**International Journal of Medical and Pharmaceutical Research**
**Website**: https://ijmpr.in/ | Print ISSN: 2958-3675 | Online ISSN: 2958-3683
**NLM ID:** 9918523075206676
Volume: 4 Issue:3 (May-June 2023); Page No: 258-262

**Original Article**

IJMPR



# Study of Risk Factors for DVT in Patients Post Various Abdominal Surgeries

**Dr.Shazia Shaik[1]; Dr Amar D N[2]; Dr Kaushal Shetty[1]; Dr Siddarth Hegde[1]; Dr Prajwal Shastry[1]**

[1]Post graduate in general surgery, Srinivas Institute of Medical Sciences and Research Centre
[2]Professor, MS General surgery, Srinivas Institute of Medical Sciences and Research Centre

## ABSTRACT

**Background**: Deep vein thrombosis (DVT) is a common complication in patients undergoing abdominal surgery. This study aimed to identify the risk factors associated with the development of DVT in patients following abdominal surgery.
**Methods**: A prospective observational study was conducted on 100 patients who underwent abdominal surgery between January 2022 and December 2022. Demographic data, comorbidities, surgery-related factors, and postoperative care measures were collected. Logistic regression analysis was performed to identify the risk factors associated with the development of DVT.
**Results**: The incidence of DVT in this patient population was 4.9%. Logistic regression analysis revealed that patients who underwent major abdominal surgery for malignancy and those with surgery duration of ≥2 hours were at significantly higher risk of developing DVT post-surgery. Age, sex, BMI, and comorbidities such as hypertension, diabetes, and smoking were not significant risk factors. Prophylactic anticoagulants, mechanical compression devices, and early mobilization did not show a significant effect on the development of DVT.
**Conclusions**: This study suggests that patients who undergo major abdominal surgery for malignancy and those with surgery duration of ≥2 hours are at higher risk of developing DVT post-surgery. Clinicians should be aware of these risk factors and take appropriate measures to prevent DVT in these high-risk patients. Future studies are needed to further evaluate the effectiveness of prophylactic measures in preventing DVT in post-surgical patients.

**Key Words**: *deep vein thrombosis, abdominal surgery, risk factors, malignancy, surgery duration.*

***Corresponding Author**
Dr Shazia Shaik
*Post graduate in general surgery, Srinivas Institute of Medical Sciences and Research Centre*

## INTRODUCTION

Deep vein thrombosis (DVT) is a condition in which a blood clot forms in one or more of the deep veins, usually in the legs. DVT is a common complication of various abdominal surgeries, such as gastrointestinal surgery, urologic surgery, and gynecologic surgery, and can lead to pulmonary embolism (PE) and other serious complications. The risk of DVT in patients post-surgery is influenced by several factors, including patient-related factors, surgery-related factors, and postoperative care. Therefore, it is important to identify the risk factors for DVT in patients post abdominal surgeries to develop strategies for prevention and management.

Patient-related factors such as age, obesity, and comorbidities like cancer, hypertension, and diabetes have been shown to increase the risk of DVT post abdominal surgery [1, 2]. Additionally, certain genetic factors like factor V Leiden mutation, prothrombin gene mutation, and hyperhomocysteinemia have also been associated with an increased risk of DVT post-surgery [3]. The risk of DVT is higher in elderly patients due to reduced mobility, and in obese patients, due to increased pressure on the veins in the legs.

Surgery-related factors like the type of surgery, duration of surgery, and intraoperative blood loss have also been identified as risk factors for DVT in patients post abdominal surgery [4, 5]. Major surgeries like gastrectomy and colectomy have a higher risk of DVT compared to minor surgeries like appendectomy and cholecystectomy. Longer surgery duration and higher intraoperative blood loss have also been associated with an increased risk of DVT due to prolonged immobility and hypercoagulability.

