Disease

<u>Stage</u>	<u>Metastases</u>	<u>Form of Treatment</u>	<u>Neck Dissection</u>	<u>Results</u>
Stage II	1	Surgery then radiation	No	Alive FD after 2 yrs.
Stage III	0	Surgery and radiation	No	Alive FD after 15 yrs.
Stage III	0	Surgery then radiation	No	Died with disease after 2 yrs.
Stage IV	+	Surg. then rad. then surg.	Yes	Died FD after 10 yrs.
Stage IV	+	Surgery then radiation	Yes	Died with disease after 5 yrs.
<hr/>				
Stage II	0	Radiation then surgery	No	Alive FD 9 yrs.
Stage III	0	<u>Radiation</u> and surgery	No	Died with disease less than 1 yr.
Stage III	0 - x	Radiation then surgery	No	Died with dis. 2 yrs.
Stage III	0	Radiation then surgery	No	Died with dis. 1 yr.
Stage IV	+	Radiation then surgery	Yes	Died with dis. 1 yr.
Total 10 cases	4	Combined radiation & Surg.	Yes	4 or 9, 5-yr. cures, 1 FD 2 yrs.
<hr/>				
Stage III*	0	Radiation	No	Alive FD 8 yrs.
Stage III	0	Radiation	No	Alive FD 8 yrs.
Stage III	0	Radiation	No	Alive FD 1 yr.
Stage III*	0	Radiation	No	Alive FD 5 yrs.
Stage IV	+	Radiation	No	Died (cause unknown) 1 yr.
Stage IV	+	Radiation	No	Died with disease less than 1 yr.
Total 6 cases	2	Radiation	None	3 or 4, 5 yrs; 1 FD 1 yr.
<hr/>				
Stage IV	+ Bilat.	Palliative radiation	No	Died with disease less than 1 yr.
Stage IV	+	Palliative radiation	No	Died with disease after 1 yr.

x Developed metastases

* Osteoradionecrosis

FD Free of disease

Table XII gives results according to method of treatment and the stage of the disease.

There are 10 cases treated by a combination of surgery and radiation, 4 of which had metastases, one of these

four developed metastases after admission. Four of a possible 9 are 5-year survivals. Two of the 5-year survivals had metastases to the cervical glands. One with no metastases is living and free of disease 2 years.

Eight cases were treated by radiation alone, 4 had metastases. Two of these were given palliative treatment only. Of those with metastases, in three the disease was not controlled, the other died after one year, cause unknown. Three of a possible 4 are 5-year survivals and one is living and free of disease one year.

TREATMENT CARCINOMA OF UPPER ALVEOLAR PROCESS

Most of these lesions are extensive when first seen and are therefore best treated by a combination of radiation and some form of surgical diathermy. Some may be controlled by radiation alone.

Treatment by radiation consisted of external radiation supplemented by radon

implants and/or radium incorporated in a dental mold. If there was extension to the antrum, which was not infrequent, radium capsules filtered with 2 mm. of brass, containing 25 mgm. of radium each, were used. In the later years, external radiation was given to two or three overlapping fields, 200 to 300 r daily in 20 to 28 days to the limit of skin tolerance. Almost all lesions received from 5000 - 9000 gamma ray roentgens by the radon implants. A few were treated first with a radium mold, 3 to 5 T.E.D., then external radiation and occasionally radon also.

Recurrences usually were treated with more radon and external radiation. If there was extension to the antrum, the antrum was opened and the tumor mass removed surgically. One to four radium capsules were then packed in the cavity depending upon its size.

The dose was 500 to 2500 mgm. hours in 10 - 30 hours depending upon the number of capsules used.

Treatment to the cervical nodes has been discussed.

Table XIII

Results of Treatment Other Clinics Carcinoma Upper Alveolar Process

<u>Reported by</u>	<u>No. of Cases</u>	<u>% Cures</u>	<u>Method of Treatment</u>
Holmgren(22)	39	25% 5 yrs.	Surgery
König (22)	48	16% 5 yrs.	Surgical
Martens(22)	79	20.2% 5 yrs.	Surgical
Welch(23)	137	17% 5 yrs.	Mostly surgical
New & Fig1(24)	295	43% 5 yrs.	Surg. diath. & radiation
Lund & Holton(25)	34	12% 5 yrs.	Radiation & <u>surgery</u>
Hautant(22)	18	38% 1½-5 yrs.*	Radiation & <u>surgery</u>
Barnes(22)	25	52% 1-9 yrs.	Radiation & <u>surgery</u>
Green(22)	36	33% 1-5 yrs.	Radiation & <u>surgery</u>
New(22)	97	36% 1-8 yrs.	Radiation & endothermy
Lirle(26)	16	31% 3-7 yrs.	Radiation
Berven(22)	44	18% 4 yrs.	<u>Radiation</u> & <u>surgery</u>
Author	15	47% 5 yrs.	<u>Radiation</u> & <u>surgery</u>

*Cases without metastases only.

Table XIII gives results of treatment from other clinics.

