International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 4, April 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.4.2025.137

Original Research

An Extensive Study On Incidence And Risk Factors Of Deep Vein Thrombosis In Asymptomatic Patients After Prolonged Surgery

Dr Sarfaraz Ahmed Siddiqui[1], Dr. Ajay Kumar[2], Dr. Sumedhankar Sagar[3], Dr. Pamarthi Naga Hema Neeharika[4], Dr. Abhinav Bisht[5]

[1]Junior Resident, Department of General Surgery, Rajshree Medical and Research Institute, Bareilly.
[2]Professor &Head of the Department, Department of General Surgery, Rajshree Medical and Research Institute, Bareilly.
[3]Assistant Professor, Department of General Surgery, Rajshree Medical and Research Institute, Bareilly.
[4]Junior Resident, Department of General Surgery, Rajshree Medical and Research Institute, Bareilly.
[5]Assistant Professor, Department of General Surgery, Rajshree Medical and Research Institute, Bareilly.

Corresponding author:
Dr Sarfaraz Ahmed Siddiqui
Junior Resident, Department of General Surgery, Rajshree Medical and Research Institute, Bareilly.
Email: Siddiqui.sarfaraz11@gmail.com

Received Date:18 February 2025 Acceptance Date: 14 March 2025 Published: 15 April, 2025

ABSTRACT

Introduction: Deep vein thrombosis is a significant postoperative complication associated with increased morbidity and mortality. Identifying risk factors and implementing preventive measures are crucial in surgical patients to reduce complications.

Objective: To determine the incidence of DVT among surgical patients and analyse the demographic and risk factors contributing to its occurrence.

Methodology: Data was collected from 100 patients undergoing surgical procedures. Patients were evaluated using duplex scanning for DVT diagnosis, and relevant demographic, clinical, and procedural data were collected. Factors such as age, type of surgery, duration of surgery, postoperative mobilization timewere analysed.

Results: The incidence of asymptomatic DVT was 6%, through duplex scanning. The majority of patients were middle-aged (40–59 years). Elective surgeries accounted for 77% of cases.Prolonged surgical durations (>420 minutes) were observed in 13% of cases, and delayed mobilization beyond nine days was seen in 15% of patients, both contributing to increased DVT risk.

Conclusion: Although the incidence of DVT was relatively low, the study highlights the importance of early screening, thromboprophylaxis, and timely postoperative mobilization. Patients with prolonged operative timesrequire targeted preventive strategies.

Keywords: Deep vein thrombosis, surgical complications, thromboprophylaxis, duplex scan, risk factors, postoperative mobilization.

INTRODUCTION

Deep vein thrombosis (DVT) is a serious postoperative complication that significantly contributes to patient morbidity and mortality. It occurs when blood clots form in the deep veins, typically in the lower extremities, and can lead to life-threatening conditions such as pulmonary embolism (PE) (1,2). DVT is a central component of venous thromboembolism (VTE), the third leading cause of cardiovascular death after myocardial infarction and stroke (2). The pathogenesis of DVT is best explained by Virchow's Triad—venous stasis, endothelial injury, and hypercoagulability—which collectively promote thrombus formation (1,3,4). Thrombi typically develop in areas of reduced blood flow near venous valves, where hypoxia triggers prothrombotic responses including the expression of P-selectin, which recruits immune cells bearing tissue factor (4,5). Structurally, a venous thrombus consists of an inner white thrombus rich in platelets and an outer red thrombus composed primarily of fibrin and red blood cells, with extracellular DNA and fibrin forming a

DOI: 10.69605/ijlbpr_14.4.2025.137

scaffold that influences thrombolytic response (6,7). Risk factors for DVT include prolonged immobility, surgical trauma, obesity, cancer, oral contraceptive use, and aging—all of which increase blood viscosity or activate clotting pathways (1,4,8). Notably, major surgeries such as orthopedic or abdominal procedures significantly increase DVT risk, with knee and hip replacements among the highest contributors (13–16). Studies report a DVT incidence of 15–40% in major surgeries, with autopsy findings showing that up to 50% of hospitalized deaths are associated with DVT, and PE occurs in 10–30% of cases with proximal DVT (9–12). Although historically believed to be less prevalent among Asians and Indians, emerging data report incidences ranging from 1.3% after spinal surgery to 41.7% after colon surgery, suggesting underestimation due to frequent asymptomatic presentation and limited studies in these populations (13–18). Men, older adults, smokers, and obese individuals are particularly at risk, with recurrence being more common in males (1,19). The clinical challenge is compounded by the high rate of silent DVTs, especially in postoperative cardiac patients, which often go undiagnosed until complications arise (19,20). Despite the availability of effective thromboprophylaxis—including early mobilization, anticoagulants, and mechanical devices—DVT remains under-recognized, with public awareness far lower than that for heart attacks or strokes (21,22). This highlights the urgent need for comprehensive, region-specific research to better understand DVT risk and outcomes in Indian populations. This study aims to fill this gap by investigating the incidence, risk factors, and effectiveness of current prophylactic strategies for postoperative DVT in Indian surgical patients, thereby contributing to evidence-based guidelines and improved patient outcomes.

