How Well Do We Communicate?

A Comparison of Intraoperative Diagnoses Listed in Pathology Reports and Operative Notes

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ABSTRACT

Objectives: To compare surgeons’ interpretations of intraoperative diagnoses with those rendered by the pathologist.

Methods: Consecutive intraoperative diagnoses over a nine-month period were retrospectively reviewed. For each case, operative notes were obtained from the hospital information system. The intraoperative diagnoses listed in the final pathology reports were compared with those dictated by the surgeon. Discrepancies were stratified by potential clinical impact: category A, overall correct diagnosis with minor unimportant differences; category B, discrepant diagnosis with both either benign or malignant; and category C, intraoperative diagnoses differing between benign and malignant. The method of communication of each discrepant intraoperative diagnoses (in person vs telephone) was also examined.

Results: There was no record of the intraoperative diagnoses in 20% of operative notes. Comparison of intraoperative diagnoses was possible in 1,131 cases. Category A errors were noted in 94 (8.3%) cases, B in 11 (1%), and C in 4 (0.3%). The most frequent means of communication in A and B cases was the telephone, with more C cases being relayed in person.

Conclusions: A subset of verbally reported intraoperative diagnoses is misinterpreted by surgeons. While rare events, miscommunication can lead to inappropriate intraoperative management. Communicating diagnoses by phone may increase the risk of perception errors.

While precision and reproducibility in anatomic pathology are key, accurate communication is just as important. Indeed, a pathologist’s most impressive feat of diagnostic legerdemain is for naught if the receiving individual misinterprets the information.

Prior work has highlighted that communication gaps exist between pathologists and their clinical colleagues, which sometimes may involve key diagnostic information.1 In most instances, the ultimate impact of a clinician’s immediate misinterpretation of anatomic pathology data is minimal. There is opportunity (interdisciplinary conferences, personal or telephone conversations, or follow-up patient encounters) to resolve any unclear or ambiguous items encountered in a pathology report and to ensure accurate conveyance of data. Furthermore, an electronic or paper copy of the pathologist’s diagnosis is available for a surgeon’s repeated review.

Diagnoses made at the time of surgery, however, are acted on immediately and often highly dependent on verbal interactions. As such, there is no time when the fidelity of communication is more critical, and potentially problematic, than in the intraoperative setting.2,4

Many studies have concentrated on improving the quality of intraoperative diagnoses through minimizing preanalytic and analytic issues (such as processing artifacts and diagnostic accuracy/precision). Less attention has been paid to postanalytic factors—namely, clarity of pathologists’ verbal communication with surgeons during procedures with comprehension by the surgeon and proper resulting management. One large retrospective study examining the accuracy of frozen section diagnoses found that 9.5% involved lack of communication between the pathologist and surgeon.5 However, this and other similar studies of accuracy are based on the correlation...
of the pathologists’ frozen and permanent section diagnoses and did not concentrate specifically on the clinicians’ understanding of the intraoperative diagnosis.

To this end, we examined the concordance of intraoperative diagnoses recorded in final pathology reports to what the surgeons dictated in operative notes. The goal was to ascertain the accuracy of clinicians’ interpretation of the outcome of verbal exchanges with pathologists. Furthermore, we characterized discrepancies based on type of difference(s) and potential clinical impact.

Materials and Methods

The intraoperative diagnoses (gross evaluations and frozen sections) from all consecutive surgical pathology cases over a nine-month period (September 2010 through May 2011), recorded in the final pathology report, were obtained from the anatomic pathology database at a tertiary academic medical center that handles approximately 32,000 accessions per year. A review of quality assurance data for the timeframe was evaluated, with cases to be excluded when intraoperative diagnoses were found to be incorrect on review of permanent sections or random review by a second pathologist.

All intraoperative diagnoses were rendered by board-certified pathologists with the exception of after-hours evaluation of donor organs, which were evaluated by senior residents. All were conveyed to the attending surgeon through face-to-face interaction in the operating room or frozen section laboratory, via loudspeaker in the operating room, or over the telephone via a nurse with “readback.” Per departmental policy, pathologists were to write the diagnostic information given to the surgeon on the specimen requisition. This diagnosis was later dictated by support staff for incorporation into the final report. Per hospital policy, operative notes were to have been dictated within 24 hours of the procedure, and when multiple frozen sections were performed, each was to be mentioned separately by site. Surgeons did not have access to the written pathologic diagnosis until final case sign-out.

