



ROLE OF ROUTINE DVT PROPHYLAXIS AFTER MAJOR GENERAL SURGICAL PROCEDURE; OUR EXPERIENCE IN A TERTIARY CARE CENTRE OF KOLKATA

Büyük Cerrahi girişimlerden sonra DVT profilaksisinin rolü; Kolkata'da üçüncü basamak bir tedavi merkezindeki deneyimimiz.

Jyotiranjana Swain, Souvik Chatterjee, Saurabh Jain, Saibal Bera, Debabratta Kundu, and Shahana Gupta

Department of General Surgery, Medical College and Hospital, Kolkata, 70073 West Bengal, INDIA

Corresponding address: Dr. Souvik Chatterjee, dr.souvikchatterjee@gmail.com

J Surg Arts (Cer San D), 2014;7(2):52-57. <http://dx.doi.org/10.14717/jsurgarts.2014.145>

ABSTRACT

According to western literature, venous thromboembolism (VTE), a term encompassing deep vein thrombosis (DVT) and pulmonary embolism, is one of the most common postoperative complications after major surgery. Very few studies have been published on the subject and very little is known about true incidence of condition. There are no clear guidelines regarding the prophylaxis for venous thromboembolism for an Indian patient.

A prospective study was carried in the Department of General Surgery, Medical College and hospital, Kolkata to determine the incidence of deep vein thrombosis. Present study included 127 patients undergoing major general surgeries (including abdomen, pelvis and lower extremities) over a 1 year period. All the patients were subjected to Duplex USG between the 7th and 14th postoperative period. No mechanical and chemical form of DVT prophylaxis was used.

Only eight patients (6.29 %) showed sonographic evidence of DVT and the majority of them resolved without treatment. There was no case of pulmonary embolism.

Deep vein thrombosis following major general surgery in Indian patients is not as common as reported in the Western literature. A high level of suspicion and close clinical monitoring is mandatory. In our opinion routine chemoprophylaxis is perhaps not justified in every patient undergoing major general surgery, which can be of great help to both mankind and nation.

Key words: Deep venous thrombosis, pulmonary embolism and thromboprophylaxis.

ÖZET

Batı literatürüne göre, derin ven trombozu ve pulmoner emboliyi kapsayan venöz tromboembolizm büyük ameliyatlar sonrasında karşımıza çıkan en ciddi komplikasyonlardan birisidir. Konuyla ilgili çok sayıda çalışma yapılmış olmakla beraber, gerçek insidansı bilinmemektedir. Hindistanlı hastalar için belirlenmiş bir algoritma henüz tam olarak ortaya konulmamıştır.

Kolkata Tıp Fakültesi ve hastanesinde gerçek venöz tromboembolizm insidansını bulmak için prospektif bir çalışma yapıldı. Bir yıl içerisinde büyük cerrahi girişim (karın, pelvis ve alt ekstremiteler) yapılan 127 hasta çalışmaya alındı. Bütün hastalara ameliyat sonrasındaki 7. ve 14. günlerde duplex USG yapıldı. Venöz tromboembolizmi önlemek için kimyasal veya mekanik profilaksik ilaç tedavisi yapılmadı.

Hastaların 8'inde (%6.29) derin ven trombozuna rastlanmakla beraber, çoğu herhangi bir tedavi almaksızın iyileşti. Pulmoner emboli vakası görülmedi.

Sonuç olarak, Hindistan'da büyük ameliyatlar sonrasında karşılaşılan derin ven trombozu vakalarının sıklığı, Batı ülkelerine göre daha az sıklıkta rastlanmıştır. Hastalığın her vakada akılda tutulması ve gözlem yeterli olmaktadır. Bizim görüşümüze göre; büyük cerrahi yapılan her vakada profilaksi yapılmasına gerek olmadığını düşünüyor ve bunun ülke ve insanlık için faydalı olacağını düşünüyoruz.

Anahtar kelimeler: Derin ven trombozu, pulmoner emboli ve profilaktik tedavi.

