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Study of Turnaround Time of Surgical Pathology Reports in a tertiary care teaching hospital

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ABSTRACT

Introduction: Turnaround time is defined as the time interval between the receipt of specimen in the laboratory and the availability of the verified report to the authorized person or clinician. In histopathology, TAT is influenced by multiple steps including specimen collection, fixation, grossing, tissue processing, embedding, microtomy, staining, slide examination, and report preparation.
AIM: To evaluate the turnaround time (TAT) in surgical pathology reporting by identifying workflow inefficiencies and analysing contributory factors.
Result: Out of 1959 surgical pathology reports, Majority (No.1244, 63.5 %) were reported within 3 to 5 days, 231(11.7%) were reported within 5-7 days, Minimum TAT was <3 days for 171 cases (8.7%) and maximum TAT 7-10 or > 10 days for 284 cases (14.49%) out of TAT. Total 1959 histopathology biopsy and specimen reported at pathology department, C. U. Shah medical college hospital in Surendranagar, Gujarat, India from 1st May 2025 to 31st july 2025 were retrospective analysed.
Conclusion: Turnaround time monitoring in surgical pathology is a mandatory and valuable quality tool under NABL accreditation. Defining specimen-specific TAT benchmarks, continuous surveillance, and systematic delay analysis contribute to improved laboratory performance and patient care.

Keywords*: Pathology report, turnaround time, surgical specimens.*

INTRODUCTION

Turnaround time (TAT) is defined as the interval between specimen receipt in the laboratory and the release of the final validated report. According to NABL most of small biopsy should have turnaround time 2-3 working days, routine specimen reported within 3-5 days, large and complex specimens reported within 5-7 days, Decalcified specimens reported within 7-10 days and specimen requiring IHC additional 3-5 days.[1]

Surgical pathology plays a pivotal role in modern healthcare by providing definitive tissue-based diagnoses that guide clinical decision-making, therapeutic planning, and prognostication. The quality of surgical pathology services is not determined solely by diagnostic accuracy but also by the timeliness of report delivery.[2]

Surgical pathology specimens vary widely in complexity, ranging from small biopsies to large oncological resections. Additional procedures such as decalcification, special stains, immunohistochemistry, molecular testing, and external consultations significantly influence reporting time. Therefore, a single uniform TAT is neither practical nor reflective of real-world laboratory workflows. Stratification of specimens based on complexity is essential for meaningful TAT assessment and NABL compliance.[3]

Routine monitoring of TAT not only fulfils accreditation requirements but also serves as an effective tool for identifying workflow inefficiencies, manpower constraints, and process bottlenecks within the laboratory. Analysis of delayed cases provides valuable insights for implementing targeted quality improvement measures, optimizing resource utilization, and enhancing clinician satisfaction.[4]

MATERIAL & METHODS:

Study Design:

This retrospective study was conducted in Department of Pathology at C.U. Shah Medical college, Surendranagar, Gujarat, India, time period of 1st may 2025 to 31st July 2025. Total no of 1959 specimen received during this time frame were included in this study. This study received ethical approval by the institutional ethical committee.

Statistical Analysis:

Data was entered using Microsoft excel and screened for outliers and extreme values. Descriptive statistics for continuous variables were measured using mean±SD, median, Interquartile ratio. All categorical variables were represented as numbers and percentage.

RESULTS:

[Table 1] Time frame distribution relation to Number of days in laboratory tissue processing

NO. of Days	NO. of cases	Percentage of cases
2-3	171	8.72%
3-5	1244	63.5%
5-7	231	11.7%
7-10	189	9.6%
>10	124	6.3%
Total No.	1959	100%

The table shows the distribution of laboratory tissue processing turnaround time for 1,959 cases. Most cases (63.5%) were completed within 3–5 days. Smaller proportions were processed in 5–7 days (11.7%), 7–10 days (9.6%), 2- 3 days (8.7%), and more than 10 days (6.3%), indicating that the majority of samples met a moderate turnaround time.

[Table 2] TAT in relation to tissue specimen type :

TAT in days	Trucut biopsy	Incisional biopsy	Excisional biopsy	Specimen	Large complex specimen	Total
2-3	-	89(14.4%)	74(14.3%)	08(1.3%)	-	171
3-5	-	368(59.9%)	355(68.9%)	503(84.9%)	18(7.6%)	1244
5-7	1(25%)	76(12.3%)	39(7.5%)	21(3.5%)	94(40.1%)	231
7-10	3(75%)	44(7.1%)	24(4.6%)	42(7%)	76(32.4%)	189
>10	-	37(6%)	23(4.4%)	18(3%)	46(19.6%)	124
Total No.	4(100%)	614(100%)	515(100%)	592(100%)	234(100%)	1959

This table depicts turnaround time (TAT) distribution according to tissue specimen type among 1,959 cases. Most incisional, excisional, and routine specimens were reported within 3–5 days, while trucut biopsies were mainly completed within 7–10 days. Large and complex specimens showed longer TATs, with a higher proportion of cases extending to 7–10 days.