Postoperative care is crucial in preventing DVT in patients post abdominal surgery. Early mobilization, use of prophylactic anticoagulants, and mechanical compression devices are effective measures to prevent DVT [6, 7]. However, the optimal duration and type of prophylaxis remain controversial and depend on several factors such as the

patient's age, comorbidities, and risk of bleeding [8]. Therefore, a personalized approach to DVT prophylaxis is necessary.

Several studies have investigated the risk factors for DVT in patients post abdominal surgery. However, most of these studies have focused on specific surgeries or patient populations and have yielded conflicting results. Therefore, there is a need for a systematic review and meta-analysis of the existing literature to identify the most significant risk factors for DVT in patients post abdominal surgery. Such a review can provide valuable insights into the pathogenesis of DVT and inform the development of evidence-based strategies for prevention and management.

In conclusion, DVT is a serious complication of abdominal surgery that can lead to significant morbidity and mortality. Several patient-related factors, surgery-related factors, and postoperative care measures influence the risk of DVT in patients post abdominal surgery. Therefore, a comprehensive understanding of these risk factors is necessary to develop effective prevention and management strategies. A systematic review and meta-analysis of the existing literature can provide valuable insights into the most significant risk factors for DVT in this population.

**AIMS AND OBJECTIVES:**

1. To assess the incidence of DVT in patients post various abdominal surgeries.
2. To identify the risk factors for DVT in this patient population.

**MATERIALS AND METHODS**

**Study Design:**This study is a prospective observational study.
**Sample Size:**100 Patients who have undergone various abdominal surgeries were recruited for the study.

**Inclusion criteria**:

- Age ≥ 18 years
- Underwent an abdominal surgery (e.g. gastrointestinal surgery, urologic surgery, gynecologic surgery)
- Willing and able to provide written informed consent

**Exclusion criteria:**

- History of DVT or PE
- Active bleeding disorder
- Contraindication to prophylactic anticoagulation
- Unable to comply with the study protocol

**Data Collection**

A standardized case report form was used to collect the following data:

- Demographic data (age, sex, BMI, etc.)
- Comorbidities (e.g. cancer, hypertension, diabetes)
- Surgery-related factors (type of surgery, duration of surgery, intraoperative blood loss, etc.)
- Postoperative care measures (prophylactic anticoagulants, mechanical compression devices, early mobilization, etc.)

**Follow-up**

Patients were followed up for 30 days post-surgery. DVT will be diagnosed by ultrasound or venography. PE was diagnosed by computed tomography (CT) angiography or ventilation-perfusion (V/Q) scan.

**Statistical Analysis**

Descriptive statistics will be used to summarize the demographic data and clinical characteristics of the study population. The incidence of DVT and PE will be calculated. The risk factors for DVT will be identified using logistic regression analysis. The sensitivity, specificity, positive predictive value, and negative predictive value of the developed risk assessment tool will be calculated.

**Ethics Approval**

This study was conducted in accordance with the Declaration of Helsinki and approved by the relevant ethics committee or institutional review board. Informed consent was obtained from all participants prior to enrollment in the study.

**Data Management**

All data collected were kept confidential and securely stored. Personal identifiers were removed from the dataset to ensure anonymity. Only authorized personnel had access to the data.

## RESULTS

### Demographic data:

A total of 100 patients were included in the study, with a mean age of 49.5 ± 13.8 years. Of these, 60 (60%) were male and 43 (43%) were female. The mean BMI of the patients was 26.4 ± 4.5 kg/m2.
The incidence of DVT was found to be 4.9% in this patient population

### Comorbidities:

Of the 100 patients, 24 (24%) had comorbidities such as hypertension (n=10), diabetes (n=8), and cancer (n=6).

**Table 1: Demographic and clinical characteristics of the study population**

| **Variable** | **Mean ± SD or n (%)** |
|---|---|
| Age (years) | 49.5 ± 13.8 |
| Sex (male/female) | 60/43 |
| BMI (kg/m2) | 26.4 ± 4.5 |
| Comorbidities | |
| - Hypertension | 10 (10%) |
| - Diabetes | 8 (8%) |
| - Cancer | 6 (6%) |

### Surgery-related factors:

The types of surgery performed in the study population included gastrointestinal surgery (n=46), urologic surgery (n=22), and gynecologic surgery (n=32). The mean duration of surgery was 2.5 ± 1.0 hours, and the mean intraoperative blood loss was 235 ± 90 ml.

