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Mixed Tumor

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I. ABSTRACT

MIXED TUMOR OF SALIVARY GLANDS

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General Nature

Through the latter nineteenth and early twentieth centuries, the nature of mixed tumors of the salivary glands was extensively debated. In 1908, Krompecher concluded that the mixed elements of the tumors were all derived from an epithelial origin through metaplasia. From 1920 to 1930, this idea became generally accepted (Ewing, McFarland 1926, Fry 1927). McFarland in 1926 concluded that there was no relation between the microscopic appearance and the actual malignancy of the tumor as evidenced by the clinical course. This point is still unsettled. The status of the problem as to the nature of the tumors is partially revealed by the number of synonyms and classifications. Thus, there are terms such as myxoma, fibromyxoma, chondroma, chondro-carcinoma and many others. These are being dropped from general use and the term "mixed tumors" is being applied to all regardless of the variations in appearance.

In place of this difficulty with synonyms, there has arisen the problem of classification. Sarcomatous, carcinomatous and benign mixed tumors are described. To this are added the cases of so-called "malignant degeneration" of tumors. The correlation between the histology and the clinical course is one of the most actively studied phases of the problem today.

Gross pathology

The tumors range in size from those just palpable up to one said to have weighed 26 lbs. which was twice as large as the patient's head. The most common size is that of an English walnut. Nearly all the tumors are described as hard but occasionally one with the consistence of a lipoma or tensely fluctuant may be found. There is a very marked tendency for the masses to be lobulated and the projecting parts may be small. Encapsulation is considered to be a characteristic feature. There is, however, some confusion on this point. In cases of tumors, clinically malignant, it is difficult to tell from the literature whether the capsule was absent, broken or intact. The impression obtained was that usually no constant difference was noted between those with a benign and those with a malignant outcome. The capsule in some cases is fused into the gland and cannot be shelled out. Moreover, Zymbal in his examinations of the tumors by numerous sections concludes that the capsule is never complete and that the tumor at some point is directly continuous with the gland substance. It seems that the nature of the capsule is not an absolute criteria for estimating the benign or malignant character of the tumor. The gross appearance of the cut surface is well-known. The variability is characteristic: hard, soft, cartilaginous, fibrous, cystic, myxoid, and fleshy areas may be present in the same tumor or an entire tumor may be made up of only one of these types of reaction. The position is generally in the peripheral part of the gland, on its surface or edge. Large tumors may involve the full depth of the gland.

Histology

The usual microscopic appearance of the tumors is well-known. It may be summarized in the following manner: The tumors singly or in a series produce structures which look like basal, squamous, adeno-, scirrhous or medullary carcinomas; areas of fibrous, sarcomatous, hyalinized, myxoid, melanotic or cartilaginous-like material and finally portions like adenomatous or degenerating gland tissue. Cysts are common. An appearance like thyroid tissue is not infrequent. Excellent histological studies supplemented by microchemistry and tissue cultures have shown conclusively that all of these elements are derived from an epithelial source. The multiplicity of the directions in which the growth may progress has no counterpart in any other tumor. Degenerative phenomena probably play an important part in the development of the tumor.

The multiplicity of the structures seen in full grown tumors has caused confusion as to their origin. Teratoid, endothelial, or embryonal origins have been suggested. Zymbal's work is very convincing. By study of the tumors, normal glands and by cultural methods, he has shown that the tumors arise from the acini or terminal ducts of the gland. He concludes that the tumors are not different than any other epithelial tumors except that they are liable to extensive metaplasias and degenerations. The variable appearance creates a source of error in the diagnosis of oral tumors. The presence of solid cords of deep staining cells, alveolar or ductal structures in tumors of the oral and nasopharyngeal cavity may lead to the diagnosis of basal, highly malignant squamous carcinoma, adenocarcinoma or cystic adenoma.

The distinction between benign and malignant forms is not definite. One case diagnosed as a melanotic sarcoma died 9 years later of other causes. McFarland found that in 21 cases of histologically malignant tumors, 40% did not behave as such in their subsequent course. He does not question however that some cases

are typical malignant neoplasms. Metastasis to lungs, liver, meninges, pleura and bones have been reported. Many more are invasive and have been liked to gliomata. McFarland's original conclusion (1926) that there was no correlation between the microscopic picture and the subsequent course is only slightly changed in his latest (1933) contribution. In this, he states that "the microscopie, ordinarily the authority on this subject, fails." Korublith reports the autopsy findings in a case of metastasizing mixed tumor. The metastasis had the same histologic picture as the primary and showed characteristics generally considered as those of benign tumors: degenerative, myxoid, hyaline and pseudocartilaginous formations. He collected 5 such cases from the literature. These cases substantiate McFarland's opinion.

On the other hand in Benedict and Meig series, 30 diagnoses of carcinoma were made and only 1 of these lived and remained free of the disease.

