Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i6.6613

A STUDY ON POSTOPERATIVE COMPLICATIONS AFTER ABDOMINAL SURGERY IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Noor Fatima[1], Amna Mumtaz[2], Maria Shaikh[3], Muhammad Faheem Anwer[4*], Akashnath Kivalur Ganeshanath[5], Bushra Safeer[6], Hosam Alazazzi[7], Kamel J. K. Walwil[8], Jumana Abdelrahman Diab[9]

[1]Department of Medical Education, Rashid Latif Khan University and Medical College, Lahore, Pakistan
[2]Medical Officer, Institute of Cardiology, DG Khan, Pakistan
[3]Medical Officer, General Surgery, Jinnah Postgraduate Medical Center, Karachi, Pakistan
[4*]Associate professor, Department of Surgery, CMH Lahore Medical College, Lahore, Pakistan
[5]Royal College of Surgeons Ireland
[6]Department of Medicine, Saidu Teaching Hospital, Swat, Pakistan
[7,8,9]Royal College of Surgeons in Ireland - Bahrain

***Corresponding Author:** Muhammad Faheem Anwer
*Associate professor, Department of Surgery, CMH Lahore Medical College, Lahore, Pakistan
Email: drfaheem99@hotmail.com

Abstract

Aim: The objective of the current study was to investigate postoperative complications following abdominal surgery in COPD patients.

Patients and Methods: A retrospective study investigated 118 patients who underwent abdominal surgery out of which 46 patients had COPD in the Department of General Surgery and Gastroenterology of Tertiary Care Hospital, Lahore from January 2023 to December 2023. The severity of COPD was defined based on forced expiratory volume (FEV); Severe (FEV1<50%); Moderate (FEV1 50-79%), and Mild (FEV1 >80% of predicted). Each patient is subjected to medical history, physical examination, forced expiratory volume, Chest X-rays, and arterial blood gases. SPSS version 26 was used for descriptive statistics.

Results: The overall mean age was 62.14±8.52 years. Out of 46 COPD patients, there were 28 (60.9%) male and 18 (39.1%) females. The incidence of mild, moderate, and severe COPD was 6 (13%), 26 (56.5%), and 14 (30.4%), respectively. Laparotomy or laparoscopy was the most prevalent intervention performed in COPD followed by Cholecystectomy, Colectomy, Small-bowel resection, Gastrectomy, Ileostomy, Appendectomy, Pancreatic resection, and Low anterior resection. The prevalence of postoperative pulmonary and cardiac complications was 19.6% and 26.1%, respectively.

Conclusion: COPD Patients showed an increased incidence of pulmonary and cardiac complications. Complications were particularly high in proximal surgical sites such as the upper abdomen.

Keywords: Chronic obstructive pulmonary disease, abdominal surgery, postoperative complications

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) refers to limitation of airflow due to lung parenchyma's destruction and narrowing of small airways contributing to the higher rate of morbidity and mortality [1, 2]. Chronic lung function in patients with COPD confers a high risk of the incidence of postoperative pulmonary complications (PPCs) [3]. Even minor PPCs such as atelectasis or pleural effusion can aggravate a patient's disease state and increase the chances of prolonged hospital stay and ICU admission, as well as hospital readmission [4, 5]. Anesthesiologists to prevent PPC oral techniques, such as mechanical ventilation, fluid administration, and reversal of neuromuscular blockers [6, 7]. Patient's admission to the intensive care unit and prolonged hospitalization come from increasing risk caused by pleural effusion like mild PPCs [8].

Postoperative pulmonary complications are a major cause of morbidity and mortality [9]. Previously considered unsuitable cases for surgery are now turned into possible surgery due to the advancement in medical field especially surgery and anesthetic techniques. PPCs mainly caused by the intervention done for upper abdominal and chest surgery. Elective abdominal surgery patients revealed that pulmonary complications were more common than cardiac complications [10]. Postoperative pulmonary complications reported in the literature ranged from 2% to 70%. This high variability is partly due to differences in patient selection and treatment-related risk factors [11, 12].

