Parotid Neoplasms:

A Report of 250 Cases and Review of the Literature

EDWARD J. DUNN, M.D., TYLER KENT, M.D., JAMES HINES, M.D.,* ISIDORE COHN, JR., M.D.

A 25-year experience with parotid tumors was reviewed. From a total of 250 neoplasms, 173 were histologically benign and 77 were malignant. Benign mixed tumors accounted for 59% of all lesions. Clinical parameters used to diagnose parotid neoplasms were found to be unreliable in determining whether a given tumor was benign or malignant. The mean age for malignant lesions was 10 years greater than for benign lesions. The phenomenon of malignant transformation of a benign tumor was considered in four patients. Complete surgical excision is the safest and preferred method for diagnosis. Preoperative needle or incisional biopsy are associated with a high degree of local recurrence. The appropriate management of any parotid tumor is predicated on special histological type. Local excision or enucleation no longer have a place in the surgical management of benign parotid tumors. Postoperative tumor recurrence and morbidity are directly related to awareness of surgical anatomy and pursuit of correct surgical techniques for adequate resection. The five-year recurrence rate for 102 benign mixed tumors was 6%. Recurrence in malignant tumors varied with specific histological types but was generally high. Five-year survival for all malignant parotid tumors was 48%.

From the Department of Surgery,
Louisiana State University School of Medicine,
1542 Tulane Avenue, New Orleans, Louisiana 70112

THIS REPORT is based on a retrospective chart review of 250 patients with histologically confirmed parotid neoplasms. All patients were treated in Louisiana State University Affiliated Hospitals† during a 25-year period, 1948 through 1973. Information was gathered from patient hospital records or the Tumor Registry of Charity Hospital, New Orleans, Louisiana. The Registry attempts to follow all patients yearly and, through cooperating statewide agencies, obtains necessary data on patients who do not return for followup.

The records of 250 patients with microscopically proven parotid tumors were reviewed. Information was transferred to data processing equipment for evaluation and correlation of the various clinical parameters in this study.

Clinical Data

There was a fairly even distribution of sex and race (Fig. 1). However, the ratio of Caucasian to Negro admissions during this period was approximately 1:2, and the male to female hospital population 1:2. There was a slight preponderance of Negro females with benign lesions and Caucasian males with malignant lesions.

At the time of diagnosis the age range was from 9½ months to 96 years (Fig. 2). The peak incidence of all lesions was in the fifth, sixth, and seventh decades. The mean age for a benign tumor was 48 years and for a malignant tumor 57 years.

The typical patient with a parotid tumor presented with an asymptomatic mass of long duration. However, signs and symptoms were not constant and could not be used as reliable indices for differentiation between benign and malignant tumors (Table 1). Of patients with benign disease, 38% manifested recent enlargement and over 6%

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* American Cancer Society Clinical Fellow #CS3325.

† Charity Hospital of Louisiana at New Orleans, New Orleans, Veterans Administration Hospital, New Orleans, and Earl K. Long Memorial Hospital, Baton Rouge, Louisiana.

complained of pain. Malignant tumors were painful in 33% of cases.

Facial nerve palsy, a poor prognostic sign, was present in 19% of the patients with malignant lesions. Eleven of 15 patients with malignant tumors and associated facial nerve involvement died within one year of diagnosis.

On initial physical examination 26 patients with malignant tumors had palpable cervical lymph nodes. Eighteen of these patients died from metastatic disease.

Forty-one per cent of benign and 61% of malignant lesions were diagnosed within one year from the onset of symptoms (Table 2). The median delay in diagnosis was two years for benign and 6 months for malignant tumors.

Twenty-four benign mixed tumors were present for over 10 years at the time of diagnosis, the longest delay being 20 years. Four patients with malignant tumors failed to seek medical attention for greater than 10 years: they sought help after sudden enlargement of their preexisting masses.

The median size of all tumors was 3 cm and 75% of patients had tumors measuring one to 4 cm. Median size was similar for benign and malignant lesions, and there was no relationship between size and malignancy. The largest lesion, a 15 cm malignant mixed tumor, occurred in a 77-year-old woman who underwent excision of a benign mixed tumor 50 years prior to the diagnosis of her malignancy.