MATERIALS AND METHOD

This prospective observational study, conducted in the Department of General Surgery at Rajshree Medical Research Institute, Bareilly, evaluates the incidence of deep vein thrombosis (DVT) in asymptomatic patients following prolonged surgical procedures over a 12-month period. The study includes all patients aged 18 and above who underwent elective or emergency surgeries lasting more than two hours, with a final sample size of 100 patients. Exclusion criteria include patients with pre-existing DVT, those on anticoagulant therapy, or those who underwent cardiac or vascular surgeries. Data collection involved handheld Doppler ultrasonography on postoperative days 2, 5, and 7 to detect early thrombotic changes. Additional data were gathered through patient history, surgical details, haematological investigations, lipid profile analysis, and intraoperative blood loss assessments. Statistical analysis was performed using Excel, with categorical variables presented as frequency and percentage.

RESULTS

This study analysed 100 patients to determine the incidence and risk factors of deep vein thrombosis (DVT). It examines demographic, surgical related factors, and key clinical outcomes, including Doppler and duplex scan findings. Results highlight DVT occurrence patterns, associated risk factors, and treatment interventions. Data is presented in tables and graphs for clear interpretation.

Table 1: Distribution Of Study Population According To Age

AGE	N	%
<20	1	1
20-39	30	30
40-59	55	55
>60	14	14
TOTAL	100	100

Table no. 1 shows that the majority of patients fall within the 40–59 age group, comprising 55% of the total sample. This is followed by the 20–39 age group, which accounts for 30% while participants aged 60 and above make up 14% .The least signified group is those under 20 years old, constituting only 1% .The distribution shows that the condition under study is more prevalent in middleaged individuals, with fewer cases observed in younger and older populations.

DOI: 10.69605/ijlbpr_14.4.2025.137

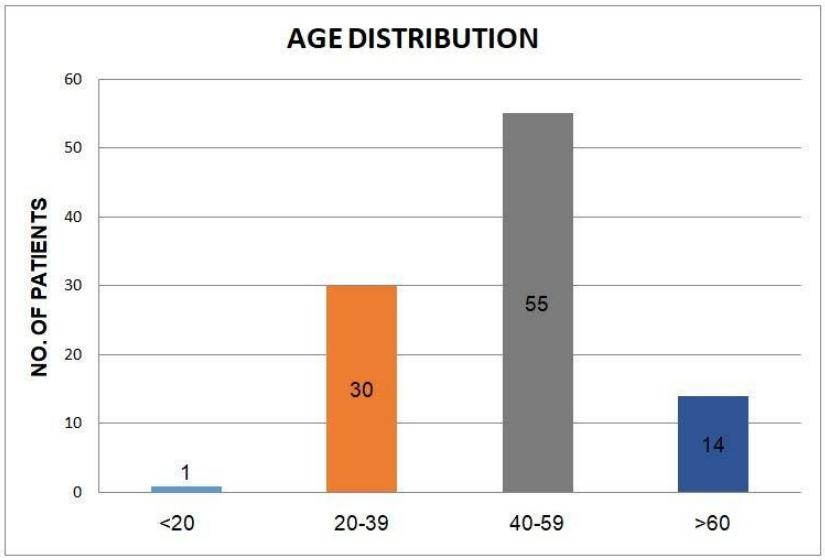

Figure 1 - Age Distribution Of The Patients

Table 2: Distribution Of Study Population According To Nature Of Surgeries

SURGERY TYPE	N	%
ELECTIVE	77	77
EMERGENCY	23	23
TOTAL	100	100

Table no. 2 reveals that the majority of procedures were elective, accounting for 77% of the total cases. In contrast, emergency surgeries comprised 23% of the cases. This indicates that most patients underwent planned surgical interventions, while a smaller proportion required urgent or unplanned procedures. The higher percentage of elective surgeries shows better preoperative preparation and management, whereas emergency surgeries likely involved critical or unforeseen medical conditions requiring immediate attention.