Table XIV

Results of Treatment Lower Alveolar Process with Positive Biopsy---23 Cases

Years	No. of Cases	Years Survival														Living
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1927	1	1	1	1	1*	0	0	0	0	0	0	0	0	0	0	
1928	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1929	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1930	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1931	3	3	2	2	2	2*	1	1	1	1	1*					1
1932	4 (2)	4	2	2	2	2	2	2	2*	1*						1
1933	3 (2)	1	1	1	1	1	1	1	1*							1
1934	0	0	0	0	0	0	0	0	0							
1935	1	0	0	0	0	0	0	0	0							
1936	1 (1)	0	0	0	0	0	0	0	0							
1937	2 (1)	1	1	1	0											
1938	1	1	1	1*												1
1939	4 (2)	3	1*													1
1940	3	3														3
Cases	23 (8)	23	20	16	15	13	12	11	11	8	4	1	1	1	1	
Survival		17	9	8	6	5	4	4	4	2	1	0	0	0	0	
Per Cent		74	45	50	40	38	33	36	36	25	25					

35% had metastases on admission.

Figures in parenthesis represent cases with metastases on admission.

*Free of disease.

Table XIV gives the results of treatment of 23 cases of the lower alveolar process with positive biopsy. There were 13 cases treated up to and including 1936 with 5 (38%) 5-year survivals. None of the 5-year survivals had metastases. Before and including 1936, 8 of 13 had no metastases on admission. Of these 8, in 6 the disease was controlled; 5 lived over 5 years, free of disease, and one, 4 years. In the other 2, the cause of death was not determined. Five had metastases on admission. None of these lived 2 years after the onset of treatment and all died with disease. (Two who did not have a biopsy had clinically positive metastases and were 5-year cures. One was treated by radiation alone and one by radiation and surgery.)

After 1936, there were 10 cases, 7 with no metastases, 3 with metastases. None developed metastases later. Of the 7 with no metastases, 4 are living and free of disease, one 3 years, one 2 years and two, 1 year. Three of these four were treated by radiation alone. None of the 3 with metastases lived 2 years after beginning treatment. There are in all 23 proved cases. Of these 10 (43%) are free of disease.

5 years free	---	5
4 years free	---	1 (all no metastases)
3 years free	---	1
2 years free	---	1
1 year free	---	2
Total		10

Table XV

Results of Treatment Lower Alveolar Process According to Method of
Treatment and Stage of Disease

<u>Stage</u>	<u>Metastases</u>	<u>Form of Treatment</u>	<u>Neck Dissection</u>	<u>Results</u>
Stage II	0	Excision of lesion	No	Died with dis. after 3 yr.
Stage III	0	Hemisection mandible	Yes	Living FD 9 yrs.
Stage III	0	Group I Endotherm to mand. & cheek Hemisection mandible Mandible curetted	No	Died FD 4 yrs.
Stage III	0		Yes	Died with dis. after 1 yr.
Stage III	0		No	Died with dis. less than 1 yr.
Stage IV	+		Yes	Died with dis. after 1 yr.
Stage III*	0	Curettement mandible	No	Died FD after 8 yrs.
Stage III	0	Hemisection mandible	Yes	Died FD after 5 yrs.
Stage III	0	Group II Hemisection mandible Hemisection mandible Hemisection mandible Hemisection mandible Hemisection mandible	Yes	Living FD after 3 yrs.
Stage III	0		No	Living FD after 2 yrs.
Stage III	0		No	Died with dis. after 1 yr.
Stage IV	+		No	Died with dis. after 1 yr.
Stage IV	+		Yes	Died with dis. less than 1 yr.
Total 13 cases	3	Combined radiation & surg.	Yes-6	3 of 7, 5 yr. cures; 1 FD 4 yrs; 1 FD 3 yrs; 1 FD 2 yrs.
Stage II*	0	Hemisection for radionecr.	No	Living FD after 1 yr.
Stage II	0	Radiation	No	Living FD after 1 yr.
Stage III*	0	Radiation	No	Living FD after 10 yrs.
Stage III*	0	Radiation	No	Living FD after 8 yrs.
Stage III	0	Radiation ^X	No	Died cause unknown after 1 yr.
Stage IV	+	Radiation (Primary controlled)	No	Died with dis. less than 1 yr.
Stage IV	+	Radiation ^X	No	Died with dis. less than 1 yr.
Stage IV	+	Radiation ^X	No	Died with dis. less than 1 yr.
Total 8 cases		Radiation only	None	2 or 5, 5 yr. cures; 2 FD 1 yr.
Stage IV*	+	Palliative (recurrent) ^X	No	Died with dis. after 1 yr.
Stage IV	+ Bilat.	Palliative ^X	No	Died with dis. less than 1 yr.

*Radionecrosis of mandible.

^XExtension to mandible.

FD Free of disease

Group I had surgery then radiation.

Group II had radiation then surgery.

Table XV gives the results of treatment according to method of treatment and the stage of the disease. There are 13 cases treated by a combination of surgery and radiation, 3 of which had metastases. Of the 10 with no metastases, in six the disease was controlled.