METHODOLOGY

A retrospective study investigated 118 patients who underwent abdominal surgery out of which 46 patients had COPD in the Department of General Surgery and Gastroenterology of Tertiary Care Hospital of Lahore, Pakistan from January 2023 to December 2023. The severity of COPD was defined based on forced expiratory volume (FEV); Severe (FEV1<50%); Moderate (FEV1 50-79%), and Mild (FEV1 >80% of predicted). Each patient is subjected to medical history, physical examination, forced expiratory volume, Chest X-rays, and arterial blood gases. All patients received sevoflurane or desflurane after infusion of propofol, fentanyl, and midazolam. Complications were defined as follows: pneumonia, with chest radiograph findings of temperature greater than 38.5°C and/or prolonged mechanical ventilation due to respiratory failure efficacy requiring antibiotic therapy was evidenced by resistant hypoxemia, and the unexpected need for postoperative aerosol therapy.

SPSS version 26 was used for descriptive statistics. Numerical data were expressed as mean and standard deviation whereas Categorical variables were presented as frequency and percentages. Chi-square test was used for the assessment of association between different categorical variables by considering 95% confidence interval and p-value≤5 statistically significant.

RESULTS

The overall mean age was 62.14±8.52 years. Patients were divided into two groups; Group-I (With COPD) and Group-II (without COPD). There were 46 and 72 patients in Group-I and Group-II, respectively. Out of 46 patients, there were 28 (60.9%) male and 18 (39.1%) females. The incidence of mild, moderate, and severe COPD was 6 (13%), 26 (56.5%), and 14 (30.4%), respectively. Laparotomy or laparoscopy was the most prevalent intervention performed in COPD followed by Cholecystectomy, Colectomy, Small-bowel resection, Gastrectomy, Ileostomy, Appendectomy, Pancreatic resection, and Low anterior resection. The prevalence of postoperative pulmonary and cardiac complications was 19.6% and 26.1%, respectively. Baseline details and clinical characteristics of both groups are compared in Table-I. The incidence of mild, moderate, and severe COPD is shown in Figure 1. Types of intervention in COPD patients demonstrated in Figure-2.

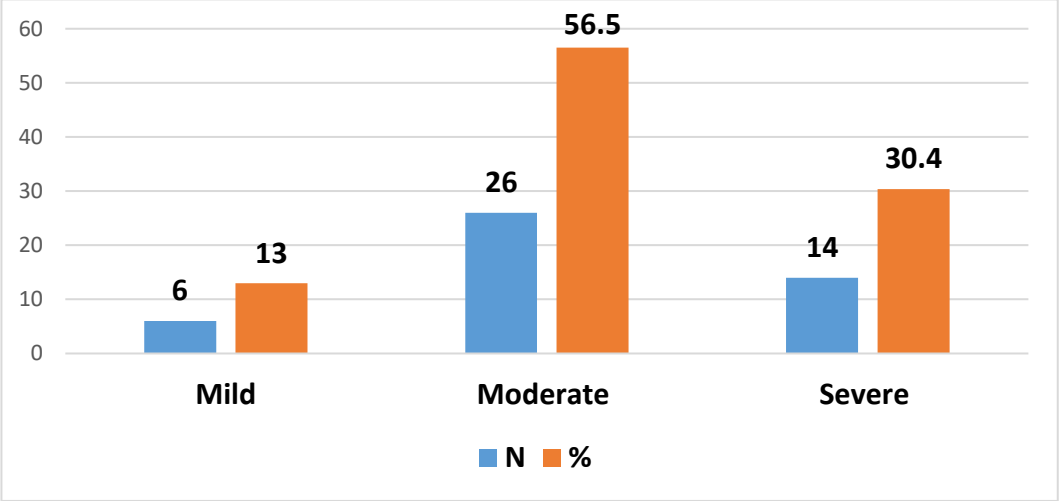

Figure-1 Severity of COPD (N=46)

Table-I Comparison of baseline details and clinical characteristics in both groups (N=118)