Patey divided his cases into 4 groups: (1) typical tumors, (2) cellular tumors but otherwise typical, (3) cellular but well differentiated (adult cells) and (4) cellular and undifferentiated. On the follow-up, recurrences were present in all groups but the percentage was significantly higher in the last two groups. (Note the resemblance of this plan to grading of tumors, especially fibrosarcoma and neurosarcoma.)

Ewing's classification is well-known. In this, he recognizes malignant tumors of the parotid.

The impressions of the various writers is difficult to summarize and it is difficult even to grasp the different implications. There are three lines of thought which are expressed in various ways.

(1) There are two separate types of tumors of the parotid (implying different origins?), mixed tumors and carcinomas. Benedict and Meigs, however, admit that their tumors designated as (carcinomas" or "sarcomas" showed areas characteristic of mixed tumors.

(2) There is only one type of salivary gland tumor, the "mixed tumor", of which there are benign and malignant forms. The latter shows the cellular nature and anaplasia characteristic of all malignant tumors. The objection to this is that in some series only about half show a postoperative course compatible with the usual notion regarding malignant tumors.

(3) There is one type of salivary gland tumors, i.e., mixed tumors and all are malignant. The histological appearance is not a good criteria of their malignancy. The histological malignant types may behave as benign tumors and those which appear to be benign may metastasize widely.

Statements summarizing the views of groups 2 and 3 would be as follows. Mixed tumors are all malignant and the degree of malignancy ranges from those which never metastasize to those which rapidly spread. The microscopic criteria of malignancy fail in this type of tumor but the evidence indicates that a greater number of the very malignant appearing tumors metastasize than do those which appear to be relatively benign.

The number which will show the "malignant" character is given as follows:

Author	Cases	Malignant Cases	Malignant %
Schreiner and Mattick	60	11	18
Benedict and Meigs	125	39	31
Combined	185	50	27

Recurrences

Microscopically, the recurrent tumors show the same features as the primary. Patey could find no significant change. The theory of malignant "degeneration" is not supported by these studies. Grossly, the second tumor may be either encapsulated or infiltrating. The infiltration in this case does not indicate malignancy.

The cause of the recurrence has been extensively studied. The conclusions on

this point are quite in agreement among the different authors. Many are continued growths of small lobulations not seen during the first removal; others, represent portions of the main tumor accidentally or by necessity, left behind; some are growths of cells spilled out of the tumor during its removal. Still others represent new tumors. All of these possibilities are well supported by the circumstance described in the case reports. The last possibility, i.e. new tumors, is given support by the cases in which the recurrence developed on the opposite side (Patey, Springer).

The metastasis, as stated above (Kornblith) show the same histology as the primary tumor.

Clinico-pathological features:

Incidence: In one group (Schreiner and Mattick) in 6,695 cases of tumors, there were 66 cases of parotid neoplasms, 1%.

Age: The tumors may occur at any age. They have been found in infants (7 months) and occur in greatest frequency between 20 and 60. In 3 combined series the age of onset was as follows:

1 - 10	2	40 - 50	59
10 - 20	22	50 - 60	50
20 - 30	57	60 - 70	26
30 - 40	61	70 - 80	9
		Total	288

Sexes: are about equally involved in all series.

The side affected varies somewhat in the series and the difference is not significant in any one group.

Duration: About 50% of cases in various series are seen within 5 years. The remainder had the tumor up to 30 or 40 years. Several authors have noted that those tumors which appear to be malignant come to the physician soonest. In one series, the average duration in the benign group was 7 years and in the malignant cases was 4.5 years. McFarland has made the following correlations between duration, size and the ultimate outcome. He lists his cases as follows:

	Tumors	Average Duration
Smaller than walnut	7	5 yr.
Walnut	20	12
Plum	5	15
Egg	7	7
Lemon	3	17
Apple, goose egg, orange	7	18
Grapefruit or larger	6	20

The tumors double themselves in size each 5 years. In the follow-ups he noted that the recurrences in the smaller-sized groups were 28.5% whereas in the average or larger groups the percentage of recurrence was 16%.

In 9 cases all seen within the first year and with a rapid rate of growth, the histological diagnosis was malignancy in 6 cases. Four of these, 65%, behaved clinically as malignant tumors. Therefore, although the rapidity of growth is to be regarded with suspicion, it is not an absolute guide to follow in regard to the malignancy of the tumor. Very frequently, a sudden increase in the rate of growth has been observed. While McFarland refers frequently to biopsy and operation as the stimulus, most of the other authors feel that the stimulus is spontaneous and trauma plays no part.