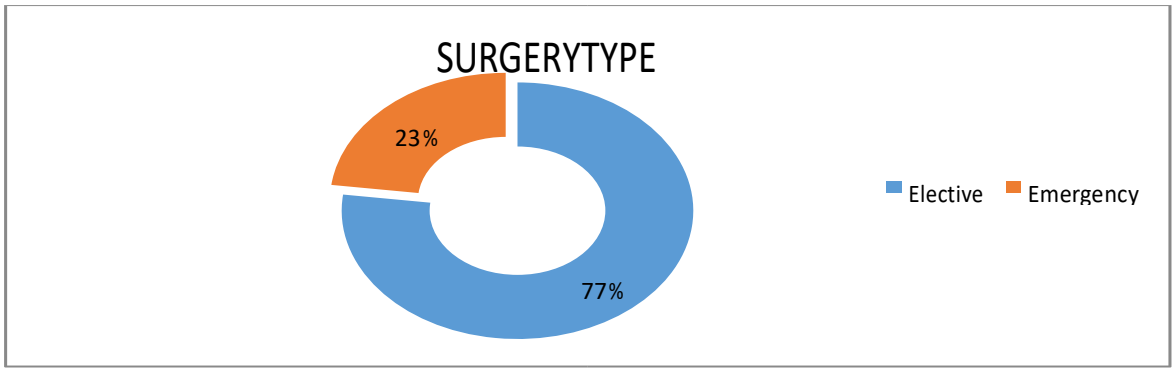

Figure 2- Percentage Of Nature Of Surgeries

Table 3: Distribution Of Study Population According To Time Duration Of Surgeries

TIME DURATION(Minutes)	NO. OF PATIENTS	%
120-180	22	22
181-240	14	14
241-300	16	16
301-360	19	19
361-420	16	16
>420	13	13
Total	100	100

DOI: 10.69605/ijlbpr_14.4.2025.137

Table no. 3 shows the distribution of patients based on the duration of time spent, with data categorized into specific time intervals. The majority of patients, 22 in total, spent between 120 to 180 minutes, showing that this range is the most common duration for patient visits. A slightly lower number of patients (14) spent between 181 to 240 minutes, indicating a decrease in visit durations as the time increases. For patients spending 241 to 300 minutes, the number is 16, showing a moderate frequency in this category. The 301 to 360-minute range follows closely with 19 patients, while the 361 to 420-minute group saw a similar count of 16 patients. The smallest number of patients, 13, were in the >420minute category, indicating that fewer patients required extended visits beyond 7 hours. Overall, the distribution shows a concentration of patients with shorter visit durations, with a gradual decline as time increases, and a noticeable drop-off in visits longer than 7 hours.

