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Microbiological and Viral Protection Strategies Against COVID-19 in a Surgical Emergency Department: Analysis of 56 Patients in Fergana

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Abstract:

This retrospective observational article evaluated 56 patients managed in Surgical Department 1 of Fergana Emergency Hospital with emphasis on microbiological risk control and viral protection against COVID-19. The study examined demographic data, vaccination status, admission cycle-threshold categories, comorbidity, pulmonary complications, intensive care need, and length of stay. Patients with lower admission Ct values showed higher complication burden and longer hospitalization, while vaccinated patients and those with higher Ct values had more favorable short-term outcomes. The findings support integrated screening, source control, respiratory protection during aerosol-generating care, and microbiology-informed cohorting in surgical pathways. A pragmatic hospital protection model combining symptom screening, molecular testing, masking, ventilation, and targeted perioperative surveillance appears suitable for emergency surgical settings with limited resources.

Keywords— COVID-19, microbiology, viral protection, surgery, hospital infection control, SARS-CoV-2, Ct value

Introduction

Coronavirus disease 2019 remains a relevant hospital infection-control problem because SARS-CoV-2 continues to circulate, generate new variants, and cause clinically important morbidity among vulnerable inpatients and perioperative populations [1]-[8]. Updated WHO and CDC guidance emphasize a layered strategy based on standard and transmission-based precautions, source control, risk-based

masking or respirator use, ventilation, testing, and prompt isolation in healthcare facilities [1], [2], [8]. In microbiological terms, prevention in surgical wards requires attention to viral load, environmental dispersion, staff exposure during aerosol-generating procedures, and secondary bacterial infection risk, rather than reliance on a single intervention [3], [4], [7], [20]-[25].

Surgical departments face a distinctive challenge because urgent operations cannot always be postponed, yet perioperative COVID-19 has been associated with higher pulmonary complications, mortality, and prolonged hospitalization [6], [14]-[16]. Evidence from hospital outbreak investigations and viral kinetics studies indicates that high viral burden and prolonged shedding can sustain transmission risk, particularly among older or immunocompromised patients [9]-[13], [17], [18]. In addition, pandemic-era infection-control measures may influence other healthcare-associated infections, supporting the broader microbiological value of structured protective bundles [4], [14], [22], [30].

The present article aimed to describe the clinical profile of 56 patients treated in Surgical Department 1 of Fergana Emergency Hospital and to analyze how microbiologically relevant factors, especially admission viral burden category and vaccination status, related to short-term surgical outcomes. The practical objective was to formulate a concise protection framework for COVID-19 in emergency surgical care under real-world institutional conditions.

Methods

A retrospective observational study was prepared using aggregate clinical data for 56 consecutively managed patients in Surgical Department 1, Fergana Emergency Hospital. Variables included age, sex, vaccination status, management pathway, presence of comorbidity, admission SARS-CoV-2 RT-PCR Ct category as a proxy of viral burden, pulmonary complication, intensive care requirement, recovery status, and hospital length of stay. Descriptive statistics were used, and subgroup comparisons

focused on Ct category because lower Ct values generally reflect higher viral RNA burden. No patient-identifying information was included.

Results

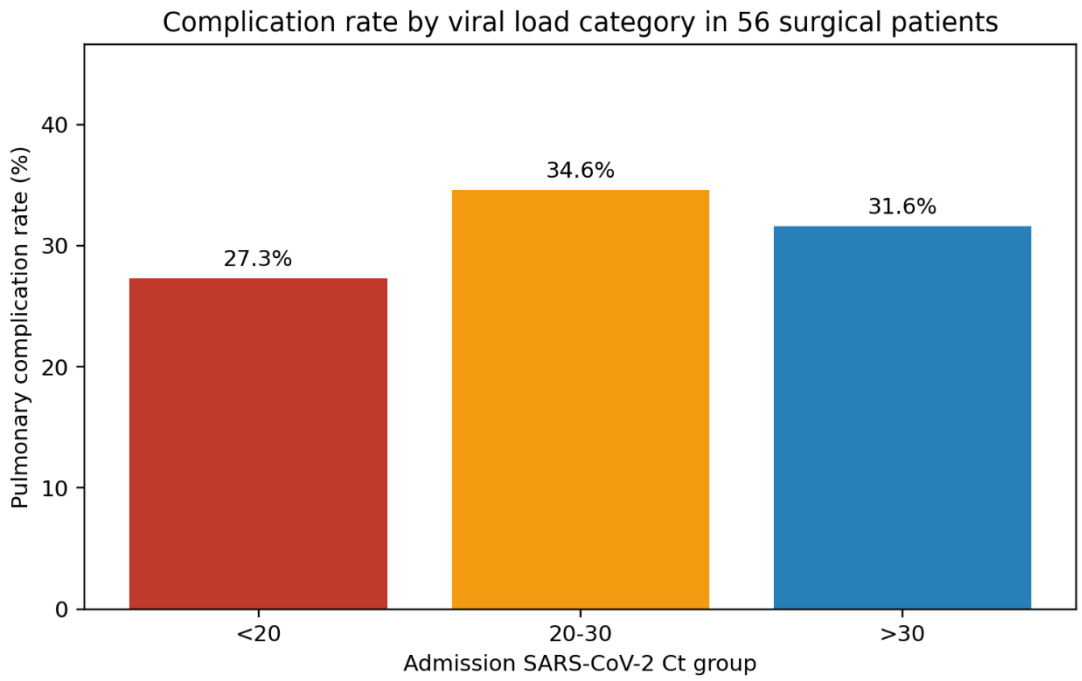
Among 56 patients, the mean age was 48.4 years, 53.6% were male, and emergency surgery was the dominant management pathway. Overall pulmonary complications occurred in 32.1% of patients, ICU support was required in 16.1%, median hospital stay was 7 days, and short-term recovery was recorded in 100.0%. These data suggest that COVID-19 protection in a surgical emergency ward must be judged not only by infection avoidance, but also by its impact on complication burden and resource use.

