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Same-Day Discharge in Laparoscopic Acute Non-Perforated Appendectomy in our Hospital

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Abstract
L*APAROSCOPIC appendectomy has become one of the most common laparoscopic surgery performed in day to day of a surgeon. Advantages outrage far more when compared to open appendectomy and thus the shift from to open to minimal access surgery has gained importance considering mainly perioperative period. Small studies done during the past decade have demonstrated same-day discharge after appendectomy as an option for non-perforated appendicitis. Here we have examined a study group to confirm that same-day discharge in acute non-perforated appendicitis is a safe option. All patients older than 18 years of age with acute, non-perforated appendicitis who underwent a laparoscopic appendectomy were included. Compared patients discharged on the day of surgery with patients hospitalized for 1 night and followed up sequentially. The study was composed of 403patients; 283 patients were in the same-day discharge group and 120 patients were in the hospitalized group. Patients in the same-day discharge group had a lower rate of readmission within 30 days when compared with the hospitalized group (2.2% vs 3.1%; p < 0.005). Postoperative general surgery department visits were slightly higher in the hospitalized group (85% vs 81%; p < 0.001).*
Keywords: *Laparoscopic Appendectomy, Open Appendectomy, Minimal Access Surgery, Non-Perforated Appendicitis.*

Introduction

More than 250,000 appendectomies are performed annually in the India for acute appendicitis in children and adults. Laparoscopic appendectomy with discharge the next day is the widely accepted treatment for non perforated acute appendicitis. However, with increasing emphasis on safely minimizing hospital-acquired costs, small trials have demonstrated the safety of discharging adults and children within the same day without overnight hospitalization. Cross and colleagues1 presented retrospective data for 2 years of laparoscopic appendectomies, which included 54 patients discharged within 24 hours. They demonstrated no statistical difference in same-day discharge (SDD) compared with overnight stay for

non-perforated, acute appendicitis. The purpose of this study is to compare safety and outcomes for patients who underwent a laparoscopic appendectomy at Kempegowda Institute of Medical Sciences and Research Centre Bangalore, discharged on the day of surgery compared with those kept for the traditional overnight stay.

Materials and Methods

Between Jan 2014 and oct 2017, All patients older than 18 years of age with acute, non perforated appendicitis who underwent a laparoscopic appendectomy were included. Exclusion criteria included those who presented with evidence of perforation, incidental appendectomy, appendectomy performed concomitant with another procedure. We compared patients discharged on the day of surgery with those hospitalized overnight. Overnight hospitalization was defined as having an admission status beyond 12:01 AM. Patients in the SDD group were discharged from the post operative room at the discretion of the operating surgeon and if they met discharge criteria. The surgeon's discretion was based on preoperative evaluation, intraoperative findings, postoperative recovery, and whether the patient met discharge criteria. The post operative room discharge criteria were based on the Procedural and Anesthesia Scoring System (Table 1). Patients with a score >12 were deemed safe for discharge. We examined readmission rates, complication rates, postoperative emergency department visits, reoperation. All the data management and analyses were performed suing SAS Enterprise Guide (version 6.1). Chi-square testing was performed to compare patient demographics, comorbidities, return visits, and complication rates. A Cochran-Armitage Trend Test was used to assess the trend of SDD after appendectomy.

Table .1

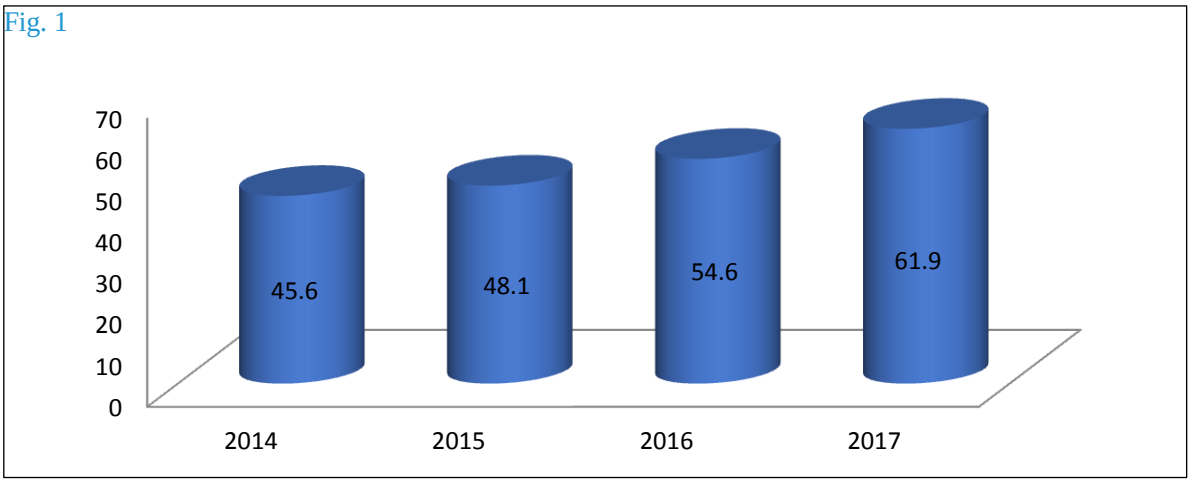
Variable	Score
Consciousness	
Awake and alert, turns toward voice	2
Arousable but drifts back to sleep	1
Unresponsive (except for painful/repeated stimuli)	0
Activity	
Appropriate for age or development	2
Weak for age or development	1
No voluntary movement	0
Circulation	
Stable BP within 15% of pre-sedation level	2
BP within 30% of pre-sedation level	1
BP >30% higher or lower than pre-sedation level	0
Respiration	
Able to cough, breathe deeply or cry	2
Dyspnea or limited breathing	1
Apnea or obstructed breathing requires assistance to maintain airway	0
O2 saturation	
Room air: O2 >95%	2
Needs supplemental O2 to maintain >95%	1
O2 saturation <95% with supplementation	0
Pain	
None or mild pain	2
Moderate or severe pain controlled with IV analgesics	1
Persistent severe pain	0
Emetic	
None or mild nausea without vomiting	2
Transient vomiting or retching	1
Persistent moderate to severe nausea or vomiting	0