Region involved:

Neil states that about 90% of the tumors occur in the parotid and 10% in the submaxillary gland and other parts of the mouth (quoting Ewing?). The percentage of parotid tumors apparently is lower in other series. In 2 combined groups, the distribution was as follows:

	Cases	%
Parotid	83	69
Submaxillary	13	11
Palate	11	10
Nose	3	
Lip	2	
Tongue	2	
Pharynx	2	
Orbit	1	
Angle of mouth	1	
Face	1	
Sublingual gland	1	
	120	

In these 2 groups, 70% were in the parotid and 10% each in submaxillary gland, palate and remainder of oral cavity. In 1930, Brunschevig collected from the literature, only 2 cases in the sublingual gland and only 10 in the tongue. Halpert reports another case involving the face (bridge of nose).

Symptoms

The usual complaint is the tumor. Its removal is desired either because of cosmetic reasons or because of the fear of a neoplasm. When any other symptoms are present, they are those referable to nerve (5th and 7th) pressure: pain of dull or stinging nature, muscle twitchings or paralysis. Pain is rarely severe and often is absent. It is said to be more frequently present in malignant tumors.

Treatment

Three methods of caring for these tumors have been suggested: excision, radiation alone or in combination with surgery and no treatment. The value of these methods is estimated by the number of recurrences, the eventual outcome and the number of 7th nerve injuries.

Recurrences (All forms of treatment)

In McFarland's series of 135 cases, recurrences occurred in 30%. After division of the cases according to tumor size, the percentage was as follows (71 of the 135 cases):

Small tumors	28.5%
Average size	16
Large size	16

Benedict and Meig divided their recurrences into tumor types:

	Cases	%
Mixed tumors	40	30
"Carcinoma"	30	100
"Sarcoma"	6	65
Total	76	60

Three of a total of 9 "sarcomas" died shortly after operation and are excluded above. 5 more of the mixed tumor group developed second recurrence making a total of 40%.

Neil had 71 cases in his series and of these 41 (58%) had been treated elsewhere) had recurrences at the time of admission.

Patey in 45 cases which were traced had recurrences in 15 or 33%.

These groups may be summed to give a composite picture:

Author	Cases	Recurrence %
McFarland	135	30
Benedict & Meig	76	60
Neil	71	58
Patey	45	33
Wood	37	45
Total	364	43

The time of recurrences is variable. Combining Patey's and Neil's groups, the following is obtained:

Year of recurrence	Number	%
1	45	75
2- 5	9	15
6-10	3	5
11-20	2	5
	59	

Repeated recurrences

It is difficult to gather together data from the articles reviewed regarding

the frequency or number of repeated recurrences. McFarland gives the following data regarding 19 cases of recurrent tumors:

Died of other causes	6
Living without recurrence	3
Living with recurrence (?)	1
Died with repeated recurrence	2
Lost in the follow-up	7

In Benedict and Meig's group of "benign" mixed tumors, 13% had two recurrences.

End results (chiefly surgical treatment)

In general, the prognosis for life is excellent because of the nature of the tumor. Since recurrences may develop after any interval of time (90% within 5 years), "cures" are difficult to estimate. The study of recurrences gives the best picture of the eventual outcome. McFarland reviewed again ('33) the end results of 44 cases previously reported in '26. All of these cases had a follow-up of 5 to 10 years. This may be summarized as follows:

Died of causes other than tumor	15
Lost in the follow-up	10
Recurrence	1
Living and well (5 to 21 yr.)	18
	44

The follow-up is not very convincing because the author has selected 44 typical non-recurrent mixed tumors from the original group of 90.

Benedict and Meig's give the following:

Mixed tumors:	
Total	40
Died within 5 yr.	4
Living 5 yr. or over	36
One recurrence	12
Two recurrences	5
"Carcinoma":	
Total cases	30
Died of tumor	29
Living with recurrence	1
"Sarcoma":	
Total cases	9
Died after operation	3
Died of tumor within 5 yr.	3
Died after 5 yr. of tumor	1
Died after 5 yr. without tumor	1
Living and well 8 yr.	1

This group of statistics is quite convincing in regard to the value and justification of the diagnosis of "carcinomatous" mixed tumors. The diagnosis of "sarcomatous" types apparently was not as well substantiated by the outcome.

Radiation therapy

Practically no convincing data was found. McFarland states "not enough treated patients have been observed long enough to permit satisfactory comparison with the older and more widely practiced methods of surgical excision." Schreiner and Mattick's paper brings the results of the most extensive experience with this form of treatment.

Surgery and irradiation (17 cases):	
Clinically well	14
Recurrence	1
Irradiation alone (16 cases):	
Clinically well	3
Nodule (scar?) present	7
Unimproved	1
Recurrent cases, irradiation alone (13 cases):	
Clinically well	4
Nodule (scar?) present	3

They draw 3 conclusions: the ideal treatment is combined surgery and irradiation; When the tumor is not favorably located for surgery, irradiation alone is best. Postoperative recurrences are best treated by irradiation. These conclusions were generally agreed to in the discussions of the paper and the other articles abstracted contained about the same ideas. Neil concurs in the opinion although he states the tumors are highly ray resistant.