The exact intraoperative diagnoses from the final pathology reports were electronically imported into an Excel (Microsoft, Redmond, WA) spreadsheet. For each case, a search of the hospital information system was performed for the corresponding surgeon’s operative note, and his or her description of the result of the intraoperative consultation was also obtained. The diagnoses were compared for overall content and accuracy by a single reviewer (G.T.).

Discrepancies between the diagnosis recorded by the pathologist and that dictated by the surgeon were further classified. Cases were considered to have “no significant discrepancy” if the pathologist’s written diagnosis and the surgeon’s account in the operative note contained an equivalent amount of information and displayed essentially no difference in wording. Category A discrepancies were those in which the overall diagnosis was correct but with minor differences that could have at most minimal clinical impact. Examples include diagnoses deferred by the pathologist but discussed by the surgeon as definitive, discrepant anatomic site, incorrect numeric data (eg, lymph node count), report of a diagnosis that is more or less specific than recorded by the pathologist, and additional information listed in the operative note not recorded by the pathologist. Category B discrepancies included cases in which the overall diagnoses were discrepant with possible differences in intra- or postoperative management, but both were either benign or malignant. Diagnoses were classified as having a category C discrepancy if they differed on the basis of benign vs malignant. For procedures in which multiple intraoperative diagnoses were performed, a case was considered discrepant when a difference was found in any.

For any category of difference, an attempt was made to determine the means by which the diagnosis was conveyed to the surgeon (ie, in person or via the telephone). In instances of category B and C discrepancies, the pathologist’s original handwritten diagnosis was reviewed to ensure the accuracy of dictation and transcription. In category C cases, the clinical notes following the procedure were then examined for evidence of incorrect intraoperative management based on the discrepancy.

Results

Intraoperative consultations were performed on 1,558 of 18,959 cases during the designated timeframe. Quality assurance data revealed that the intraoperative diagnosis and final diagnoses were discrepant in three cases, and these were excluded.

The availability of clinical data is depicted in **Figure 1.** Operative notes were not available for 118 (7.6%), representing procedures performed at an outside institution or on donor organs that were not used. The results of the intraoperative diagnoses were not described by the surgeon in 306 (19.7%) cases. As such, comparison was possible in 1,131 (72.7%) cases.

No significant discrepancy was found between the written pathologists’ diagnosis and the surgeons’ recollection of it in 1,019 (90.1%) cases. Category A discrepancies were noted in 94 (8.3%) instances and category B dissimilarities in 11 (1.0%). Four cases (0.3%) demonstrated category C differences.

Examples of category A discrepancies, along with the diagnoses in all cases demonstrating all category B and C differences, are listed in **Table 1, Table 2, and Table 3.** Further stratifying the 94 category A cases **Table 4, more**
than half reflected instances when the surgeons’ descriptions of the intraoperative pathologic findings was either more or less definitive or specific than what was recorded by the pathologist. In 16%, there was additional information listed in the operative note, usually discussing specific microscopic features of a lesion or the status of margin(s). In 14 cases, the pathologist deferred the final diagnosis, and the surgeon’s impression was that the intraoperative diagnosis was definitive. Further medical record review of the category B cases did not identify any negative clinical impact.

**Figure 2** lists the method by which the intraoperative diagnosis was communicated to the surgeon in the cases with discrepancies. In at least one-third of cases, the means of relaying the diagnosis was not recorded in the pathology report. For categories A and B, the largest number of diagnoses was relayed by telephone, while two of the four category C cases were relayed via telephone.

**Cases With Category C Discrepancies**

**Case 1**

The patient was a 57-year-old woman who presented with several months of abdominal pain. She underwent a laparoscopic cholecystectomy with no significant relief of her abdominal pain. Computed tomography (CT) showed ascites as well as an omental mass that was consistent with neoplastic disease. She underwent an exploratory laparoscopy, and the surgeon described “multiple peritoneal nodules.” A single frozen section was performed on one nodule with the recorded intraoperative diagnosis of “poorly differentiated malignancy,” which was reported to the surgeon in person. No other specimens were submitted, and no simultaneous frozen sections on other cases were performed during the examination of the slides. The operative note listed the frozen section diagnosis as “completely benign.” The surgeon aspirated peritoneal fluid, placed a central line, and aborted the procedure.

