End Results in Parotid Tumors

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• **Management of parotid tumors can be based on a clinical classification of these lesions as being either "encapsulated" or infiltrating.**

The Warthin tumor (papillary cystadenolymphomatosum) is a benign encapsulated tumor, often occurring multicentrically or bilaterally especially in the lower pole area of the parotid. It is characterized clinically by its softness and fluctuation in size and a high incidence in elderly men.

The so-called "capsule" of well demarcated mixed and mucoepidermoid tumors is represented by a condensation of host fibrous stroma, in the interstices of which tumor cells may be present.

The "encapsulated" tumors should be excised with a "shell" of uninvolved parotid tissue. To do this safely, the facial nerve should first be isolated.

Total parotidectomy is necessary only if the size of the tumor, the multiplicity of recurrences, or the infiltrating nature of the tumor are such that complete eradication of the primary site must be done.

Radical neck dissection is never performed electively except in the small group of nonencapsulated infiltrating primary lesions.

In a series of cases of previously untreated parotid tumors treated by the method outlined, the local parotid recurrence rate was less than 1 per cent.

ALTHOUGH THERE HAVE BEEN many excellent papers published recently on the subject of parotid tumors, many important questions relative to the natural history and management of these lesions still remain either unanswered or neutralized by diametrically contradictory statements.

Unfortunately, the means usually resorted to for solution of problems of this type is a review of many cases documented by a large and varied group of clinicians, with operation done by numerous surgeons, often histologically reviewed by different pathologists and finally analyzed by one or several members of a writing team who interpret the findings of the others as best they can by making due allowances for omissions in the notations and by grouping together various facts of numerous observers who have used different and varied nomenclature. Anyone who has tried to make such an analysis of the charts of others realizes how much he has to read into and between the lines and how often he has to decide whether one historian uses "pigmented lesion" to mean black while others mean brown or red, and whether a "large" lesion is 1 cm. or 10 cm. in diameter and if a "nonpalpable node" was really palpable, and vice versa. The list of such variables could be extended. The errors possible in this kind of analysis can be compounded if the group analyzing the charts hands them over to a third echelon for final interpretation and analysis. It is, therefore, obvious that the more one can reduce the many variables involved in such an analysis, the more objective should be the end results. The validity of the conclusions will be inversely proportional to the number of variables involved in the study. In the present study such an attempt has been made by only including cases of parotid tumors managed by one surgeon who also carried out the follow-up observation and analyzed the data.

MATERIAL

The material was 218 cases of parotid tumor in which the patients were observed for periods of one to nine years. Many questions can be answered on the basis of a follow-up of this length, while the answers to others will require even longer periods.

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METHOD

In all cases surgical operation was done (see Figures 1 to 6). External radiation was used postoperatively in certain selected cases. The type of operation was standardized and therefore performed in the same manner in all cases. Only the extent of the operation was varied, but on one basis only—the extent of the disease.

Most parotid tumors are well defined and limited by a so-called capsule. This "capsule" (directly related to the slow growth of the tumor) is only a condensation of the host fibrous stroma in the interstices of which are islands or clumps of tumor cells. The surgical objective, then, is complete removal of the tumor and the "capsule." To do this an intact shell of uninvolved parotid tissue around the palpable mass must be taken. It is only rarely necessary to do total parotidectomy to accomplish this purpose. Even then, total parotidectomy is never performed "en masse" unless the facial nerve is totally sacrificed. Technically, if the nerve is spared, a total parotidectomy is performed piecemeal so that tiny

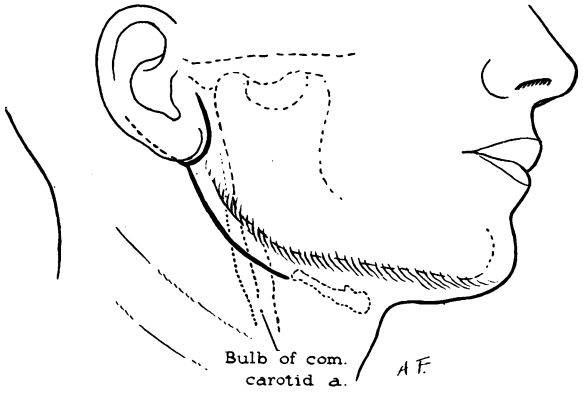

Figure 1.—Illustrating the "Y" incision with the preauricular arm placed in a natural wrinkle very close to the tragus and the cervical arm paralleling an adjacent neck crease as it is extended to the tip of the hyoid.

