



TO EVALUATE THE ROLE OF ARISCAT SCORE IN PREDICTING POSTOPERATIVE PULMONARY COMPLICATIONS IN PATIENTS UNDERGOING ANY ELECTIVE/EMERGENCY SURGERY –a prospective study

Dr. PTM Ashfaqh¹, Dr. Vidya Sagar S², Dr. SriPrabhatha K³, Dr. D.C.U. Siva Kumar⁴

¹Junior resident, Department of Pulmonology, Alluri Sita Ramaraju Academy of Medical Sciences, Eluru, India

² Assistant Professor, Department of General Medicine, Alluri Sita Ramaraju Academy of Medical Sciences, Eluru, India

³ Assistant Professor, Department of Pulmonology, Alluri Sita Ramaraju Academy of Medical Sciences, Eluru, India

⁴ Statistician, Assistant Professor, Department of Community Medicine, Alluri Sita Ramaraju Academy of Medical Sciences, Eluru, India

Corresponding Author: Dr. SriPrabhatha Kota, Assistant Professor, Department of Pulmonology, Alluri Sita Ramaraju Academy of Medical Sciences, Eluru, India

Article History

Volume 6, Issue 12, 2024

Received Date: 20 May 2024

Acceptance Date: 28 June 2024

Doi:

10.48047/AFJBS.6.12.2024.3100-3106

ABSTRACT

- **Background:** ARISCAT (Assess Respiratory risk In Surgical patients in Catalonia) is a 7 variable index classifying the patients into mild, moderate and high risk for postoperative pulmonary complications. Components of score include age, preoperative SpO₂, respiratory infection in last month, preoperative anaemia, surgical incision, duration of surgery, emergency procedure. However this index is derived from population of only one particular geographical area (Catalonia, Spain). There are only few prospective studies of this risk score in our geographic population.

AIM and OBJECTIVES: To study the risk of post operative pulmonary complications in patients undergoing elective or emergency surgeries using ARISCAT score

- To find out the incidence of post operative pulmonary complications in various surgeries
- To calculate sensitivity and specificity of ARISCAT score

METHODOLOGY: This is a prospective observational study done in a tertiary care hospital in 100 patients referred to pulmonology department for preoperative evaluation from sept 2023 to NOV 2023. They were assessed with ARISCAT score preoperatively and followed up postoperatively for any complications.

RESULTS: Out of 100 patients studied, 38 were predicted as low risk, 41 were predicted as intermediate risk and 21 as high risk to develop postoperative pulmonary complications. 80.9% predicted as high risk with ARISCAT score developed postoperative pulmonary complication, 31.7% predicted as intermediate risk and 11.7% predicted

as low risk developed postoperative pulmonary complications. Sensitivity of ARISCAT score is 53% and specificity is 93.9% in our study.

CONCLUSION: ARISCAT score can be used in preoperative evaluation to assess the risk for postoperative pulmonary complications with a specificity of 93.9%. Postoperative pulmonary complications have higher incidence in our study and is responsible for increased length of stay in hospital.
Keywords : ARISCAT score, Postoperative pulmonary complications

INTRODUCTION: POSTOPERATIVE pulmonary complications (PPCs) contribute to a substantial proportion of risk related to surgery and anesthesia and are a major cause of postoperative morbidity, mortality, and longer hospital stays. Few patients may require oxygen support or NIV and some may need ICU admission, whereas few may have subclinical presentation postoperatively. Preoperative evaluation is required in order to predict the risk of pulmonary complications postoperatively, for which several risk indices were introduced. Respiratory failure index (RFI), ASA, Saphiro index, GUPTA scoring, ARISCAT (Assess Respiratory Risk in Surgical Patients in Catalonia) were few among them. Risk prediction models developed by Gupta et al, Hua et al, Blum et al for predicting PPC were retrospective studies, but ARISCAT score by Canet et al is developed from a prospective study. This score was built in 2010, by Canet et al with a prospective, multicentre, observational study including 59 hospitals in Spain. ARISCAT risk index included seven independent risk factors like low preoperative arterial oxygen saturation, acute respiratory infection during the previous month, Age, Preoperative anemia, upper abdominal or intrathoracic surgery, Surgical duration of at least 2 hours and Emergency surgery. In the present study we wanted to assess the ability of ARISCAT index in identifying PPCs. Even though the ARISCAT Risk Index was eventually validated in a large surgical population, its effectiveness varied across geographic areas in the PERISCOPE (Prospective Evaluation of a Risk Score for postoperative pulmonary complications in Europe) study in Europe.¹

