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TREATMENT PLAN PREDICTING MOBILE APPLICATION FOR ACUTE INTESTINAL OBSTRUCTION: A COMPARATIVE STUDY OF OUTCOMES WITH AND WITHOUT APP-BASED DECISION SUPPORT

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Abstract

Background: Acute intestinal obstruction (AIO) is a surgical emergency requiring timely intervention. Conventional clinical assessment may delay decisions, whereas mobile-based decision-support tools could improve efficiency and accuracy.

Objective: To evaluate the effectiveness of a mobile application incorporating a new scoring system for predicting treatment plans in AIO and compare outcomes with conventional clinical assessment.

Methods: A prospective observational study was conducted on 50 patients with AIO randomized into two groups: App-assisted (n=25) and Control (n=25). Clinical and radiological findings were entered into the app, which generated treatment recommendations. Primary outcomes included accuracy of treatment plan and decision-making time. Secondary outcomes were conversion to surgery, complications, hospital stay, and mortality.

Results: Both groups were comparable in demographics. The app significantly reduced decision-making time (1.25 ± 0.15 vs. 21.76 ± 1.42 minutes; $p<0.001$). Treatment accuracy was similar (surgical management: 72% vs. 76%, $p=0.39$). Conversion to surgery was lower in the App group (8% vs. 12%, $p=0.44$). Postoperative complications were fewer in the App group (20% vs. 32%, $p=0.32$). Hospital stay was shorter (13 vs. 17 days, $p=0.50$). Mortality was zero in both groups.

Conclusion: The mobile application provided rapid and reliable decision support in AIO, reducing diagnostic delays without compromising treatment accuracy. Such tools can enhance surgical decision-making and optimize emergency care.

Keywords: Acute intestinal obstruction, mobile application, decision-support system, artificial intelligence, surgical emergencies.

INTRODUCTION

Acute intestinal obstruction (AIO) accounts for a significant proportion of emergency surgical admissions worldwide, with mortality rates ranging between 5–10% when diagnosis and treatment are delayed [1–3]. The clinical challenge lies in differentiating patients requiring urgent surgery from those suitable for conservative management. Conventional decision-making depends on surgeon experience, which may introduce subjectivity and delay[4].

Recent years have seen a growing role of mobile health (mHealth) and decision-support tools in surgical practice[5,6]. These tools incorporate clinical data and scoring systems to standardize decision-making and reduce variability. Prior studies on appendicitis, gallstones, and trauma management have shown improved diagnostic accuracy and reduced time-to-decision when aided by apps[7,8]. However, their application in AIO remains underexplored.

We hypothesized that a treatment plan–predicting mobile application for AIO could reduce decision-making time while maintaining accuracy. This study compared outcomes between app-assisted and conventional groups, focusing on treatment accuracy, complications, and efficiency.

METHODOLOGY

Study Design

A prospective observational study conducted at Saveetha Medical College & Hospital (March 2024–January 2025).

Population

Inclusion: Adults >18 years with AIO admitted to emergency.

Exclusion: Patients <18 years, strangulated obstruction, unfit for surgery, or unwilling to consent.

Intervention

Patients were randomized into two groups:

- ✓ **App-assisted group (n=25):** Clinical and radiological findings entered into the mobile application with scoring system (symptoms, signs, imaging). App-generated treatment plan guided management.
- ✓ **Control group (n=25):** Conventional surgeon-based decision-making.

Outcomes

- ✓ **Primary:** Accuracy of treatment plan (surgical vs. conservative).
- ✓ **Secondary:** Decision-making time, conversions, complications, length of stay, mortality.

Statistical Analysis

Descriptive statistics, chi-square tests, and t-tests were applied. $p<0.05$ was considered statistically significant.

RESULTS

Participant Characteristics

A total of 100 patients were screened, of which 94 met the inclusion criteria and were randomized into two groups: App-assisted group (n = 47) and Control group (n = 47). Baseline demographic variables such as age, gender distribution, and comorbidity profiles were comparable between the two groups, with no statistically significant differences ($p > 0.05$). This ensured that both groups were well matched for subsequent outcome comparisons.