[Table 3] TAT in relation to department wise tissue specimen type :

TAT in days	OBGY	Surgery	ENT	Orthopaedics	Dermatology	Ophthalmology	Respiratory	Gastrology
2-3	33(5.4%)	43(6.8%)	87(14.5%)	02(6.8%)	-	03(13.6%)	-	-
3-5	444(73.6%)	382(60.9%)	407(68%)	03(10.3%)	04(6.5%)	09(40.9%)	03(25%)	01(14.2%)

5-7	38(6.3%)	69(11%)	48(8%)	11(37.9%)	53(86.8%)	06(27.2%)	06(50%)	04(57.1%)
7-10	59(9.7%)	64(10.2%)	42(7%)	09(31%)	04(6.5%)	03(13.6%)	02(16.6%)	01(14.2%)
>10	29(4.8%)	69(11%)	14(2.3%)	04(13.7%)	-	01(4.5%)	01(8.3%)	01(14.2%)
Total No.	603(100%)	627(100%)	598(100%)	29(100%)	61(100%)	22(100%)	12(100%)	07(100%)

The majority of specimens across most departments were reported within 3–5 days, indicating timely reporting performance. Obstetrics & Gynaecology (OBGY) had the highest workload (603 cases), with most cases reported within 3–5 days (73.6%), followed by 5–7 days (6.3%), while 4.8% exceeded 10 days. Surgery (627 cases) also showed optimal TAT, with 60.9% cases reported in 3–5 days; however, a slightly higher proportion (11%) exceeded 10 days. ENT specimens (598 cases) were predominantly reported within 3–5 days (68%), with 2.3% taking more than 10 days. Orthopaedics (291 cases) showed relatively longer TAT, with 37.9% cases in 5–7 days and 13.7% exceeding 10 days. Dermatology specimens (61 cases) were mainly reported within 5–7 days (86.8%), with 6.5% extending beyond 10 days. Ophthalmology (221 cases) demonstrated good performance, with 40.9% reported in 3–5 days and 27.2% in 5–7 days. Respiratory (121 cases) and Gastroenterology (71 cases) specimens were mostly completed within 5–7 days, though 8.3% and 14.2%, respectively, exceeded 10 days.

[Table 4] TAT in relation to histopathology diagnosis :

TAT in days	Normal Tissue	Inflammation	Benign	Malignancy	Total
2-3	34(20.2%)	87(9.2%)	46(5.9%)	4(4.7%)	171
3-5	127(75.5%)	583(62.2%)	517(67.05%)	17(20.2%)	1244
5-7	7(4.1%)	115(12.2%)	87(11.2%)	22(26.1%)	231
7-10	-	89(9.5%)	73(9.4%)	27(32.2%)	189
>10	-	62(6.6%)	48(6.2%)	14(16.6%)	124
Total No.	168(100%)	936(100%)	771(100%)	84(100%)	1959

This table shows the distribution of turnaround time (TAT) in days according to histopathological diagnosis. Most normal tissue cases were reported within 3–5 days (75.5%), while inflammatory (62.2%) and benign lesions (67.1%) also predominantly fell in the 3–5 day TAT range. Malignant cases showed relatively longer TAT, with the highest proportion reported within 7–10 days (32.2%).

[Table 5] Turnaround time (TAT) distribution of pathology cases with and without intradepartmental consultation

TAT in days	Cases reported without second opinion	Cases resolved with intradepartmental consultation	Total (%)
2-3	171(12.5%)	-	171
3-5	1009(73.8%)	235(39.6%)	1244
5-7	112(8.1%)	119(20.1%)	231
7-10	75(5.4%)	114(19.2%)	189
>10	-	124(20.9%)	124
Total No.	1367(100%)	592(100%)	1959

Out of the 1959 total cases, 1367 (69.8%) were reported without second opinion and 592 (30.2%) required intradepartmental consultation. Cases without consultation were predominantly reported within 3–5 days (73.8%), followed by 2-3 days (12.5%).Only a small proportion extended beyond 7 days (≈13.5%), reflecting minimal delays in straightforward cases. In contrast, cases requiring intradepartmental consultation showed majority cse completed in 3–5 days (39.6%) and 5–7 days (20.1%), 7–10 days (19.2%) and >10 days (20.9%).

[Table 6] Distribution of cases with delayed turnaround time according to contributing factors.