- **AIM OF THE STUDY:**

To study the risk of post operative pulmonary complications in patients undergoing elective or emergency surgeries using ARISCAT score

- **OBJECTIVES:**

- To find out the incidence of post operative pulmonary complications in various surgeries
- To calculate sensitivity and specificity of ARISCAT score

METHODOLOGY: This is a prospective observational study done in a tertiary care hospital in 100 patients sent to Department of Pulmonology for preoperative evaluation in the months of September 2023 to November 2023. They were assessed with ARISCAT score preoperatively and classified into mild, moderate and high risk. From the day of the procedure until they were discharged from the hospital, the study participants were monitored every day. Any event, such as hypoxia, cough, fever, breathlessness, wheezing, aspiration were recorded, and the necessary investigations such as ABG, Pulse-oximetry, Chest xray were done.

ARISCAT TABLE

		RISK SCORE
Age	≤ 50 Year	0
	51-80 Year	3
	>80 Year	16
Preoperative oxygen saturation	≥ 96%	0
	91-95%	8
	≤ 90%	24
Respiratory infection in past 1 month	No	0
	Yes	17
Preoperative hemoglobin < 10g/dl	No	0
	Yes	11
Incision	Peripheral Incision	0
	Upper Abdominal Incision	15
	Intrathoracic Incision	24
Surgery Duration	< 2 Hours	0
	2-3 Hours	16
	> 3 Hours	23
Emergency Procedure	No	0
	Yes	8
Risk	ARISCAT Score	
Low	< 26 (1.6%)	
Medium/Intermediate	26-44 (13.3%)	
High	≥ 45% (42.1%)	

Postoperative pulmonary complications were considered based on EPCO-European Perioperative Clinical Outcome^c

RESULTS: We have studied 100 patients attending to pulmonology OPD and cases referred from various departments to pulmonology department for preoperative evaluation. All the subjects were assessed with ARISCAT score to know the level of postoperative risk. ARISCAT score predicted high risk for postoperative pulmonary complications in 21 patients, intermediate risk in 41 and low risk in 38 patients.

Among 100 cases studied, 38 cases were abdominal surgeries, 22 were orthopedic, 20 were peripheral surgeries like abscess drainage and rest of them were constituted by Cardiothoracic (3), ENT (6), NEUROSURGERY (8), PLASTIC SURGERY (1), UROLOGY (2).

Out of 100 patients,34 developed postoperative pulmonary complications.