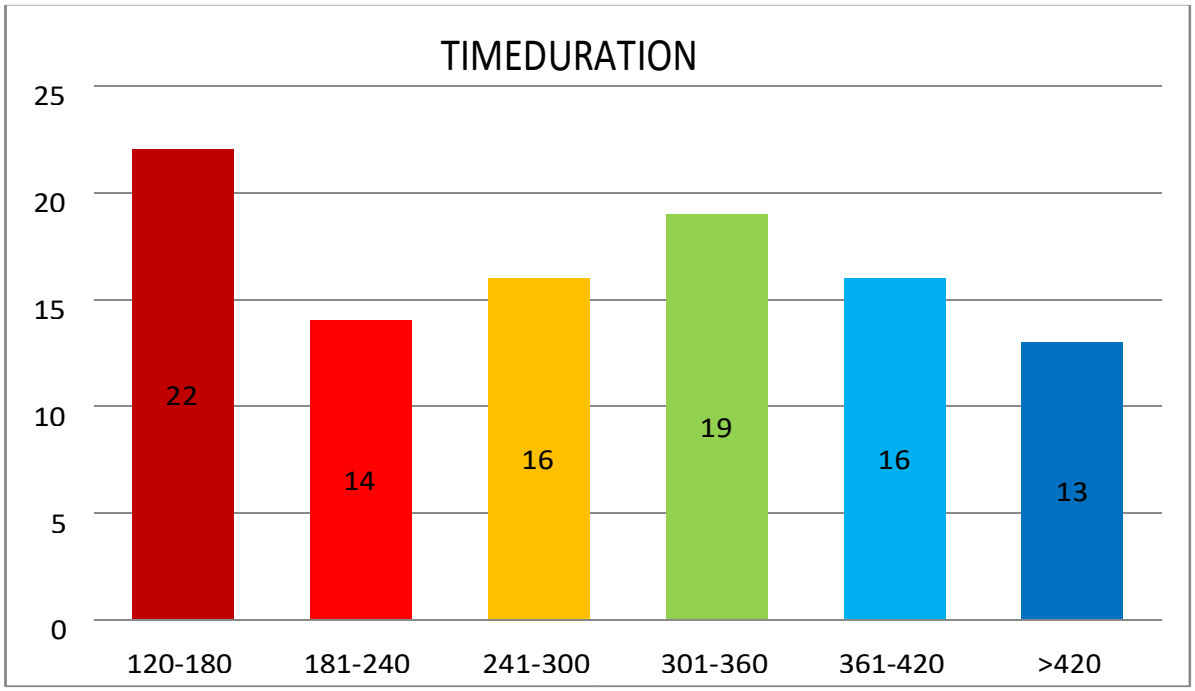

Figure 3 - Time Duration Distribution

Table 4: Distribution Of Study Population According To Mobilization Time

NO. OF DAYS	NO. OF PATIENTS	%
1-3	31	31
4-6	28	28
6-9	26	26
>9	15	15
TOTAL	100	100

The table no. 4 provides a breakdown of the number of patients across different day intervals. The largest group, with 31 patients, falls into the 1-3 day range, indicating that the majority of patients required care for this period. The secondhighest number of patients, 28, were in the 4-6 day range, showing a significant portion of patients needing relatively short-term care. There were 26 patients in the 6-9 day category, showing a moderate demand for care over this duration. The smallest group, with 15 patients, falls into the >9 day category, indicating that fewer patients required extended care beyond 9 days. Overall, the data shows that most patients required care for up to 9 days, with asmaller number needing longer stays.