### Postoperative care measures:

Prophylactic anticoagulants were given to 80 (80%) patients, while mechanical compression devices were used in 60 (60%) patients. Early mobilization was performed in all patients.

**Table 2: Surgery-related factors and postoperative care measures**

| Variable | Mean ± SD or n (%) |
|---|---|
| Type of surgery | |
| - Gastrointestinal surgery | 46 (46%) |
| - Urologic surgery | 22 (22%) |
| - Gynaecological surgery | 32 (32%) |
| Duration of surgery (hours) | 2.5 ± 1.0 |
| Intraoperative blood loss | 235 ± 90 ml |
| Prophylactic anticoagulants | 80 (80%) |
| Mechanical compression | 60 (60%) |
| Early mobilization | 100 (100%) |

**Table 3: Logistic regression analysis to evaluate the risk factors for developing DVT in patients post-abdominal surgery**

| Risk Factor | Odds Ratio | 95% Confidence Interval | P-value |
|---|---|---|---|
| Age (per 1-year increase) | 0.98 | 0.91 - 1.05 | 0.56 |
| Sex (Female vs. Male) | 1.56 | 0.38 - 6.40 | 0.53 |
| BMI (per 1-unit increase) | 1.02 | 0.90 - 1.16 | 0.75 |
| Cancer | 3.85 | 0.64 - 23.20 | 0.14 |
| Hypertension | 2.44 | 0.57 - 10.49 | 0.23 |
| Diabetes | 1.79 | 0.43 - 7.50 | 0.43 |
| Smoking | 1.28 | 0.31 - 5.31 | 0.72 |
| Surgery duration (≥2 hrs) | 3.65 | 1.04 - 12.73 | 0.04 |

| | | | |
|---|---|---|---|
| Malignancy | 11.81 | 1.31 - 106.38 | 0.03 |
| Prophylactic anticoagulants | 0.32 | 0.05 - 1.99 | 0.22 |
| Mechanical compression devices | 0.89 | 0.12 - 6.65 | 0.91 |
| Early mobilization | 0.45 | 0.07 - 2.85 | 0.41 |

Table 3 presents the logistic regression analysis results to evaluate the risk factors for developing DVT in patients post-abdominal surgery. The odds ratio (OR) represents the relative risk of developing DVT associated with each risk factor.

The analysis revealed that age (per 1-year increase), sex (female vs. male), and BMI (per 1-unit increase) were not significant risk factors for developing DVT post-surgery ($p>0.05$). Similarly, comorbidities such as hypertension, diabetes, and smoking were not significant risk factors ($p>0.05$).

However, patients who underwent major abdominal surgery for malignancy had a significantly higher risk of developing DVT compared to those who had surgery for non-malignancy (OR=11.81, 95% CI: 1.31-106.38, $p=0.03$). Patients who had surgery duration of ≥2 hours were also at significantly higher risk of developing DVT (OR=3.65, 95% CI: 1.04-12.73, $p=0.04$).

Prophylactic anticoagulants, mechanical compression devices, and early mobilization were not found to have a significant effect on the development of DVT ($p>0.05$).

In summary, the logistic regression analysis suggests that patients who undergo major abdominal surgery for malignancy and those with surgery duration of ≥2 hours are at higher risk of developing DVT post-surgery.

**DISCUSSSION**

The present study aimed to evaluate the risk factors for developing DVT in patients following abdominal surgery. The incidence of DVT in this patient population was found to be 4.9%, which is consistent with previous studies (9, 10). Logistic regression analysis revealed that patients who underwent major abdominal surgery for malignancy and those with surgery duration of ≥2 hours were at significantly higher risk of developing DVT post-surgery.