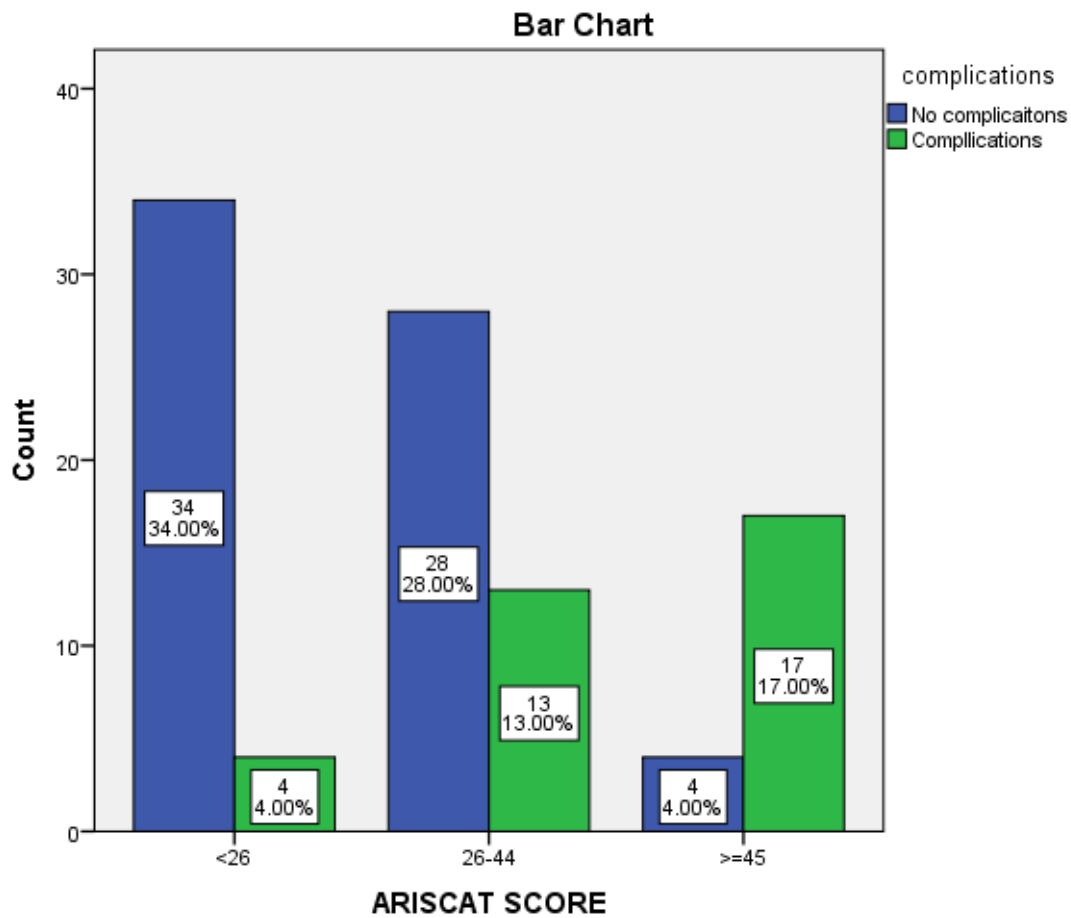


Fig 1 :Complications developed with respect to ARISCAT risk score

Postoperative pulmonary complications were considered based on EPCO-European Perioperative Clinical Outcome ².The complications seen in our study are Respiratory failure(12),Pneumonia(10),ARDS(4),Atelectasis(4),Pleural effusion(3),Pneumothorax (1)