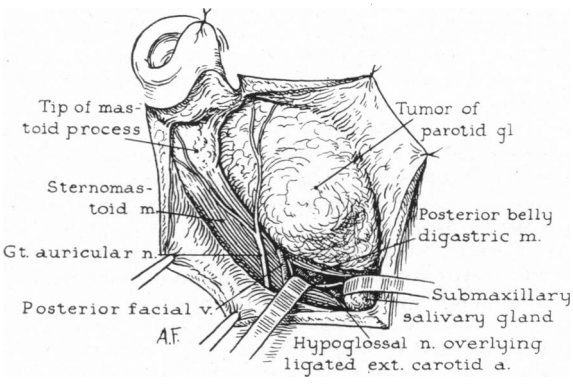

Figure 2.—The anatomical landmarks displayed after elevation of the skin flaps. The external carotid artery may be ligated at this time just caudad to the posterior belly of the digastric muscle.

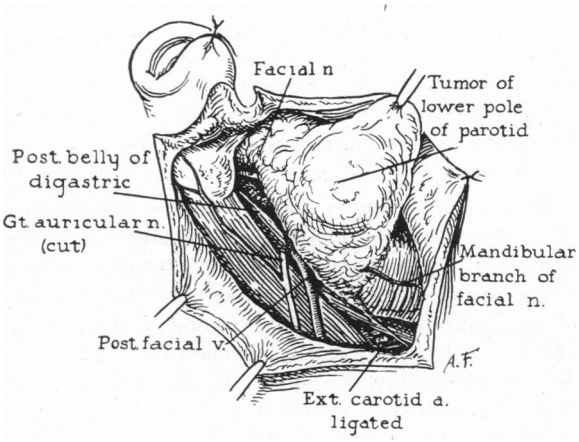

Figure 3.—By tracing the posterior belly of the digastric muscle to its origin on the medial surface of the mastoid process, the main stem of the facial nerve is identified as it lies 1 to 2 cm. deeply medial to this point. When the volar surface of the tip of the index finger is placed on the medial surface of the mastoid, the nail will be in contact with the main stem of the facial nerve.

remnants of parotid tissue are left "in situ" in all instances.

Total parotidectomy is often recommended because of the multicentric nature of these "encapsulated" tumors. The rarity[3] of such an occurrence in previously untreated cases makes this recommendation entirely invalid. Presumably the high percentage of multicentricity refers to cases in which operation has been done and inadequate excision or enucleation has left remnants of capsule with attached tumor cells in the perimeter of the tumor bed. From these multiple points growth may take place into the previously made surgical field, giving rise to a false genetic manifestation of multicentricity.

In the present series no attempt was made to deliberately do a total parotidectomy as a finite procedure. If the tumor was such that total or almost total parotidectomy was necessary to extirpate it, this procedure was performed; and in such instances it was often necessary to include extraparotid tissue such as skin, fat, fascia or muscle in the excision.

In all cases the facial nerve was isolated, and always at one point only—where the main stem emerged from the stylomastoid foramen. None of the other avenues of approach for isolation of the facial nerve branches was utilized in this series of cases. In previously untreated cases, regardless of the histologic diagnosis or size of the tumor, the facial nerve was never sacrificed—with the one exception of cases of infiltrating nonencapsulated malignant tumor wherein the facial nerve was embedded within the substance of the spreading tumor. Even in such cases, unless the surgeon is prepared to remove the adjacent condemned areas such as the masseter muscle and possibly the auricle, the external auditory canal and part of the mandible and mastoid,

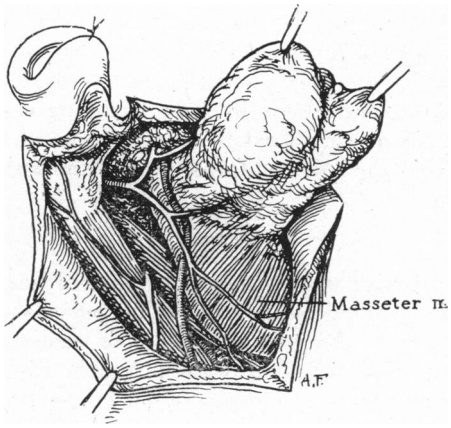

Figure 4.—While dissecting out the branches of the facial nerve, the superficial lobe of the parotid is elevated with its contained tumor. Note that the posterior facial vein is usually deep to the facial nerve.

there is nothing to be gained by simply sacrificing the facial nerve and leaving all or some of these involved contiguous structures "in situ." Simply removing the facial nerve with the parotid under such circumstances adds nothing to the surgical extirpation of local disease of this type, except that it makes the operation much easier.