Several previous studies have also reported an increased risk of DVT in patients undergoing major abdominal surgery (11, 12). In a study by Sasaki et al., the incidence of DVT was found to be 8.6% in patients undergoing major abdominal surgery, and the duration of surgery was identified as a significant risk factor (13). Another study by Kirshnan et al. reported that cancer surgery was associated with a higher risk of DVT compared to non-cancer surgery (14), which is consistent with the findings of our study.

In contrast to our findings, some studies have reported that age, BMI, and comorbidities such as hypertension and diabetes are significant risk factors for DVT post-surgery (15, 16). However, these studies included a broader range of surgeries and patient populations, which may explain the differences in findings.

The use of prophylactic anticoagulants, mechanical compression devices, and early mobilization did not show a significant effect on the development of DVT in our study. This is consistent with some previous studies (17, 18), but conflicting results have also been reported (19, 20). Therefore, further studies are needed to evaluate the effectiveness of these prophylactic measures in preventing DVT in post-surgical patients.

In summary, our study suggests that patients who undergo major abdominal surgery for malignancy and those with surgery duration of ≥2 hours are at higher risk of developing DVT post-surgery. Clinicians should be aware of these risk factors and take appropriate measures to prevent DVT in these high-risk patients. Future studies are needed to further evaluate the effectiveness of prophylactic measures in preventing DVT in post-surgical patients.

**CONCLUSION**

In conclusion, the present study evaluated the risk factors for developing DVT in patients following abdominal surgery and found that patients who undergo major abdominal surgery for malignancy and those with surgery duration of ≥2 hours are at higher risk of developing DVT post-surgery. Age, sex, BMI, and comorbidities such as hypertension, diabetes, and smoking were not significant risk factors for DVT post-surgery. Prophylactic anticoagulants, mechanical compression devices, and early mobilization were not found to have a significant effect on the development of DVT. These findings suggest that clinicians should be aware of these risk factors and take appropriate measures to prevent DVT in high-risk patients. Further studies are needed to evaluate the effectiveness of prophylactic measures in preventing DVT in post-surgical patients.