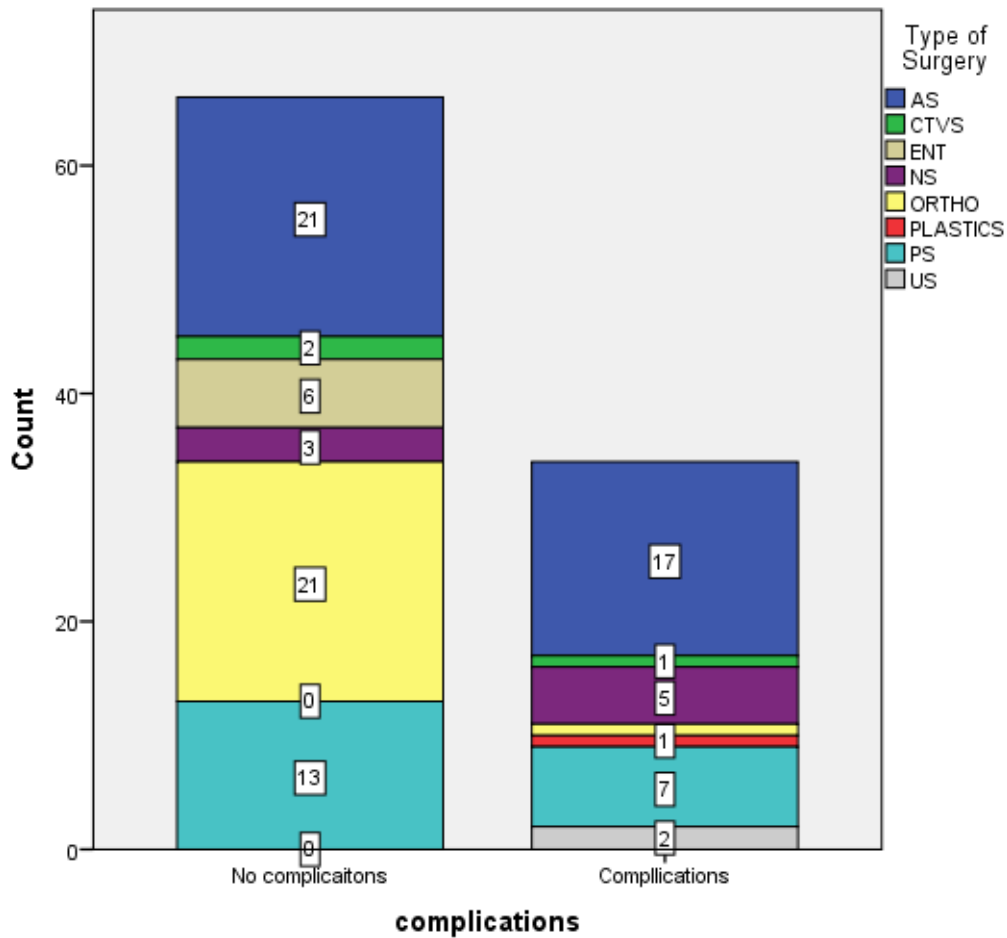


Fig 2: Complications in various types of surgeries

80.9% predicted as high risk with ARISCAT score developed postoperative pulmonary complication, 31.7% predicted as intermediate risk and 11.7% predicted as low risk developed postoperative pulmonary complications.

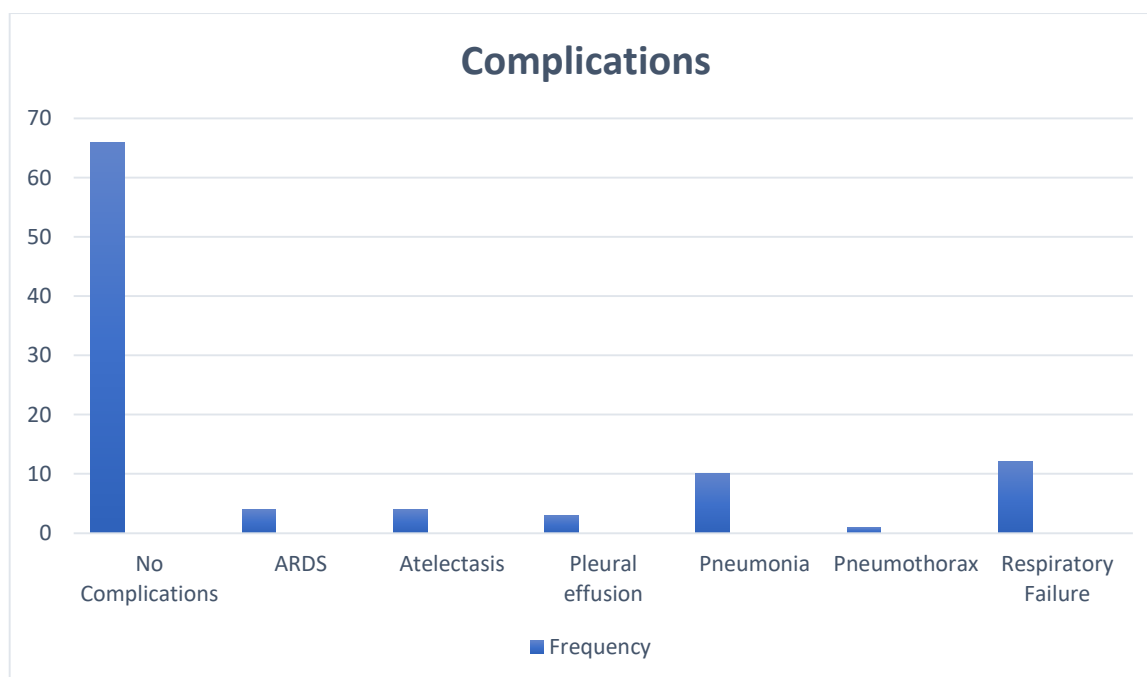


Fig :Postoperative pulmonary complications developed among study population

Among them respiratory failure was seen in 35.29% of cases, pneumonia in 29.4% cases, 11.76% developed atelectasis and ARDS, pleural effusion in 8.8% cases and one case developed pneumothorax. There was mortality in 3 out of 34 cases. Sensitivity of ARISCAT score is 52.9% and specificity is 93.9% in our study.