Since the majority of such infiltrating tumors are much more radiosensitive than the average "encapsulated" parotid tumor and since a very high proportion of them (50 to 75 per cent) metastasize at least to the regional lymph nodes, the preferable course (unless one is prepared to perform wide radical excision of the primary site as previously mentioned) would be to perform a radical neck dissection in continuity with removal of all of the parotid gland, saving the facial nerve. Thus postoperatively the surgeon presents the radiologist with a more limited field for radiation, namely the primary site. The presence of the facial nerve in this field will in no way minimize whatever success the radiologist may have. It is believed that such a combination of modalities offers a greater opportunity of success in cases of this type than the use of either alone. This combined surgical and radiologic treatment was carried out in four cases in the present series.

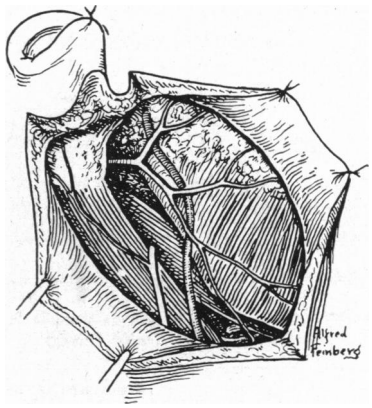

Figure 5.—If the tumor is in the deep lobe, the superficial lobe must first be removed as shown in Figure 4 and then the diseased deep lobe may be removed from beneath the facial nerve by elevating or spreading the branches.

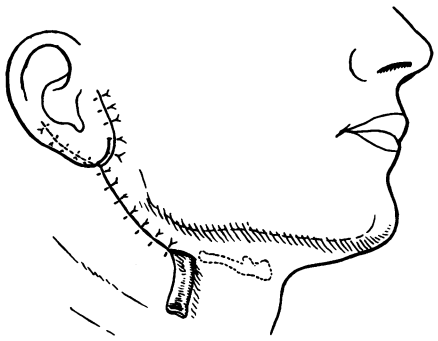

Figure 6.—Closure, showing site of drain.

The "Y" skin incision with the "hub" of the incision immediately below the lobe of the ear was used in all cases in this series.

The external carotid artery was ligated in continuity whenever it was felt that as bloodless a field as possible was necessary to avoid injury while locating the main stem of the facial nerve. This was particularly helpful in cases of large or incarcerated tumors of the pterygoid extension of the superficial lobe or in tumors of the deep lobe and in recurrent cases. The procedure can be performed through the same incision by extending the submandibular arm several centimeters toward the hyoid bone. The theoretical disadvantage of such ligation—that is, that it would interfere with the clean performance of neck dissection later, if that were indicated—can be dismissed as being of little importance when one considers that the incidence of subsequent cervical node involvement in such cases is less than 1 per cent.

When the preauricular area of the parotid gland is approached during the dissection, careful search is made for large tributaries of Stensen's duct. When these tributaries are isolated and transected, the cut distal ends are tied with fine silk to reduce the possibility of prolonged fistula formation.

Elective radical neck dissection was never performed, as fewer than 1 per cent of these tumors ever spread to regional lymph nodes after the primary lesion was controlled. In cases in which the homolateral cervical lymph nodes were involved and in all cases of infiltrating primary lesions, therapeutic radical neck dissection was performed either in continuity if the involvement was known at the time of operation or as a second stage when involvement became manifest later.

RESULTS

In the 218 cases of parotid tumor 121 were mixed tumors, 29 mucoepidermoid tumors and 18 Warthin's tumors. The present analysis deals with those cases. The tumors of other categories were too few in number for valid analysis (Table 1).

The age range of patients with mixed and mucoepidermoid tumors was from 16 to 82 years; of those with Warthin's tumor, 48 to 83 years (Table 2). The incidence of Warthin's tumor was considerably higher in men than in women; for mixed and mucoepidermoid tumors the converse was true (Table 3). Warthin's tumors were located predominantly in the lower pole of the superficial lobe of the parotid and only 11 per cent in the deep lobe; the mixed and mucoepidermoid tumors were in the

lower pole in a considerably smaller proportion of cases (Table 4). These data raise strong suspicion of a Warthin's tumor if the patient is an elderly man and the lesion is "encapsulated," is located at the lower pole of the parotid, and especially if, in addition, it is somewhat soft and varies in size from time to time.

