Original Research Article

DOI: http://dx.doi.org/10.18203/2349-2902.isj20175908

Deep venous thrombosis after major abdominal surgeries: a tertiary level centre study

Krishnakumar G. Kuttanchettiyar, Meer M. Chisthi*

Department of General Surgery, Government Medical College, Trivandrum, Kerala, India

Received: 23 October 2017 **Accepted:** 28 November 2017

*Correspondence: Dr. Meer M. Chisthi,

E-mail: meerchisthi@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial

use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Deep venous thrombo-embolism is a proven major complication in the postoperative setup among the western population. Hence specific guidelines exist on thrombo-prophylaxis for surgical patients. The limited number of studies available on the Indian patients do not provide conclusive data regarding the incidence of postoperative thrombo-embolism. Also, Indian patients are not routinely given prophylactic anticoagulants in many settings still now. In this research, we studied the incidence of deep venous thrombosis among patients who underwent major abdominal surgeries, over a period of 2 years.

Methods: This retrospective descriptive study was done on patients who underwent any sort of major abdominal surgery from the surgical wards of Government Medical College, Thiruvananthapuram, for 2 years. This data was used to analyses the incidence of and factors related to postoperative deep venous thrombo-embolism.

Results: We studied a total of 334 patients who fulfilled the inclusion criteria. Among these patients, only 1.19% developed deep venous thrombosis during the post-operative period. Since no guidelines existed regarding the usage of thrombo-prophylaxis during that period, very few patients were found to have used any of the prophylactic measures.

Conclusions: The incidence of postoperative deep venous thrombosis is not very high in the Indian population after major abdominal surgeries. This might be due to the relatively low prevalence of hyper-coagulable states in the community itself. As a corollary, routine chemical prophylaxis might be administered only in high risk patients. Other measures like early ambulation and mechanical prophylaxis might be used in patients with lesser risk.

Keywords: Abdominal surgery, Anticoagulants, Deep venous thrombosis (DVT), Laparotomy, Thrombo-prophylaxis

INTRODUCTION

Deep Vein Thrombosis (DVT) or Venous Thrombo-Embolism (VTE) is one of the common postoperative complications observed among the Western population. During the acute phase of DVT, 10 to 40% of patients may develop PE (Pulmonary Embolism), having a mortality rate as high as 10 to 20%. However, the mortality rate for PE has been stated to be as high as 30% in studies that included autopsy-based diagnosis of PE. In fact, autopsy studies document that 50% of all patients

dying in hospital have some form of DVT, pointing out that many episodes of PE may go unrecognized clinically before death.² Surgical removal of malignant tumours and abdominal surgeries are supposed to be the high risk factors for development of DVT.³ The high incidence of DVT in postoperative patients is due to the multiple risk factors that exist in patients admitted to hospitals, the most important being malignancies, vascular disease, trauma, and surgery, as well as other conditions that lead to prolonged hospitalization. In the process leading to thrombosis, the damage to vascular endothelial cells

caused by abdominal surgery and tissue injury, and underlying coagulation disorders are all interrelated.⁴

DVT commonly affects the calf veins or the deep veins of the pelvis. In high risk hospitalized patients, most deep vein thrombi occur in the small calf veins, are asymptomatic, and are hence rarely detected. Vague aching pain, tenderness along the distribution of the veins, oedema, and erythema are some nonspecific signs and often vary in frequency and severity. Tenderness, swelling of the whole leg, more than 3cm difference in circumference between calves, pitting oedema, and collateral superficial veins are the most specific signs. A combination of 3 or more signs, with the absence of another likely diagnosis makes DVT more probable. To identify clinically important thrombi in patients, Wells' score for DVT have been developed, which combines multiple clinical parameters to increase the sensitivity.⁵ Recently, the revised Geneva score has also been introduced for determination of probability of pulmonary embolism.⁶ Along with these scoring systems, D-dimer assay is validated as a diagnostic tool to safely exclude the diagnosis of VTE due to its high negative predictive value.^{7,8} Though venography was traditionally regarded as the gold standard for diagnosis, recent publications have found that Doppler ultrasound has very high sensitivity (up to 100%) and specificity (91.8%) as well.⁹ Some studies are proclaiming that Doppler ultrasound can be taken as the current gold standard for diagnosis of DVT.10