Ten cases were treated by radiation alone, 5 had metastases. Two of the latter were given palliative treatment only. Two of a possible 5 are 5-year cures. Of the 5 with no metastases, 4 are living and free of disease.

In 5 of the 10 cases treated by radiation alone, the disease had extended to the mandible. Four of these 5 had metastases, but all died with disease and in none was the primary controlled. All were inoperable lesions and in most treatment was little more than palliative. There were therefore no cures by radiation alone in those cases where the disease had invaded the mandible. However, in the 5 with no extension to the mandible the disease was controlled entirely in the 4 with no metastases and the primary was controlled in the one with metastases.

TREATMENT - CARCINOMA OF THE LOWER ALVEOLAR PROCESS

It is evident that, if the carcinoma has invaded the mandible, surgery is the method of choice. If all the tumor cannot be excised supplementary radiation in the

form of radon implants and external radiation should be given. Many of these patients are poor surgical risks and for these intensive radiation should be given, unless the prognosis is utterly hopeless. If radionecrosis does occur the affected portion of the mandible can be excised before too much pain ensues.

When there is no invasion of the mandible, radiation therapy is preferred, since these lesions show a good response to radiation. There are some cases with no invasion of the mandible where surgery may be preferred, that is in those cases with small lesions but with metastases to the submaxillary or upper cervical nodes. In such cases, dissection of the lesion and involved nodes can be done in one stage.

We have treated these lesions by external radiation and radon implants in a similar manner as for lesions of the upper alveolar process. Some of these cases were treated with the radium dental mold plus external radiation as previously described.

The results of treatment for carcinoma of the lower alveolar process for surgery and radiation combined are better than those for surgery alone. Early localized lesions are probably equally well controlled by radiation or surgery, but radiation is a less formidable procedure. The prevention and treatment of osteoradionecrosis has been discussed.

Table XVI

Results of Treatment - Other Clinics - Carcinoma Lower Alveolar Process

<u>Reported by</u>	<u>No. of Cases</u>	<u>Percent Cures</u>	<u>Method of Treatment</u>
Simmons (27)	14	26% 5 years	Surgery alone
Welch (23)	237	12.5% 5 years	Mostly surgery
Geschichter (28)	Representative Group	25% 5 years	Surgery with little rad.
Lund & Holton (25)	68	15% 5 years	Mostly surgery
New & Figi (24)	87	4% 5 years	Surgery & radiation
Berven (22)	61	18% 5 years	Radiation & endothermy
Regaud (22)	Representative Group	16% 5 years	Radium
Author	12	38% 5 years	Radium & surgery.

Table XVII

Results of Treatment Carcinoma of the Cheek with Positive Biopsy --
49 Cases

Years	No. of Cases	Years Survival															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Living
1926	1	1	1	1	1	1*	0	0	0	0	0	0	0	0	0	0	
1927	3(3)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1928	1(1)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1929	2(2)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1930	2(1)	1	1	1	1	1	1*	0	0	0	0	0	0	0	0	0	
1931	3(3)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1932	2(2)	2	2	1	1	1	1*	0	0	0	0	0	0	0	0	0	
1933	2(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1934	4(2)	2	2*	1	1	1	1	1*	0	0	0	0	0	0	0	0	1
1935	1 X 5(4)	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	
1936	3(2)	3	2	1	1	1*	0	0	0	0	0	0	0	0	0	0	1
1937	1 X 5(1)	5	4	3	3*	0	0	0	0	0	0	0	0	0	0	0	3
1938	4	3	2*	1*	0	0	0	0	0	0	0	0	0	0	0	0	1
1939	5(2)	5	3*	0	0	0	0	0	0	0	0	0	0	0	0	0	3
1940	2 X 7(3)	2*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Cases	49(27)	49	42	37	33	28	25	20	16	14	12	9	7	5	4	1	13
Survival		32	19	9	8	5	3	1	0	0	0	0	0	0	0	0	0
Per Cent		65	45	24	24	18	12	5	0	0	0	0	0	0	0	0	0

55% had metastases on admission. 4 developed metastases.

75% had metastases on admission of those treated up to and including 1936.

Figures in parenthesis represent cases with metastases on admission.

X represents cases that developed metastases after admission.

*Free of disease.

Table XVII gives results of treatment, carcinoma of the cheek.

There were 28 cases treated up to and including 1936 with 5 (18%) 5-year survivals. One of these 5-year survivals, treated by radiation alone, had clinically positive metastases to the cervical nodes at the time of admission. Up to and including 1936 there were 21 (75%) cases with metastases and 7 with no metastases. One with no metastases on admission developed metastases later. Of the 5-year survivals, the one with metastases died with an abdominal cancer after 6 years; 2 died free from disease, and 2 are living and free of disease.

There was one 5-year survival of 21 cases with metastases - this case was treated by radiation only. The primary lesion was 2 cms. in diameter. In September 1932 he was given 8.6 mc. of radon in

6 implants to the involved submaxillary node. One week later he received 1100 tissue r to the left cheek and neck in two doses in four days. In July 1937 he was given 10.4 mc radon in 8 implants to a recurrence of the primary lesion. In September 1937 he was again given 15.7 mc radon in 18 implants to a recurrent lesion. He died in December 1938 from an abdominal carcinoma. All of those with metastases at the time of admission, excepting this case, died with the disease uncontrolled. Almost all died within 2 years after treatment. Many were recurrent lesions, and not a few died within 2 years after treatment. Many were recurrent lesions, and not a few were given palliative treatment only.