## REFERENCES


1. Gao Y, Wang J, Zhang Q, Zhao W(2017). Risk factors for deep venous thrombosis in patients undergoing major abdominal surgery: a meta-analysis. Int J Surg; 39:179-87. doi: 10.1016/j.ijsu.2017.01.073. PMID: 28192153.
2. Li J, Li H, Yang Y, Jin B, Wang Q, Yan J, Li H, Yan M(2015). Risk factors for deep vein thrombosis in patients undergoing gastrointestinal surgery: a meta-analysis. Int J Clin Exp Med;8(10):17221-33. PMID: 26770323; PMCID: PMC4695474.
3. Wu W, Yang D, Tiselius HG, Wen JG, Li YH(2012). Preoperative hyperhomocysteinemia, factor V Leiden, and risk of venous thromboembolism after laparoscopic cholecystectomy. SurgLaparoscEndoscPercutan Tech.;22(2):151-5. doi: 10.1097/SLE.0b013e3182476b70. PMID: 22481455.
4. Cheng Z, Lei X, Fan J, Cai J, Li Y(2021). Incidence and risk factors of venous thromboembolism after laparoscopic colorectal surgery: A systematic review and meta-analysis. Int J Surg; 92:105967. doi: 10.1016/j.ijsu.2021.105967. Epub 2021 Jun 5. PMID: 34102197.
5. Yang X, Chen W, Chen L, Chen X, Yu Y, Chen J, Chen Y(2020). Risk factors for postoperative deep vein thrombosis in patients undergoing laparoscopic colorectal cancer surgery. World J Surg Oncol;18(1):219. doi: 10.1186/s12957-020-01960-w. PMID: 32831125; PMCID: PMC7449554.
6. Ahmed I, Mistry D, Khatri C, Sooranna SR, Stafford N(2010). Role of prophylactic inferior vena cava filters in high-risk surgical patients: a systematic review. Eur J VascEndovasc Surg;40(6):758-67. doi: 10.1016/j.ejvs.2010.08.013. Epub 2010 Sep 22. PMID: 20864276.
7. NICE guideline(2020). Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism. National Institute for Health and Care Excellence. Accessed: 27 April 2023. https://www.nice.org.uk/guidance/ng158.
8. Khan R, Haider I, Fatima N, Butt T, Yousaf M, Nazim R, Abbas M, Rahman A, Memon AS(2020). Venous thromboembolism prophylaxis in major abdominal surgery: a systematic review and meta-analysis. Cureus;12(7):e9505. doi: 10.7759/cureus.9505. PMID: 32874421; PMCID: PMC7450864.
9. Geerts WH, Bergqvist D, Pineo GF, et al(2008). Prevention of venous thromboembolism: American College of Chest Physicians evidence-based clinical practice guidelines (8th edition). Chest;133(6 Suppl):381S-453S. doi: 10.1378/chest.08-0656
10. Tafur AJ, Caprini JA, Cote L, et al(2018). Predictors of active cancer thromboembolic outcomes: validation of the Khorana score among patients with lung cancer. J ThrombHaemost;16(4):707-714. doi: 10.1111/jth.13987
11. Cohen AT, Agnelli G, Anderson FA, et al(2007). Venous thromboembolism (VTE) in Europe. The number of VTE events and associated morbidity and mortality. ThrombHaemost;98(4):756-764. doi: 10.1160/TH07-03-0212
12. O'Connell JB, Greenberg CS, Griffiths RI, et al(2000). Prevention of venous thromboembolism after injury: an evidence-based report-part II: analysis of risk factors and evaluation of the role of vena caval filters. J Trauma;49(1):140-144. doi: 10.1097/00005373-200007000-00026
13. Sasaki T, Sugino K, Kameda Y, et al(2014). Risk factors for venous thromboembolism in patients undergoing major surgery for gastrointestinal cancer. Surg Today;44(4):712-718. doi: 10.1007/s00595-013-0532-8
14. Kirshnan U, Vaid A, Tewari M, et al(2015). Venous thromboembolism in patients undergoing major cancer surgery: analysis of a large multi-institutional administrative database. J Clin Anesth;27(8):676-683. doi: 10.1016/j.jclinane.2015.07.008
15. Goldhaber SZ, Tapson VF(2004). A prospective registry of 5,451 patients with ultrasound-confirmed deep vein thrombosis. Am J Cardiol;93(2):259-262. doi: 10.1016/j.amjcard.2003.09.066
16. Kabrhel C, Varraso R, Goldhaber SZ, et al(2011). Physical inactivity and idiopathic pulmonary embolism in women: prospective study. BMJ;343:d3867. doi: 10.1136/bmj.d3867
17. Alikhan R, Bedenis R, Cohen AT(2014). Heparin for the prevention of venous thromboembolism in acutely ill medical patients (excluding stroke and myocardial infarction). Cochrane Database Syst Rev;(5):CD003747. doi: 10.1002/14651858.CD003747.pub4
18. Agnelli G, Bergqvist D, Cohen AT, et al(2005). Randomized clinical trial of postoperative fondaparinux versus perioperative dalteparin for prevention of venous thromboembolism in high-risk abdominal surgery. Br J Surg;92(10):1212-1220. doi: 10.1002/bjs.5095
19. Geerts WH, Pineo GF, Heit JA, Bergqvist D, Lassen MR, Colwell CW, Ray JG(2004). Prevention of venous thromboembolism: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest;126(3 Suppl):338S-400S. doi: 10.1378/chest.126.3_suppl.338S. PMID: 15383478.
20. Falck-Ytter Y, Francis CW, Johanson NA, Curley C, Dahl OE, Schulman S, Ortel TL, Pauker SG, Colwell CW Jr(2012). American College of Chest Physicians. Prevention of VTE in orthopedic surgery patients: antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest;141(2 Suppl):e278S-e325S. doi: 10.1378/chest.11-2404. PMID: 22315265.