Variables	Group-I (With COPD)	Group-II (without COPD)	P-value
Age (years)	64.8±7.72	59.48±6.92	0.68
Gender			0.59
Male	28 (60.9%)	48 (66.7%)	
Female	18 (39.1%)	24 (33.3%)	
Postoperative complications			0.001
Pulmonary	9 (19.6%)	0	
Cardiac	10 (21.7%)	2 (2.8%)	
ASA status			
1	3 (6.5%)	8 (11.1%)	
2	34 (73.9%)	52 (72.2%)	
3	7 (15.2%)	9 (12.5%)	
4	2 (4.3%)	3 (4.2%)	
Preoperative spirometry			0.001
FVC (%)	66.3 (49.0, 91.0)	91.5 (81.0, 99.0)	
FEV 1 (%)	57 (37, 77)	95 (81, 105)	
FEV1/FVC	0.86 (0.71, 0.89)	0.96 (0.81, 0.99)	

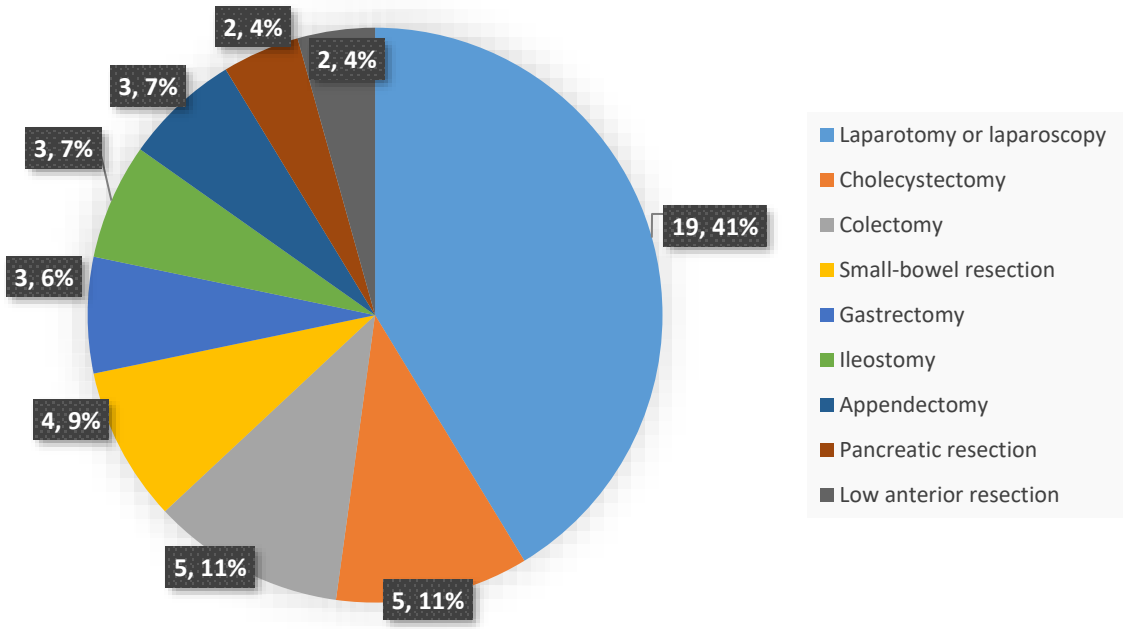

Figure-2 Types of interventions performed on COPD patients (N=46)

DISCUSSION

The present study mainly focused on the increasing rate of postoperative complications following abdominal surgery in COPD patients and reported that COPD patients had higher incidence of postoperative cardiac and pulmonary complications. Complication rates were particularly high in proximal surgical sites such as the upper abdomen. These findings are consistent with prior studies [13, 14]. There is scarcity of data regrading the association with postoperative pulmonary complications (PPCs) and between mild and moderate COPD.

There was no difference in complication rates based on severity of COPD. Higher ASA group and pulmonary vaccination were significantly associated with increased cardiac complications. No significant variations regarding duration and type of surgery among COPD patients. Yet, higher incidence of pulmonary complications observed in upper abdominal surgery than lower abdominal surgery [15, 16].