For removal of the tumors, subtotal parotidectomy was done in 128 of the 168 cases and total parotidectomy in 40 cases (Table 5). In only seven instances was radical neck dissection performed in continuity because of the presence of clinically involved nodes or an infiltrating primary tumor. In one instance a staged procedure was done. In that case there was no clinical evidence of cervical involvement, but subsequently there was found to be metastatic extension to a cervical node in proximity to the lower pole of the superficial lobe of the parotid gland, where an "encapsulated" mucoepidermoid tumor was located.

In no case in the series was there accidental injury of the main stem or a major branch of the facial nerve. In six cases deliberate transection of the main stem was done, in four of them because of presurgical paralysis and in two because of intimate tangling of the nerve in the crevices of huge recurrent tumors (Table 6). The latter were really multicentric foci of recurrent tumors which became fused in conglomerate masses, trapping the nerve branches adhesively within the substance of the entire blob.

TABLE 1.—*Description of Parotid Tumors (218 Cases)*

Kind of Tumor	No. of Cases	Primary Site
MALIGNANT TUMORS (186 CASES)		
A. Primary (160 cases):		
1. Mixed tumors	121	
2. Mucoepidermoid tumors	29	
3. Acinic cell tumors	2	
4. Lymphomas	8*	
Lymphosarcoma	5	
Giant follicular lymphoma	1	
Hodgkin's disease	1	
Lymphatic leukemia	1	
B. Secondary (26 cases):		
1. Metastatic (15 cases):		
(a) Melanoma	11	Skin
(b) Squamous cell carcinoma	2	Ear, tonsil
(c) Lymphosarcoma	1	Tonsil
(d) Fibrosarcoma	1	Orbit
2. Direct extension (11 cases):		
(a) Squamous cell carcinoma		Ear, cheek, external auditory canal
(b) Basal cell carcinoma		Ear
(c) Adenocystic carcinoma		Cheek, skin appendage
(d) Ceruminous adenocarcinoma		Ear canal
(e) Fibrosarcoma		Mandible
(f) Rhabdomyosarcoma		Temporal muscle
BENIGN TUMORS (32 CASES)		
1. Warthin's tumors (papillary cystadenolymphomatosum)	18	
2. Benign lymphoepithelioma (Godwin)	3	
3. Hemangioma	2	
4. Lipoma	4	
5. Epithelial cyst	5	

*The lymphomas in this primary group were invariably within peri- or intraparotid lymph nodes without clinical evidence of disease elsewhere.

TABLE 2.—*Data on Age of Patients in Relation to Kind of Tumor*

	No. of Cases	Age of Patient (Years) Range	Average
Mixed tumor	121	16 to 76	46
Mucoepidermoid tumor	29	18 to 82	50
Warthin's tumor	18	48 to 83	65

TABLE 3.—*Relation of Kind of Tumor to Sex of Patient*

	No. of Cases	Male (Per Cent)	Female (Per Cent)
Mixed tumor	121	30	70
Mucoepidermoid tumor	29	38	62
Warthin's tumor	18	72	28

TABLE 4.—*Location of Various Kinds of Parotid Tumors*

	(Per Cent of Total Number of Each Kind)			
	Superficial Lobe			Deep Lobe
	Preauricular Area	Lower Pole	Pterygoid Extension	Includes Intra-oral and Duct Lesions
Mixed tumor	14	23	33	30
Mucoepidermoid tumor	21	17	24	38
Warthin's tumor	6	72	11	11

TABLE 5.—*Data on Kinds of Operations Used in Dealing with Various Kinds of Parotid Tumors*

	No. of Cases	Kind of Operation: Parotidectomy Subtotal	Parotidectomy Total	Neck Dissection In Continuity	Neck Dissection Staged
Mixed tumor	121	98	23	2	1
Mucoepidermoid tumor	29	13	16	5	0
Warthin's tumor	18	17	1	0	0
		128	40	7	1

TABLE 6.—*Data on Postsurgical Paralysis in Cases in Which Facial Nerve Was Transected*

	No. of Cases	Presurgical Paralysis	Postsurgical Result
Total transection	6	4	Two permanent
Buccal transection	9	0	Total recovery in 17 to 450 days
Mandibular transection	7	1	Five recovered in 120 to 600 days; 1 permanent

This never occurs with previously untreated "encapsulated" tumors, even large ones, because the nerve branches in such instances are either stretched over the surface of the mass or, at the most, embedded in a crevice of the nodular tumor and separated from it by an easily removed specific fascial layer. In addition nine smaller buccal branches and seven smaller mandibular branches were deliberately transected in recurrent cases because of the increased possibility of further recurrences, the intimate adherence to these nerves and the apparent unimportance of these branches. The estimate that they were unimportant was borne out by the fact that in all but one instance function returned completely in two weeks to two years.