Since DVT and PE gain importance as postoperative complications and their treatment is accompanied by recurrence and bleeding morbidity including complications, thrombo-prophylaxis becomes important for improving the prognosis as well as quality of life. Although numerous effective methods are available for reducing and even preventing DVT and PE, studies have shown that only 21 to 35% of the surgeons take appropriate prophylactics steps for their patients. 11,12 For patients with cancer who are undergoing major surgery, College American of Chest Physicians recommendations include routine thrombo-prophylaxis with Low Molecular Weight Heparin (LMWH) 10,000 to 15,000IU/day and for patients with cancer with additional risk for VTE, the recommendation is to use LMWH in combination with mechanical methods such as sequential compression devices.¹³ Mechanical prophylaxis methods such as elastic (Tedd) stockings, intermittent pneumatic compression devices, and venous foot pump counteract stasis, one of the three aspects of Virchow's triad and have been demonstrated to be effective and safe. Pharmacologic options for thrombo-prophylaxis include unfractionated heparin (UFH), LMWH, Fondaparinux, and Vitamin K antagonists. 14,15

The incidence of DVT as well as VTE in Asian patients is traditionally considered to be lower than the Western population. Very few studies have come out of India on this subject and hence very little is known about the true

incidence of this condition. This issue has acquired greater significance in Indian subjects in recent times as there has been a manifold increase in the number of major surgeries. However, there are no clear guidelines regarding the prophylaxis for VTE for Indian patients. This fact is all the more important in a country like India where a majority of the general population may not be able to afford such a cost of treatment unless the public health care system is able to provide it free of cost. That would necessitate gross change in funds allocation. If the incidence of DVT is truly negligible, prophylaxis may not be indicated in our patients. Also, there are possible medico-legal implications of not subjecting patients undergoing major surgery to routine thromboprophylaxis, as this might be considered as an act of negligence.

With this background, the general aim of this review was to assess the incidence of documented venous thromboembolism in patients undergoing major abdominal surgeries at our institution. Ours is a large volume, tertiary level care centre in the public sector and caters to a large number of patients from the southern states of India. Because the general guidelines regarding routine thrombo-prophylaxis were established after the study period only, we assumed it was very rare for any patient in our study to have received prophylactic anti-thrombotic measures. The primary objective of this study was to find the incidence of deep venous thrombosis developing after major abdominal surgeries, over a 5-year study period.

METHODS

The study was carried out at the General Surgery department of Government Medical College, Thiruvananthapuram, Kerala. Institutional **Ethics** Committee clearance was obtained before data collection. The case sheets of all the patients who underwent elective major abdominal surgeries during the study period from January 2008 to December 2010, were obtained from the Medical Records Library. For the purpose of the study, major abdominal surgery was defined as any abdominal surgical procedure done under general anaesthesia where the total duration of operation lasted more than 1 hour.

Inclusion criteria: patients aged between 18-80 years, patients who underwent any abdominal surgery which lasted more than 1 hour, during the study period of 2 years at our institution. Exclusion criteria: patients already on anticoagulants, patients with diagnosed bleeding or clotting disorders, pregnant as well as lactating patients.

All consecutive patients who fulfilled the inclusion criteria were included in the study. Patients were identified from the computerized database of all inpatients, classified based on the international classification of diseases (ICD) coding. The patients' case records were used to collect data regarding the study

variables. Data was collected from the case sheets and directly entered in to excel database. Data was recorded regarding the patient's demographic profile, the disease at presentation and the surgical procedure carried out. Deep vein thrombosis was suspected based on the clinical features of limb pain and swelling and further sonologically confirmation. Also, it was noted whether any form of thrombo-prophylaxis - either mechanical or chemical was used in any patient. The resultant data was entered into the prefixed proforma. All statistical analyses were performed using the CDC 'Epinfo'. All relevant data is presented as mean±standard deviation and proportions as appropriate. Where relevant, a 'p' value less than 0.05 is considered to be statistically significant.