DOI: 10.69605/ijlbpr_14.4.2025.137

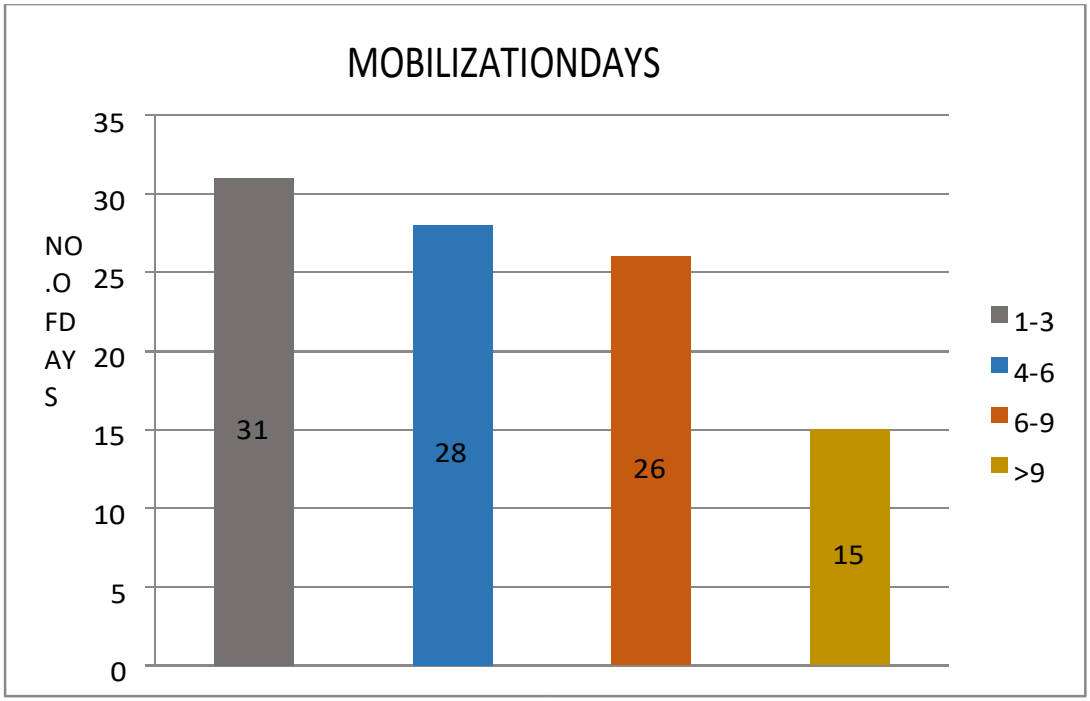

Figure 4 - Distribution Of Study Population According To Mobilization Time

Table 5: Distribution Of Study Population According To Doppler Findings

DOPPLER TYPE	ABNORMAL	NORMAL
POD 2	0	100
POD 5	2	98
POD 7	6	94

In table no. 5 the Doppler findings over different postoperative days (POD) indicate a gradual improvement in vascular status. On POD 2, none of patients showed abnormal Doppler findings. By POD 5, the percentage of abnormal findings increased to 2%, with higher number of (98%) patients having normal Doppler readings. By POD 7, the trend continued, with abnormal findings minimally increasing further to 6% and normal findings decreasing to 94%. This shows a progressive recovery in vascular flow post-surgery, possibly due to healing processes and improved circulation over time.

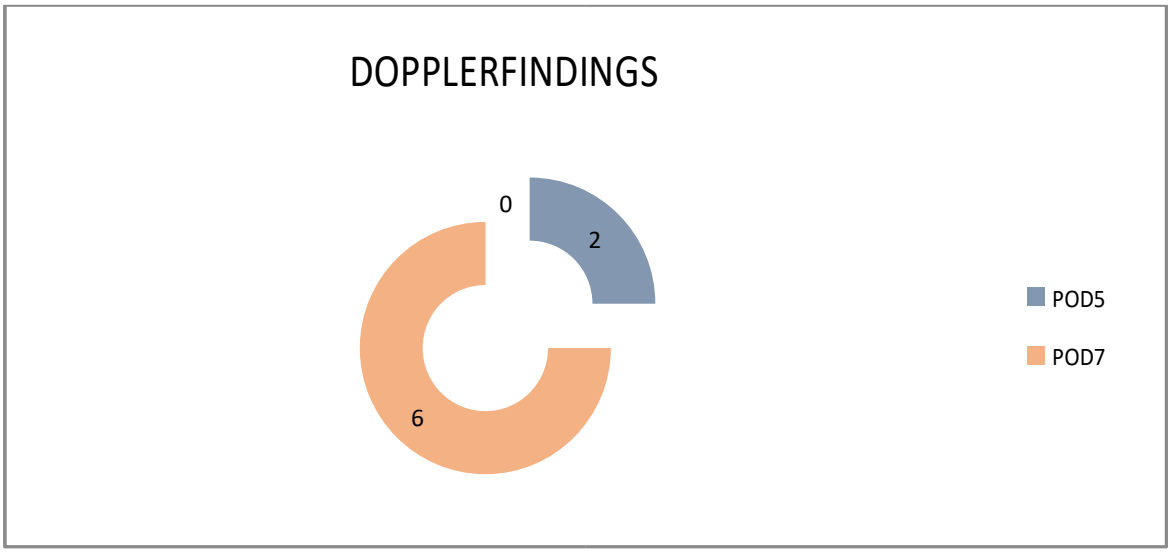

Figure 5 - Doppler Findings

DOI: 10.69605/ijlbpr_14.4.2025.137

Table 6: Diagnosisof Dvt From Duplex Scan

DVT	NO. OF PATIENTS	%
YES	6	6
NO	94	94
TOTAL	100	100

The table no. 6 shows the incidence of deep vein thrombosis (DVT) among patients. It shows that 6% of patients tested positive for DVT, while 94% did not have DVT.