Salivary fistula occurred in only 6.5 per cent of patients who had subtotal parotidectomy and all cleared spontaneously in 15 to 87 days. Searching for and tying off major duct branches with nonabsorbable fine silk may have been an important factor (Table 7).

TABLE 7.—*Data on Occurrence of Salivary Fistulae in 168 Cases of Parotidectomy*

Occurred in 11 cases (6.5 per cent).
Extent of operation—8 subtotal parotidectomies; 3 total.
Previous operation—3 cases.
Location of tumor—Preauricular area 4; lower pole 4; pterygoid extension 2; deep lobe 1.
Duration of fistula—15 to 87 days; average—32 days.

TABLE 8.—*Data on Development of Auriculotemporal Syndrome in 237 Cases of Parotidectomy*

Incidence:
24 per cent of all cases.
20 per cent of subtotal parotidectomies.
34 per cent of total parotidectomies.
Onset:
Two to 48 months after operation. (Average—11 months).

TABLE 9.—*Data on Metastasis from Parotid Tumors of Various Kinds*

	No. of Cases	No. with Metastasis	Metastasis to Cervical Nodes	Metastasis to Distant Lung, Bones
Mixed tumor	121	3	1	3
Mucoepidermoid tumor	29	10	10	5
Warthin's tumor	18	0	0	0

TABLE 10.—*Data on Death from Disease in 168 Cases of Parotid Tumor in Which Operation Was Done*

Kind of tumor:
(a) Mixed tumor, 2 cases (1.5 per cent).
(b) Mucoepidermoid tumor, 7 cases (24 per cent).
Areas involved:
(a) Residual disease in parotid, 6 cases.
(b) Regional nodes involved, 8 cases.
(c) Distant metastasis, 6 cases.

The auriculotemporal syndrome was, surprisingly, found in 24 per cent of the entire series* (Table 8).

After many consultations with the group of pathologists involved, it was decided that the criteria for diagnosis of benign mixed tumors and low-grade mucoepidermoid tumors were either so nonspecific or borderline that from a clinical standpoint still other important variables would be eliminated by accepting all of these lesions as malignant. The impression was gained that genetically all the mixed and mucoepidermoid tumors had a common genesis, differing only in their growth potential, with the mucoepidermoid tumors representing the more malignant types. The Warthin tumor was considered to be a benign lesion, often multicentric and bilateral. Further, from a clinical standpoint, the management of these tumors was dependent on only two factors. First, whether the primary lesion was "encapsulated" or infiltrating, and, second, whether or not metastasis was present. In this series of cases nothing occurred during the one to nine-year period of observation to warrant a change in the utilization of this simplified classification as a basis for management. Using this clinical classification, it was found (Table 9) that a 0.8 per cent of the mixed and 32 per cent of the mucoepidermoid tumors metastasized to the cervical lymph nodes, and in all cases this occurred preoperatively. Distant metastasis, primarily to the lungs and bones, occurred in 2.5 per cent of the cases of mixed tumors and in 16 per cent of the cases of mucoepidermoid tumors—postoperatively in all cases. As was expected metastasis did not occur in cases of Warthin's tumor.

That patients die from parotid tumors is well known. In the present series there was a 1.6 per cent mortality in the mixed tumor group and 24 per cent in the mucoepidermoid tumors (Table 10). Death was due to distant metastasis in six of the nine cases and to the local effects of the disease in the other three cases.

Perhaps the most important criterion upon which the effectiveness of this method of management rests is that of recurrence in the primary site. McFarland[5] and others[1,2,4,9,10] showed that with simple enucleation, curettage, radiation or any combination of these therapeutic measures the local (parotid area) recurrence rate is from 15 to 65 per cent. The higher figure is perhaps the more dependable,

*The factors involved in this interesting sequela will be discussed in a separate paper.

TABLE 11.—*Local Recurrence*

Mixed tumor:		
Primary cases	(89)	1%
Cases previously operated on	(32)	18%
Mucoepidermoid tumor:		
Primary cases	(14)	None
Cases previously operated on	(15)	13%

since it is based on a study of a large group of cases over a long period of time.[5] In the present series (Table 11) there was only one local recurrence in a series of 103 cases, not previously treated, of mixed and mucoepidermoid tumors observed for a period of one to nine years after operation. On the other hand, with the same and even more extensive management applied to previously treated patients who had recurrence, the subsequent recurrence rate was 17 per cent.

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