The risk of mild postoperative complications increased by the COPD among surgical patients [17]. Cardiac and pulmonary complications were significantly higher in COPD cases. Consequently, numerous criteria for surgery associated risk assessment mainly seen in COPD patients [18]. Pulmonary complications is generally indicated by the FEV1 or FVC < 70 percent. Through, numerous investigations observed the clinical status during and after surgery and reported that pulmonary related parameters are less significant than clinical status during surgery [19, 20].

Obesity, COPD, general medical conditions, age advancement, and smoking are different risk factors for pulmonary complications. The present investigation reported that besides COPD, higher ASA scores were associated with increased cardiac complications. The worst medical condition has been identified as a risk factor. The primary comorbidities are older age and classification of ASA [21].

Vascular occlusion, surgery duration, surgical site, and anesthesia considered as risk factors for causing pulmonary complication among COPD patients. These factors and surgical site emerges as the most important risk factor. Peri-thoracic surgical sites have higher complication rates. The incidence rates of pulmonary complications among patients undergone abdominal surgery were 20.1%, 8.6%, and 13.9% as reported by numerous studies [22-24].

An earlier study reported that postoperative pulmonary complications associated risk factors reduced by laparoscopic type interventional procedure performed on COPD patients [25]. Postoperatively, improving lung weight and deep breathing facilities are the main factors along with lower pain for laparoscopic procedures as preferable choice. Additionally, pulmonary complications after abdominal surgery were evidence for laparoscopic as a preferable choice.

CONCLUSION

COPD Patients showed an increased incidence of pulmonary and cardiac complications. Complications were particularly high in proximal surgical sites such as the upper abdomen.

REFERENCES

1. Atalay F, Uygur F, Cömert M, Özkoçak I. Postoperative complications after abdominal surgery in patients with chronic obstructive pulmonary disease. The Turkish Journal of Gastroenterology: the Official Journal of Turkish Society of Gastroenterology. 2011 Oct 1;22(5):523-8.
2. Vogelmeier, C.F.; Criner, G.J.; Martinez, F.J.; Anzueto, A.; Barnes, P.J.; Bourbeau, J.; Celli, B.R.; Chen, R.; Decramer, M.; Fabbri, L.M.; et al. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease 2017 Report. GOLD Executive Summary. Am. J. Respir. Crit. Care Med. 2017, 195, 557–582.
3. Yang CK, Teng A, Lee DY, Rose K. Pulmonary complications after major abdominal surgery: National Surgical Quality Improvement Program analysis. J Surg Res. 2015;198(2):441–449.
4. Gupta H, Ramanan B, Gupta PK, et al. Impact of COPD on postoperative outcomes: results from a national database. Chest. 2013;143(6):1599–1606.
5. Kim HJ, Lee J, Park YS, et al. Impact of GOLD groups of chronic pulmonary obstructive disease on surgical complications. Int J Chron Obstruct Pulmon Dis. 2016;11:281–287.