RESULTS

334 patients who have undergone different major surgical procedures during the study period. Among them 200 patients were males and 134 were females. Out of this, the maximum: 64 (19%) patients: underwent surgery for peptic ulcer perforation followed by acute intestinal obstruction: 32 cases (Figure 1). The average duration of surgery taken among the study group was 2 hours and 07 The longest time recorded minutes. pancreaticoduodenectomy (mean time of 4 hours and 17 minutes) and the shortest time recorded was for peptic ulcer perforation peritonitis (mean of 1 hour and 20 minutes). The average duration of stay in hospital was 11.2 days. The average weight of patients was 57.8kg and the height were 163.1cm. 12 patients had a BMI more than 30.

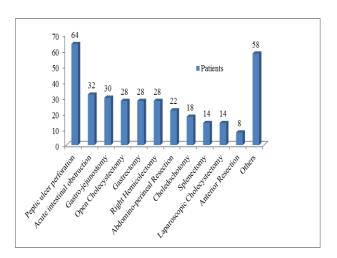


Figure 1: Procedure wise distribution of patients included in the study.

During the study period, 4 patients were found to have developed deep venous thrombosis (1.19%). Of these, 2 were following pancreaticoduodenectomy(Whipple's) procedure, 1 was after gastrectomy and 1 patient after abdomino-perineal resection (Figure 2). For all of the patients with DVT, the common factors were underlying malignancy, prolonged surgical duration (more than 3 hours) as well as prolonged immobilization (more than 72

hours). After doppler confirmation all 4 of these patients had treatment with heparin and no mortality was recorded among them. It was found that the diagnosis of DVT was done by Duplex ultrasound and was confirmed by: presence of a thrombus seen on B-mode imaging, compressibility of veins, respiratory phaticity and augmentation response. The confirmed cases of VTE were found to be treated with intravenous infusion of heparin which was followed by an oral course of warfarin for a period of three months. The therapeutic monitoring for heparin was done using activated partial thromboplastin time and that of warfarin by international normalized ratio of prothrombin time.

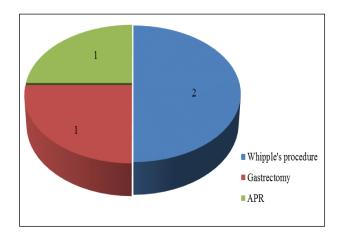


Figure 2: Procedure wise distribution of patients who developed DVT.

There was a total mortality of 15 in the population of 334 (4.49%). Of these, 4 patients died on the operative table itself due to cardiovascular arrest, while 6 patients died within the first postoperative week due to sepsis or cardiovascular events. 5 patients died within the hospital stay period due to sepsis and related events. after the first week. None of these patients had a documented diagnosis of DVT. The post-operative complications were found in many patients (Figure 3).

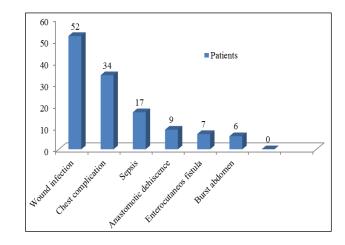


Figure 3: Distribution of patients' postoperative complications.

These included: wound infections: 52 (15.57%), chest complications: 34 (10.17%), sepsis: 17 (5.09%), anastomotic dehiscence: 9 (2.69%) entero-cutaneous fistulae: 7 (2.09%) and burst abdomen: 6 (1.79%).

Among our study group, no form of venous thromboprophylaxis was found employed in most of the patients. However, heparin (UFH) was found to be given in 2 patients who underwent prolonged surgeries: 1 patient underwent pancreaticoduodenectomy and another underwent abdomino-perineal resection. Both of them escaped from developing DVT.

DISCUSSION

This study provides information on incidence and risk factors for DVT in a group of Indian population undergoing major abdominal surgeries. As per this study, the incidence of postoperative thrombosis in patients undergoing major abdominal procedures is very minimal, to the level of 0.92% only. The fact that any form of prophylaxis was found to be used in very less number of patients might be explained by the fact that the thromboprophylaxis guidelines were not established and accepted until after 2007.