There was no predilection of right or left-sided lesions for benign or malignant parotid tumors. There were 6 bilaterally occurring tumors, two of which were bilateral Warthin's tumors, two bilateral benign mixed tumors, and one patient had a benign mixed tumor on one side and a benign lymphoepithelial lesion on the other. Finally, an unusual case of bilateral acinic cell carcinoma occurred in a 32-year-old woman who was dead from tumor within 8 months of diagnosis.

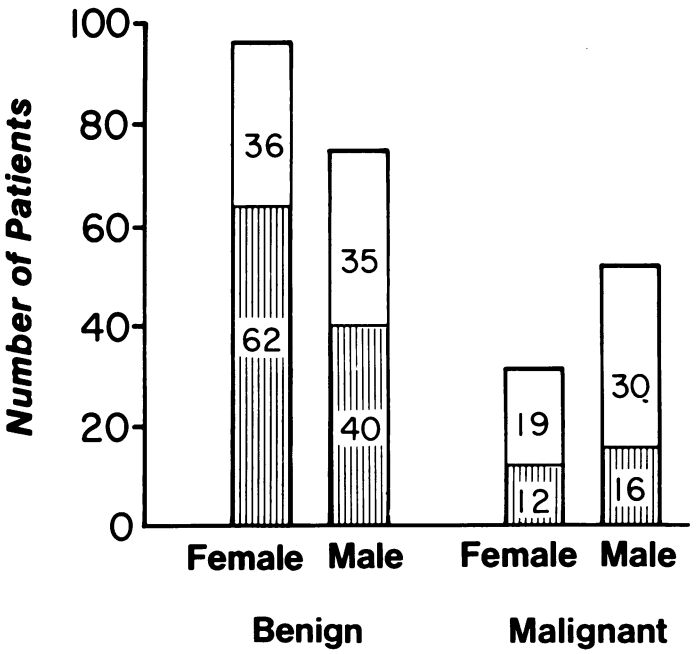

FIG. 1. Sex and race of patients with benign and malignant parotid neoplasms (open columns = Caucasian patients; scored columns = Negro patients.)

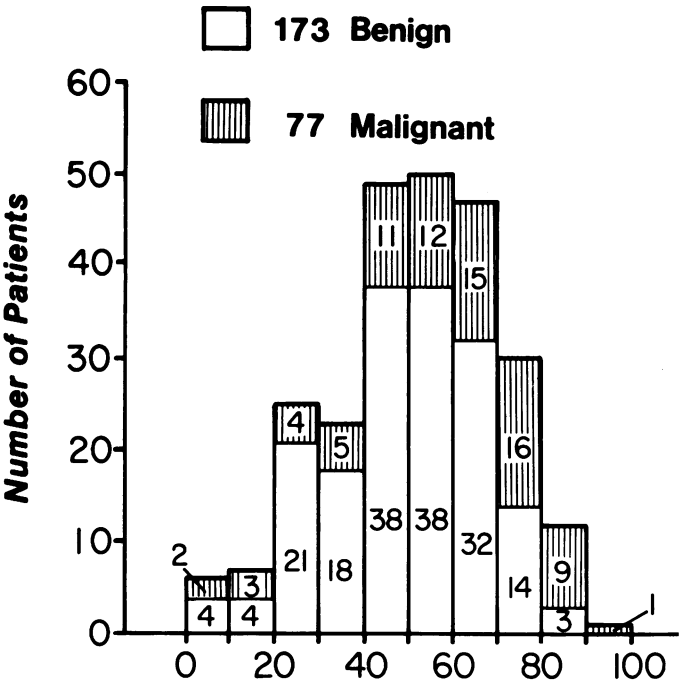

FIG. 2. Age of 250 patients with parotid neoplasms.

Diagnosis

Diagnosis was made most frequently by histologic evaluation of frozen or permanent specimen obtained during an operative procedure. Needle or incisional biopsy were used infrequently, and both were associated with a high degree of recurrence. Of 146 benign mixed tumors, a total of 15 recurred for an overall recurrence of 10%. Twenty benign mixed tumors were biopsied; 4, or 20%, recurred.

