Routine Evaluation of Adult Tonsillectomy Specimens: Toward Establishing a New Standard of Care

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Abstract

Tonsil excision is a common surgery for both children and adults. Prior studies have consistently shown that the rate of malignancy in tonsil specimens is low and that the possibility of true, occult malignancy is remote. Practice trends accept triage of pediatric tonsillectomies for exemption or gross exam only. However, for adults, despite a low malignancy rate, routine histological evaluation of tonsillectomy specimens is standard of care at most health care facilities. The authors performed a retrospective review of all tonsil specimens received in their department over 45 months with categorization of pathological diagnosis and surgical indication. Of 1746 adult tonsillectomy specimens removed during this time, there were no incidental/occult malignancies. These data indicate that gross examination of adult tonsillectomy specimens excised for chronic tonsillitis or sleep apnea is sound practice, and this, taken together with other published data, provides a basis for consensus-derived practice guidelines.

Keywords

tonsil, triage, adult, malignancy

Background

Palatine (fauces) tonsil excision is a common surgical procedure. In 2006, according to the National Center for Health Statistics of the Centers for Disease Control,1 there were 737,000 tonsillectomy procedures performed. More than half of these (530,000) were in children younger than 15 years old. Tonsillectomy is primarily performed in children secondary to recurrent infections and sleep apnea. In adults, the majority of excisions are secondary to recurrent infection, apnea, or upper-airway obstruction caused by tonsillar hypertrophy and tonsil lithiasis. Rarely, tonsils are excised because of suspected neoplasm. The most common primary neoplasms of the palatine tonsil are squamous cell carcinoma and lymphoma,2 although there are case reports of other primary neoplasms and metastases.3,9

The necessity of routine processing of all tonsil specimens from the pediatric population has been addressed by prior publications,10-15 mainly in the head and neck surgical literature. These articles conclude that elimination of routine histological examination of all pediatric tonsil specimens poses a minimal risk for missing clinically significant pathology and that histological examination should be based on specific criteria such as preoperative risk factors and specimen asymmetry. At our institution, current triage of tonsillectomy specimens from patients <18 years old involves gross examination by a pathologist with histological sections put through only if there is an abnormal gross finding or a preoperative or perioperative clinical suspicion for malignancy. All tonsillectomy specimens from adult patients (≥18 years old) are subjected to a routine histological evaluation.

Articles addressing the incidence of malignancy and the processing of tonsil specimens from the adult population have appeared in the head and neck surgical literature since 1939.16 These articles have shown consistently that the rate of malignancy in tonsil specimens is small and that true occult malignancy (in patients without suspicious preoperative or perioperative findings) is rare.17 Despite this body of evidence, to our knowledge, histological examination of all adult tonsillectomy specimens is considered standard practice. In the
pathology literature, practice guidelines are largely based on survey data from the College of American Pathologists.\textsuperscript{18,19}

In this study, we categorize the pathological diagnosis and clinical indication for surgery for all tonsil specimens processed in our department over 45 consecutive months. We aim to add data to the growing body of literature regarding the rate of occult malignancy in tonsillectomy specimens and to provide a context for discussion of the rational triaging of adult tonsillectomy specimens.

Materials and Methods

This retrospective study was approved by our internal review board (2009P002643). We reviewed all tonsil specimens received in our department from June 24, 2004, to March 21, 2008, excluding outside consult cases. Our electronic medical record and pathology database were used to obtain pathological diagnoses and clinical information.

The clinical indication for surgery, operative findings, final pathological diagnosis, frozen section pathological diagnosis, and flow cytometry results were categorized according to defined criteria. Each specimen in an accessioned case was individually evaluated. Suspicion for malignancy was based on the presence of one or more of the following: history of an oropharyngeal malignancy, a positive lymph node within the head and neck, positive positron emission tomography (PET) scan within the tonsillar region, constitutional symptoms such as diffuse lymphadenopathy, and prior tonsillar biopsy that revealed malignancy. Statistical analysis for confidence intervals (CIs) was performed.\textsuperscript{20,21}

Results

Over 45 months, from June 24, 2004, to March 21, 2008, our pathology department accessioned 1651 tonsil cases. The average patient age was 25.4 years (range 1.2-88.8 years), and 66\% of these cases were from patients \( \geq 18 \) years. The cases consisted of 94 unilateral tonsillectomy specimens, 1390 bilateral tonsillectomy specimens, 148 single biopsy specimens, and 26 cases with 2 or more biopsy specimens, for a total of 3080 specimens. After excluding pediatric patients (<18 years), the average age was 34.2 years (range 18-88.8 years). Among the adult patients, there were 601 women, 492 men, and 2 patients whose gender was not known.