**Table 1**

**Selected Category A Discrepancies**

<table>
<thead>
<tr>
<th>Pathology Report</th>
<th>Operative Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edema with hemorrhage; need more sampling and possible additional studies</td>
<td>No malignancy identified</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>Malignancy of undetermined cell etiology</td>
</tr>
<tr>
<td>Bland spindle cell lesion with occasional giant cells; no atypia or malignancy identified</td>
<td>Most likely nonossifying fibroma</td>
</tr>
<tr>
<td>Poorly differentiated epithelioid neoplasm</td>
<td>Metastatic poorly differentiated non-small cell carcinoma</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>Findings consistent with adenocarcinoma favoring breast as a primary source; margins were clear both by frozen section and grossly</td>
</tr>
<tr>
<td>Infiltrating glioma</td>
<td>Recurrent glioblastoma multiforme with a treatment effect</td>
</tr>
<tr>
<td>Chronic inflammation and fibrin and debris, no definitive viable tumor identified in sections examined; defer to permanent sections. Neuroendocrine neoplasm</td>
<td>Frozen section suggested reactive mesothelial cells</td>
</tr>
<tr>
<td>Cerebellar tissue with focal macrophagic infiltration; no evidence of malignancy</td>
<td>Low-grade bland gastrinoma cells without evidence of invasion and encapsulated</td>
</tr>
<tr>
<td>Rare fragments of atypical cells, highly suspicious for malignant neoplasm, but too scanty for definitive diagnosis; suggest additional material Malignant tumor Giant cell tumor</td>
<td>No definitive results</td>
</tr>
<tr>
<td>Diagnostic material present Three lymph nodes negative for metastatic disease Malignant neoplasm No carcinoma identified; sheets of small blue cells favor lymphoproliferative process (stains pending) Negative for acute osteomyelitis; medullary fibrosis and histocytoid cells; defer classification</td>
<td>Consistent with an adenocarcinoma</td>
</tr>
<tr>
<td>Concern of lymphoma</td>
<td>Consistent with a benign diagnosis with a large amount of giant cells, either aneurysmal bone cyst versus giant cell tumor Probable chondrosarcoma</td>
</tr>
<tr>
<td>Frozen section was obtained on the node, and the node was negative High-grade tumor concerning for possible recurrent melanoma Lymphoma</td>
<td>Fibrosis vs recurrent eosinophilic granuloma</td>
</tr>
</tbody>
</table>
The final diagnosis was malignant mesothelioma. The patient received palliative chemotherapy and died four months following the procedure.

Case 2
A 45-year-old man underwent neoadjuvant radiation with a wide excision of a high-grade pleomorphic sarcoma with negative margins. Eight months later, he presented with significant pain in the right buttock and posterior thigh and a rapidly enlarging mass in his gluteal region with radiologic findings concerning for recurrent sarcoma. He underwent an incisional biopsy, in which an intraoperative diagnosis obtained on the single submitted specimen was “benign fibroadipose tissue and skeletal muscle,” reported in person. No other simultaneous frozen sections were performed or reported. The surgeon’s operative note stated the following: “initial frozen section diagnosis consistent with high-grade sarcoma.” The wound was then closed and the surgery concluded.

The frozen section diagnosis was confirmed on examination of the permanent sections. The patient later completed another course of radiotherapy with a subsequent hemipelvectomy and is currently free of disease.

Case 3
A 45-year-old woman underwent a total thyroidectomy for multinodular goiter three years prior to presentation. At that time, two foci of papillary microcarcinoma were identified, one measuring 0.3 cm and the other 0.4 cm in diameter.
She had been followed with serial ultrasounds, which showed no significant change over the years. Three months before surgery, a nodule in the left thyroid bed was identified, and a fine-needle aspirate of the lesion was read as recurrent papillary thyroid carcinoma.

A neck exploration was performed. Multiple specimens were submitted for intraoperative diagnosis, all of which were negative for malignancy and reported separately. Near the end of the procedure, the surgeon noted a 0.5-cm nodule that was removed and separately submitted for frozen section analysis without other concurrent specimens. The initial intraoperative diagnosis was listed by the surgeon as “small follicles of thyroid tissue in an inflammatory background with question of lymphocytic thyroiditis.” Since the diagnosis was discordant with the results from the prior specimen, the surgeon requested a second diagnostic opinion, during which time he proceeded to close. Although the surgeon stated that “the consulting pathologist felt there was nothing to be there to label it papillary carcinoma of the thyroid,” the pathologist’s handwritten diagnosis was “papillary carcinoma,” which was reportedly relayed by telephone.