Treatment

The therapeutic approach was almost exclusively operative (Table 3). Major deviations from this policy were in patients who refused operation, had extensive metastatic disease, or had co-existing medical illnesses precluding any surgical therapy.

Ninety-two per cent of the patients underwent a surgical procedure. Subtotal (or superficial) parotidectomy was the most common procedure performed for benign tumors localized to the superficial lobe. Total parotidectomy with facial nerve preservation was used for

TABLE 1. *Signs and Symptoms: 250 Cases*

Sign or symptom	Benign	Malignant
Fixed mass	34 (20%)	40 (52%)
Mobile mass	100 (58%)	15 (19%)
Soft mass	6 (3%)	1 (1%)
Hard mass	131 (76%)	56 (73%)
Tenderness	19 (11%)	11 (14%)
Pain	11 (6%)	23 (30%)
Recent enlargement	65 (38%)	35 (45%)
Seventh nerve involvement	1 (0.6%)	15 (19%)

benign tumors involving the deep lobe. Malignant lesions were treated with total parotidectomy, and part or all of the facial nerve was sacrificed if involved in tumor. In addition, radical neck dissection and, occasionally, hemimandibulectomy were employed for highly invasive carcinomas, malignant tumors with positive cervical lymph node involvement, and most invasive squamous cell carcinomas.

Twelve benign tumors were treated by local excision. A Warthin's tumor treated in this fashion recurred in one year, and a mixed tumor treated similarly recurred in 5 years. The occasional local excision performed in the outpatient clinic was usually a result of a pre-excision, mistaken diagnosis, such as sebaceous cyst, epidermoid cyst, or cervical lymphadenopathy.

Complications

Facial nerve injury, either transient or permanent, was the most common surgical complication (Table 4). This occurred in 17 patients with benign tumors, 13 of whom had full return of function from three to 12 months after operation. The facial nerve was intentionally sacrificed with radical parotidectomy in 11 patients with malignant tumors. Post-gustatory sweating in the preauricular area, or Frey syndrome,[36] was observed in three patients. All salivary fistulas closed spontaneously within several weeks of onset.

Histopathology

From a total of 250 parotid neoplasms, 173 were histologically benign and 77 were malignant. Benign mixed tumors accounted for 59% of all tumors. Malignant tumors were evenly distributed among malignant mixed, high and low grade mucoepidermoid, and squamous cell carcinomas. Table 5 compares the frequency of various histological types of parotid tumors in this study and in other series.

TABLE 2. *Delay in Diagnosis: 250 Cases*

Delay period	Benign	Malignant
6 mon	33 (19%)	32 (42%)
1 year	38 (22%)	15 (19%)
2 years	27 (16%)	7 (9%)
3 years	6 (3%)	1 (1%)
3–10 years	34 (20%)	7 (9%)
Over 10 years	24 (14%)	4 (5%)
Unknown	11 (6%)	11 (14%)

TABLE 3. *Treatment*

Treatment	Benign	Malignant
Subtotal parotidectomy	135 (78%)	18 (23%)
Total parotidectomy	19 (11%)	38 (49%)
Local excision	12 (7%)	9* (12%)
No operation	7 (4%)	12 (16%)

* Radon seed implant—2 patients.

Tumor Recurrence

One hundred and forty-six patients had benign mixed tumors. Of the one hundred and two patients followed for a minimum of 5 years, 6 had recurrent tumors for an overall 5 year recurrence rate of 6%. The remaining 44 patients with benign mixed tumors were lost to followup, died, or had their procedure within the last 5 years.

An additional 6 cases of benign mixed tumors recurred after 5 years and 3 recurred after 10 years. Four patients had a second recurrence.

Of 77 patients with malignant tumors, 12 had no surgical procedure, 5 died from other causes, 6 were found to have unresectable lesions, and 2 were lost to followup. Of the remaining 52 patients followed a minimum of 5 years, 26 developed a tumor recurrence, for a recurrence rate of 50% (Table 6).