The clinical indications for surgery (Table 1) included tonsillitis (60\%), sleep apnea (15\%), suspicion for malignancy (9\%), no clinical history provided (9\%), tonsillar mass (4\%), and tonsillar asymmetry (3\%). Among pediatric patients, there were more cases with a benign clinical indication (tonsillitis or sleep apnea) than among adult patients (86\% vs 70\%), and consequently, there were fewer cases with a suspicious clinical indication (malignancy, mass, or asymmetry) among pediatric patients than among adult patients (5.4\% vs 21\%). After excluding 643 cases for which no operative report was available, operative findings (Table 2) included no clinically significant finding (41\%), tonsillar hypertrophy (40\%), tonsillar asymmetry (9\%), tonsillar mass (8\%), and tonsillar ulceration (2\%). Adult patients were more likely than pediatric patients to have an operative finding of mass (12\% vs 1\%) or ulceration (3\% vs 0.3\%).
The classification of the final pathology diagnoses for adult patients is listed in Table 3. For all adult patients, 8 specimens (0.4%) were gross-only specimens. Of the 1997 specimens with a full histological examination, 1903 (95%) had a benign diagnosis, 87 (4%) had a malignant diagnosis (squamous cell carcinoma, lymphoproliferative disorder, or other malignancy), and 7 (0.4%) had a diagnosis of dysplasia/atypia. A lymphoproliferative disorder was diagnosed in 11 specimens (0.6%; Table 4), squamous cell carcinoma was diagnosed in 75 specimens (3.8%), and a low-grade

<table>
<thead>
<tr>
<th>Final Histopathological Diagnosis</th>
<th>Total Specimens, No. (%)</th>
<th>Biopsy Specimens</th>
<th>Excisional Specimens</th>
<th>Total</th>
<th>Unilateral</th>
<th>Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign</td>
<td>1758 (88)</td>
<td>41</td>
<td>1717</td>
<td>35</td>
<td>1682</td>
<td></td>
</tr>
<tr>
<td>Gross diagnosis only</td>
<td>8 (0.4)</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>No evidence of malignancy/Benin</td>
<td>145 (7)</td>
<td>84</td>
<td>61</td>
<td>9</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>tonsillar tissue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>75 (4)</td>
<td>63</td>
<td>12</td>
<td>10</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Lymphoproliferative Disorder</td>
<td>11 (0.5)</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Squamous mucosa w/dysplasia/atypia</td>
<td>7 (0.4)</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Malignancy (other)</td>
<td>1 (0.04)</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>2005</td>
<td>200</td>
<td>1805</td>
<td>59</td>
<td>1746</td>
<td></td>
</tr>
</tbody>
</table>

Each tonsil was counted as 1 specimen.

Benign diagnoses included follicular lymphoid hyperplasia, tonsillitis, reactive lymphoid hyperplasia, and squamous papilloma.

| Table 4. Cases With a Diagnosis of a Tonsillar Lymphoproliferative Disorder |
|-----------------|-----------------|------------------|----------------------|
| Case No. | Gender | Age (years) | Specimen | Clinical Indication | Final Histopathological Diagnosis | Flow Cytometry Result |
| 1      | M      | 63         | One biopsy | Tonsillar mass      | B cell lymphoma most consistent with marginal zone B cell lymphoma | Consistent with a diagnosis of B cell lymphoma |
| 2      | M      | 54         | One biopsy | Tonsillar mass (polypoid lesion) | Plasmacytoma | Not performed |
| 3      | M      | 40         | Unilateral excision | Asymmetrical tonsillar hypertrophy | Atypical lymphoid infiltrate with expression of some B cell antigens and α heavy chain, highly suspicious for B cell lymphoma | No evidence for a monoclonal B or unusual T cell population |
| 4      | M      | 41         | Unilateral excision | Hypertrophied right tonsil, history of atypical lymphoid infiltrate in left tonsil | Highly atypical lymphoplasmacytic proliferation with expression of α heavy chain | No evidence for a monoclonal B or unusual T cell population |
| 5      | M      | 20         | Two biopsies | Massively enlarged right tonsil | EBV+ High-grade B cell lymphoma, favor Burkitt lymphoma | No evidence for a monoclonal B or unusual T cell population |
| 6      | M      | 62         | Unilateral excision | Right neck mass showed high-grade lymphoma on FNA, and has right tonsillar mass | Diffuse large B cell lymphoma | Consistent with a diagnosis of B cell lymphoma |
| 7      | M      | 72         | One biopsy | Oropharyngeal and hypopharyngeal mass | Diffuse large B cell lymphoma | Insufficient cells for analysis |
| 8      | F      | 42         | Bilateral excision | Diffuse lymphadenopathy and enlarged tonsils | Follicular lymphoma | Consistent with follicular lymphoma |
| 9      | M      | 71         | One biopsy | Right tonsillar mass and history of MALT lymphoma | Lymphocytic infiltrate with amyloid deposition and λ light chain restriction consistent with extranodal marginal zone B-cell lymphoma (MALT lymphoma) | Consistent with a diagnosis of B-cell lymphoma |

Abbreviations: EBV, Epstein Barr virus; FNA, fine needle aspiration.
mucoepidermoid carcinoma was diagnosed in 1 specimen (0.05%). For all specimens with a diagnosis of squamous cell carcinoma, the clinical indication for surgery was mass or suspicion for malignancy. For all specimens with a diagnosis of a lymphoproliferative disorder, the clinical indication for surgery was mass, asymmetric hypertrophy, or suspicion for malignancy. The mucoepidermoid carcinoma was suspected based on a prior biopsy.

