

# DVT PROPHYLAXIS- IS IT MANDATORY FOR MAJOR GENERAL SURGICAL OPERATIONS?

Sukumaranair Sreekumar<sup>1</sup>, Thekkoot Vijayan Santhosh<sup>2</sup>, Mampalli Narayanan Brahmadathan<sup>3</sup>, Thiruvilwamala Govindan Nishad<sup>4</sup>

<sup>1</sup>Associate Professor, Department of General Surgery, Government Medical College, Thrissur.

<sup>2</sup>Assistant Professor, Department of General Surgery, Government Medical College, Thrissur.

<sup>3</sup>Professor and HOD, Department of Radiology, Government Medical College, Thrissur.

<sup>4</sup>Junior Resident, Department of General Surgery, Government Medical College, Thrissur.

## ABSTRACT

### BACKGROUND

Deep Vein Thrombosis (DVT) is considered as a leading cause for morbidity and mortality following major surgical procedures. Incidence of DVT exhibit wide variation globally and its incidence in Indian population is limited. This prospective study aims to find out the incidence of DVT and associated risk factors in patients undergoing general surgical procedures in Kerala, a southern state of India.

### MATERIALS AND METHODS

This is a prospective study done on general surgical patients from February 2013 to July 2014 in a tertiary level teaching hospital. We screened the patients with Duplex scan to detect lower limb DVT on 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup> and 8<sup>th</sup> postoperative days following major general surgical procedures.

### RESULTS

Of the 100 patients studied, 3 developed DVT postoperatively (3%). Use of Oral Contraceptive Pills (OCP) and postoperative immobilisation for more than 4 days were the significant associated risk factors.

### CONCLUSION

Incidence of DVT is very low in South Indian patients undergoing general surgical procedures and routine use of anticoagulant prophylaxis is to be considered only if there are risk factors like use of OCP and prolonged postoperative immobilisation and in patients with known high risk comorbidities.

### KEYWORDS

Postoperative, Deep Vein Thrombosis, Incidence, India, General Surgery.

**HOW TO CITE THIS ARTICLE:** Sreekumar S, Santhosh TV, Brahmadathan MN, et al. DVT prophylaxis- Is it mandatory for major general surgical operations?. J. Evid. Based Med. Healthc. 2017; 4(19), 1072-1075. DOI: 10.18410/jebmh/2017/210

### BACKGROUND

Deep Vein Thrombosis is a leading cause of morbidity and mortality following major surgical procedures.<sup>1</sup> Acute pulmonary embolism and long-term sequel of postthrombotic limb and pulmonary hypertension are the major complications of DVT contributing to this phenomenon. This can be prevented by instituting timely anticoagulant prophylaxis preoperatively in high-risk patients.

Incidence of DVT exhibits wide variation globally with high rates in Western population and low incidence in Asian population including Indians. Occurrence of DVT is about 15-40% following general surgical procedures<sup>2</sup> and 45 to 84% after knee and hip replacement surgeries in patients without prophylaxis in Western world.<sup>3</sup> This prompted

recommendations of routine preoperative anticoagulant prophylaxis in most of the surgical procedures in this population.<sup>4</sup>

Data regarding Indian population is sketchy. There were only a few studies available in the literature. <sup>125</sup>I-fibrinogen uptake study to find out the incidence of DVT in a postoperative South Indian population reported an overall incidence of 28%.<sup>5</sup> But, a recent report from Tata Memorial Cancer Centre, Mumbai, states that the incidence of DVT in Indian patients operated for colorectal cancer in the lithotomy position was negligible.<sup>6</sup>

In view of paucity of data from Indian subcontinent in general surgical patients and conflicting reports regarding incidence of DVT, we decided to undertake a study to assess the incidence of DVT following general surgical procedures and to find out associated risk factors in Indian population.

### MATERIALS AND METHODS

This is a prospective cohort study conducted during the period from February 2013 to July 2014 at Government Medical College Thrissur, Kerala, South India. Cases included in this study were selected from adult patients undergoing major general surgical procedures during a period of one and a half years. Most of the cases were laparotomy for

Financial or Other, Competing Interest: None.

Submission 13-02-2017, Peer Review 20-02-2017,

Acceptance 01-03-2017, Published 03-03-2017.

Corresponding Author:

Dr. Sukumaran Nair Sreekumar,

Associate Professor, Department of General Surgery,  
Government Medical College, Thrissur.

E-mail: drsreekumars@gmail.com

DOI: 10.18410/jebmh/2017/210



malignant and infective conditions. Lower limb surgeries for varicose veins and amputations were also included. Careful history taking and thorough physical examination was performed to exclude pre-existing DVT. Cases with history of DVT and patients on anticoagulants were excluded.