Lower extremity DVT is predominantly a disease of older age and the incidence of DVT increases exponentially with age, for both idiopathic and secondary DVT, rising nearly 90-fold between 15 and 80 years of age with a relative risk of 1.9 for each 10-year increase in age. 16,17 It is uncommon in young adults and very rare before the age of 20 years. Considering that cancer confers upon a patient undergoing surgery a 3 to 5 fold increase in risk for VTE, the relatively low cancer rates in our setting may translate into the observed relatively low DVT incidence here.¹⁸ Chen and colleagues found a fourfold increase in incidence of VTE in patient undergoing head and neck reconstruction compared with those of non-head and neck reconstruction.¹⁹ Reported rates of VTE following bariatric surgery are 0.3% - 2.2%, with rates of PE being approximately 1%, despite application of methods to prevent these complications.^{20,21} PE is also a frequent cause of postoperative mortality in the bariatric surgery population and is a common finding at autopsy. 22,23

Epidemiological data on the incidence of VTE in Asian populations is highly confusing and ambiguous. While most studies claim that the incidence of DVT is lower in Asian patients than their western counterparts, some of the recent studies from this region have shown a significant incidence of DVT in high risk surgical patients. ^{24,25} The Indian data from ENDORSE study revealed that despite a similar proportion of patients at risk in India and other participating countries, there is major underutilization of prophylaxis (17.4%) in India when compared to global data (50.2%). ²⁶ Their data show a significant increase in acute DVT (±PE) from 2006 to 2010. This can be explained by the increased awareness

of VTE in India as well as the advent of better diagnostic modalities, such as duplex ultrasonography which have become more readily available and cheaper.²⁷

Jain and his study group reported a very low incidence of DVT following TKA and THA in Indian patients.²⁸ Only two patients in their series of 106 patients from North India undergoing THA and TKA showed duplex sonographic evidence of proximal DVT. Similarly, Bagaria and his associates reported 6.12% incidence of DVT and 0.6% incidence of PE in their prospective study of 147 patients undergoing major orthopedic surgery of lower limb without any prophylaxis.²⁹ DVT following total joint arthroplasty and surgery for lower limb fractures in Indian patients is not as common as reported in the Western literature.³⁰ On the other hand, Parakh and his study group observed that very few studies are available to assess the prevalence of PE in Asian countries and found that PE does occur frequently in Indian patients with symptomatic DVT.³¹ Another group of authors found that venous thrombosis may occur in more than 50% of patients undergoing surgical procedures, particularly those involving the hip and knee.³² Agarwala and his associates by using contrast venography as a diagnostic tool for DVT, however, reported a very high incidence of DVT both in patients not receiving chemoprophylaxis(60%) and in patients receiving prophylaxis(43.2%) in their study of patients underwent major limb surgeries.³³ Another report on antenatal patients concluded that the prevalence of DVT in India is more or less similar to other reports published.34

The differential occurrence of a particular disease in some ethnic groups is commonly attributed to the influence of multiple genetic traits. Resistance to activated protein C (APC) is the most common inherited risk factor for venous thrombosis and most cases of APC resistance are caused by Factor V Leiden mutation. This mutation is the most frequent genetic disposition for thrombophilia and DVT and with a carrier rate of 2.9% in the Dutch population, 5% in Poland and only 1.3% in India.35 This fact could explain the low incidence of DVT and PE in Indian patients. The genetic traits that are given as possible explanations for the reduced incidence of VTE in Asian population include APC resistance, decreased prevalence of homocysteine, as well as lesser prevalence of factor V Leiden mutation. Acquired traits that are thought to be risk factors for development of VTE including obesity and heart failure are also found to be less prevalent in Asian patients.

An apparent shortcoming of this study is the descriptive nature, which might necessitate caution, especially while interpreting the findings with respect to determination of risk factors. Another limitation is that post-mortem reports analysis was not performed for the patients who died, and hence conclusive evidence is lacking. However, our numbers although statistically small, are clinically not insignificant, particularly in view of obtaining such a

large group of patients who got no prophylaxis. Being an important cause of postoperative morbidity, comprehensive data on the incidence of VTE will probably help in formulating guidelines for patients of Indian origin.

CONCLUSION

In conclusion, the results of our study are consistent with most of the previously published results and reaffirm that the incidence of postoperative VTE in Indian patients is significantly lower than in the Western population. As a corollary, it may be prudent not to apply the Western criteria of universal thrombo-prophylaxis in this ethnic group and limit its use to those with very high-risk factors only. We opine that the employment of thrombo-prophylaxis may be advocated for patients with cancers undergoing prolonged surgical procedures or patients being immobilized for prolonged duration after the procedure. In other patients the cost-effective alternatives of early ambulation as well as mechanical prophylaxis might be employed to reduce the development of VTE.