- DISCUSSION:** Postoperative complications can lead to prolonged hospital stay and may lead to disability at discharge. So, preoperative evaluation, risk stratification and optimization of medical therapy are required before surgery to prevent these complications. Many risk prediction models were developed to assess PPC but most of them were confined to a particular group of surgeries. For example, risk prediction models developed by Arozulla et al³ study included non-cardiac surgeries, Yang et al⁴ included only major abdominal surgeries, Scholes et al⁵ study included upper abdominal surgeries only. ARISCAT (Assess Respiratory risk In Surgical patients in CATolonia) is a 7 variable index classifying the patients into mild, moderate and high risk for postoperative pulmonary complications which included all types of surgeries. We have assessed 100 patients sent for preoperative evaluation for any non-obstetric elective or emergency surgery for a period of 3 months. The average age of participants in our study is 53 years and among 100 patients 58 are males, 42 were females. Incidence of PPC in our study is 34%. The higher incidence of PPCs in our study can be due to inclusion of all types of surgeries unlike many other studies which included only upper abdominal surgeries in a study by Scholes et al⁵ or major abdominal surgeries or only laparotomy surgeries like in study by Smith et al⁶. Arozullah and colleagues have considered only respiratory failure as their outcome. In a study done by Tilak et al⁷ the incidence of PPCs was 19.9%, Li et al was 19% which included all types of surgeries like our study.
- Most common PPC in our study is Respiratory failure (35.29%). In the studies conducted by Jeong et al⁸ (3.4%), Canet et al. (2.6%), McAlister et al. (1.2%) the most common PPC was Respiratory failure which is similar to our study.

- The second most common PPC in our study is Pneumonia. This is similar to study by Gupta et al⁹ where 50% of patients who developed PPC had pneumonia. These findings correlate with our study as, pneumonia was found in 29.4% of those developing PPC. As per study done by Kronel and colleagues respiratory failure is more common followed by Pneumonia which is 4% of total patients developing PPC.
- Blum et al¹⁰ study found that postoperatively ALI\ARDS development is associated with median drive pressure, FiO₂, crystalloid volume and transfusion. In our study we found that out of 34 patients, 11.7% developed ARDS among which 2 had history of malignancy.
- Among our study population of 100, 38% patients have undergone upper abdominal surgeries, 20% have undergone peripheral surgeries, 22% orthopaedic surgery, 8% Neurosurgery, 6% ENT, 3% CTVS, 2% uro-surgery and 1% Plastic surgeries. The incidence of PPC is more among who have undergone upper abdominal surgeries 17% which is similar to a study done by Miskovic et al¹¹
- Length of stay in the hospital was longer in patients with PPC (11 days) than in those without PPC (5.4 days). Canet *et al*[1] in their study also observed that the median postoperative length of stay in the hospital was longer in patients with PPC (11 days) than in those without PPC (3 days). This shows that PPCs are a major cause of longer hospital stays in postoperative patients.
- In our study, complications are seen in [80.95%] patients who had high Ariscat score and [31.7%] in moderate Ariscat score and [10.5%] in low ariscat score patients. The incidence of PPC was more among high-risk score group compared to moderate risk and low-risk groups which was statistically significant with *p*value= 0.0001. This was similar to the study done by Mazo *et al.*⁽¹⁾ which showed that the incidence of PPC was more among high-risk score group (38.01%) compared to moderate risk (12.98%) and low-risk groups (3.39%).
- In this study, the Sensitivity, Specificity, PPV, and NPV of ARISCAT score were 52.94%, 93.94%, 81.81% and 79.48%, respectively. These findings were nearly similar to the study done by Mazo *et al.*[1] The Sensitivity, Specificity, PPV, and NPV of ARISCAT score were 69.31%, 75.25%, 19.4%, and 96.6%, respectively. In the study done by V. Perilli *et al.*¹² a cut-off of 23 points for ARISCAT score was identified as a determinant for the occurrence of PPCs, with 94% sensitivity and 29% specificity which is different from our study.
- **CONCLUSION** :Although ARISCAT score has less sensitivity of 53% it has high specificity of 93.9% in identifying postoperative pulmonary complications. Postoperative pulmonary complications have significant effect on length of hospital stay as seen in our study. So, assessing for the risk of PPCs with ARISCAT score which has high specificity can be recommended.