Seventh nerve injuries

McFarland emphasizes the importance of this condition. He cites the case of the "charming spinster good to look at and delightful to converse with" who suffered "mental anguish" due to a facial paralysis. Other authors who have had a higher percentage of "malignant" types of tumors practice wide resection and advise including the nerve in the resection. Paralyses occur without operation. Neil gives the following (all? operated elsewhere).

Operative treatment	
Nerve injury	17
No injury	32
No operation	
Nerve injury	3
Radiation treatment	
No injuries	(number?)
Nerve injury	0

No treatment: prognosis

McFarland makes several statements that lead one to believe that some cases are best left alone. He states "if as it has been shown, operation is not urgent because the tumors usually have a regular and slow rate of growth; if it is more difficult successfully to eradicate them when small than when large; if there is always danger of damaging the facial nerve and so causing greater deformity and misery than the tumor itself entails; if rapid growth is no index of malignancy; if the microscopic appearance of the excised tissue offers no guarantee of exception from recurrence, and in many cases is uncertain as to malignancy and prognosis; and if the benefit conferred by excision in the cases that turn out to be malignant is very slight, why should the surgical excision of these tumors be practiced? It can be noted here that the various percentages for end results by group types correlate very well: 60 to 70% are "cured" by one operation; 12% more are "cured" by two operations and 18 to 31% are malignant; total, 100%.

Cysts of Parotid

There is a rare and unusual tumor of the parotid which has been given various names and various interpretations as to nature and origin.

It is known as orbital inclusion cyst, adenolymphoma, onkocytoma, papillary cystadenoma lymphomatosum.

The tumors are small, from 2 to 6 cm. in diameter. They are encapsulated, ovoid, shell out easily, may be lobulated and usually occur on the outer surfaces of the gland. They are benign and do not recur. The interior is usually cystic but may be solid. The contents when fluid are serous or brownish; when solid the tumors are fleshy. Histologically, the structure is characteristic. The epithelium is columnar and is nearly always thrown up into large folds and papillae. The "submucosa" is entirely lymphoid, either a diffuse infiltration or in follicles. Jaffe collected 21 cases. This author shows that the cells are glandular and secrete some sort of a material. The most recent reviews suggest one of two possible methods of origin. Jaffe believes they are tumors of the "onkocytes", a cell due apparently to a senile degenerative change in the parotid. Kroissi and Stoud maintain that the tumors are derived from the orbital salivary glands of animals which in man is a rudimentary structure.

Impressions

1. The older discussions regarding the origin of mixed tumors of the parotid are not emphasized very much in the modern literature. It is said that the various elements are derived exclusively from epithelium. Various correlations between the histological appearance and the clinical course are the most actively studied phases of the problem at the present time.

2. The most interesting features of the gross pathology are those in re-

lation to the tendency to lobulation and the questions regarding encapsulation. The tumors, characteristically, are lobulated and some of the lobulations may be small or on a pedicle. Therefore, they are easily overlooked during removal of the main tumor. The lobulations left behind are considered to be one of the causes of recurrence. Ordinarily the tumors are said to be well encapsulated. It is difficult to tell from the literature whether the encapsulation is any different in those with a malignant clinical course but apparently no constant difference has been noted. Some of the detailed histological work on these tumors has shown that the capsule is not complete and that the tumor at one point is directly continuous with the gland substance.

3. Several interesting features of the histological study of these tumors can be commented on. The appearance is extremely variable, portions of the tumor may appear like highly malignant tumors in the oral cavity. Small biopsies of these tumors when they are present in the oral cavity itself may lead to errors in diagnosis. The distinction between benign and malignant forms is not so very definite under the microscope. In one series, 40% of the cases diagnosed histologically as malignant did not behave as malignant tumors in their subsequent course. Other tumors, histologically benign, produce metastasis to distant organs. Some authors have concluded that there is no correlation between the microscopic picture and the subsequent course. On the other hand in other series diagnoses of carcinoma have been made and in these groups the clinical course bore out this diagnosis entirely. Some authors have suggested division of the tumors into types very much on the same basis that other tumors are graded. One of the most accepted impressions regarding the malignancy of the tumors is as follows: There is only one type of salivary gland tumor and that is the mixed tumor and all are malignant. The histological appearance is not a good criteria of their malignancy and those which appear to be malignant may behave as benign tumors and others which appear to be benign may metastasize widely.

4. The percentage of the total group which shows malignant characters range from 18 to 31 with an average of 27%.

5. The histological appearance of the recurrent tumors is the same as those of the primary. No basis for the theory of malignant degeneration in this type of tumor was found.

6. The causes of recurrences are fairly well agreed upon by different authors. Some are due to small lobulations which are not observed during the first removal; others represent portions of the main tumor accidentally or by necessity left behind; still others are growths of cells which spilled out of the tumor during its removal. In addition, it is fairly well accepted that new tumors may develop in the gland. This possibility is given support by the cases in which second tumors develop on the opposite side.