ACKNOWLEDGEMENTS

Authors would like to thank the faculty and residents of the Department of General Surgery as well as the staff of Medical Records Library, Government Medical College, Thiruvananthapuram for providing valuable assistance in conducting this study.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

REFERENCES

- 1. Stein PD, Goodman LR, Hull RD, Dalen JE, Matta F. Diagnosis and management of isolated subsegmental pulmonary embolism: review and assessment of the options. Clin Appl Thromb Hemost. 2012;18:20-6.
- 2. Bergqvist D, Lindblad B. A 30-year survey of pulmonary embolism verified at autopsy: an analysis of 1274 surgical patient. Br J Surg. 1985;72(2):105-8.
- 3. Akl EA, Vasireddi SR, Gunukula S, Yosuico VE, Barba M, Sperati F, et al. Anticoagulation for patients with cancer and central venous catheters. Cochrane Database Syst Rev. 2011;CD006468.
- 4. Tufano A, Coppola A, Cerbone AM, Ruosi C, Franchini M. Preventing postsurgical venous thromboembolism: pharmacological approaches. Semin Thromb Hemost. 2011;37:252-66.
- Chagnon I, Bounameaux H, Aujesky D, Roy PM, Gourdier AL, Cornuz J, Perneger T, Perrier A. Comparison of two clinical prediction rules and implicit assessment among patients with suspected

- pulmonary embolism. Am J Med. 2002;113(4):269-75
- 6. Le Gal G, Righini M, Roy PM, Sanchez O, Aujesky D, Bounameaux H, et al. Prediction of pulmonary embolism in the emergency department: The revised Geneva score. Ann Intern Med. 2006;144:165-71.
- 7. Kelly J, Rudd A, Lewis RR. Screening for subclinical deep-vein thrombosis. QJ Med. 2001;94:511-9.
- 8. Diamond S, Goldbweber R, Katz S: Use of D-dimer to aid in excluding deep venous thrombosis in ambulatory patients. Am J Surg. 2005;189:23-6.
- 9. Aywak AA, Masesa JV. Comparison of sonography with venography in diagnosis of deep venous thrombosis. East Afr Med J. 2007;84(7):304-11.
- 10. Forbes K, Stevenson AJM. The use of power Doppler ultrasound in the diagnosis of isolated deep venous thrombosis of the calf. Clin Radiol. 1998;53:752-4.
- 11. Anderson FA Jr, Wheeler HB, Goldberg RJ, Hosmer DW, Forcier A, Patwardhan NA. Physician practices in the prevention of venous thromboembolism. Ann Int Med. 1991;115(8):591-5.
- 12. Conti S, Daschbach M. Venous thromboembolism prophylaxis: a survey of its use in the United States. Arch Surg. 1982;117(8): 1036-40.
- 13. Gould MK, Garcia DA, Wren SM, Karanicolas PJ, Arcelus JI, Heit JA, et al. Prevention of VTE in nonorthopedic surgical patients: antithrombotic therapy and prevention of thrombosis. CHEST J. 2012;141:e227S-77S.
- 14. Samama MM, Cohen AT, Darmon JY, Desjardins L, Eldor A, Janbon C, et al. A comparison of enoxaparin with placebo for the prevention of venous thromboembolism in acutely ill medical patients. En J Med. 1999;341(11):793-800.
- 15. Cohen AT, Davidson BL, Gallus AS, Lassen MR, Prins MH, Tomkowski W, et al. Efficacy and safety of fondaparinux for the prevention of venous thromboembolism in older acute medical patients: randomised placebo controlled trial. BMJ. 2006;332(7537):325-9.
- Næss IA, Christiansen SC, Romundstad P, Cannegieter SC, Rosendaal FR, Hammerstrøm J. Incidence and mortality of venous thrombosis: a population-based study. J Thromb Haem. 2007;5(4):692-9.
- 17. Montagnana M, Favaloro EJ, Franchini M, Guidi GC, Lipi G. The role of ethnicity, age and gender in venous thromboembolism. J Thromb Thrombolysis. 2010;29(4):489-96.
- 18. Donati MB. Cancer and thrombosis. Haemostasis 1994:24:128-31.
- Chen CM, Disa JJ, Cordeiro PG, Pusic AL, McCarthy CM, Mehrara BJ. The incidence of venous thromboembolism after oncologic head and neck reconstruction. Ann Plast Surg. 2008;60(5):476-9.