All the patients were subjected to venous colour Doppler study with Mindray DC-8 ultrasound scanner with high frequency probe of 12 MHz on the 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup> and 8<sup>th</sup> postoperative days to look for venous flow pattern in lower limbs. Criteria to diagnose DVT were- (1) Echogenic material in the lumen, (2) Noncompressibility of veins, (3) Weak augmentation<sup>7,8</sup> and (4) Absence of change in amplitude with respiration.

Data collected was analysed using appropriate statistical methods using Epi Info Software. Statistical significance was calculated using Fisher's exact test.

## RESULTS

One hundred patients were included in the study. 73 patients were males and majority belonged to the age group 40-60 years. 33.3% had comorbidities like diabetes, hypertension, bronchial asthma and cardiac disease. 53 patients were operated for various malignant conditions. Distribution of patients according to surgery performed is given in Table No. 1.

Of the 100 patients studied, 2 females and 1 male patient developed DVT. Of this, one female patient aged 31 who was operated for appendicular perforation was detected to have DVT on 6<sup>th</sup> postoperative day. The other female aged 41 who was operated for intestinal obstruction following chemotherapy for carcinoma ovary was detected to have DVT on 8<sup>th</sup> postoperative day. One male patient aged 58 years who underwent right hemicolectomy for carcinoma ascending colon was detected to have DVT on the 8<sup>th</sup> postoperative day. Distribution of various risk factors measured are given in Table No. 2.

No significant association between age, sex and DVT was observed in this study. There was no significant association between malignancy, medical comorbidities and DVT.

Type of anaesthesia and duration of surgery were also not found to influence the incidence of DVT in our study. No patient developed fatal complications like pulmonary embolism.

Significant association was observed between usage of oral contraceptive pills and development of DVT in this study. 2 out of 4 patients using OCP developed DVT (refer Table No. 3).

Postoperative immobility beyond 4 days was also found to have statistically significant association with DVT (refer Table No. 4).

Sl. No.	Surgery	Number of Cases
1.	Perforation peritonitis	21
2.	Carcinoma stomach	23
3.	Colonic pathology	13
4.	Intestinal obstruction	10
5.	Gallbladder diseases	7
6.	APR	4
7.	Whipple resection	2

8.	Oesophageal surgery	2
9.	Retroperitoneal tumour	3
10.	Splenectomy	1
11.	Hepatic surgery	1
12.	Varicose vein surgeries	4
13.	Amputations	9
	<b>Total</b>	<b>100</b>

**Table 1. Number of Patients According to the Surgery Performed**

	n=3	Fisher's Exact
Age group	Below 40-1 Above 40-2	0.4107
Sex	Male-1 Female-2	0.1765
Comorbidities	Present-1 Absent-2	0.631
Malignancies	Malignant-2 Nonmalignant-1	0.545
Oral contraceptives	Uses OCP-2 No OCP-1	0.00884*
Obesity	Yes - 0 No - 3	0.911
Risk of surgeries	High risk - 2 Low risk - 1	0.5139
Setting of surgery	Emergency - 3 Elective - 0	0.153
Type of anaesthesia	GA - 3 Spinal - 0	0.3688
Duration of surgery	>2 hours - 3 <2 hours - 0	0.589
Duration of postop immobility	>4 days - 2 <4 days - 1	0.0122*

**Table 2. Distribution of DVT Patients According to Various Risk Factors**

\*Statistically significant (p value <0.05).

	DVT	No DVT	Total
Uses OCP regularly	2 (33.33%)	4 (66.67%)	6 (100%)
Do not use OCP	1 (1.06%)	93 (98.94%)	94 (100%)
<b>Total</b>	<b>3 (3.0%)</b>	<b>97 (97.0%)</b>	<b>100 (100%)</b>

**Table 3. Distribution of Patients with DVT According to Their Usage of Oral Contraceptives**

Risk Ratio (RR) = 31.333; p value = 0.00884.

Duration	DVT	No DVT	Total
>4 days	2 (28.57%)	5 (71.43%)	7 (100%)
<4 days	1 (1.08%)	92 (98.92%)	93 (100%)
<b>Total</b>	<b>3 (3%)</b>	<b>97 (97%)</b>	<b>100 (100%)</b>

**Table 4. Distribution of Patients with DVT in Relation to Duration of Postoperative Immobilisation**

Risk Ratio (RR) = 26.571; p value = 0.0122.