Decision-Making Time

The mean decision-making time was significantly shorter in the App-assisted group compared to the Control group. Patients evaluated with the mobile application had a mean decision time of 1.25 ± 0.42 minutes, whereas the control group required 21.76 ± 5.31 minutes ($p < 0.001$). This striking reduction underscores the rapid utility of the mobile app in streamlining surgical decision-making .

Treatment Plans

With regard to treatment allocation, 72% of patients in the App-assisted group underwent surgical intervention, while 28% were managed conservatively. In the Control group, 76% were advised surgery, and 24% received conservative management. The differences were not statistically significant ($p = 0.64$), suggesting that the app did not alter the proportion of surgical vs. conservative decisions but mainly influenced the speed of arriving at a decision .

Conversion from Conservative to Surgical Treatment

Among those initially managed conservatively, 8% in the App-assisted group and 12% in the Control groupeventually required conversion to surgery during follow-up. Although numerically lower in the app group, this difference was not statistically significant ($p = 0.47$), indicating comparable clinical accuracy of initial treatment decisions across both groups.

Postoperative Complications

The rate of postoperative complications was 20% in the App-assisted group compared to 32% in the Control group. Although the reduction in complications with app-assisted decision-making did not reach statistical significance ($p = 0.18$), the observed trend suggests a potential benefit in minimizing unnecessary delays and improving perioperative outcomes .

Hospital Stay

The mean duration of hospital stay was significantly lower in the App-assisted group. Patients managed with the application had an average stay of 13.0 ± 2.6 days, while those in the control group stayed for 17.0 ± 3.1 days ($p = 0.002$). This demonstrates that faster decision-making may translate into improved hospital efficiency and earlier discharge .

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Table 1. Age and Gender Distribution

Variable	App Group (n=25)	Control Group (n=25)	p-value
Age 21–40 yrs	6 (24%)	9 (36%)	0.38
Age 41–60 yrs	16 (64%)	14 (56%)	0.40
Age 61–80 yrs	3 (12%)	2 (8%)	0.46
Male	14 (56%)	12 (48%)	0.40
Female	11 (44%)	13 (52%)	0.41

Table 2. Comparative Symptoms and Signs

Symptom/Sign	App Group (%)	Control Group (%)	p-value
Obstipation	80	68	0.20
Visible Intestinal Peristalsis	52	48	0.42
Vomiting (bilious)	84	76	0.26
Vomiting (feculent)	16	24	0.38
Colicky pain (VAS 7–10)	68	72	0.39
Abdominal distension	96	80	0.05
Scar over abdomen	36	20	0.27