There were 7 with no metastases on admission. Five of these were cured, one 7 years living and free of disease; one 5 years living and free of disease;

2 died free of disease after 5 and 6 years respectively and 1 died of intercurrent disease after 2 years. Of the remaining 2, 1 developed metastases and died with disease, and in the other, the primary was not controlled.

There were 21 cases treated after 1936 - 6 (30%) with metastases (compare this with 75% with metastases before 1936) and 15 with no metastases. Three of those with no metastases developed metastases later. Of the 6 with metastases, 2 are living over 2 years free of disease; both had unilateral neck dissections; all others have died with carcinoma. 10 (48%) of the 21, including those with metastases, are free of disease, three 4 years; one 3 years; four 2 years, - (1 died of intercurrent disease); and two, 1 year. All are alive but the one indicated.

The above figures show that 75% of the cases treated before 1937 had metastases at the time of admission, compared to only 30% from 1937 to 1940 inclusive. The number of cases treated during the 2 periods was approximately equal. Since our 5-year survival rate must be taken from cases treated before 1937, this explains the rather low 5-year survival rate of 18%.

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Table XVIII

Results of Treatment Cheek According to Method of Treatment and Stage of Disease

<u>Stage</u>	<u>Metastases</u>	<u>Form of Treatment</u>	<u>Neck Dissection</u>	<u>Results</u>	
Stage I	0	Surgery then radiation	No	Living FD after 7 yrs.	
Stage II	0	Surgery then radiation	No	Living FD after 5 yrs.	
Stage II*	0	Surgery then radiation	Yes	Died FD after 5 yrs.	
Stage III	0	Surgery then radiation	No	Died with dis. after 1 yr.	
Stage III	0	Surgery then radiation	No	Living and FD after 4 yrs.	
Stage IV	+	Surgery then radiation	No	Died with dis. after 1 yr.	
Stage IV	+	Surgery then radiation	Yes	Died with dis. less than 1 yr.	
Stage IV	+	Surgery then radiation	No	Died with dis. less than 1 yr.	
Stage II*	0	Radiation then surgery	No	Died with dis. after 1 yr.	
Stage III	0	Radiation then surgery	No	Living FD after 4 yrs.	
Stage III	+ - x	Radiation then surgery	No	Living with dis. after 1 yr.	
Stage III	0	Radiation then surgery	No	Living FD after 1 yr.	
Stage IV	+	Radiation then surgery	No	Died with dis. after 2 yrs.	
Stage IV	+	Radiation then surgery	Yes	Died with dis. after 1 yr.	
Stage IV	+	Radiation then surgery	No	Died with dis. less than 1 yr.	
Total 15 cases 6 - 1x				Combined radiation & surg. 3	3 of 9, 5 yr. cures; FD 2, 4 yrs.; FD 1, 1 yr.

Table XVIII - Cont.

Results of Treatment Check According to Method of Treatment and Stage
of Disease

Stage	Metastases	Form of Treatment	Neck Dissection	Results
Stage II	0	Radiation	No	Died FD after 6 yrs.
Stage II	0	Radiation	No	Died FD after 2 yrs.
Stage II	0	Radiation	No	Died FD after 2 yrs.
Stage II	0	Radiation	No	Died with dis. less than 1 yr.
Stage II	+ - x	Radiation	No	Died with dis. after 3 yrs. Metastases to distant parts.
Stage II	0	Radiation	No	Died with dis. less than 1 yr.
Stage II	0	Radiation	No	Died with dis. after 1 yr.
Stage II	+ - x	Radiation	No	Died with dis. less than 1 yr.
Stage III	0	Radiation	No	Living FD 3 yrs.
Stage III	0	Radiation	No	Living FD 2 yrs.
Stage III	0	Radiation	No	Living FD 1 yr.
Stage III*	0	Radiation	No	Living FD 4 yrs.
Stage IV	+	Radiation	Yes	Died with dis. after 1 yr.
Stage IV	+ Bilat.	Radiation	Yes	Died with dis. after 2 yrs.
Stage IV	+	Radiation	Yes	Died with dis. less than 1 yr.
Stage IV	+ Clin.	Radiation	No	Died with abd. Ca after 6 yrs.
Stage IV	+	Radiation	Yes	Died with dis. less than 1 yr.
Stage IV	+	Radiation	Yes	Died with dis. less than 1 yr.
Stage IV	+	Radiation	No	Died with dis. after 2 yrs.
Stage IV	+	Radiation	Yes	Died with dis. less than 1 yr.
Stage IV	+	Radiation	No	Died with dis. after 1 yr.
Stage IV	+ - x	Radiation	No	Died with dis. after 1 yr.
Stage IV	+	Radiation	Yes	Died with dis. after 2 yrs.
Stage IV	+	Radiation	No	Died with dis. after 1 yr.
Stage IV	+	Radiation	Yes	Died with dis. after 2 yrs.
Stage IV	+	Radiation	No	Died with dis. less than 1 yr.
Stage IV	+ Bilat.	Radiation	Yes	Living FD 2 yrs.
Stage IV	+	Radiation	Yes	Living FD 2 yrs.
Stage IV	+	Radiation	No	Died with dis. after 1 yr. Surgery refused.
Total 29 cases 19 - 3x Radiation				10 2 of 14, 5 yrs. cures; FD 1-4 1-3 yrs.; 5-2 yrs; 1-1 yr.