There were 1746 specimens from bilateral excisions in adults. The majority (1738) of these had a histological examination. In the specimens with available clinical history, the clinical indication was benign (tonsillitis or sleep apnea) in 731 (95%); 20 (2.6%) were removed for a suspicion of malignancy, 3 (0.4%) were removed for a mass, and 15 (2%) were removed for asymmetry. Of those examined by histology, 1734 (99.8%) had a benign histopathological diagnosis. Two (0.12%) had a diagnosis of squamous cell carcinoma; for both these specimens, the clinical indication for surgery was a suspicion for malignancy. The mucoepidermoid carcinoma was suspected based on a prior biopsy.

A portion of the tonsil from 88 (2.9%) of the specimens (adult and pediatric) was sent for flow cytometry analysis with the clinical aim of ruling out lymphoma (Table 5). The majority (85% of specimens sent for flow cytometry) were benign (no evidence for a monoclonal B or unusual T cell population). Five (6% of specimens sent for flow cytometry) were consistent with a B-cell lymphoma; none of these diagnoses was unexpected. The remaining 8 cases (9% of specimens sent for flow cytometry) had a diagnosis of insufficient material for analysis. A portion of the tonsil was sent for intraoperative frozen-section analysis in 344 (11%) of the cases (Table 5). A benign/reactive intraoperative diagnosis was rendered in the majority of cases (71%). A malignant diagnosis was rendered in 17% of the cases, a diagnosis was deferred to permanence/results of a lymphoma workup in 10% of the cases, and a diagnosis of probable lymphoma was rendered in 1% of the cases.

In the evaluation of cases from all patients (adult and pediatric), of the 821 cases with a benign indication (tonsillitis or sleep apnea) and histological examination, no case with a benign indication had a malignant final pathological diagnosis (0%, 95% CI = 0%-0.4%; Table 6). Of the 261 cases with a
suspicious indication (mass, asymmetry, or suspicion for malignancy) and histological examination, 70.5% (95% CI = 62%-79%) had a benign final pathological diagnosis. The remainder had a malignant final pathological diagnosis, including squamous cell carcinoma (25%; 95% CI = 22%-28%), lymphoma (4%; 95% CI = 3.8%-4.7%), and mucocutaneous carcinoma (0.4%; 95% CI = 0.32%-0.44%).

Discussion

Practice trends accept triage of pediatric tonsillectomies for exemption or gross exam only with histological sections put through in the case of an abnormal gross finding or a preoperative or perioperative clinical suspicion for malignancy. However, despite the low malignancy rate, routine histological evaluation of tonsillectomy specimens for all patients ≥18 years is standard of care at most health care facilities. This standard of care is based largely on survey-derived data rather than outcomes-based research. To renew the discussion of adult tonsillectomy triaging, we performed a retrospective review of all tonsil specimens received in our department over 45 months with categorization of pathological diagnosis and surgical indication.

The clinical indications for tonsillar surgery in our study were similar to those previously published. In a study of tonsillectomy specimens from adult patients, the indications for surgery included chronic infection (57%), upper-airway obstruction secondary to tonsillar hypertrophy (27%), and suspected neoplasm (16%). Similarly, among our tonsil excision and biopsy specimens from adult patients, the indications for surgery were tonsillitis (59%), sleep apnea (11%), and suspicion for malignancy (13%). In the same study, pathological findings in those who underwent surgery for suspected neoplasm included benign lymphoid tissue (50% of cases of suspected neoplasm), squamous cell carcinoma (41%), and B cell lymphoma (9%). Again, our findings were similar, with a benign diagnosis in 70.5% of the cases with a suspicious clinical indication for surgery, a diagnosis of squamous cell carcinoma in 25%, and a diagnosis of lymphoma in 4%. These similarities suggest that our patient population is similar to that of other academic institutions, and this supports the generalization of our findings.