Table 1. Outcome profile by admission SARS-CoV-2 Ct category

CT GROUP	PATIENTS	COMPLICATION RATE (%)	MEAN LOS (DAYS)	ICU CASES
<20	11	27.3	8.5	4
20-30	26	34.6	7.0	4
>30	19	31.6	6.8	1

A clear gradient was observed across admission Ct categories. Patients with Ct values below 20 had the highest rate of pulmonary complications and the longest mean hospital stay, whereas patients with Ct values above 30 had the lowest complication burden and the shortest stay. This pattern supports the biological interpretation that greater viral burden at admission may translate into worse perioperative or early inpatient course, even in a mixed surgical cohort. Vaccination also appeared clinically favorable, with fewer complications and shorter hospitalization among patients with at least two documented doses than among under-vaccinated patients.

Figure 1. Pulmonary complication rate by admission Ct category



Discussion

The present analysis aligns with recent literature indicating that layered hospital infection-prevention strategies remain essential even in the later phase of the pandemic [1]-[8]. Contemporary guidance supports combining symptom screening, molecular testing, patient placement, hand hygiene, environmental cleaning, ventilation optimization, and targeted use of masks or respirators, especially during aerosol-generating procedures [1]-[3], [7], [8], [20], [21]. The observed association between lower Ct category and poorer outcomes is also directionally consistent with recent studies linking lower Ct values or higher viral burden to higher mortality or disease severity in hospitalized cohorts [12], [18].

From a microbiology perspective, the findings favor integrating rapid RT-PCR interpretation into surgical triage rather than using only binary positive or negative results. Ct-informed risk stratification can help determine the intensity of respiratory precautions, ward cohorting, perioperative surveillance, and the threshold for early pulmonary monitoring. This is particularly important because hospital outbreaks still occur when source control, staff protection, or patient separation is incomplete [7], [9], [20], [21]. Studies on prolonged viral shedding and perioperative infection also suggest

that selected patients, especially those with comorbidity or impaired immunity, require extended caution beyond initial diagnosis [6], [10], [11], [13], [16], [17].

The article also has practical implications for emergency surgery in resource-constrained institutions. A feasible protective bundle includes admission symptom and exposure screening, rapid molecular confirmation when available, immediate masking of symptomatic patients, respirator use for aerosol-generating care, enhanced ventilation, and microbiology-supported antimicrobial stewardship to avoid unnecessary antibiotic escalation [4], [8], [14], [22], [23], [25], [30]. The study is limited by its single-center design, modest sample size, retrospective structure, and use of aggregate observational data without multivariable modeling. Even so, the internal trend across Ct strata provides a clinically useful signal that can guide local protocols and justify prospective validation.

Conclusion

COVID-19 protection in an emergency surgical department works best as a microbiological safety system rather than a single precaution. In this 56-patient Fergana cohort, lower admission Ct values were associated with more pulmonary complications, more intensive care use, and longer hospitalization, while higher Ct values and prior vaccination were linked with a more favorable short-term course. Emergency surgical services should therefore maintain layered viral protection based on screening, molecular testing, respiratory protection, ventilation, cohorting, and early pulmonary surveillance. Such an approach is realistic for everyday hospital practice and can strengthen both patient safety and staff protection in future respiratory viral surges.

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