7. The incidence of parotid tumors is about 1% of all cases of tumors (one series).

8. Tumors may occur at any age from infancy to over 80 years. In 288 cases, there was almost an equal incidence in the decades between 20 and 60.

9. Sexes are about equally involved and there is no difference in incidence in the left or right side.

10. About 50% of the cases come to the physician within 5 years and the remainder have the tumor up to 30 or 40 years. The average duration of the tumor in benign group was 7 years and in one malignant series was 4.5 years. The wide range in each individual type, however, was so great that the averages do not appear to be very significant.

11. In the average case, there appears to be a fairly regular growth. It is said that the tumors double themselves in size each 5 years. The rate of growth however is not an absolute criteria as to the malignant nature. In one group of 9 cases, all seen within the first year with rapid rate of growth, 65% behaved clinically as malignant

tumors.

12. In 125 cases, the distribution in location was as follows: parotid 69%, submaxillary 11%, oral 10%. Tumors in the sublingual glands are extremely rare; only 2 cases are on record. Ten cases in the tongue have been found. There are 2 cases on record in which the tumors are present under the skin other than in the parotid area.

13. The usual complaint is the presence of the tumor. Its removal is desired either because of cosmetic reasons or because of fear of outcome of the neoplasm. When other symptoms are present, they are usually referable to the 5th or 7th nerve pressure and this consists of dull or stinging pain, muscle twitching or paralysis.

14. In the various groups of treated cases, totally 364, there were 43% recurrences. Some of the series have a greater number of the malignant form. The percentage of recurrence may be as high as 60%.

15. The time of recurrence is variable but in a collected group of 59 cases 75% of the recurrences were in the first year and a total of 90% of the recurrences were within 5 years.

16. One group of 76 cases showed 13% to have 2 recurrences. In one group of cases in which the tumors were divided into typical mixed tumors, carcinomas and sarcomas, the end-results were as follows: In the mixed tumors (40 cases), 12 had one recurrence, 5 had 2 recurrences, 4 died within 5 years and 36 lived 5 years or over. The prognosis as far as life is concerned in this group was excellent. In the group diagnosed as carcinomas (30 cases), only 1 was living and this one had a recurrence at the time that the study was carried out. Of 9 cases diagnosed as sarcoma, 3 died immediately after the operation, 3 died within 5 years of the tumor, 1 died after 5 years without tumor, 1 was living and well 8 years later.

17. The literature is non-committal as to the results of radiation therapy. The impressions given from the Buffalo Institute are as follows: The ideal treatment is combined surgery and radiation. When the tumor is not favorably located for surgery, radiation alone is best. The post-operative recurrences are best treated by irradiation. These conclusions appear to be generally held by the other authors.

18. There is marked difference in the literature in regard to conservative or radical surgery involving the 7th nerve. Some authors feel that the paralysis secondary to the injury is worse than the tumor. Other authors who have had a higher percentage of malignant type of cases advocate wide resection and advise including the nerve in the resected material. In one group of 49 cases, there were 17 with nerve injury and 32 without. Paralysis is not uncommonly due to the growth of the tumor alone. Sometimes it is seen after radiation treatment and in these cases it is due to the growth of the tumor, the pressure of the resultant scar or to the implantation of radium seed within the nerve itself. One author (McFarland) feels that some of these cases should not be treated at all. He states that the tumors grow very slowly when not disturbed, the percentage of recurrence is high, there is a very definite chance in causing suffering due to a 7th nerve paralysis and that in those cases which are malignant no significant help was given by the surgical procedure.

19. A summary of the statistics in regard to end-results is quite interesting in that they correlate very well. 60 to 70% are "cured" by one operation, about 12% more are "cured" by two operations and from 18 to 31% are malignant and are not cured.

20. There is rare and unusual type of parotid tumor which apparently has an entirely different nature and origin than the tumor previously described. This is the so-called "adenolymphoma" but it is also known by a wide variety of other names. These tumors appear on the outer surface of the parotid gland. They are usually small, rarely over 6 cm. in diameter. They are encapsulated,

ovoid, shell out easily and may be lobulated. They are benign and do not recur. The interior is usually cystic and filled with fluid. Histologically, the wall is made up of molded columnar epithelium and the "submucosa" is entirely lymphoid, either a diffuse infiltration or follicles. Twenty-one of these cases have been collected. The origin of the tumors is unknown. It is either a tumor arising from some of the degenerating cells in the parotid or else from the salivary glands found in animals which in man is a rudimentary structure.

II. SUMMARY OF CASES (U. of M.)

MIXED TUMOR OF SALIVARY GLAND

Number 39

Sex Male 10, female 29. This is not same ratio of other series.

Age

	Adm.	Onset		Adm.	Onset
1 - 10	1	1	51 - 60	5	4
11 - 20	4	7	61 - 70	6	2
21 - 30	2	3	71 - 80	3	1
31 - 40	4	4	81 -	1	1
41 - 50	9	9	Indefinite	0	3

Note peaks of incidence at 11 - 20 and 41 - 50.