INTRODUCTION

Venous thromboembolism, a syndrome encompassing deep vein thrombosis and pulmonary embolism, is a potential fatal disease. It has long term effects on the patient including increased incidence of recurrence, venous insufficiency, chronic leg swelling and ulceration. Long term sequela particularly post-phlebotic syndrome is frequent and often disabling. In a study from Olmsted County, Minnesota, surgery was associated with an over twentyfold increase in the incidence of VTE (1). This prolongs hospital stay, increases expenses on investigative procedure and treatment regimes which makes DVT costly to both patients and hospitals (2). The estimated cost of treating DVT is more than US \$3000 per patient, which poses a great financial burden on any country (3). The incidence of asymptomatic VTE is significantly higher than that of symptomatic VTE, with asymptomatic VTE developing in 20-25% of after General surgery and 45-60% after orthopaedic surgery involving hip or knee (4).

Surgeries which increase the risk include surgery for malignancies, for major vascular surgery involving major vessels, surgeries involving removal of a portion of small or large bowel, radical cystectomy, gastric bypass for obesity, varicose vein. American college of chest physicians' criteria for VTE stratification are widely endorsed. Patients are categorised on the basis of age, type of surgery and presence or absence of additional thromboembolic risk factors.

The majority of the studies have been conducted and published from the western countries where DVT is a more common scenario. On the other hand, very few papers have been published from this part of the world where DVT was, until recently, considered to be a rarity (5-8). We, therefore, have to follow the western literature for the guidelines on thromboprophylaxis for patients undergoing major general surgeries. Though some of the recent studies published from other Asian countries have shown that DVT is not a rarity in Asian patients as was thought earlier (9, 10). "Pubmed" have been searched for the published studies on the subject from India; we could find very few studies (11-14). Parakh et al. assessed that very few studies are published in this context which can help us to assess the prevalence of PE in Asian countries and found that PE occurs frequently in Indian patients with symptomatic DVT (15). Parakh et al. in their review article have stated that the Indian perspective on this topic is lacking because of very few published Indian data (15). They believe that venous thrombosis may occur in more than

50% of patients undergoing surgical procedures, particularly those involving the abdomen, pelvis and lower limb.

The issue has become even more relevant today due to several fold increase in number of major general surgeries in the last few years with very few Indian surgeons offering some kind of thromboprophylaxis to their patients undergoing major general surgery. Also, there are medico-legal implications of not subjecting patients undergoing major general surgery to some kind of thromboprophylaxis, as this is an act of negligence in the opinion of some people. We, therefore, decided to undertake this prospective study at our institution to determine the incidence of DVT in Indian patients undergoing major general surgery by duplex ultrasonography. This method was selected because it has a sensitivity of 100% and a specificity of 97%. It is a safe, effective and quick technique for diagnosing venous thrombosis in patients. It is well accepted by both patients and staff and is without any inherent complication or risk.

MATERIALS AND METHODS

Our study is a prospective observational study which includes 127 consecutive major general surgical cases carried out over a one year period from Jan 2011 to Jan 2012. These major general surgical cases include cases of intestinal obstructions, bowel perforation, malignancies of gastrointestinal tract and hepatobiliary system, operations for varicose vein and major amputation of lower limb. A prior consent was obtained from all the patients. Among all patients, 44 were female and 83 were male. Out of these 127 patients, 19 patients underwent emergency surgeries including intestinal obstruction and bowel perforation, 11 patients underwent Whipple's procedure, 54 patients underwent surgery for malignancies (like Gastric carcinoma, hepatobiliary malignancies, colorectal carcinoma, pancreatic carcinoma), 9 patients underwent varicose vein surgery, 5 patients underwent gastric bypass surgery, 4 patients underwent major amputation of lower limb and 25 patients underwent other major general surgery. Any known risk factor associated with occurrence of DVT like past history of DVT, presence of varicose veins, obesity, malignancy, increased duration of operation etc was recorded. Other variables e.g., age, sex, height, weight, presence of any medical problems etc. were also documented for a possible correlation with the occurrence of DVT. No mechanical or chemical form of DVT prophylaxis was given to any of the patients.

A strict protocol was observed and all the patients were mobilized 48hrs after surgery. All the patients underwent duplex ultrasonography assessment of both the lower limbs between the seventh and 14th post-operative day. The Doppler assessment included examination of bilateral common femoral, superficial femoral, popliteal, anterior tibial and posterior tibial veins. Important factors like flow, visualized thrombus, compressibility and augmentation were assessed. Visualization of thrombus, absence of flow, lack of compressibility or lack of augmentation is considered to be the evidence of DVT. The thrombus was classified as distal if it involved the calf veins only and as proximal if it involved the popliteal or a more proximal vein. Patients who had both a proximal and a distal thrombus were classified as having proximal thrombosis.