The final surgical pathology report, following immunoperoxidase studies and additional intrainstitutional consultation, was “lymphoid and follicular tissue with some nuclear atypia, probably representing lymphocytic thyroiditis. No tumor identified.” The preceding cytology specimen was also reviewed and amended to read “atypical cells present.” The patient was discharged following the surgery without additional therapy and has had no recorded recurrence of her tumor.

Case 4
The patient was a 61-year-old woman with a history of recurrent endometrial carcinoma, originally diagnosed 16 years prior to surgery when she underwent a total abdominal hysterectomy–bilateral salpingo-oophorectomy for menorrhagia. Radiographic studies performed for new-onset lower extremity swelling showed a pelvic mass causing severe hydronephrosis. A ureteral stent was placed, and a CT-guided biopsy revealed metastatic adenocarcinoma.

She was taken to surgery for a planned exploratory laparotomy, nephroureterectomy with removal of the ureter, possible bladder resection, and removal of the right pelvic mass. During surgery, a 2-cm area of puckering with apparent necrosis was identified. A frozen section from this area was performed with no other specimens submitted for intraoperative diagnosis or other cases evaluated simultaneously. The pathologist’s handwritten diagnosis was “adenocarcinoma.” A hospital-conducted internal review later revealed that this was communicated to the surgeon by telephone via a nurse who relayed the diagnosis as “no carcinoma,” and the surgeon’s operative note stated that the frozen section “revealed no malignancy.” The area was extensively dissected, and no gross tumor was remaining in the pelvis, although the mass was adherent to the iliac vessels. Additional margin tissue was submitted for permanent sections only.

The intraoperative diagnosis was confirmed in the final report with crushed tumor cells present in the marginal tissue as well. The patient was informed that she likely had residual disease not identified at the time of surgery and has resumed chemotherapy.

Discussion
Intraoperative diagnoses are one of the few times when an anatomic pathology diagnosis can have an impact on the immediate medical management of a patient. It is, therefore, important to ensure accurate and precise communication between the surgeon and the pathologist since there is less room for errors caused by misinterpretations. In addition, the operating room is a complex and distracting environment, with a recent study finding that an average of one distracting event occurs nearly every two minutes during a procedure.7

While there have been numerous studies looking at preanalytic or analytic sources of error in intraoperative diagnoses, few authors have examined the sources and effects of postanalytic error.3,4,5,8 One source of these mistakes is the inaccurate communication of a pathologist’s correctly rendered diagnosis to a clinical colleague, and to our knowledge, this phenomenon has not been examined extensively. In an effort to indirectly assess the fidelity of pathologist-surgeon communication, we evaluated the rate of concordance between the pathologist’s written frozen section diagnosis and the diagnosis recorded by the surgeon in his or her operative note.

We identified four category C errors (discrepancy between a benign and a malignant diagnosis), which composed 0.3% of the evaluated cases. Of the four category C errors, only one ultimately resulted in improper patient management at the time of surgery (case 4). In that case, a diagnosis of “adenocarcinoma” was relayed to the surgeon via phone by a nurse as “no carcinoma,” and clean margins were not confirmed at the time of the procedure. This illustrates the importance of never using the word no in a diagnostic statement (on both sides of the microscope). If “no” is lost in translation, the remaining sentence is still sensational (“no carcinoma” becomes “carcinoma”).8 It is recommended to use a positive or negative qualifier (eg, “POSITIVE for carcinoma” or “NEGATIVE for carcinoma”), which, if lost, would prompt the clinician to investigate for a possible error. While this is a small number, any discrepancy of this magnitude should be a “never-event.”

The other three category C errors arguably did not result in improper intraoperative management and otherwise would
not have come to attention. The exact cause of these errors is uncertain. It is unlikely that the fault was in the hand-off of the diagnosis because in two instances (cases 1 and 2) it was reported to the surgeon in person. It is possible that the surgeon made a mistake while dictating the operative note (possibly dictating from a personal “mental template” many hours after the conclusion of the procedure). The third case was relayed via telephone. Consultation from another pathologist was sought at the time of frozen section after the initial diagnosis was reported to the surgeon (lymphocytic thyroiditis vs papillary carcinoma), which may explain the incongruity. In any case, it is important to seek some sort of confirmation that the information was correctly understood by the clinician (such as a “read back,” ideally from the surgeon himself or herself).