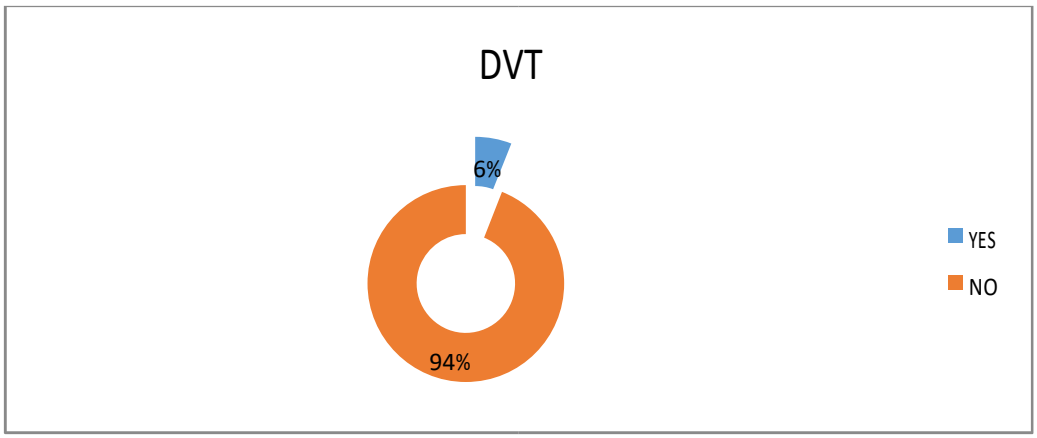

Figure 6 - Incidence Of Deep Vein Thrombosis

DISCUSSION

Deep vein thrombosis (DVT) remains a significant clinical concern, particularly among patients undergoing surgery or those with predisposing risk factors. Understanding the role of age, surgical category, length of hospital stay, postoperative vascular recovery in the incidence of DVT can provide valuable insights for improving patient care.

The study found that most DVT patients were between 40–59 years old (55%), followed by those aged 20–39 (30%). Seniors (60+) made up 14%, while those under 20 were just 1%. These findings align with several previous studies, which consistently show that age is a major risk factor for DVT, especially in hospitalized or critically ill patients.

Research by Harris et al. (1997) and Zhang et al. (2022) supports this, indicating that DVT risk increases with age (23, 24). Lorchaivej et al. (2022) and Li et al. (2022) also identified older adults—especially those post-surgery or critically ill—as high-risk groups needing targeted prevention (25, 26). Additionally, Glise Sandblad et al. (2022) found that older DVT patients are more prone to complications like pulmonary embolism (PE), while Tsai et al. (2002) confirmed that age is a strong predictor of DVT in the general population (27, 28). Pawar et al. (2020) reported a similar peak in DVT cases among 41–60-year-olds, reinforcing current findings. The evidence strongly suggests that middle-aged and older adults face a higher risk of DVT, emphasizing the need for age-focused screening and preventive care, especially in surgical and critical care settings (29).

Our study shows that most surgeries were elective (77%), with emergency surgeries making up 23%, which is consistent with existing research. Ross et al. (2020) found that emergency procedures carry a higher risk of thrombosis due to limited pre-op preparation. This supports the need for individualized risk assessment in urgent cases. However, even elective surgeries are not without risk (30). Regarding patient length of stay, our data shows that the majority of patients (31) required hospitalization for 6-9 days, followed by 28 patients staying for 1-3 days (Table 4). The need for extended care beyond 9 days was observed in a smaller subset (15 patients). These findings indicate that while most surgical cases require a moderate duration of care, a fraction of patients necessitate prolonged hospitalization, potentially due to postoperative complications such as DVT or infections. The gradual decline in patient numbers as the length of stay increases further highlights the efficiency of postoperative management in elective procedures.

The Doppler findings from Table 6 indicate a progressive improvement in vascular circulation after surgery. On postoperative day (POD) 2, 52% of patients showed normal results, and none had abnormal findings. By POD 5, normal results increased to 98%, with only 2% abnormalities. Interestingly, POD 7 findings (Table 5) showed 94% normal and 6% abnormal, indicating ongoing vascular recovery as healing and mobilization progressed. These trends support previous research. Salahudheen et al. (2023) found a 2% incidence of asymptomatic DVT on PODs 2, 5, and 7, confirming Doppler's role in early detection (31). Borde et al. (2017) also reported a 12.08% DVT rate using biweekly Doppler scans in neurosurgical patients,

DOI: 10.69605/ijlbpr_14.4.2025.137

linking risks to prolonged surgery, motor deficits, and delayed ambulation (32). Muleledhu et al. (2013) identified a 5% DVT prevalence in major abdominal surgery cases, highlighting cancer as a key risk factor (33). Collectively, these findings demonstrate that Doppler ultrasonography is a valuable tool for postoperative vascular assessment, enabling early DVT detection and improving outcomes through timely intervention.