6. Miskovic, A.; Lumb, A.B. Postoperative pulmonary complications. Br. J. Anaesth. 2017, 118, 317–334.
7. Neto, A.S.; Hemmes, S.N.; Barbas, C.S.; Beiderlinden, M.; Fernandez-Bustamante, A.; Futier, E.; Gajic, O.; El-Tahan, M.R.; Ghamdi, A.A.; Gunay, E.; et al. Association between driving pressure and development of postoperative pulmonary complications in patients undergoing mechanical ventilation for general anesthesia: A meta-analysis of individual patient data. Lancet Respir. Med. 2016, 4, 272–280.
8. Shin, B.; Lee, H.; Kang, D.; Jeong, B.H.; Kang, H.K.; Chon, H.R.; Koh, W.J.; Chung, M.P.; Guallar, E.; Cho, J.; et al. Airflow limitation severity and post-operative pulmonary complications following extra-pulmonary surgery in COPD patients. Respirology 2017, 22, 935–941.
9. Gülsen A, Kilinc O, Tertemiz KC, Ekice T, Günay T. Comparison of postoperative pulmonary complication indices in elective abdominal surgery patients. Tanaffos. 2020 Jan;19(1):20.
10. Chandler D, Mosieri C, Kallurkar A, Pham AD, Okada LK, Kaye RJ, Cornett EM, Fox CJ, Urman RD, Kaye AD. Perioperative strategies for the reduction of postoperative pulmonary complications. Best practice & research Clinical anaesthesiology. 2020 Jun 1;34(2):153-66.
11. Hou R, Miao F, Jin D, Duan Q, Yin C, Feng Q, Wang T. General Anesthesia for Patients With Chronic Obstructive Pulmonary Disease and Postoperative Respiratory Failure: A Retrospective Analysis of 120 Patients. Frontiers in Physiology. 2022 May 30;13:842784.
12. Li XF, Jiang D, Jiang YL, Yu H, Zhang MQ, Jiang JL, He LL, Yu H. Comparison of low and high inspiratory oxygen fraction added to lung-protective ventilation on postoperative pulmonary complications after abdominal surgery: a randomized controlled trial. Journal of clinical anesthesia. 2020 Dec 1;67:110009.
13. Fernandez-Bustamante A, Frendl G, Sprung J, Kor DJ, Subramaniam B, Martinez Ruiz R, et al. Postoperative Pulmonary Complications, Early Mortality, and Hospital Stay Following Noncardiothoracic Surgery: A Multicenter Study by the Perioperative Research Network Investigators. JAMA Surg 2017;152(2):157–166
14. Kumar L, Satheesan KN, Rajan S, Vasu BK, Paul J. Predictors and Outcomes of Postoperative Pulmonary Complications following Abdominal Surgery in a South Indian Population. Anesth Essays Res 2018;12(1):199–205.
15. Patel K, Hadian F, Ali A, Broadley G, Evans K, Horder C, et al. Postoperative pulmonary complications after major abdominal elective surgery? Perioper Med. 2016;5:10. Doi:10.1186/s13741-016-0037-0.
16. Kim TH, Lee JS, Lee SW, Oh YM. Pulmonary complications after abdominal surgery in patients with mild-to-moderate chronic obstructive pulmonary disease. Int J Chron Obstruct Pulmon Dis. 2016;11:2785–96.
17. Nithiuthai J, Siriussawakul A, Junkai R, Horugsa N, Jarungjitaree S, Triyasunant N. Do ARISCAT scores help to predict the incidence of postoperative pulmonary complications in elderly patients after upper abdominal surgery? An observational study at a single university hospital. Perioperative Medicine. 2021 Dec;10:1-2.
18. Kassahun WT, Babel J, Mehdorn M. The impact of chronic obstructive pulmonary disease on surgical outcomes after surgery for an acute abdominal diagnosis. European Journal of Trauma and Emergency Surgery. 2023 Dec 8:1-0.
19. Zhao CH, Sun YH, Mao XM. Volume Incentive Spirometry Reduces Pulmonary Complications in Patients After Open Abdominal Surgery: A Randomized Clinical Trial. International Journal of General Medicine. 2023 Dec 31:793-801.
20. Sun M, Xu M, Sun J. Risk factor analysis of postoperative complications in patients undergoing emergency abdominal surgery. Heliyon. 2023 Mar 1;9(3).
21. Shahait AD, Dolman H, Mostafa G. Postoperative outcomes after emergency laparotomy in nontrauma settings: a single-center experience. Cureus. 2022;14(3): e23426

22. Kassahun WT, Mehdorn M, Wagner TC. The effects of reoperation on surgical outcomes following surgery for major abdominal emergencies. A retrospective cohort study. Int J Surg. 2019;72:235–40.
23. Kassahun WT. The effects of pre-existing dementia on surgical outcomes in emergent and nonemergent general surgical procedures: assessing differences in surgical risk with dementia. BMC Geriatr. 2018;18:153.
24. Sankar A, Thorpe K, McIsaac DI, Luo J, Wijeysundera DN, Gershon AS. Survival and health care costs after inpatient elective surgery: comparison of patients with and without chronic obstructive pulmonary disease. Cmaj. 2023 Jan 17;195(2):E62-71.
25. Salama M, El-Taher EM, Al-Touny AH, Ismail RA, Abdel-Ghaffar ME. Postoperative Pulmonary Complications: A Review of the Literature and Implications for Practice. Suez Canal University Medical Journal. 2024 Feb 1;27(2):0-.