- 20. Stein PD, Matta F. Pulmonary embolism and deep venous thrombosis following bariatric surgery. Obes Surg. 2013;23(5):663-8.
- 21. Lancaster RT, Hutter MM. Bands and bypasses: 30-day morbidity and mortality of bariatric surgical procedures as assessed by prospective, multi-center, risk-adjusted ACS-NSQIP data. Surg Endosc. 2008;22(12):2554-63.
- 22. Sapala JA, Wood MH, Schuhknecht MP, Sapala MA. Fatal pulmonary embolism after bariatric operations for morbid obesity: a 24-year retrospective analysis. Obes Surg. 2003;13(6):819-25.
- 23. Morino M, Toppino M, Forestieri P, Angrisani L, Allaix ME, Scopinaro N. Mortality after bariatric surgery: analysis of 13,871 morbidly obese patients from a National Registry. Ann Surg. 2007;246(6):1002-7.
- 24. Klatsky AL, Baer D. What protects Asians from venous thromboembolism? Am J Med. 2004;116:493-5.
- 25. Dhillon KS, Askander A, Doraismay S. Postoperative deep-vein thrombosis in Asian patients is not a rarity: a prospective study of 88 patients with no prophylaxis. J Bone Joint Surg Br. 1996;78:427-30.
- 26. Pinjala R, Agnihotri V, Balraj A. Venous thromboembolism risk and prophylaxis in the acute hospital care setting (ENDORSE) a multinational cross-sectional study: Results from the Indian subset data. Indian J Med Res. 2012;136:60-7.
- 27. Kamerkar DR, John MJ, Desai SC, Dsilva LC, Joglekar SJ. Arrive: A retrospective registry of Indian patients with venous thromboembolism. Indian J Crit Care Med. 2016;20:150-8.
- 28. Jain V, Dhaon BK, Jaiswal A, Nigam V, Singla J. Deep vein thrombosis after total hip and knee

- arthroplasty in Indian patients. Postgrad Med J. 2004;80:729-31.
- Bagaria V, Modi N, Panghate A, Vaidya S. Incidence and risk factors for development of venous thromboembolism in Indian patients undergoing major orthopaedic surgery: Results of a prospective study. Postgrad Med J. 2006;82:136-9.
- 30. Mavalankar AP, Majmundar D, Rani S. Routine chemoprophylaxis for deep venous thrombosis in Indian patients: Is it really justified? Indian Journal of Orthopaedics. 2007;41(3):188-93.
- 31. Parakh R, Kapadia SR, Sen I, Agarwal S, Grover T, Yadav A. Pulmonary embolism: A frequent occurrence in Indian patients with symptomatic lower limb venous thrombosis. Asian J Surg. 2006;29:86-91.
- 32. Parakh R, Kakkar VV, Kakkar AK. Venous Thromboembolism (VTE) Core Study Group. Management of venous thromboembolism. J Assoc Physicians India. 2007;55:49-70.
- 33. Agarwala S, Bhagwat AS, Modhe J. Deep vein thrombosis in Indian patients undergoing major lower limb surgery. Indian J Surg. 2003;65:159-62.
- 34. Vora S, Ghosh K, Shetty S, Salvi V, Satoskar P. Deep venous thrombosis in the antenatal period in a large cohort of pregnancies from western India. Thromb J. 2007;5:9.
- 35. Herrmann FH, Koesling M, Schroder W, Altman R, Jimenez Bonilla R, Lopaciuk S, et al. Prevalence of factor V Leiden mutation in various populations. Gene Epidemiol. 1998;14:403-11.

Cite this article as: Kuttanchettiyar KG, Chisthi MM. Deep venous thrombosis after major abdominal surgeries: a tertiary level centre study. Int Surg J 2018:5:267-72.