Survival

No patient died as a result of a benign tumor. Of the 77 patients with malignant tumors, 5 died from unrelated causes, two were lost to followup, and one patient was not followed a minimum of 5 years. The overall 5-year survival was 48%. However, individual survival by tumor type was quite variable (Table 7).

TABLE 4. *Complications*

Complication	Benign		Malignant	
	Number	Per cent	Number	Per cent
Hematoma	4	2	4	6
Wound infection	7	4	5	7
Facial nerve injury*	17	10	15	23
Fistula	4	2	1	1
Seroma	1	1	1	1
Frey syndrome	3	2	0	0

* Transient and permanent.

There were two postoperative deaths: one from cardiac arrest secondary to hypoxia and one from myocardial infarction.

TABLE 5. *Histologic Type*

Histologic type	LSU-1973 (250 patients) per cent	Mayo-1969[37] (1360 patients) per cent	Memorial-1959[13] (1549 patients) per cent
Benign	69.0	83.2	65.8
Malignant	31.0	16.8	34.2
All benign			
Mixed	84.4	72.8	89.0
Warthin's	8.7	25.9	9.2
Others*	6.9	1.3	1.8
	100	100	100
All malignant			
Low grade mucoepidermoid	18.6	24.4	23.8
Adenoid cystic	8.3	12.3	6.4
Acinic cell	3.3	14.9	6.2
Malignant mixed	18.5	6.6	20.9
Adenocarcinoma	6.4	23.7	17.2
Squamous cell	16.7	9.8	7.2
Undifferentiated	13.5	4.8	—
High grade mucoepidermoid	12.7	2.6	12.5
Others†	2.0	0.9	5.8
	100	100	100

* Include oncocytoma and benign lymphoepithelial tumors.
† Unclassified malignant tumors, malignant melanoma, metastatic tumors.

TABLE 6. *Malignant Tumors: Recurrence—Five Years*

Type	Number of patients	Number of recurrences	Per cent recurrences
High grade mucoepidermoid	8	7	88
Squamous cell carcinoma	6	5	83
Undifferentiated	5	4	80
Acinic cell carcinoma	3	2	67
Malignant mixed	10	5	50
Cylindroma	6	1	17
Low grade mucoepidermoid	12	2	16
Adenocarcinoma	2	0	0
Total	52	26	50

Discussion

A clear understanding of the clinical presentation and natural history of parotid tumors is essential for their proper management. A mass in the preauricular or infra-auricular area should be regarded as a neoplasm until proven otherwise. A benign parotid tumor typically presents as a painless, mobile mass of long duration in contrast to the fixed, hard painless malignant tumor. Facial nerve palsy and clinically positive cervical lymph nodes are poor prognostic signs.[1,15]

No single feature or group of features leads to a clinical diagnosis of a specific tumor type.[2,24] Specific tumor types, such as cylindromas and highly invasive carcinomas, more commonly exhibit pain and facial nerve involvement, but there are reports of these features in benign tumors.[17,25]

Parotid tumors occur at any age.[3,6] The peak incidence is in the fifth, sixth, and seventh decades. The mean age for malignant lesions is 10 years greater than for benign lesions.

Several large series have reported a female preponderance of parotid neoplasms and an increased frequency of malignant tumors in males.[6] However, these data should be correlated with specific histological tumor types. For example, adenoid cystic carcinomas (cylindroma) occur predominately in men,[32] and Warthin's tumors are rare in Negroes.[9]

The average size of a parotid neoplasm, benign or malignant, is 2 to 4 cm. There is no established relationship between size and malignancy.[1,6]

Right and left-sided parotid tumors occur with equal frequency. Bilateral tumors are rare and occur most commonly with Warthin's tumors.[9]

The diagnosis of parotid tumors may be made clinically but must be corroborated histologically. Inflammatory lesions are usually distinguished from neoplams by history, physical examination, and occasionally by sialography.[10] Sialograms may distinguish intrinsic from extrinsic masses and whether a mass is located in the deep or superficial lobe. However, sialography is probably of limited diagnostic value.[13,19]