Results

The study was composed of 403 non-perforated acute appendicitis patients who underwent laparoscopic appendectomy, where 283 (70.22%) were in the SDD group and 120 patients (29.77%) were in the hospitalized group. The patients in the SDD group had a lower rate of readmission within 30 days when compared with the hospitalized group (2.2% vs 3.1%; $p < 0.005$). Subanalysis of sex, age, and diagnosis of diabetes mellitus and hypertension as independent variables was performed. Older patients (age older than 50 years) and patients with diagnosis of diabetes were more likely to be admitted for an overnight stay after their procedure. Patients with previous diagnosis of hypertension were similarly more likely to be admitted compared with patients in the SDD group (16% vs 13%; $p < 0.0001$). In both groups, postoperative complication rates, such as wound infection, and postoperative visits to

emergency department for treatment or diagnostic studies were not significantly different. There was a higher percentage of postoperative visits with the operating surgeon for patients in the hospitalized group (85% vs 81%; p < 0.001). Patients discharged without an overnight stay had a lower direct hospital cost (p < 0.001).

Fig. 1



Discussion

Appendectomy remains the gold standard for treatment of acute appendicitis.[2,5,10] Since the introduction of laparoscopic surgery and its increasing use in general surgery, studies have shown that laparoscopic surgery offers a considerable decrease in length of stay, less pain, and shorter recovery time when compared with open procedures for many surgical diseases.[2,5,11] Similar results have been demonstrated in laparoscopic appendectomy.[8,9] Page and colleagues 5 showed that appendectomies are now performed >80% of the time using laparoscopic techniques, revealing that laparoscopic appendectomy has now become the preferred choice. Common practice today in non-perforated acute appendicitis is laparoscopic appendectomy with discharge on the next day. We have shown in a case series that this group of patients can be safely discharged on the same day from the recovery room after undergoing a laparoscopic appendectomy at the discretion of the surgeon. Our results are similar to those from several studies done in the past decade. Frazee and colleagues[2] reported an 88% success rate in patients with non-perforated acute appendicitis managed with laparoscopic appendectomy and discharged on the day of surgery. Our postoperative complication rate for SDD was comparable with other studies reporting a 2% to 7% postoperative complication rate.[2,8-10] In addition, in concordance with previous studies, SDD did not result in higher rates of readmission.[2,8-10] We found that older patients and patients with existing comorbidities were less likely to be discharged on the day of surgery. Frazee and colleagues2 demonstrated that, in patients eligible for SDD, pre existing comorbidities were influencing factors prompting admission after appendectomy. Because the decision to discharge or admit the patient is at the discretion of the operating surgeon, it is logical to conclude that surgeons are more comfortable discharging younger, healthier patients from the recovery room. In addition, we observed that the later surgery took place on a given day, the more likely patients were to be admitted overnight. i.e., if the surgery was completed after 8 PM, there was a >70% chance that the patient would be kept in the hospital overnight. In most cases, patients who present in the middle of the night are admitted and then added to the operating room schedule the next day. Use of a standardized protocol has been shown to increase the rate of SDD after laparoscopic appendectomy.[2,8] When comparing patients with appendicitis managed

using an actual outpatient protocol for discharge criteria vs patients managed at the discretion of the surgeon. However, analysis of our data showed, when compared year to year, a higher percentage of patients being discharged home from the recovery room as the approach gained popularity and acceptance from 2014 to 2017, with a steady increase in SDD from 45.5% in 2014 to 61.9% in 2017 ($p < 0.0001$) (Fig. 1). In our study, we demonstrated a lower direct cost for patients in the SDD group, Improving cost-effectiveness and preserving patient safety are of stay, translating to faster recovery and better patient care. Recently, antibiotic treatment without surgical intervention for acute non-perforated appendicitis has gained attention.[12] Studies have shown antibiotics alone can be a reasonable alternative to surgery. Overall, antibiotic treatment was associated with a 63% to 78% success rate in 1-year follow-up, with a trend favoring antibiotic treatment in a shorter length of stay without a significant difference.[12,13] However, in these studies, the mean length of stay ranges from 3 to 3.96 days in the surgery group compared with 2.6 to 3.4 days in the antibiotic treatments group. Compared with our data, where the length of stay was 1 day or less after surgery, the advantages of antibiotic treatment alone with regard to length of stay do not correlate. This study's strengths are found in the statistical power generated by such a large number of patients, as well as the multi-surgeon nature of the data. The limitations of this study are in the retrospective design, but the large patient population and electronic medical record can be leveraged in future studies to prospectively analyze standard protocols for SDD after laparoscopic appendectomies to prove the safety and value of this treatment. An additional weakness of the study is that, although we showed there was no difference in readmission rates between the 2 groups, a complete analysis of the reasoning for readmission has not been performed.

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