The patients who developed postoperative asymptomatic distal venous thrombosis diagnosed only by Doppler examination were not subjected to any form of thrombolytic treatment. They were, however, kept under close clinical observation and monitoring. The patients showing evidence of proximal DVT were subjected to infusion of unfractionated Heparin at the rate of 1000 IU per hour. Activated partial thromboplastin

time (APTT) was closely monitored and was maintained at 1.5-2.5 times control. Tablet Warfarin 5 mg per day was commenced simultaneously and international normalized ratio (INR) was monitored every two days. Heparin infusion was discontinued with achievement of therapeutic level of INR between 2 and 3. Warfarin was continued for about three to four months. A repeat Doppler study was performed in all these patients within a week of the first positive Doppler study showed that no further propagation of the thrombus.

RESULTS

Out of 127 patients, DVT was detected in eight patients (two females and six males) with the average age 67.625±10.35 years (52-81 years). The distribution of thrombus in different veins is shown in Table 1. Out of these eight patients, only three patients had evidence of proximal DVT while the remaining five patients showed distal DVT.

Out of eight positive cases for DVT, only two had clinical signs of DVT like fever, calf swelling and tenderness. Also, no association was found between the occurrence of DVT and body mass index (BMI) as shown in Table 2 and 3.

Table 1: Distribution of thrombus in the lower limb veins detected by duplex ultrasonography (n=8)

Sex/Age	Operative procedure	Anterior tibial vein	Posterior tibial vein	Popliteal vein	Superficial femoral vein	Common femoral vein	CV
68/M	LAR		+	+	+	+	+
57/F	APR		+				+
60/M	Whipple's operation		+			+	+
52/F	Gastric by-pass		+				+
81/M	APR				+		
78/M	Amputation		+				+
72/M	Whipple's		+				
73/M	Whipple's				+	+	

Abbreviations: LAR; Low anterior resection, APR; Abdominoperineal resection, CV; Calf vein

Table 2: Relationship with B.M.I.

	Patient population without DVT (n=119)	Patient population with DVT (n=8)
Range	19.1-32.5	20.2-28.6
Average	24.569±4.397	25.17±2.87
(p value = 0.7)		

Table 3: Relationship with age.		
	Patient population without DVT (n=119)	Patient population with DVT (n=8)
Range	30-85 years	52-81 years
Average	62.042±11.489 years	67.625±10.35 years
(p value = 0.18)		

It was observed that average age of patients presenting with DVT was 67.625±10.35 years signifying increased incidence of DVT with increment in age, but without statistical significance between two groups.

One week after the detection of thrombus, all the patients with evidence of deep venous thrombosis (both proximal and distal) underwent repeat Doppler study to rule out proximal extension of the thrombus. Six patients with distal DVT did not show evidence of further propagation of thrombus on repeat Doppler study. In fact, there was resolution of thrombosis in all the patients. All the three patients who showed evidence of proximal DVT at the time of first Doppler examination and who were subjected to standard thrombolytic treatment did not show any propagation of thrombus. Clinically evident pulmonary embolism developed in none of the patients while in hospital or during the first six weeks following surgery.

DISCUSSION

Jain et al. reported a very low incidence of DVT in Indian patients following lower limb surgery (11). In their series of 106 patients from Northern India undergoing THA and TKA, only two patients showed duplex sonographic evidence of proximal DVT. Similarly, Bagaria et al. reported only 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 (16). They concluded that DVT has a lower incidence in Indian patients as compared with other ethnic groups.

In our study, we have observed that out of 127 patients operated for major general surgery, eight patients (6.2%) demonstrated sonographic evidence of DVT out of which three patients (2.3%) had a proximal deep venous thrombosis and six patients (3.9%) had a distal deep venous thrombosis. There was not a single case of pulmonary embolism. Jain et al. showed 1.9% rate of proximal DVT in their series of 106 patients without a single case of pulmonary embolism and Bagaria et al. reported 6.2% incidence of DVT, showing results comparable to our study (16). However, more extensive prospective trials are required to be conducted in different parts of the country to substantiate or reject this hypothesis. Our results, however do not match with those published by Agarwala et al. who reported 60% incidence of DVT in their patients not receiving any form of chemoprophylaxis (13). This difference might be due to the difference in the diagnostic modality used in both studies. While Agarwala et