Preliminary needle or incisional biopsy is hazardous due to the possibility of tumor spillage, and the diagnostic yield may be low due to an inadequate tissue specimen for histologic examination.[13,28] The safest and most acceptable means of diagnosis is complete surgical excision with permanent histologic section. The reliability of frozen section diagnosis is dependent on the pathologist's individual skill and familiarity with these tumors. Preoperative biopsy of any potentially curable parotid neoplasm, benign or malignant, is contraindicated.[1,12,25,31,34]

The basic approach to a mass in the parotid region is operative.[8,23,26] Although most parotid tumors are benign (65–80%) and characteristically slow growing, one should not be lulled into a false sense of security. The

TABLE 7. *Malignant Tumors: Five Year Survival*

Type	Number of patients	Death due to tumor
Squamous cell carcinoma	12	10
High grade mucoepidermoid	10	9
Undifferentiated carcinoma	8	6
Malignant mixed	14	4
Low grade mucoepidermoid	12	3
Adenocarcinoma	4	2
Acinic cell carcinoma	3	2
Cylindroma	6	0
Total	69	36
Overall survival: 48%		

older concept of watchful waiting is unwarranted.[12] Many malignant tumors have been diagnosed mistakenly as benign on clinical grounds. There is sound clinical evidence to suggest that benign mixed tumors have the potential for malignant transformation.[4,14] Four patients in this series with malignant tumors (two undifferentiated carcinomas, one adenocarcinoma, and one high grade mucoepidermoid carcinoma) gave a history of a slow growing mass for greater than 10 years with a sudden onset of enlargement.

Prior to 15 years ago local excision or enucleation was acceptable surgical treatment for benign parotid tumors. Recurrence rates were exceedingly high. Kirklin reported a 32% recurrence in his review of the Mayo Clinic experience from 1907–1944.[24] In 1960, Beahrs et al. reported a 10-year recurrence of 10% for benign tumors locally excised or enucleated and no recurrence in 47 patients who underwent subtotal parotidectomy.[6] Despite a recent report[16] of low recurrence rate with local excision, most authors find this approach unacceptable. Of all benign parotid tumors, 80–90% are localized to the superficial lobe. Superficial, or subtotal parotidectomy, is the preferred treatment for these lesions.

Approximately 12 to 25% of parotid tumors originate in the deep lobe.[12,28] Hanna reported 35 patients with deep lobe tumors, 26 of which were benign and treated by total parotidectomy with facial nerve preservation in most cases.[20]

Recurrent benign mixed tumors commonly consist of multiple nodules throughout the gland parenchyma.[27] The remaining gland is usually distorted by extensive fibrosis involving the facial nerve. Total parotidectomy, including sacrifice of the facial nerve, is usually required for complete extirpation.[12,28]

The surgical treatment for malignant parotid tumors varies with tumor type and degree of malignancy. Low grade malignant tumors, such as adenoid cystic and low grade mucoepidermoid, localized to the superficial lobe and not involving the facial nerve are adequately treated with superficial lobectomy. The treatment for the uncommon low grade malignancy localized in the deep lobe is controversial. Beahrs advocates total parotidectomy with preservation of the nerve when there is normal gland between tumor and nerve.[7] Peacock and others contend that total parotidectomy with nerve preservation amounts to a "piecemeal" or fragmentary dissection of the deep lobe which violates principles of en bloc cancer surgery.[13,28] They advocate radical parotidectomy.

For patients with high grade malignant tumors, such as squamous cell carcinomas, undifferentiated carcinoma and high grade mucoepidermoid carcinoma, radical parotidectomy is the treatment of choice. Surgical extirpation of any tumor that totally or partially involves the facial nerve should include resection of all or the involved portion of nerve.[34]

Acinic cell carcinoma has been regarded as a low grade malignancy. However, in this series two of the three patients were dead from tumor within 5 years of diagnosis. Included was an unusual bilateral acinic cell carcinoma in a 32-year-old woman who was dead from tumor 8 months after diagnosis. Grage, Lober and Arhelger reported a high rate of late recurrence and poor long-term survival.[18] Beahrs describes this tumor as multicentric and recommends total parotidectomy.[7]

Histologically positive cervical lymph nodes are an absolute indication for radical neck dissection for the treatment of malignant parotid tumors. The place of prophylactic neck dissection for high grade malignancies is controversial. Perzik and Fisher report a 50% incidence of cervical node metastasis in clinically negative cases.[29] However, Hollander found no difference in tumor recurrence rates between patients who underwent radical neck dissection with histologically positive nodes and those with negative nodes.