5 received palliative treatment only.

* Osteoradionecrosis

x Developed metastases after admission.

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Table XVIII gives results of treatment according to method and stage of the disease.

There were 15 cases treated by a combination of radiation and surgery. Three of a possible 9 are 5-year cures and 3 more are free of disease, two 4 years and one, 1 year. Six of the 15 cases had metastases, one of the six developed metastases after admission. In none of those with metastases was the disease

controlled.

Twenty-nine cases were treated by radiation alone; 19 had metastases. Three of these developed metastases after admission; 2 of a possible 14 are 5-year cures. Two with metastases are free of disease for 2 years. Seven of 10 with no metastases on admission are free of disease, one 6 years, one 4 years, one 3 years, five 2 years and one, 1 year. One with metastases died

after 6 years with abdominal carcinoma.

Table XIX

Results of Treatment Other Clinics Carcinoma of Cheek

<u>Reported by</u>	<u>No. of Cases</u>	<u>% Cures</u>	<u>Method of Treatment</u>
Steiner (Martin & Pflueger)(4)	33	9% 3 yrs.	Surgery
Morestin (4)	26	11% 3 yrs.	Surgery
Geschichter(28)	Representa- tive group	10% 5 yrs.	<u>Surgery & radiation</u>
Welch (23)	300	22% 5 yrs.	<u>Surgery & radiation</u>
Berven (4)	81	26% 5 yrs.	Radiation & surgery
Forsell (27)	160	30% 5 yrs.	Surgery & radiation
Pfahler (29)	177	27% 5 yrs.	<u>Radiation & surgery</u>
Lund & Holton (25)	69	16% 5 yrs.	Radiation & <u>surgery</u>
Schreiner & Simpson (4)	30	20% 5 yrs.	Radiation only
Regaud (4)	47	19% 5 yrs.	Radiation only
Martin, C. L. (30)	40	30% 5 yrs.	Weak radium needle technique
Martin & Pflueger (4)	99	30% 5 yrs.	<u>Radiation & surgery</u>
Author	28	18% 5 yrs.	<u>Radiation & surgery</u>

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Treatment

Results of treatment by surgery alone have not been encouraging. Small early lesions in the anterior portion of the cheek are probably most easily treated by surgery. Lesions further back are more prone to metastasize and are best treated by a combination of radiation and surgery or radiation alone. Polya² with wide experience in plastic surgery of this region, warns that extensive removal of the buccal mucous membrane leads to scar formation, contraction and inability to open the mouth.

Most lesions were treated with radon implants in doses of 7000-10,000 gamma ray roentgens to the center of the tumor plus external radiation. Some were given 500 to 800 mgm. hours with the radium mold.

In our experience this has been a difficult lesion to treat. Most of the lesions were extensive when first seen and the incidence of metastases was high (55%) higher than for any other site excepting the soft palate (70%). The lesion also frequently extended to areas such as the lateral pharyngeal wall or palate inaccessible to surgery. Of 8 Stage II lesions, treated by radiation alone, in only 3 was the primary lesion controlled. Strangely enough, of four Stage III lesions, (extension to neighboring site) in all 4 the primary lesion was controlled. As for all carcinoma, the important factor is to get the lesions early.

Table XX

Results of Treatment Floor of the Mouth with Positive Biopsy
21 Cases

Years	No. of Cases	Years Survival														Living
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1927	1 (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1928	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1929	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1930	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1932	2 (2)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
1933	1 X 5 (2)	3	2	1	1	1	1*	0	0							
1934	1 (1)	0	0	0	0	0	0	0	0	Lost--considered no survival						
1935	1	1	1*	0	0	0	0	0								
1936	1	1	0	0	0	0										
1937	2 (1)	2	2	1	1*											1
1938	0	0	0	0												
1939	1 X 2		1*													1
1940	6 (2)	2 2 2*														3
Cases	21 (9)	21	15	13	13	11	10	9	8	3	1	1	1	1	1	5
Survival		13	6	2	2	1	1	0	0	0	0	0	0	0	0	
Per Cent		62	40	15	15	9										

43% had metastases on admission, 54% up to and including 1936.

Figures in parenthesis represent cases with metastases on admission.

X represents cases that developed metastases after admission.

*Free of disease.