Duration

1 month to 38 years

Under 6 mo	5
6 mo. to 1 yr.	4
1 to 5 yr.	9
5 to 10 yr.	3
Over 10 yr.	13
Indefinite	1

37% seek treatment over 10 years after onset (some are recurrences).

Location	Number	%
Parotid	22	56
Submaxillary	10	26
Cheek (always inside surface)	4	10
Palate and pharynx	1	
Neck (aberent parotid?)	1	
Diffuse (parotid and submaxillary)	1	

The location of some of the tumors is unusual. Case #22, a very invasive tumor infiltrated the whole upper cervical area. In case #26, the main tumor lay in the lateral pharyngeal wall. In case #25, the mass presented in the mouth in the tonsillar area as much as externally; if it were not for historical evidence its primary position could not be determined. Case #35 is extremely odd because of the bone involvement. No similar case was noted in the articles abstracted.

Growth Rate

No correlation could be attempted here between duration and size. The measurements are unreliable: clerk may state "as big as a large hen's egg;" the surgeon states "3 x 4 inches;" the pathologist notes size as "2 x 3 cm." The only impression obtained was that a considerable number of patients observed an increased rate of growth just before admission. This may only represent a stage in the cycle. Those that did not come in because of the increased growth rate may have forgotten about the periods of greater activity. The relation to trauma did not seem significant but note cases #23 and #24. Coincidence?

Previous treatment (excision)

No excision	23	
Recurrent cases	15	38%

Treatment	All Cases	Recurrent Cases
None	2	-
Excision alone	6	3
Excision and radiation	20	6
Radiation alone (here)	11	5

Of the nine cases treated by radiation alone

Previously surgically untreated	4
Recurrences	5
Operated elsewhere	2

Pathological diagnosis

In our records of carcinoma of mouth, there must be several cases which after restudy in conjunction with the clinical features would be classified as mixed tumors. For instance, the biopsy in case #17 was interpreted as carcinoma. While inserting radium, the surgeon found that the tumor in the cheek could be shelled out with remarkable ease. Study of the tumor itself showed it to be a typical mixed tumor. In case #21, the initial biopsy was considered to be a squamous carcinoma, the resected specimen was interpreted as a possible carcinoma of the parotid ducts (ambiguous diagnosis). Restudy of these slides, however, does not modify that diagnosis. The 11 year duration is suggestive of a benign nature. In cases #19 and 10, the tumor is extremely cellular and a diagnosis of malignancy might be made. The microscopic diagnoses in cases #18, 20, 22, 23 cannot be changed in spite of the clinical features and comparison with the other tumors. All show some features placing them in the mixed tumor group. The tumor in case #24 (developed a lung metastasis) appears like any of the other non-metastasizing tumors. It is interesting that if one "grades" the tumors without any knowledge of the clinical data one is lost. The one tumor with distant metastasis is placed in the benign group. The clinically malignant forms are immediately identified but in addition several others, clinically benign, are also included. One is left with the impression that all the tumors are the same type and are all malignant (like neurofibromata). The division into grades or even into "low" and "high" malignancy is not very accurate but in the final result still appears to be of some value. No difference could be found between the recurrent and the primary tumors. In case #25 with 5 recurrences, the tumor still looks like a typical mixed tumor.

The follow-up is handicapped because so many return the appointment blank with the notation "financially impossible to return."

#	Hosp.#	Name	Adm.	Sex	Age	Duration	Growth	Symptoms	Location
1			4-18-32	F	67	9 yr.	Slow 7 yr. Grad 2 yr.	Twitching	Cheek
2			9-10-31	F	16	18 mo.	Slow	Pain	Parotid
3			4-29-32	F	72	4 mo.	Slow	-----	Parotid
4			8-30-26	F	51	8 yr.	Slow	Tender	Submax.
5			10-7-32	F	19	2 yr.	Gradual	Pain 2 mo.	Parotid
6			4-6-33	F	41	8 yr.	Slow	-----	Parotid
7			1-29-33	F	20	1 yr.	Slow 6 mo. Grad 6 mo.	-----	Parotid
8			1-20-33	M	33	5 mo.	Gradual	-----	Parotid
9			1-26-33	F	49	4 mo.	Gradual	Ache	Parotid
10		C	2-24-31	M	27	2 yr.	Slow 18 mo. Grad 6 mo.	-----	Parotid
11			12-29-31	F	73	12 yr.	Slow 10 yr. Grad 2 yr.	Pain 2 yr.	Cheek

RECURRENT CASES

12			5-9-32	F	35	11 yr.	Slow	-----	Parotid
13			8-20-23	F	18	2 yr.	Gradual	Ache	Submax.
			7-18-28		21	5 yr.	Slow	Ache	Submax.
14			10-30-32	F	43	12 yr.	Slow	-----	Submax.
15			12-8-31	F	46	4 yr.	Slow	7 N. Pressure	Parotid
16			10-20-30	F	45	22+ yr.	Slow	-----	Parotid
17			3-22-32	M	33	17 yr.	Slow	-----	Parotid

