Incidental Parotid Neoplasms: Pathology and Prevalence

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Abstract

Objective. To better characterize parotid masses incidentally identified on imaging.

Study Design. Case series with chart review.

Setting. Academic medical center.

Subjects and Methods. Medical records were reviewed for 771 patients who underwent parotidectomy at the University of Wisconsin from 1994 to 2013. Patients were stratified into 2 groups: those with tumors identified solely on imaging (parotid incidentalomas [PIs]) and those with palpable masses, pain, facial nerve dysfunction, or other reasons their mass was identified (nonincidental [NIs]). A \(^2\) test was employed to compare the prevalence of malignancy in PIs compared with NIs. Trend analysis was performed to determine the prevalence of PIs over the 20-year period.

Results. Of the 771 patients, 67 (8.7%) had their mass discovered incidentally on imaging (PIs). There was a significant difference in the rate of malignancy in the NI (32.7%) compared with the PI group (6.0%) (\(P < .01\)). During the 1994 to 2003 time period, 4.0% of all parotidectomies performed were for PIs, while during the second decade (2004-2013), this proportion increased to 10.2%. This represents a 155.0% increase in the percentage of parotidectomies carried out for PIs between these 2 periods.

Conclusion. In this study, the rate of malignancy in PIs was significantly lower than the rate of malignancy in patients with NIs. The occurrence of PIs has increased over time and now represents greater than 10.0% of all parotidectomies performed at the University of Wisconsin. This information is important to consider when consenting a patient for resection of a PI.

Keywords
incidental, parotid, neoplasm, malignancy

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Salivary gland masses account for 2% to 5% of all head and neck tumors,\(^1\)\(^5\) and parotid masses comprise the majority (70%-85%) of salivary gland tumors.\(^6\)\(^9\) The rate of malignancy for parotid neoplasms is described as 15% to 25%.\(^2\)\(^6\)\(^10\) However, these estimates do not take into consideration the manner in which the parotid neoplasm was identified.

Incidentalomas are defined as lesions that are incidentally found on imaging,\(^11\) and they have become increasingly common due to the increased utilization of imaging. For example, the prevalence of incidental thyroid nodules on ultrasonography is 67%.\(^12\) In addition, most smokers older than 50 years in the United States have small lung nodules on chest computed tomography (CT).\(^13\) In a study by Al-Hakami et al.,\(^14\) of 38 total head and neck incidentalomas discovered on imaging, 3 (7.9%) were in the parotid gland. Our literature review found little information related to parotid incidentalomas (PIs) with the exception of FDG-avid incidentalomas on a positron emission tomography (PET) scan.\(^15\)\(^17\)

Our objective was to better characterize and describe patients who had undergone parotidectomy for a PI. We performed a retrospective chart review of all patients who underwent parotidectomy at the University of Wisconsin (UW) between 1994 and 2013. We separated all patients into 2 groups: one group consisted of patients whose parotid masses were identified solely on imaging (PIs), while the other group contained patients whose masses were identified for any other reason such as a palpable mass, pain, skin erythema, facial nerve dysfunction, and more (nonincidental [NIs]). We evaluated the rate of malignancy in individuals with PIs and compared this to patients who underwent parotidectomy for NIs. Finally, we evaluated trends in the rates of incidentalomas at our institution over time.
Materials and Methods

Review of Electronic Medical Records

We obtained institutional review board (IRB) approval to analyze the medical records of all patients who underwent parotidectomy at the UW between 1994 and 2013. A careful chart review was performed to collect information related to the manner in which each patient’s parotid neoplasm was discovered as well as his or her final pathological diagnosis (ie, benign vs malignant). We separated all patients into 2 groups. The first group consisted of patients who underwent parotidectomy after their mass was found solely due to imaging carried out for an unrelated indication (PI group). The second group comprised all other patients whose masses were identified due to pain, facial nerve dysfunction, palpable mass, and so on (NI group).

Statistical Analysis

The goal of the statistical analysis in this work was to compare rates of malignancy in the PI and NI cohorts. First, the PI and NI groups were divided into 2 subgroups based on the final pathological diagnosis for each patient (benign vs malignant disease). Then, a 2 × 2 table was constructed, and a $\chi^2$ test was employed to compare the rate of malignancy in the PI vs NI groups. This statistical work was performed using SPSS software (version 22; SPSS, Inc, an IBM Company, Chicago, Illinois), and a $P$ value less than .05 was considered statistically significant.

A trend analysis was performed to compare the prevalence of PIs over time. The 20-year period of this study was divided into 2 separate decades: 1994 to 2003 and 2004 to 2013. The number of patients who underwent parotidectomy to remove a PI was compared between these two 2 periods. In addition, the total number of parotidectomies performed during both time frames was evaluated to calculate the overall proportion of parotidectomies performed for PIs within each decade.