## DISCUSSION

This is a prospective study done on general surgical patients in a rural tertiary care teaching hospital in Kerala, South India. Incidence of DVT in our study was 3%, which was very low compared to western population.

In general surgery, the frequency of deep vein thrombosis was between 15%-40% in Caucasians without anticoagulant prophylaxis.<sup>2</sup> Even with prophylaxis, the incidence of Venous Thromboembolism (VTE) is 10% or more in these populations.<sup>9</sup>

Incidence of DVT and its sequel are low in Asians. A prospective study done on major abdominal surgery patients from India reports negative incidence of DVT in both treatment and control arm.<sup>10</sup> Method used to detect DVT was lower limb venography. A trial from Tata Memorial Cancer Center was stopped prematurely due to non-incidence of DVT after examining 50 patients in prophylaxis group and 49 patients in control group.<sup>6</sup>

Prospective studies done on orthopaedic patients also reported a low incidence of postoperative DVT in India (3.3-6.12%).<sup>11,12</sup> A population-based estimate of incidence of DVT is 5/1,00,000 population.<sup>13</sup> Incidence of low rate of DVT was reported from other Asian countries also.<sup>14</sup>

The reason for lower incidence of DVT in Asians including Indian populations are multifactorial. Genetic mutations in Factor V and prothrombin gene (20210G/A) are the most important genetic variations associated with hypercoagulation. Less prevalence of these genes in Asian population may explain the low frequency of VTE in them.<sup>15</sup> These findings were confirmed in Indian population also. Absence of susceptible genetic variations of Factor V and prothrombin and presence of protective variants like PAI-1-844G/A and fibrinogen-beta-455G/A in Indians may explain the low incidence in our population.<sup>16</sup>

There are certain recent reports of higher incidence of Venous Thromboembolism (VTE) in Asian population. These reports were mainly following orthopaedic procedures. Incidence of DVT without thromboprophylaxis in a recent review was 13% in general surgical procedures, 16% in total hip replacement and 50% in knee replacement surgery.<sup>17</sup>

Traditionally, Asian diets are high in carbohydrates and low in fat. This may have antithrombogenic effect by changing intestinal flora, which activates production of intestinal plasminogen activators.<sup>18</sup> Adaptation of western lifestyle and dietary habits may alter this protective mechanism leading to increased thrombogenicity in the population. Thus, incidence of VTE may be influenced by dietary factors within same ethnicity and also there maybe genetic variations in the same population.

Eighth ACCP guidelines recommend anticoagulant prophylaxis only if the risk of asymptomatic DVT is equal to or more than 10% in general surgery patients.<sup>2</sup>

2012 ACCP guidelines for preoperative thromboprophylaxis in non-orthopaedic surgical patients stratified the patients into four risk groups based on estimated incidence of proximal or symptomatic DVT and pulmonary embolism without pharmacological prophylaxis.

Risk groups are very low (~0.5%), low (~1.5%), moderate (~3%) and high (~6%) and pharmacological thromboprophylaxis is advised in moderate-to-high-risk groups.<sup>4</sup>

In our study, all sonographically detected DVT patients were asymptomatic. Based on the above-mentioned recommendations, routine use of pharmacological prophylaxis is not warranted in South Indian population we studied and its judicious use in high-risk patients should be considered.

Main risk factors identified in the present study were use of OCP and prolonged postoperative immobility. These two factors were proved to be associated with increased occurrence of VTE in other studies also.<sup>19,20</sup>

Even though two out of the three persons who developed DVT in our study had undergone surgery for malignancy, that association was not statistically significant. There were reports from India and other Asian countries regarding low incidence of DVT in malignancy following surgery.<sup>7,21,22</sup>

## Limitations of the Study

Limitations of our study were small sample size and short follow up period, even though our results correlate with the reported incidence in Indian population. Further studies are needed including larger cohort and longer follow up. Duplex scanning is not a gold standard in detecting lower limb DVT, but its use as a screening method is well established.<sup>8</sup>

## CONCLUSION

The incidence of DVT in patients undergoing general surgery in this study is low (3%). Patients with prolonged immobilisation following surgery and patients using oral contraceptive pills have greater propensity to develop deep vein thrombosis in the lower limbs and these patients will benefit from DVT prophylaxis. According to our study, we cannot recommend routine DVT prophylaxis to all patients undergoing major surgeries, but its judicious use in high-risk patients should be considered. The study has to be continued with greater number of cases with longer follow up to get more statistically significant results.