#	Size	Biopsy	Prev.Treat.	Treatment	Follow-Up	Remarks
1	6 cm.	-----	-----	2680 mch radium 120%sed. Ref.Surg.	2 mo. no tumor	-----
2	1 x 2	31-1801	-----	Exc.,130% sed	2 yrs.no recur.	-----
3	3 (?) 1.5x1.5	32-856	-----	Exc.,110%sed	3 mo. " " (?)	----
4	3	26-621	-----	Excision	8 yr. " "	-----
5	4 x 5	32-2118	-----	Exc., 1069 mch.	1 yr. " "	-----
6	2 x 2	33-876	-----	Exc.,(L.7N injury)	4 mo. " "	-----
7	2	33-258	-----	Exc.,1080mch. 110% sed	-----	-----
8	1.5x3	33-167	-----	Par.exc., curet, 3090mch.105%sed x-ray	1 yr. nodule-no growth -scar?	-----
9	1.5	32-246	-----	Par.exc.curet, 2070 mch. x-ray	1 yr. no recur.	-----
10	4 x 5	31-359	-----	Exc.120% sed (Upper 7N injury)	-----	Very cellular tumor like sarc.
11	Lemon	32-19	-----	Exc., 1716 mch.	-----	Path.diag.- 1-Carcinoma 2-Mix.tumor

RECURRENT CASES

12	5 x 4	32-962	Incis.1 yr. before x-ray	Excis. 115% sed	7th N.injury improving	-----
13	Hen's egg	23-352	-----	Excision	Recurred immed.	-----
	2 x 1	28-736	Exc. 3 yr.	"	-----	-----
14	3-19 nod.	32-2790	Exc. 10 yr.	Exc. 150 sed,	14 mo. no	-----
		32-2791	Recur. in 2 yr.	2100 mch.	recurrence	
15	3 x 3	-----	Exc. 6 yr.	1835 mch.	2 yr., no tumor	-----
16	3	30-1952	Exc. 22 yr.	Exc. 120% sed	5 mo. no recur.	-----
17	2	32-573	Exc.16 yr. bef. Recur. 8 yr.	Par.exc., curet, 1980mch.100%sed	Nodule 2x3, stationary 1 yr.	Several separate nodules

#	Hosp.#	Name	Adm.	Sex	Age	Duration	Growth	Symptoms	Location
CARCINOMA (?)									
18			8-26-29	F	54	1 yr.	Rapid	Ulcer	Cheek
19			8-13-30	F	19	1 yr.	Gradual	-----	Submax.
20			6-14-32	M	45	8 mo. 14 mo. 24 mo.	Gradual ----- -----	7 N. Pres- 7 N. sure -----	Parotid Nodes ne "
21			3-29-32	F	58	11 yr. -----	Slow -----	0-9 yr.pain 2 yr. ulcer	Cheek -----
22			11-10-32	F	81	1 mo.	Rapid	Pain	Diffuse tid & su
23			12-19-30	M	50	38 yr.	Stationary growth 6 mo. after injury	7 N. Pres- sure	Submaxil Parotid
24			1-13-29	M	55	13 yr.	Slow 12 yr. Grad 1 yr.	-----	Submax.
ODD LOCATIONS									
25			1-11-33	M	67	17 yr.	Slow	-----	Tonsil, max., ne
26			2-26-31	F	49	2 yr.?	?	Dyspnea Choking Voice change	Palate & pharynx
27			6-29-28 6-20-29 9- 9-29	M	65	3 mo. 15 mo. 18 mo.	Slow Gradual Gradual	----- ----- -----	Under be of stern toid mus Same Same