The literature regarding tonsillectomy specimen pathological diagnoses is extensively reviewed in an article by Randall et al. The authors reviewed 20 articles, 2 published in the pathology literature and the remaining 18 published in head and neck journals. In the 20 articles reviewed, there were a total of 54,901 patients who underwent tonsillectomy, adenoidectomy, or both. Among these cases, 54 malignancies were identified (0.087% prevalence). The authors excluded procedures done for biopsy resulting from a suspicion of malignancy. The majority (48, 88%) of the cases diagnosed with malignancies had suspicious features, such as tonsillar asymmetry, cervical lymphadenopathy, or abnormal preoperative tonsil appearance; therefore, a better representation of the true occult malignancy rate was 0.011%.

In the articles reviewed, the cases included were not standardized. Some of the articles included both adult and pediatric patients, some included adenoid specimens as well as tonsil specimens, and some were restricted to specific patient populations (such as patients with asymmetric tonsils). Despite these differences, the articles all consistently reported a low occult malignancy rate.

Recent articles in the international head and neck literature have reviewed the pathological diagnoses of tonsillectomy specimens. In a prospective study from Iran, of 5058 tonsil and adenoidectomy specimens, there was 1 case of unexpected malignancy (a malignant lymphoma)—an occult malignancy rate of 0.02%. In a series from Greece, among 1027 patients, 21 cases with malignancy were identified (2.04%). None of the malignant diagnoses was unexpected (occult malignancy rate of 0%); in each case, there was at least 1 positive risk factor (tonsillar asymmetry, visible lesion, palpable firmness, cervical adenopathy, history of malignancy, or systemic symptoms) in the preoperative history.

In our series of 1997 specimens from adult patients with a full histological examination, including biopsy specimens, the malignancy rate was 4%. None of the malignant diagnoses was unexpected; therefore, our occult malignancy rate was 0%. When our analysis was restricted to adult bilateral tonsillectomy specimens, the malignancy rate was 0.2%. Again, none of the malignant diagnoses was unexpected. In a similar study performed at our institution in 1999, in 1280 tonsillectomies from patients 18 years or older performed for benign clinical indications, no malignancies were identified. Therefore, our data are consistent both with a prior study from our own institution and with data from a number of national and international studies.

When the 1280 cases from the 1999 study are combined with our 731 cases of adult bilateral tonsil excision specimens removed for benign indications, the total number of adult tonsillectomy cases studied from our institution is 2011, none of which had a malignancy. Therefore, the occult malignancy rate for this subset of tonsil specimens at our institution is 0%, with a 95% CI of 0% to 0.15%. Stated another way, an estimate of the true occult malignancy rate in adult bilateral tonsillectomy excision specimens at our institution is between 0 and 1.5 in 1000.

The scope of written guidelines regarding surgical pathology specimen gross-only examinations was evaluated in 1999 in a study by Zarbo and Nakhleh. Of the institutions surveyed in the study, 43% submitted tonsils and adenoids from a pediatric population for gross examination only. A much smaller percentage (5.6%) deemed tonsils and adenoids in patients of any age suitable for gross examination only, and
2.9% deemed tonsils and adenoids in patients of any age exempt from submission. These numbers highlight the differences in tonsil processing between adult and pediatric populations despite their similarly low occult malignancy rates. Although one may speculate that an adult population is significantly more likely to harbor an occult malignancy, based on our data and data from other series, this does not appear to be the case. However, especially in the United States, without tort reform, pathologists are reluctant to change practice, despite these substantial and increasing outcomes data.

In the current health care practice environment, safe, cost-effective strategies are increasingly important. A cost–benefit analysis of tonsillectomy specimens performed by Netser et al23 at the end of the last century concluded that it is relatively expensive to affect patient care by examining routine tonsillectomy and adenoidectomy specimens and relatively inexpensive to affect patient care by examining nonroutine tonsillectomy and adenoidectomy specimens. Because of inconsistencies in reimbursement, the cost difference between a histological evaluation of a tonsillectomy specimen and a gross-only evaluation is difficult to determine and is not as simple as the charge difference. However, resource-conscious strategies (decreased use of specimen processing infrastructure and professional staff time) should result in decreased net health care expenditure.

For tonsillectomy specimens, an outcomes-based approach would require a large, retrospective study to include all patients with unknown head and neck cancers who had previously undergone tonsillectomy for a benign indication. Lacking this, current practice needs to be informed by what has been published in the literature for known tonsillectomy indications and outcomes, with resultant consensus-derived practice rather than survey-based practice alone. Consensus guidelines can then be used by the medical staff at an individual institution to develop hospital policy regarding an appropriate triaging strategy, as suggested by the College of American Pathologists.18

Data from our institution support the findings in the literature of a low malignancy rate in tonsil specimens from both the pediatric and adult populations and an occult malignancy rate of zero in bilateral tonsillectomy specimens from the adult population. Our data indicate that gross examination of adult tonsillectomy specimens excised for chronic tonsillitis or sleep apnea is sound practice, and taken together with other published data, this provides a basis for consensus-derived practice guidelines.

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