al. used contrast venography for diagnosis of both proximal and distal DVT; we employed duplex sonography for detection of postoperative DVT. Though this is an established diagnostic modality, many authors have questioned its ability to diagnose asymptomatic calf thrombi as it may miss 20% of isolated calf DVT (17, 18). So isolated calf thrombi in some of the patients may not have been picked up by Doppler examination in our study. Also, Agarwala et al. did not elaborate the venographic evidence of DVT in their patients (13). This is due to the fact that non-filling of contrast in deep veins on phlebography is claimed to be an indirect sign of DVT by some authors but rejected by others. Though age is uncertain as a risk factor, increased evidence of thrombosis with greater age was noted in our study, but without statistical significance between two groups. All our DVT positive patients were in the age group of 52-81 years.

Our study did not show any correlation between the presence of clinical signs of thrombosis and sonographic evidence of DVT. Out of eight, only two patients (25%) had clinical features suggestive of DVT. This shows high unreliability of physical signs in the diagnosis of postoperative DVT as shown by Colwell CW Jr. It is a well known fact that thrombophilia, which predisposes individuals to thromboembolic events like myocardial infarction, deep vein thrombosis, pulmonary embolism etc, is much less in the Indian patients compared to their counterparts in the western countries (19). Activated protein C (APC) resistance is the most common inherited risk factor for venous thrombosis, which is caused by Factor V Leiden mutation. This mutation, the most frequent genetic disposition for DVT and has a carrier rate of 2.9% in the Dutch population, 5% in Poland and only 1.3% in Punjab, India (20,21). This fact could be a reason for low incidence of DVT and PE in Indian patients.

Low molecular weight heparin (LMWH) which is currently recommended to be one of the preferred drugs for thromboprophylaxis has many potential disadvantages like increase in the total cost of treatment and bleeding complications (22). According to few studies, increased incidence of bleeding complications like excessive bruising around the wound and increased wound bleeding or hematomas with the use of LMWH has precluded their routine use in major general surgery, as was the case with unfractionated heparin in the past (23, 24). We, therefore, wonder how far we are justified in subjecting all the patients undergoing major general surgery to routine chemoprophylaxis which could increase the risk of hematoma formation,

infection, a re-operation and a prolonged hospital stay and put more burdens on the already stretched financial resources of the patient as well a developing nation like India.

From our study and various studies by other Indian authors (11,12). It appears that incidence of DVT and PE in Indian patients undergoing major general surgery is fairly low. The sample size of 127 patients in our study seems to be reasonable, as the sample size required for the estimation of incidence rate (of value 0.06) is approximately 121 with an error of 0.045. Also, if thromboprophylaxis is important for all the patients, at least a few patients would have required that. In our study, none of the patients were subjected to chemoprophylaxis. Though the number is rather small, it is not too small to say that thromboprophylaxis is not important for all the patients. Further studies are required to confirm the findings of this research.

In conclusion, although there is enough evidence in the Western literature to advocate routine thromboprophylaxis for patients undergoing major general surgery for, there is not yet enough evidence to justify the routine use of DVT prophylaxis in all Indian patients undergoing major general surgery. Though it is perhaps not appropriate to make any definite recommendation about chemoprophylaxis purely on the basis of our research only, close clinical monitoring with a high level of suspicion for DVT and pulmonary embolism is highly recommended. A duplex sonography should be preferably carried out on all the elderly and high-risk patients undergoing major general surgery between the seventh and 14th postoperative day followed by a repeat ultrasonography in all the positive cases to rule out proximal propagation of thrombus. In order to solve the dilemma for the surgeons in India whether or not to subject their patients undergoing major surgery to chemoprophylaxis for DVT and PE, we require various trials involving larger number of patients in future.