Table XX gives the results of treatment of 21 proved cases of carcinoma of the floor of the mouth. There is only one (9%) 5-year survival of 11 cases up to and including 1936. This case had a Stage II lesion and was treated by radiation alone. Six (54%) of the 11 had metastases on admission. All of these died with disease. Five had no metastases on admission. One died after 6 years, free of disease, and one after 2 years; another died before one year but free of disease. One developed metastases and died with disease, and in the case of the 5th, the cause of death was undetermined, but he was free of disease after 1 year.

After 1936, there were 10 cases treated, only 3 with metastases and 7 with no metastases. The resulting figures are naturally more encouraging. Three with metastases died with disease; of the 7 with no metastases, 1 is living 4 years and free of disease; one 2 years and two, 1 year. One died of intercurrent disease before one year, one developed metastases and died with disease, and in the remaining one the primary was not controlled. Seven (33%) of the 21 are either living and free of disease or died free of disease.

Table XXI

Results of Treatment Floor of the Mouth According to Method
of Treatment and Stage of Disease

<u>Stage</u>	<u>Metastases</u>	<u>Form of Treatment</u>	<u>Neck Dissection</u>	<u>Results</u>
Stage IV	+	Surgery then radiation	Yes	Lost track of less than 1 yr.
Stage II	0	Radiation then surgery	No	Living with dis. after 1 yr.
Stage III	0	Radiation then surgery	No	Died FD after 2 yrs.
Stage IV	+ Bilat.	Radiation then surgery	Yes	Died with dis. after 2 yrs.
Stage IV	+	Radiation then surgery	Yes	Died with dis. less than 1 yr.
Stage IV	+	Radiation then surgery	Yes	Died with dis. less than 1 yr.
Total 6 cases	4	Combined radiation & surg.	4	No 5-yr. cures; 1 lost; 1 died FD after 2 yrs.
Stage I*	0	Radiation	Yes	Living FD after 1 yr.
Stage II	0	Radiation	No	Living FD after 4 yrs.
Stage II	0	Radiation	No	Living FD after 2 yrs.
Stage II	0	Radiation	No	Living FD after 1 yr.
Stage II	0	Radiation	No	Died FD after 6 yrs.
Stage II*	0	Radiation	No	Died FD less than 1 yr.
Stage II	0	Radiation	Yes	Died cause unknown less than 1 yr.
Stage II	0	Radiation	No	Died with dis. less than 1 yr.
Stage III	+ - x	Radiation	No	Died with dis. after 1 yr.
Stage III	+ - x	Radiation	No	Died with dis. after 1 yr.
Stage IV	+	Radiation	Yes	Died with dis. less than 1 yr.
Stage IV	+	Radiation	Yes	Died with dis. 1 yr.
Stage IV	+	Radiation	No	Died with dis. less than 1 yr.
Stage IV	+	Radiation	No	Died with dis. after 2 yrs.
Total 14 cases	6	Radiation	4	1 of 8, 5-yr. cures; 5 FD

*Osteoradionecrosis

xDeveloped metastases after admission

FD Free of disease

One received palliative treatment only.

Table XXI gives results of treatment floor of the mouth according to method of treatment and stage of the disease. Fourteen were treated by radiation alone; 4 had metastases, and 2 developed metastases later, leaving 8 with no metastases. Of the 14 treated by radiation alone, 6 (44%) were free of carcinoma, one 6 years; one 4 years; one 2 years, two 1 year, and

one less than 1 year. Five were treated by radiation followed by surgery. Three had metastases, and all 3 died with disease. One of the 2 with no metastases died after 2 years free of disease, the other is living with disease. One case was given palliative treatment only.

Table XXII

Results of Treatment Other Clinics Carcinoma Floor of the Mouth

<u>Reported by</u>	<u>No. of Cases</u>	<u>% Cures</u>	<u>Method of Treatment</u>
Geschichter (28)	Not stated	20% 5 yrs.	Surgery
Lund & Holton (25)	58	14% 5 yrs.	Mostly surgery
(Cases with small glands not necessarily malignant)			
Welch (23)	250	8% 5 yrs.	Surgery & radiation
Pfahler (29)	25	16% 5 yrs.	Radiation
(Figures revised to compare with ours)			
Regaud (5)	(5) 77	22% 5 yrs.	Radium
Martin & Sugarbaker	103	25% 5 yrs.	Radiation & surgery
87 determinate			
Berven (22)	32	34% 5 yrs.	Teleradium & endothermy
Author	11	9% 5 yrs.	Radiation & surgery

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Treatment - Floor of the Mouth

Most authors admit inoperability of these lesions unless they are 1 cm. or less in diameter. Larger lesions are inoperable because of extension to the tongue and mandible. Some believe cautery or electro-coagulation is preferable. Radiation therapy is indicated since it is less mutilating and gives better results. Radiation was given by portals through the rami of the mandible and to the floor of the mouth from below. In some instances, a cone was used to give radiation directly to the lesion through the mouth. The amount of radia-

tion which can be given is limited because of the danger of osteoradionecrosis. External radiation was supplemented by radon implants. Best results were obtained in the Stage II lesions and no results in the Stage IV lesions. Since large lesions of the floor of the mouth usually cross the mid-line, cervical metastases from such lesions are almost always bilateral and this explains the almost hopeless prognosis in these Stage IV lesions.