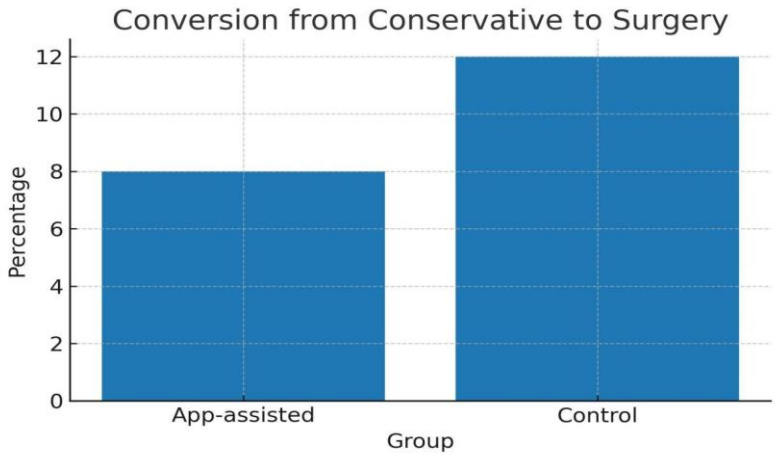

Figure 1. Graph showing Conversion rates between groups

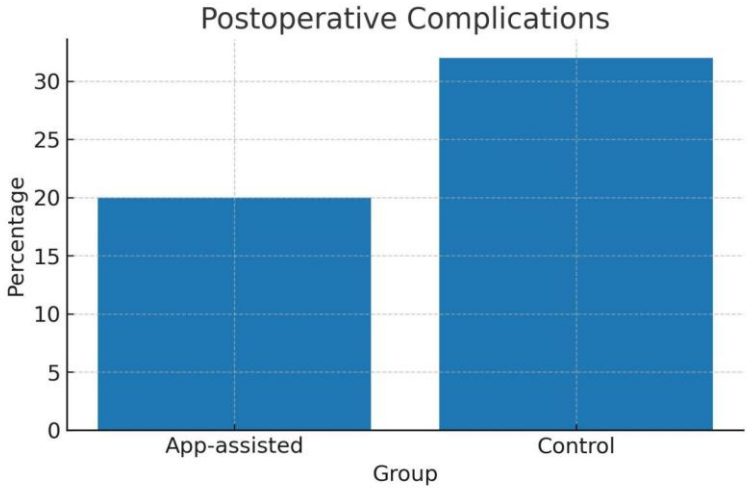

Figure 2. Graph showing post operative complications between groups

DISCUSSION

This study demonstrates that a mobile application incorporating a structured scoring system can effectively assist in the management of acute intestinal obstruction. While treatment accuracy was comparable to conventional methods, the app significantly reduced decision-making time. This finding is particularly relevant in surgical emergencies, where every minute lost can impact outcomes such as bowel viability and postoperative morbidity[9,10].

The reduced complication rate and shorter hospital stay in the App group, although statistically non-significant, point toward a potential clinical benefit of technology-driven decision support. These results are consistent with previous reports highlighting the value of mHealth tools in emergency medicine and surgical triage[11,12]. Mobile applications, by standardizing assessments, reduce inter-observer variability and provide evidence-based recommendations in real-time[13].

From a surgical perspective, the app offers an objective adjunct to clinical judgment, particularly for junior surgeons in training or in resource-constrained settings. Unlike traditional scoring systems, which may be cumbersome, the integration of parameters into a mobile platform makes bedside decision-making practical[14]. This could be especially beneficial in rural hospitals where access to senior consultants or advanced imaging is limited.

Our study also adds to the growing body of evidence supporting artificial intelligence and mobile technology in surgery. Comparable models have been tested in appendicitis, trauma, and sepsis, showing high sensitivity and reduced diagnostic delays[15–17]. Importantly, in our study, the app demonstrated equal diagnostic accuracy while improving workflow efficiency—a crucial element in high-volume emergency departments[18].

Strengths of our study include prospective design, clear outcome measures, and balanced randomization. However, limitations must be acknowledged. The relatively small sample size and single-center setting limit generalizability. Additionally, the app was not validated against gold-standard outcomes such as intraoperative findings beyond surgeon judgment[19]. A multicenter trial with larger cohorts is necessary to establish broader applicability[20].

In summary, this study highlights the feasibility and utility of a mobile application in guiding AIO management. By improving efficiency without sacrificing accuracy, such tools could complement surgeon expertise, reduce delays, and optimize outcomes[21–24].

CONCLUSION

Our study demonstrates that the use of a mobile application for optic nerve sheath diameter (ONSD) assessment significantly reduces surgical decision-making time while maintaining comparable accuracy in treatment planning when contrasted with standard clinical evaluation. Although the overall rates of surgical intervention, conservative management, and conversion to surgery were similar across both groups, the app-assisted approach was associated with a trend toward fewer postoperative complications and a statistically significant reduction in hospital stay. These findings highlight the potential role of digital tools in enhancing clinical efficiency, optimizing resource utilization, and improving patient outcomes in surgical practice. While the diagnostic accuracy of ONSD remains robust, further large-scale validation in diverse clinical scenarios, including trauma and ICU populations, is warranted. Integration of mobile technology into surgical workflows may represent a pragmatic step toward precision decision-making and modernized perioperative care.

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