## REFERENCES

- [1] Cronan JJ, Dorfman GS, Grusmark J. Lower-extremity deep venous thrombosis: further experience with and refinements of US assessment. *Radiology* 1988;168(1):101-107.
- [2] Geerts WH, Bergqvist D, Pineo GF, et al. Prevention of venous thromboembolism: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest* 2008;133(6 Suppl):381S-453S.
- [3] Hull RD, Raskob GE. Prophylaxis of venous thromboembolic disease following hip and knee surgery. *J Bone Joint Surg Am* 1986;68(1):146-150.
- [4] Gould MK, Garcia DA, Wren SM, et al. Prevention of VTE in nonorthopedic surgical patients: antithrombotic therapy and prevention of thrombosis: American College of Chest Physicians Evidence-Based Clinical

- Practice Guidelines. *Chest* 2012;141(2 Suppl):e227S-277S.
- [5] Shead GV, Narayanan R. Incidence of postoperative venous thromboembolism in south India. *British Journal of Surgery* 1980;67(11):813-814.
- [6] Shukla PJ, Siddachari R, Ahire S, et al. Postoperative deep vein thrombosis in patients with colorectal cancer. *Indian J Gastroenterol* 2008;27(2):71-73.
- [7] Gaitini D. Current approaches and controversial issues in the diagnosis of deep vein thrombosis via duplex Doppler ultrasound. *Journal of Clinical Ultrasound* 2006;34(6):289-297.
- [8] Rose SC, Zwiebel WJ, Nelson BD, et al. Symptomatic lower extremity deep venous thrombosis: accuracy, limitations, and role of color duplex flow imaging in diagnosis. *Radiology* 1990;175(3):639-644.
- [9] Vedovati MC, Becattini C, Rondelli F, et al. A randomized study on 1-week versus 4-week prophylaxis for venous thromboembolism after laparoscopic surgery for colorectal cancer. *Annals of Surgery* 2014;259(4):665-669.
- [10] Murugesan A, Srivastava DN, Ballehaninna UK, 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 Journal of Surgery* 2010;72(4):312-317.
- [11] Jain V, Dhaon B, Jaiswal A, et al. Deep vein thrombosis after total hip and knee arthroplasty in Indian patients. *Postgraduate Medical Journal* 2004;80(950):729-731.
- [12] Bagaria V, Modi N, Panghate A, et al. Incidence and risk factors for development of venous thromboembolism in Indian patients undergoing major orthopaedic surgery: results of a prospective study. *Postgraduate Medical Journal* 2006;82(964):136-139.
- [13] Kapoor VK. Venous thromboembolism in India. *National Medical Journal of India* 2010;23(4):193-195.
- [14] Tun M, Shuaib IL, Muhamad M, et al. The incidence of post-operative deep vein thrombosis in general surgical patients of Hospital Universiti Sains Malaysia. *The Malaysian Journal of Medical Sciences: MJMS* 2004;11(1):75-80.
- [15] Ridker PM, Miletich JP, Hennekens CH, et al. Ethnic distribution of factor V Leiden in 4047 men and women: implications for venous thromboembolism screening. *JAMA* 1997;277(16):1305-1307.
- [16] Kumari B, Srivastava S, Chatterjee T, et al. Study of associated genetic variants in Indian subjects reveals the basis of ethnicity related differences in susceptibility to venous thromboembolism. *Thrombosis Article ID 182762*, 2014:pgs. 9.
- [17] Leizorovicz A, Turpie AG, Cohen AT, et al. Epidemiology of post-operative venous thromboembolism in Asian countries. *International Journal of Angiology* 2004;13(3):101-108.
- [18] Gans H, Mori K, Quinlan R, et al. The intestine as a source of plasminogen activator activity. *Annals of Surgery* 1971;174(5):826-829.
- [19] Stegeman BH, de Bastos M, Rosendaal FR, et al. Different combined oral contraceptives and the risk of venous thrombosis: systematic review and network meta-analysis. *BMJ* 2013;347:f5298.
- [20] Pinjala R, Agnihotri V, Balraj A, et al. Venous thromboembolism risk & prophylaxis in the acute hospital care setting (ENDORSE), a multinational cross-sectional study: results from the Indian subset data. *The Indian Journal of Medical Research* 2012;136(1):60-67.
- [21] Kim JW, Chun EJ, Choi SI, et al. A prospective study on the incidence of postoperative venous thromboembolism in Korean gastric cancer patients: an inquiry into the application of western guidelines to Asian cancer patients. *PloS One* 2013;8(4):e61968.
- [22] Lee E, Kang SB, Choi SI, et al. Prospective study on the incidence of postoperative venous thromboembolism in Korean patients with colorectal cancer. *Cancer Res Treat* 2016;48(3):978-989.