Radiation therapy should be used in conjunction with operation and usually is palliative. Evans reported a considerable response to radiation of high grade mucoepidermoid and pure squamous cell carcinomas.[11] Cylindromas may be highly radiosensitive, but the response is usually temporary. In these cases radiotherapy is most often reserved for patients with unresectable recurrent disease.[32]

Chemotherapy has not been effective in the treatment of malignant parotid tumors.[31] Richards and Chambers have shown hydroxyurea to be beneficial in a limited number of cases as a sensitizer for radiotherapy.[30]

Prior to any surgical procedure involving the parotid gland the patient should be forewarned of possible facial nerve injury or sacrifice. Fortunately, postoperative facial nerve palsy is most often transient.[21]

Long term followup is essential for evaluation of therapeutic results with parotid tumors. Most benign tumors and some malignant types (acinic cell and cylindroma) are characteristically slow growing and may recur late. Ten to 20 year followup is needed, but seldom feasible.

Recurrence rates for benign parotid tumors should be minimal if the proper diagnostic approach and surgical techniques are employed.[5]

The outlook for low grade malignant parotid tumors is good if they are treated early, when the 5-year survival may be 70–100%. However, high grade malignancies continue to have a poor prognosis with a 0–50% 5-year survival, despite an aggressive surgical approach and adjunctive measures.

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Discussion

Dr. Erle Ewart Peacock, Jr. (Tucson, Arizona): An epidemiological survey such as this is important for many lesions, for several reasons. The superb one you have just heard is certainly important for at least two reasons: to look at the epidemiology of the disease, or the tumor, and see if it's changing as the years go by; and I think the authors would agree that it apparently it not, that the things that they have turned up in their series are pretty typical for this tumor, as contrasted with past surveys of this same type.

Another very important reason is that this paper does point out some of the important surgical principles that somehow seem to get lost in about the two decades that occur between studies of this type. I don't know how, but such things as needle biopsy, radiation, lobe excision, and the concept of a benign tumor turning into a malignant one, seem to get into the literature through the years. This has happened in the last decade. And I would like to reemphasize the points they made.

(Slide) Needle biopsy is right in front of you. The top is epithelium, and the bottom is tumor spread right through the needle track. I excised a number of these to prove this, and there's no question—it's one of the most easily seeded tumors in the human body; and if that wasn't bad enough, you have only a 50% chance of hitting the right sort of thing. They are mixed tumors, and you may only get a little fluid, or a little cartilage, while carcinoma lurks by.

(Slide) The concept that there are two lobes, like the bread in a sandwich, with the meat being the facial nerve, has no relation to the problem the surgeon faces. To be told that the parotid gland is like a sandwich, with meat in between it, as is drawn here, has little relation to what the surgeon faces in the highly vascular, distorted bed of a parotid tumor. If that tumor is in the deep lobe, as I have shown here, the superficial lobe will be compressed and surrounded, with the nerve flatened on top of it, or if it's in the superficial lobe, it will do the opposite.

The concept that one can do a lobectomy in a distorted field like this, in my jugment, is responsible for leading the surgeon into the nerve, or into the tumor. The concept of simultaneous nerve-tumor dissection is one which I believe we cannot emphasize too strongly, and should emphasize as part of an epidemiological survey such as the one we just heard.

(Slide) Finally, this concept of "Does a benign tumor in this area ever become a malignant one?" is one which Dr. Ackerman and the later Dr. Beyers of this Association and I studied 20 years ago, and concluded that if it ever occurs at all, it is in less than 5% of tumors.

If that is true, and I think the evidence strongly suggests that it is, both in the survey you just heard and in ours, then I think very