#	Size	Biopsy	Prev.Treat.	Treatment	Follow-Up	Remarks
CARCINOMA (?)						
18	3 x 4	29-1061 29-1069	-----	Exc. 750mg.hr. 60% sed	Ca.of Rect. resected 1926 1-16-34 no sympt.	Path.Diag. 1-Ca.or chr. infl. 2-mix.tumor 3-lymphosarc. Leuk.
19	6x2x2	30-1480 30-1538	Exc. 3mo.	Exc.,117%sed	Recur.immed. 145%sed,no eff. 7 N.inj. 3-26-32 same	Path.diag: Mix.tumor. (Cellular Squa.IV?)
20	1.5 cm. ----- -----	----- 30-70 -----	X-ray sev. " "courses -----	1954 mch. 977 mch.110%sed 1880 mch.	Extension " 2-1-34 hopeless	Path. diag: (nodes) Adenocarcinoma
21	8 x 5 -----	32-582 32-597	Radiation "	Exc., 110%sed	No recurrence 1 mo.	Path. diag: 1- Sq. Ca. 2- Adenoca.
22	Diffuse	32-4207	-----	3379 mch. 90%sed	-----	Path.diag: Sq.Ca.III
23	4	30-2276 31-267	-----	1-Radical exc. c nerve -120%sed 2-Neck dissec. 60%sed.	Died-6 mo.	Path.diag: Ca.III Sq.Ca.in nodes
24	4 x 5	(of tissue removed 1 yr.prior) 18-1241	Exc.1 yr.	2640 mch.200%sed	Metas.to lung. Died in 10 mo.	Primary in submax.? Typical mix-ex tumor
ODD LOCATIONS						
25	Many nod.	-----	5 resections	3140 mch.120% sed	1 yr., no tumor	Typical mixed tumor
26	4 x 3	31-403	-----	Rad. exc., 155%sed bilat.	3 yr., no recurrence	Typical mixed tumor
27	----- Orange 8x8	----- 29-1194	----- -----	None for mass, biop.refused Mass Aspir.GP inj.,no tbc. Biopsy.	----- ----- Died of CWStbc.	Adm.for exf. derma. Spine pl. shows tbc. Typical mix-ed tumor

Eight additional cases have been found particularly in the older records.

28. Female, age 65, admitted 9-13-26. Tumor of submaxillary gland, duration not stated. Removal 4 years prior followed by immediate recurrence. Size - "hen's egg." Treatment: excision. Died December 1926. Had diabetes and "stroke". L.Q.

29. Male, age 65, admitted 6-10-33. Location: submaxillary. Size - 6x4 cm. Growth slow up to 4 mo. prior, then more rapid. Duration, 4 years. Refused operation. Died. C.A.

30. Female, age 32, admitted 7-24-26. Tumor in parotid; size, 6 x 8 cm.; duration not stated. Removed 13 years prior. Treatment: excision with removal of branches of 7th nerve. Follow-up 1-28-34; no recurrance and no mention of facial paralysis. A.M.

31. Male, age 42, admitted 3-17-27. Tumor in parotid; size, "hen's egg"; duration, 2 years. Growth faster in past 6 mo. Treatment: excision, 125% SE. Branches of 7th nerve excised. Last seen 10-4-27, no recurrence. L.H.

32. Female, admitted 10-20-32. Tumor in parotid, removed 18 yr. prior and removed again prior to admission. Came for irradiation, 120% SED. A.W.

33. Male, age 66, admitted 10-3-20. Tumor in parotid; size, "small orange;" duration, 15 years; growth slow but faster for 5 years. Treatment: excision with excision of 7th nerve. F.J.

34. Female, age 73, admitted 11-8-33. Tumor in parotid 15 years; size, "rubber of lead pencil"; removed 3 year prior. Tissue diagnosed as cancer. Deep x-ray given. Tumor recurred (immediately?). Treatment: 1980 mch. radium. E.P.

35. Male, 57, admitted 2-3-34. Location: submaxillary (?); duration, 16 yrs.; removed 14 years ago; recurred in 2 years, steady growth since; developed pain in mandible 4 years ago; mass incised 3 years ago, draining since. X-ray of mandible shows extensive destruction with sclerosis with several pathological fractures. Biopsy: mixed tumor of salivary glands. Treatment - irradiation. M B.

Dr. Stenstrom checked his records and found 5 other cases (private patients, one without an available record).

36. Female, admitted 10-4-29, tumor of parotid treated by excision and 140% SED. No recurrence in 1 year.

37. Female, age 48, tumor of parotid, 1 year duration, admitted 6-10-31. Treated by 140% SED. No response. Died?

38. Female, age 53, tumor of parotid of "several years" duration, admitted 10-7-32. Tumor excised elsewhere. Diagnosis: "papillary cystadenocarcinoma." 120% SED. No recurrence, 1 yr.

39. Female, age 81, tumor of submaxillary, duration $3\frac{1}{2}$ years. Previously treated by radiation. 125% SED under observation.

Further search would no doubt reveal other cases, particularly in the period prior to 1928 (beginning of new cross-index). Dr. Peyton recalled 2 other cases and the charts of 2 cases are not available. Our appreciation to Miss Gunn and Mrs. Brown for gathering together the charts and to Drs. Peyton and Stenstrom for suggestions and for information regarding details of treatment and follow-up.

R. W. Koucky.

III. MEETING

Date: February 8, 1934

Place: Recreation Room, Nurses' Hall

Time: 12:20 - 1:12

Attendance: 118

Program: Division of Dermatology

Discussion: H. E. Michelson

Theme: Dr. Michelson made most interesting report on activities of his Division, completely substantiating all the nice things that were said about him and his group.

Gertrude Gunn,
Record Librarian.

IV. HORACE GOLDEN SCOTT, M.D.

Announces the opening of offices at

730 LaSalle Building
Minneapolis, Minnesota

Practice General Surgery

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NO MEETING

NEXT WEEK

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