There were minor discrepancies (category A and category B) in 9.6% of the cases. Most (47%) were due to the surgeon being more specific or providing additional information in his or her note that was not present in the pathologist’s written diagnosis. An additional 15% were due to a deferred diagnosis being listed by the surgeon as definitive. It is not uncommon for the surgeon to visit the frozen section suite as pathologists verbalize their thoughts while examining a specimen or ask for more information in difficult/equivocal cases (such as when a frozen section was performed to confirm the presence of diagnostic tissue and the surgeon asks, “What do you think it is?”). The results illustrate that what is said conversationally or “off the record” may be regarded by the clinician as more definite than the pathologist intended. They also highlight the importance of not providing more information than can be definitively determined by the tissue available for examination at the time of frozen section. Pathologists should thoroughly document their intraoperative conversations with clinicians or specifically state before the end of the encounter that “my intraoperative diagnosis is X.”

In 22% of the cases, the surgeon’s operative note contained less information than what was given in the pathologist’s written diagnosis. This may be due to the pathologist providing more data than clinically needed at that time. Good communication between the pathologists and surgeons, both at the time of frozen section and during interdisciplinary conferences, can help clarify the intraoperative needs of the surgeon, reduce unnecessary effort on the part of the pathologist, and minimize the likelihood of interpretive errors.

The most common method of communication for cases with category A and B errors was the telephone. Most category C diagnoses were relayed in person (further supporting the “mental template” theory); however, the telephone was the medium used in communication in the one case with inappropriate intraoperative management (case 4). There are multiple points for errors to occur when communicating via the telephone, including (but not limited to) technical issues, such as a poor connection and difficulty with intercom/speakerphone systems. These issues are amplified when information is passed through multiple individuals since the diagnosis may be first taken by a nurse who answers the phone and is then verbally relayed to the surgeon. Even with “read-back” procedures, there is the possibility of misinterpretation because of pronunciation or other complications resulting from an increased number of communication steps. However, errors occurred both over the phone and in person, which likely reflects communication issues between two (or more) groups of people and cannot be attributed to the method of communication alone.

There was no mention of a frozen section diagnosis in the operative note in 20% of the cases. This may again be due to a surgeon dictating from a mental template and forgetting to include the results of frozen sections. It also raises the question of the clinical necessity of some frozen sections. With increasing administrative scrutiny of practice patterns and budgetary constraints looming, it may become necessary to fully document the medical need for a frozen section.

Cases in which a discrepancy existed between the intraoperative diagnosis and the final diagnosis were excluded. The goal of this study was an evaluation of postanalytic communication, and it would have been inappropriate to include cases with errors at the analytic stage.

While the ultimate indicator of effective communication is the correct patient management that would result from an intraoperative diagnosis, these data are much more difficult to gather since each patient’s situation is unique and not cut. We acknowledge that our method of review is an indirect assessment of the surgeon’s comprehension of intraoperative diagnoses, and using operative notes as a barometer of communication quality does have limitations. For example, it is dependent on the accuracy of the surgeon’s memory when dictating at a time distant from the procedure. Uncorrected typographical errors in either operative notes or final pathology diagnoses may also have been a confounding factor in some instances. In addition, the operative notes may have been dictated after the release of the final surgical pathology report; however, hospital policy requires operative notes to be dictated within 24 hours prior to final case sign-out in most instances at our institution.

It is also clear that the presence of a discrepancy did not result in clinical misadventure in most cases. Indeed, with the exception of the category C error described in case 4, none would have come to the attention of the treating clinic(s), pathologist, or patient. However, the presence of these discrepancies, irrespective of their severity or clinical importance, suggests that postanalytic errors in anatomic pathology may go unrecognized in standard departmental or institutional quality control review. In addition, in the current litigious environment, it is important to accurately document what exactly was stated. Data from surgeons’ operative notes
and regular examination of the management resulting from an intraoperative diagnosis (the most important indicator of accuracy of communication) may be important to consider as additional quality assurance monitors, especially as new-in-practice pathologists become accustomed to the needs of their clinical colleagues or new surgeons establish their thresholds for ordering and acting on intraoperative consultations. Such reviews may also present an opportunity for resident instruction and as an evaluation of pathologists’ intraoperative diagnosis reporting practices to prevent more significant events and improve patient safety.

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References