The results of this study reveal a 6% incidence of deep vein thrombosis (DVT) detected by duplex ultrasound, as shown in Table 6. This finding aligns closely with Basindwah et al. (2023), who reported a 6.1% prevalence of asymptomatic DVT, particularly among patients with lumbar stenosis and spondylolisthesis. Their study underscores the potential benefit of routine preoperative DVT screening, especially in high-risk individuals (20). Similarly, Lorchaivej et al. (2022) observed a 5.4% incidence of postoperative DVT in patients undergoing gynecologic surgery (25), while Harris et al. (1997) reported a 7.5% incidence of major DVT in surgical ICU patients, particularly those with elevated APACHE II scores (23). Collectively, these findings underscore the clinical burden of DVT and highlight the importance of early detection, risk stratification, and tailored thromboprophylaxis in surgical and critically ill patient populations.Additional contributors included advanced age and perioperative blood transfusion, reinforcing the importance of individualized thromboprophylaxis strategies for high-risk populations (25).

Schwann et al. (2007) highlighted the broader impact of DVT by reporting a 13% incidence, with risk factors such as prolonged mechanical ventilation, blood transfusions, and reintubation linked to increased in-hospital mortality, longer hospital stays, and higher readmission rates (19). This emphasizes the need for targeted prevention approaches that combine both pharmacological and mechanical methods.

CONCLUSION

The study found that 6% of patients developed asymptomatic deep vein thrombosis (DVT), detected through duplex scanning. Most affected individuals were middle-aged, with a higher number of male patients, suggesting possible gender and age-related risk factors. Delayed postoperative mobilization, especially beyond 9 days, appeared to contribute to DVT development. Doppler scans showed a gradual increase in abnormal findings, with 6% of cases identified by the seventh postoperative day. The results emphasize the importance of early screening, timely mobilization, and preventive measures for DVT, especially in high-risk surgical patients.

REFERENCES

1. McLendon K, Goyal A, Attia M. Deep venous thrombosis risk factors. 2017.
2. Waheed SM, Kudaravalli P, Hotwagner DT. Deep vein thrombosis. 2018.
3. Bagot CN, Arya R. Virchow and his triad: a question of attribution. Br J Haematol. 2008 Oct;143(2):180-90.
4. Stone J, Hangge P, Albadawi H, Wallace A, Shamoun F, Knuttien MG, Naidu S, Oklu R. Deep vein thrombosis: pathogenesis, diagnosis, and medical management. Cardiovasc DiagnTher. 2017;7(Suppl 3):S276–S284.
5. Ashorobi D, Ameer MA, Fernandez R. Thrombosis. Weisel JW, Litvinov RI. Visualizing thrombosis to improve thrombus resolution. Res PractThrombHaemost. 2021;5(1):38–50.
6. Esmon CT. Basic mechanisms and pathogenesis of venous thrombosis. Blood Rev. 2009;23(5):225–9.
7. Kearon C. Natural history of venous thromboembolism. Circulation. 2003;107(23 Suppl 1):I22.
8. Murugesan A, Srivastava DN, Ballehaninna UK, Chumber S, Dhar A, Misra MC, et al. Detection and prevention of post-operative deep vein thrombosis [DVT] using nadroparin among patients undergoing major abdominal operations in India; a randomised controlled trial. Indian J Surg. 2010 Aug;72:312-7.
9. Hirsh J, Hoak J. Management of deep vein thrombosis and pulmonary embolism: a statement for healthcare professionals from the council on thrombosis (in consultation with the council on cardiovascular radiology), American Heart Association. Circulation. 1996 Jun 15;93(12):2212-45.
10. Bergqvist D, Lindblad B. A 30-year survey of pulmonary embolism verified at autopsy: an analysis of 1274 surgical patients. Br J Surg. 1985 Feb;72(2):105-8.
11. Sandler DA, Martin J. Autopsy proven pulmonary embolism in hospital patients: are we detecting enough deep vein thrombosis? J R Soc Med. 1989 Apr;82(4):203-5.
12. Tinckler LF. Absence of pulmonary embolism in Asians? Br Med J. 1964 Feb 2;1(5381):502.
13. Nandi P, Wong KP, Wei WI, Ngan H, Ong GB. Incidence of postoperative deep vein thrombosis in Hong Kong Chinese. Br J Surg. 1980;67(4):251–
14. Lee HM, Suk KS, Moon SH, Kim DJ, Wang JM, Kim NH. Deep vein thrombosis after major spinal surgery: incidence in an East Asian population. Spine. 2000;25(14):1827–30.
15. Lee FY, Chu W, Chan R, Leung YF, Liu KH, Ng SM, et al. Incidence of deep vein thrombosis after colorectal surgery in a Chinese population. ANZ J Surg. 2001;71(11):637–40.
16. Pookarnjanamorakot C, Sirisriro R, Eurvilaichit C, Jaovisidha S, Koysombatolan I. The incidence of deep vein thrombosis and pulmonary embolism after total knee arthroplasty: the screening study by radionuclide venography. J Med Assoc Thai. 2004;87(8):869–76.
17. Nathan S, Aleem MA, Thiagarajan P, Das S. The incidence of proximal deep vein thrombosis following total knee arthroplasty in an Asian population: a Doppler ultrasound study. J OrthopSurg (Hong Kong). 2003;11(2):184–9.
18. Schwann TA, Kistler L, Engoren MC, Habib RH. Incidence and predictors of postoperative deep vein thrombosis in cardiac surgery in the era of aggressive