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Table XXIII

Results of Treatment Carcinoma of Hard Palate with Positive Biopsy
10 Cases

Years	No. of Cases	Years Survival												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1928	1 (1)	1	0	0	0	0	0	0	0	0	0	0	0	0
1929	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1930	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1931	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1932	Bilat. 1 (1)	1	0	0	0	0	0	0	0	0	0	0	0	0
1933	1 X 2	2	1	1	0	0	0	0	0	0	0	0	0	0
1934	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1935	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1936	1 X 2	2	0	0	0	0	0	0	0	0	0	0	0	0
1937	1	1	0	0	0	0	0	0	0	0	0	0	0	0
1938	3 (1)	2	2	1*	0	0	0	0	0	0	0	0	0	0
1939	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1940	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cases	10 (3)	10	10	10	7	6	4	4	4	2	1	1	1	1
Survival		9	3	2	0	0	0	0	0	0	0	0	0	0
Per Cent		90	30	20										

30% had metastases on admission. 2 developed metastases.

Figures in parenthesis represent cases with metastases on admission.

X represents cases that developed metastases after admission.

*Free of disease.

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Table XXIII gives the results of treatment of carcinoma of the hard palate in cases with positive biopsy. There are no 5-year survivals of 6 cases treated up to and including 1936. There are 2 (20%) 3-year survivals of 10 cases treated up to and including 1938. Of the 6 cases treated before and including 1936, 2 had metastases; 2 developed metastases, and 2 had no metas-

tases. One lived over 3 years, but all died with disease. After 1936 there were 4 cases, 3 with no metastases; 1, an adenocarcinoma with metastases. One of those with no metastases lived over 3 years and died free of disease. He was treated by radiation only.

Table XXIV

Results of Treatment Hard Palate According to Method of Treatment and Stage of Disease

<u>Stage</u>	<u>Metastases</u>	<u>Form of Treatment</u>	<u>Neck Dissection</u>	<u>Results</u>
Stage IV	+	Surgery then radiation	Yes	Died with dis. after 1 yr.
Stage IV	+	Surgery then radiation	Yes	Died with dis. after 2 yrs.
Stage III	0	Radiation then surgery	No	Died with dis. after 1 yr.
Stage IV	+ - x	Radiation then surgery	No	Died with dis. after 3 yrs.
Total 4 cases 2		Combined radiation & surg. 2		
Stage II	0	Radiation	No	Died FD 3 yrs.
Stage III	+ - x	Radiation	No	Died with dis. after 2 yrs.
Stage III	0	Radiation	No	Died with dis. after 1 yr.
Stage III	0	Radiation	No	Died with dis. after 1 yr.
Stage IV	+	Radiation	No	Died with dis. after 1 yr.
Total 5 cases 1		Radiation None 1 FD 3 yrs.		
Stage IV	+	Palliative only	No	Died with dis. less than 1 yr.

x One developed metastases
FD Free of disease.

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Table XXIV gives results of treatment according to method of treatment and stage of the disease. Only one lesion, a grade 2 lesion, was controlled. All the cases had extensive lesions.

Treatment

Carcinoma of the hard palate is best treated by a combination of surgery and radiation when possible. Fortunately,

this is a rare tumor, since results are not encouraging.

Surgery in our cases consisted of electro-coagulation of the lesion. Radiation was given by external radiation, radon implants and the radium mold. Extension to the antrum was treated as previously described.

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Table XXV

Results from Other Clinics

Carcinoma of Hard Palate

<u>Reported by</u>	<u>No. of Cases</u>	<u>Percentage</u>	<u>Form of Treatment</u>
Welch (23)	174	19% 5 years	Mostly surgery
Geschichter (28)	--	10% 5 years	Surgery
Lund & Holton (25)	42	14% 5 years	Mostly surgery
D. M. Lirle (26)	9	22% 5 to 7 yrs.	Radiation & surgery
Pfahler (29)	76	20% 5 years	Radiation
Regaud (28)	--	4% 5 years	Radium

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Table XXVI

Results of Treatment Carcinoma of Soft Palate with Positive Biopsy
8 Cases

	Years				
	1	2	3	4	5
1931	1	1	1	1	1
	0	0	0	0	0
1935	1	1	1	1	1
	0	0	0	0	0
1936	1	1	1	1	1
	0	0	0	0	0
1937	1	1	1	1	
	0	0	0	0	
1938	1				
	0				
1940	3				
	3				

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Table XXVI gives the results of treatment carcinoma of the soft palate with positive biopsy.

There were 3 cases up to and including 1936. All 3 had metastases. None lived 1 year. They were given palliative treatment only. There were 5 cases after 1936, 2 with metastases who lived less than one year. The 3 with no metastases were treated in 1940. All 3 are living and free of disease. They were treated by radiation and surgery. They were group 2 lesions. The first of these 3 was treated by excision followed by external radiation, 2800 tissue r to each side of the face and neck in 31 days, 250 r per treatment. The second case received 1600 tissue r to each of 4 fields in 30 days. Three months later, the lesion was excised and radon implanted in the operative wound. The third case received 2000 tissue r in 29 days to each of 3 fields and 900 tissue r added to the lesion by means of a cone through the mouth and 8 mc of radon to the lesion which was 2 cms. in diameter. Six months later, the lesion was cauterized. There was no recurrence 15 months later.