REFERENCES

1. Heit JA, Silverstein MD, Mohr DN, Pettersen TM, Lohse CM, O'Fallon WM, et al. The epidemiology of venous thromboembolism in the community. *Thromb Haemost* 2001;86(1):452-63.
2. Millar JA. Rational thromboprophylaxis in medical inpatients: not quite there yet. *Med J Aust*. 2008;189(9):504-6.
3. Chan CMS, Shorr AF. Economic and outcomes aspects of venous thromboembolic disease. *Crit Care Clin*. 2012;28(1):113-23.
4. Liberman JR, Hsu WK. Prevention of venous thromboembolic disease after total hip and knee arthroplasty. *Current Concepts Review*. *J Bone Joint Surg Am*. 2005;87(9):2097-112.
5. Segal, JB, Eng, J, Tamariz, LJ, Bass, EB. Review of the Evidence of Diagnosis of Deep Venous Thrombosis and Pulmonary Embolism. *Annals of Family Medicine*. 2007;5(1):63-73.
6. Ginsberg JS, Turkstra F, Buller HR, MacKinnon B, Magier D, Hirsh J. Post-thrombotic syndrome after hip or knee arthroplasty: a cross-sectional study. *Arch Intern Med* 2000;160(5):669-72.
7. Weitz, JI, Hirsh, J, Samama, M. New Antithrombotic Drugs: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *CHEST*. 2008;8(133):234-56.
8. White RH, Romano PS, Zhou H. A population-based comparison of the 3-month incidence of thromboembolism after major elective/urgent surgery. *Thromb Haemost* 2001;86(12):P2255.
9. Liew NC, Chang YH, Choi G, et al. Asian venous thromboembolism guidelines: prevention of venous thromboembolism. *Int Angiol*. 2012;31(6): 501-16.
10. Nathan S, Aleem MA, Thiagarajan P, Das De S. The incidence of proximal deep vein thrombosis following total knee arthroplasty in an Asian population: a Doppler ultrasound study. *J Orthop Surg (Hong Kong)* 2003;11(2):184-9.
11. 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(950):729-31.
12. 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(2):136-9.
13. Agarwala S, Bhagwat AS, Modhe J. Deep vein thrombosis in Indian patients undergoing major lower limb surgery. *Indian J Surg*. 2003;65(2): 159-62.
14. Rasmussen MS, Jørgensen LN, Wille-Jørgensen P. Prolonged thromboprophylaxis with low molecular weight heparin for abdominal or pelvic surgery. 2009;(1):CD004318.
15. Parakh R, Kakkar VV, Kakkar AK. Venous Thromboembolism (VTE) Core Study Group. Management of venous thromboembolism. *J Assoc Physicians India*. 2007;55(1):49-70.
16. 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(2):136-9.
17. Brenda K. Zierler. Diagnosis of Venous Thromboembolism: Ultrasonography and Diagnosis of Venous Thromboembolism. *Circulation*. 2004; 109(12):S9-14.
18. Gottlieb RH, Widjaja J, Tian L, Rubens DJ, Voci SL. Calf sonography for detecting deep venous thrombosis in symptomatic patients: Experience and review of the literature. *J Clin Ultrasound*. 1999; 27(4):415-20.
19. Colwell CW Jr Thromboprophylaxis in orthopedic surgery. *Am J Orthop (Belle Mead NJ)*. 2006;Suppl:1-9; quiz 10-1.
20. Wang CJ, Wang JW, Chen LM, Chen HS, Yang BY, Cheng SM. Deep vein thrombosis after total

knee arthroplasty. *J Formos Med Assoc* 2000;99(11):848-53.

21. Middeldorp S, Meinardi JR, Koopman MM et al. A prospective study of asymptomatic carriers of the factor V Leiden mutation to determine the incidence of venous thromboembolism. *Ann Intern Med*. 2001;135(5):322-7.

22. Colman RW, Hirsh J, Marder VJ, Clowes AW, George JN (Editors). *Hemostasis and thrombosis*, 4th Edition, Philadelphia, Lippincott Williams and Wilkins, 2001. P:1085-100.

23. McNally MA, Cooke EA, Harding ML, Mollan RA. Attitudes to and utilization of, low molecular weight heparins in joint replacement surgery. *J R Coll Surg Edinb*. 1997;42(4):407-9.

24. Deheinzelin D, Braga AL, Martins LC, Martins MA, Hernandez A, Yoshida WB, Maffei F, Monachini M, Calderaro D, Campos W Jr, Sguizzatto GT, Caramelli B; Incorrect use of thromboprophylaxis for venous thromboembolism in medical and surgical patients: results of a multicentric, observational and cross-sectional study in Brazil. *J Thromb Haemost*. 2006;4(6):1266-70.