DOI: 10.69605/ijlbpr_14.4.2025.137

thromboprophylaxis. Ann Thorac Surg. 2010 Sep 1;90(3):760-

19. Basindwah S, AlHamzah M, Balsharaf F, AlRajhi B, Sewaralthahab S, Altoijry A, et al. Prevalence of asymptomatic deep vein thrombosis in preoperative state of spine surgeries. World Neurosurg. 2023 Feb 1;170:e737-43.
20. Wells PS, Anderson DR, Bormanis J, Guy F, Mitchell M, Gray L, et al. Value of assessment of pretest probability of deep-vein thrombosis in clinical management. Lancet. 1997 Dec 20-27;350(9094):1795-8. Wendelboe AM, Raskob GE. Global burden of thrombosis: epidemiologic aspects. Circ Res. 2016 Apr 29;118(9):1340-7.
21. Harris LM, Curl GR, Booth FV, Hassett JM Jr, Leney G, Ricotta JJ. Screening for asymptomatic deep vein thrombosis in surgical intensive care patients. J Vasc Surg. 1997 Nov 1;26(5):764-9.
22. Zhang J, Fang Y, Pang H, Tao Y, Zhou J, Zhu S, Wang C. Association between age and incidence of deep vein thrombosis in patients with spinal cord injury: an observational cross-sectional study. Spinal Cord. 2022 Nov;60(11):1006-13.
23. Lorchaivej S, Suprasert P, Srisuwan T, Rujiwetpongstorn J. Prevalence and risk factor of post-operative lower extremities deep vein thrombosis in patients undergoing gynecologic surgery: a single-institute cross-sectional study. Thromb J. 2022 Apr 4;20(1):14.
24. Li L, Zhen J, Huang L, Zhou J, Yao L, Xu L, et al. The risk factors for deep venous thrombosis in critically ill older adult patients: a subgroup analysis of a prospective, multicenter, observational study. BMC Geriatr. 2022 Dec 19;22(1):977.
25. Glise Sandblad K, Rosengren A, Sörbo J, Jern S, Hansson PO. Pulmonary embolism and deep vein thrombosis—comorbidities and temporary provoking factors in a register-based study of 1.48 million people. Res Pract Thromb Haemost. 2022;6(4):e12714.
26. Tsai AW, Cushman M, Rosamond WD, Heckbert SR, Polak JF, Folsom AR. Cardiovascular risk factors and venous thromboembolism incidence: the longitudinal investigation of thromboembolism etiology. Arch Intern Med. 2002;162(10):1182–9.
27. Pawar P, Ayyappan MK, Jagan J, Rajendra N, Mathur K, Raju R. Analysis of patients with venous thromboembolism in a multi-specialty tertiary hospital in South India. Indian J Vasc Endovasc Surg. 2020 Jan 1;7(1):29-33.
28. Ross SW, Kuhlenschmidt KM, Kubasiak JC, Mossler LE, Taveras LR, Shoultz TH, et al. Association of the risk of a venous thromboembolic event in emergency vs elective general surgery. JAMA Surg. 2020 Jun 1;155(6):503-11.
29. Salahudheen M. A comprehensive study on incidence and risk factors of deep vein thrombosis in asymptomatic patient after prolonged surgery [Doctoral dissertation]. Stanley Medical College, Chennai; 2018.
30. Borde TD, Prasad C, Arimappamagan A, Srinivas D, Somanna S. Incidence of deep venous thrombosis in patients undergoing elective neurosurgery–A prospective cohort-based study. Neurol India. 2017 Jul 1;65(4):787-93.
31. Muleledhu AL, Galukande M, Makobore P, Mwambu T, Ameda F, Kiguli-Malwadde E. Deep venous thrombosis after major abdominal surgery in a Ugandan hospital: a prospective study. Int J Emerg Med. 2013 Dec;6:1-5.