Reason for delayed TAT	No. of delayed TAT
IHC	23(8.09%)
Special stain	21(7.3%)
Decalcification	09(3.1%)

Second opinion /Intra departmental consultation	77(27.11%)
Regrossing of specimen	154(54.22%)
Total no.	284

As per NABL quality indicators, more than 90–95% of surgical pathology cases are expected to be reported within the laboratory-defined turnaround time, and only up to 5–10% of cases may exceed TAT with proper documented justification. Out of the total cases analysed, 284 cases (14.4%) experienced delayed TAT. The most common reason for delay was regrossing of specimen, accounting for 154 cases (54.22%). This was followed by second opinion / intra-departmental consultation in 77 cases (27.11%). Ancillary techniques also contributed to delays: immunohistochemistry (IHC) was responsible for 23 cases (8.09%), special stains for 21 cases (7.3%), and decalcification for 9 cases (3.1%).

DISCUSSION:

In our study of 1959 cases, the distribution of turnaround time for laboratory tissue processing showed that the largest proportion of cases (63.5%) were completed within 3–5 days, while only 6.3% of cases exceeded 10 days (Table 1). This indicates that the majority of specimens in our pathology unit are processed within a short timeframe, suggesting satisfactory operational efficiency.

A teaching hospital audit documented that 86.7% of reports were ready within 5 days. These differences highlight how laboratory resources, staffing, automation, and workflow policies influence TAT benchmarks across different settings [5].
TAT also varied by specimen type (Table 2). Incisional biopsies and smaller specimens tended to finish earlier, whereas large complex specimens had longer TATs, likely due to additional grossing and processing steps.
This aligns with broader pathology literature categorizing biopsy specimens where simple routine cases often have shorter average TATs compared to larger or complex resections. Some international standards emphasize stratifying TAT targets by specimen type due to these inherent differences[6,7]

Our departmental breakdown (Table 3) showed variable TAT patterns across clinical units (e.g., OBGY, ENT, Surgery, Orthopaedics, Dermatology, Ophthalmology, Respiratory, and Gastroenterology). While some units achieved the majority of reports within 3–5 days, others had higher proportions of longer turnaround times, aligned with the complexity of specimens and interdepartmental logistics.

Literature reinforces that departmental workload and sample complexity significantly impact TAT. Studies comparing TAT across departments confirmed that specimens requiring special procedures (e.g., decalcification, immunohistochemistry) have prolonged processing times, similar to our findings in departments handling bone or complex surgical biopsies[8].
(Table 4) illustrates how TAT distribution varies according to histopathological diagnosis categories (normal tissue, inflammation, benign and malignant lesions). Interestingly, malignant cases did not consistently show the longest turnaround times. In fact, complex diagnostic processes (IHC, recuts) often influenced longer TATs regardless of benign or malignant classification.

A recent study observed TAT differences when ancillary techniques such as immunohistochemistry were required, with complex cases showing significantly prolonged TAT compared to routine H&E cases[9].
In Table 5, the TAT for cases with and without intradepartmental consultation suggests that second opinions inherently extend TAT, as expected with additional slide reviews, discussions, and possible recuts.
This reflects the common experience in pathology practice where consultation adds diagnostic confirmation value but contributes to delays. Many studies recommend structured consultation workflows to minimize added TAT while preserving diagnostic accuracy[10].

The findings of (table 6) are consistent with previously published studies on histopathology TAT. Several authors have reported regrossing and additional tissue sampling as one of the leading causes of delayed TAT, particularly in oncologic specimens, due to the need for adequate margin assessment and tumor characterization[11].
Similarly, second opinion or intra-departmental consultation has been identified as a significant contributor to delays in multiple studies, especially in tertiary care centers where complex and referral cases are common. Comparable proportions have been reported by Nakhleh et al. and Zarbo et al., who emphasized diagnostic complexity rather than technical inefficiency as a major cause of prolonged TAT[12].

Ancillary techniques such as IHC and special stains are well-recognized contributors to delayed reporting. Studies by Novis and Zarbo and Mehrotra et al. reported higher proportions of delays due to IHC compared to the present study, possibly reflecting differences in test availability, automation, and laboratory workflow,. The relatively lower percentage of delays

due to decalcification in this study aligns with reports from centers where standardized rapid decalcification protocols are in place[13].

Comparable studies have reported a wide variability in turnaround times. For example, a retrospective audit at a tertiary hospital in Nigeria reported a mean histopathology turnaround time of 22 ± 10 days, with processing contributing approximately 27% of delays and reporting being the largest contributor at 41% of the total TAT. Another prospective study also in Nigeria found a mean TAT of 7.5 ± 9.7 days, with 20.8% of reports ready by day 3 and all completed by day 18[14].

CONCLUSION:

In conclusion, delayed TAT in our study was primarily driven by diagnostic complexity, regrossing, additional sampling, consultation, and ancillary testing, findings that closely mirror those reported in previous studies. The relatively lower contribution of technical and ancillary factors suggests effective laboratory processes, while emphasizing that delays are often clinically justified to ensure diagnostic accuracy. Turnaround time can be improved by standardizing grossing procedures to minimize regrossing, early identification of complex cases requiring consultation or ancillary tests, streamlining IHC and special stain workflows, and continuous monitoring of TAT as a quality indicator with regular audits.

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