REFERENCES:

1. Mazo V, Sabaté S, Canet J, Gallart L, de Abreu MG, Belda J, et al. Prospective external validation of a predictive score for postoperative pulmonary complications. *Anesthesiology*. 2014;121(2):219–31.
2. Jammer, Ib; Wickboldt, Nadine; Sander, Michael; Smith, Andrew; Schultz, Marcus J.; Pelosi, Paolo; Leva, Brigitte; Rhodes, Andrew; Hoefft, Andreas; Walder, Bernhard; Chew, Michelle S.; Pearse, Rupert M.. Standards for definitions and use of outcome measures for clinical effectiveness research in perioperative medicine: European Perioperative Clinical Outcome (EPCO) definitions. *European Journal of Anaesthesiology* 32(2):p 88-105, February 2015. | DOI: 10.1097/EJA.000000000000118

3. Arozullah AM, Daley J, Henderson WG, Khuri SF. Multifactorial risk index for predicting postoperative respiratory failure in men after major noncardiac surgery. The National Veterans Administration Surgical Quality Improvement Program. *Ann Surg.* 2000 Aug;232(2):242-53. doi: 10.1097/00000658-200008000-00015. PMID: 10903604; PMCID: PMC1421137.
4. Yang CK, Teng A, Lee DY, Rose K. Pulmonary complications after major abdominal surgery: National Surgical Quality Improvement Program analysis. *J Surg Res.* 2015 Oct;198(2):441-9. doi: 10.1016/j.jss.2015.03.028. Epub 2015 Mar 18. PMID: 25930169.
5. Scholes RL, Browning L, Sztendur EM, Denehy L. Duration of anaesthesia, type of surgery, respiratory co-morbidity, predicted VO₂max and smoking predict postoperative pulmonary complications after upper abdominal surgery: an observational study. *Aust J Physiother.* 2009;55(3):191-8. doi: 10.1016/s0004-9514(09)70081-9. PMID: 19681741
6. Smith PR, Baig MA, Brito V, Bader F, Bergman MI, Alfonso A. Postoperative pulmonary complications after laparotomy. *Respiration.* 2010;80(4):269-74. doi: 10.1159/000253881. Epub 2009 Oct 28. PMID: 19864881.
7. Tilak, Kedar & Litake, Manjusha & Shingada, Krupa. (2019). Study of risk, incidence and mortality associated with postoperative pulmonary complications using assess respiratory risk in surgical patients in catalonia score. *International Surgery Journal.* 6. 3215. 10.18203/2349-2902.isj20194054.
8. Jeong B-H, Shin B, Eom JS, Yoo H, Song W, Han S, et al. (2014) Development of a PredictionRule for Estimating Postoperative Pulmonary Complications. *PLoS ONE* 9(12): e113656. <https://doi.org/10.1371/journal.pone.0113656>
9. Gupta H, Gupta PK, Schuller D, Fang X, Miller WJ, Modrykamien A, et al. Development and validation of a risk calculator for predicting postoperative pneumonia. *Mayo Clin Proc* 2013;88:1241-9.
10. Blum JM, Stentz MJ, Dechert R, Jewell E, Engoren M, Rosenberg AL, Park PK. Preoperative and intraoperative predictors of postoperative acute respiratory distress syndrome in a general surgical population. *Anesthesiology.* 2013 Jan;118(1):19-29. doi: 10.1097/ALN.0b013e3182794975. PMID: 23221870; PMCID: PMC3813014
11. Miskovic A, Lumb AB Postoperative pulmonary complications. *Br J Anaesth.* 2017 Mar 1;118(3):317-334. doi: 10.1093/bja/aex002. PMID: 28186222.
12. Perilli V, Aceto P, Ancona P, De Cicco R, Papanice D, Magalini S, et al. Role of surgical setting and patients-related factors in predicting the occurrence of postoperative pulmonary complications after abdominal surgery. *Eur Rev Med Pharmacol Sci* 2018;22:547-50