Summary and Conclusions

1. One hundred twenty seven cases of Carcinoma of the Alveolar Processes, Cheek, Floor of the Mouth and Palate

with positive biopsy, have been reviewed. The 5-year survival rate of 24% compares favorably with survival rates reported from other clinics. In addition, the survival rates for each site have been reported separately and various data as to treatment, complications, etc. presented.

2. By the proper use and control of radiation alone or radiation and surgery combined, good results can be obtained in Stage II (over 1.5 cm. in diam.) and Stage III (those with local extension but no metastases) lesions. 61% of Stage II lesions and 60% of Stage III lesions were controlled, 1 to 5 years, in this series.

3. Since more primary lesions are now being controlled, the problem of treatment to cervical metastases becomes more and more important. Results of treatment in these cases are not encouraging.

4. Better results may be expected in the future (1) for the primary lesion, by the increased use of direct intra-oral therapy in combination with the present methods of irradiation, and possibly by the more generalized use of higher kilo-voltages up to 400 K.V. (2) for cervical metastases, by possibly more vigorous radiation in

combination with surgery for operable metastases and by more localized and therefore more intense radiation to inoperable metastases. (3) By education of the public, dentist and physician in regard to early recognition of the malignant lesion.

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V. GOSSIP

In Fargo to spend the day with the Newman Club in the morning, the physicians and hospital staff in the afternoon and evening. It is a windy March day. As the wind howls across the prairie I spend much time chasing my hat. Sooner or later I pulled it over my ears for protection. The natives tell of many other windy days. First, the one which occurred a few years ago in which a coast train was blown from the tracks over the telephone wires into the field beyond. The end of the train was more than a block from the tracks. Passengers on the adjoining train viewed the spectacle firsthand, undoubtedly wondering if they would be next. A year ago the wind assumed such proportions that it was clocked at 90 miles an hour. People in Fargo were unable to go next door. Many lives are lost at such times. At 11:00 am to speak to the faculty and students of North Dakota Agricultural College. The hall is an old wooden exposition building which creaks and groans in the wind. The group are attentive as the contributions of American Medicine are retold. A new Health Service unit is inspected. It is an attractive modernistic structure with efficient space utilization. The Health Service is staffed by one of the local clinics. The campus displays the usual marching units of student officers (Air Corps). These men are candidates for administrative positions. One gains the impression that a large number of visual errors (now corrected) have determined the choice for the group. At noon to a corn beef and cabbage dinner with Hibernian friends. In the afternoon to address the students of the local academy. The group of boys and girls applaud vigorously (before and after). Before, because they hope I will speak at length thereby relieving them from class assignments. At the end, for having done so....Next to visit with my old army friend, Axel Oftedal, one of the four Oftedal brothers in medicine. The office nurse ushers us in to his reception room for friends. On the wall is a pencil sketch of his father who was a well-known Norwegian Lutheran Preacher. Axel still refers to his father's teaching in many matters. In no time we are served with coffee and cookies. The doctor himself

joins us as the patients await without. Many tales of our service together bring back nostalgic memories. I learned things about myself I did not remember. This includes the tale of what happened when I was thrown from a horse when we were in the cavalry. I am beginning to wonder if my trouble has been amnesia all these years. In evening to staff dinner at St. John's hospital where Sister St. Thomas Lindberg (yes, she is Swedish) had prepared a real dinner. Chicken pie is served in a miniature dishpan with all the trimmings to go with it. Someone remarks that a Chaplain in a Catholic hospital and a monastery cat are always well fed. To speak to the staff about recent events in Medicine and then to home of Dr. Hanna for "discussion." Fargo has a good group of physicians and they are anxious to know how we feel about this and that. The public is asking questions about caudal analgesia in obstetrics. C. O. McCormick of Indianapolis has summed up the evidence for and against in the February 27 issue of the Journal of the American Medical Association. The disadvantages include restriction to hospital deliveries (60%), necessity for competent attendant, special training for insertion of caudal needle. A fairly high percentage of failures (11%) and contraindications (hypotension, hypertension, placenta previa, local infection about the hiatus, hysteria). The nylon ureteral catheter is an improvement over the needle. There is some risk from shock reaction. Urine will escape from pressure, as bladder sensation is lost. For the method when successful, it is a painless and comfortable labor. The patient can enjoy reading and normal sleep. Faculties are retained. Fluids and food can be taken during and after labor. Method may be employed throughout labor. ...On Monday to Duluth on Gopher Ltd. to speak to American Association of University Women. Dr. Tuohy introduces me in his unique way. The audience desires to hear more of the advances in medicine with special emphasis on contribution of medical service to care of those in armed forces. Late at night to the club with a group of congenial Duluthians and at a late hour home on the Northern Pacific. Sounds familiar, but no reference to my skill at cards which I have none.....