Results

Electronic Medical Record Review and Patient Selection

Between 1994 and 2013, a total of 771 patients underwent parotidectomy at the UW. Sixty-seven patients (8.7%) had their mass discovered incidentally on imaging and comprised the PI group for this analysis. Radiographically, 34.3% were found on CT (23/67), 56.7% on magnetic resonance imaging (MRI) (38/67), and 8.9% on PET/CT (6/67). The overall malignancy rate was 6.0% (4/67) for the PI group. This included 2 mucoepidermoid carcinomas and 1 each of lymphoma and acinic cell carcinoma. Overall, most of the PI tumors were benign (n = 63, 94.0%), which were most commonly pleomorphic adenoma (n = 31, 46.3%) and Warthin’s tumor (n = 16, 23.9%).

All other patients (n = 704) comprised the NI group, and the rate of malignancy in this group was 32.7% (230/704). There was a statistically significant difference when comparing the rates of malignancy between the NI and PI groups ($P < .01$).

Trend Estimation of PIs

The rate of change of PIs was evaluated over the 20-year period of this study by comparing the first decade (1994-2003) with the second one (2004-2013). There were 250 parotidectomies performed between 1994 and 2003, and this included 10 patients with PIs that were managed operatively. During the 2004 to 2013 time frame, 521 parotidectomies were carried out, which included 53 patients who underwent parotidectomy for a PI. Of all parotidectomies performed, 4.0% were for PIs in the first decade and 10.2% were for PIs in the second decade. This represents a 155.0% increase in the proportion of parotidectomies carried out for PIs between these 2 periods.

Discussion

We evaluated all patients who underwent parotidectomy at the UW for the past 20 years to examine the rate of malignancy in patients with PIs as well as to evaluate for any changes in the proportion of patients who had parotidectomy for a PI over time. Our pathologic results for the PI group were consistent with other published reports demonstrating that pleomorphic adenoma and Warthin’s tumor comprised the most common benign tumors, and mucoepidermoid carcinoma was the most common malignant neoplasm.

The overall rate of malignancy for the entire group of 771 patients who underwent parotidectomy was 30.4%. This number is on the high side of typically quoted rates of malignancy for parotid masses, and we suspect this is related to the fact that our institution is a tertiary care facility and includes a subset of patients with symptoms, specifically facial paralysis and pain, known signs suspicious for malignancy. More important, the rate of malignancy in the PI group was only 6.0%, which by definition included no patients with any clinical signs or symptoms of disease. This population has a much lower rate of malignancy than commonly quoted values of 15% to 25%. When we compared the rates of malignancy in the PI vs NI groups, there was a statistically significant lower rate of malignancy ($P < .01$). This suggests that malignancy rates for individuals with a mass found incidentally on imaging are significantly lower than the usually quoted rates. As we balance the risks of parotidectomy with the likelihood of malignancy, it will be important to counsel patients appropriately who initially presented to the clinic with a PI.

We also identified a dramatic increase in the prevalence of PIs over time, with a 155.0% increase over the 20-year study period. Parotid incidentalomas now account for 10.2% of all parotidectomies performed at our institution. The most common imaging modalities that identified PIs initially were MRI and CT. Previous studies have shown that some benign parotid tumors, including Warthin’s tumor and oncocytoma, may show FDG-avid uptake on PET imaging. This is consistent with our results as 5 of 6 incidentalomas found on PET imaging were Warthin’s tumor.

In this study, only 6 PIs were identified on PET imaging, and none were malignant. A large meta-analysis and 2
retrospective review articles examined parotid PET/CT incidentalomas and found that malignancy rates ranged from 19% to 33.3%.15-17 We did not find any malignant tumors on PET imaging; however, tumors described on PET imaging accounted for only 8.9% of all incidentalomas in our group. It is plausible that PET-identified PIs will increase in the future as this imaging modality sees greater utilization. Malignancy rate using PET imaging may be higher based on these studies than other imaging modalities.

We recognize there are several important limitations to this work. First, this work was carried out retrospectively, and all patient data related to pathology and other clinical features were retrieved from available electronic medical records. In addition, our IRB approval only allowed us to evaluate the medical records of patients who underwent parotidectomy. This means all patients who underwent other forms of treatment or observation for PIs were excluded. Finally, our study was limited by our status as a large academic tertiary referral center. Our patient population may not perfectly mirror that seen in the general population.

Conclusions
This work describes characteristics of patients with incidentally identified parotid masses who underwent parotidectomy. The most important finding is that the incidental (PI) group had a significantly lower rate of malignancy compared with the nonincidental (NI) cohort. It is important to note that while we did not identify any malignant tumors on PET imaging, previous studies have demonstrated that this subgroup of parotid incidentalomas may have a higher risk of malignancy compared with CT and MRI incidentalomas presented here. As the percentage of persons with incidentally identified parotid tumors increases, understanding the relative risk of malignancy in this group will become an important component of informed decision making and patient consent.

Author Contributions
Christopher J. Britt, data analysis, drafting, final approval, accountability for all aspects of the work; Andrew P. Stein, data analysis, final approval, accountability for all aspects of the work; Priyesh N. Patel, data analysis, drafting, final approval, accountability for all aspects of the work; Paul M. Harari, data analysis, drafting and revising the work critically for important intellectual content, final approval, accountability for all aspects of the work; Gregory K. Hartig, data analysis, drafting and revising the work critically for important intellectual content, final approval, accountability for all aspects of the work.

Disclosures
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