

DVT PROPHYLAXIS

ROLE OF LOW MOLECULAR WEIGHT HEPARIN.

DR. MUHAMMAD SAJID SHEIKHAssociate Professor of Surgery
Punjab Medical College, Faisalabad.**DR. MUHAMMAD FASIH UR REHMAN, FCPS**Medical Officer
Surgical Unit IV
DHQ Hospital, Faisalabad

ABSTRACT... Objectives: To evaluate the effectiveness of LMWH prophylaxis for DVT in high risk patients after general surgery. **Study design:** Randomized controlled study. **Setting:** Surgical Unit-IV, District Head Quarters Hospital, Faisalabad. **Period:** From March 2009 to August 2009. **Patients and Methods:** Sixty patients in the LMWH group were given perioperative enoxaparin (Clexane) as prophylaxis while compression stockings were used in another control group comprised of 60 patients. At 5th postoperative day, Doppler study was performed to detect DVT in both groups. Categorical data were analyzed for significance using Chi square test through SPSS. **Results:** There were significant difference in age factor, history of DVT, Medical factor, surgical trauma factor and interpretation on the basis of points. However, there is non significant difference between LMWH group and control group for chemoprophylaxis. **Conclusions:** LMWH administration is effective for the prevention of venous thromboembolism in high risk patients and its practice should be the standard of care in the practice of surgery.

Key words: Deep Vein thrombosis, Prophylaxis; Enoxaparin (Low Molecular Weight Heparin).

INTRODUCTION

Deep vein thrombosis (DVT) is a condition which presents a diagnostic and therapeutic challenge to all clinicians directly involved in patient care. The spectrum of acute disease ranges from asymptomatic thrombosis (typically affecting distal, calf veins) discovered incidentally at autopsy or during screening procedures, through to the classic swollen, red, painful leg, to the potentially fatal complication of pulmonary embolism (PE)¹. Subsequently, these two entities, DVT and PE, should be considered part of the same disease, called venous thromboembolism (VTE)².

In hospitalized patients, VTE occurs with relatively high frequency³. A patient's risk of VTE varies depending on multiple factors including age, medical condition, type of surgery, duration of immobilization, and the presence of an underlying hypercoagulable state such as malignancy.

Measures to prevent VTE have been widely studied in European countries for many reasons, including VTE's high incidence, its associated mortality and morbidity, its cost of treatment, and its treatment-related complications⁴. As always prevention is better than cure, and apart from the obvious benefit to patients, prophylactic measures against DVT are cost effective through reduction in fatal complications and treatment requirements. It has been estimated in the USA that

widespread use of prophylactic measures in surgery would save \$60 per operated patient⁵. For all these reasons the prevention of deep vein thrombosis is of paramount importance.

In Asia, thromboprophylaxis is not routine, even in situation considered high risk in Western countries, the incidence of VTE is generally thought to be low⁶⁻¹⁰. However, several studies have recently challenged this view^{11,12}. The SMART study¹² (SMART: Surgical Multinational Asian Registry in Thrombosis study) concludes that the incidence of symptomatic DVT is not low in Asian patients rather consistent with the rates observed in Western countries and the use of thromboprophylaxis should be considered in Asian patients undergoing high risk surgical procedures.

In Pakistan, the incidence of VTE is generally unknown particularly in absence of any published epidemiological data, owing to often clinical silent nature of DVT. The clinical signs and symptoms of VTE are non-specific and screening tests are not always sensitive enough to detect the disease in asymptomatic patients. But the relative high prevalence of the disease in certain clinical circumstances and its potentially harmful consequences cannot be denied. There is no routine use of chemoprophylaxis for even high risk patients in the country under present set up¹³. While some centres in Pakistan do exercise routine prophylactic practices,

there are many centres which need to undertake chemoprophylaxis as routine practice. It is in recognition of this need VTE Advisory Board committee have formulated "National Guidelines for the Management of VTE" in Pakistan. The formation of these guidelines is just a first step. Its implementation is the next essential step in order to minimize morbidity and mortality of this preventable condition.

Present study was thus planned in the light of National Guidelines for the Management of VTE to assess the effectiveness of chemoprophylaxis (Low Molecular Weight Heparin) in high risk patients after general surgery using the color Doppler as a diagnostic tool due to its reproducibility and non-invasive nature.

PURPOSE OF STUDY

To evaluate the effectiveness of low molecular weight heparin prophylaxis for deep vein thrombosis in high risk patients after general surgery.

PATIENTS AND METHODS

Study design

A randomized controlled trial was conducted to compare the role of LMWH prophylaxis with those receiving no prophylaxis i.e., controls but given compression stockings in post operative period.

Sample size

The sample size for each group viz., those administered low molecular weight heparin (LMWH) and control was 60. Total 120 cases were studied.

Sampling technique

Non probability (purposive)

Place of study

The study was conducted in Surgical Unit-IV of District Head Quarters, Hospital (Punjab Medical College), Faisalabad.

Duration of study

The duration of study was 6 months, starting from March 2009 to August 2009.

INCLUSION CRITERIA

Patients of either sex and over 40 years of age, who were referred to surgical unit-IV of the hospital for general surgery and found at high risk of DVT with score ≥ 3 , on the basis of risk factor assessment scoring system were enrolled in the study.

EXCLUSION CRITERIA

Patients were excluded if they had clinical evidence of DVT or suspected DVT, conditions that increase the risk of bleeding (i.e., recent surgery or stroke, malignant hyper tension, increased risk of falling, pregnancy), age less than 20 years, likelihood of non-compliance or geographic inaccessibility, making follow up impractical. Eligible patients were excluded if they had already received heparin, LMWH or oral anticoagulant therapy for 24 hours or more.

METHODOLOGY

All study patients were included in this study after their consent and in accordance with ethical principles. About 120 consecutive patients after general surgery with high risk of DVT (i.e., having score ≥ 3) were randomly assigned to control or LMWH groups. A computer generated randomization scheme was used to assign groups to patients.

For each patient a protocol proforma including demographic details, history of DVT, medical factors, surgical/trauma factors and haematologic factors was completed. The risk factors which were recorded included documented history of DVT or PE, family history of DVT or PE, bed confinement, immobilization, pelvic or long bone fracture, leg swelling, ulcers, varicose veins, congestive heart failure, cancer, obesity, estrogen hormone therapy, pregnancy and confining air/ground traveling.

Patients in the LMWH group (A) were given perioperative enoxaparin (Clexane) 0.4ml as prophylaxis about 2 hours before surgery and later on once daily 0.4 ml subcutaneous up to four postoperative days. In the control group (B) compression stockings were used in post operative period.

At 5th postoperative day, when the patients were fully mobilized, Doppler study (duplex ultrasound) was performed to detect DVT in both groups. Colored Doppler Toshiba Eccocee with linear probe 7.5 MHz was used for this purpose.

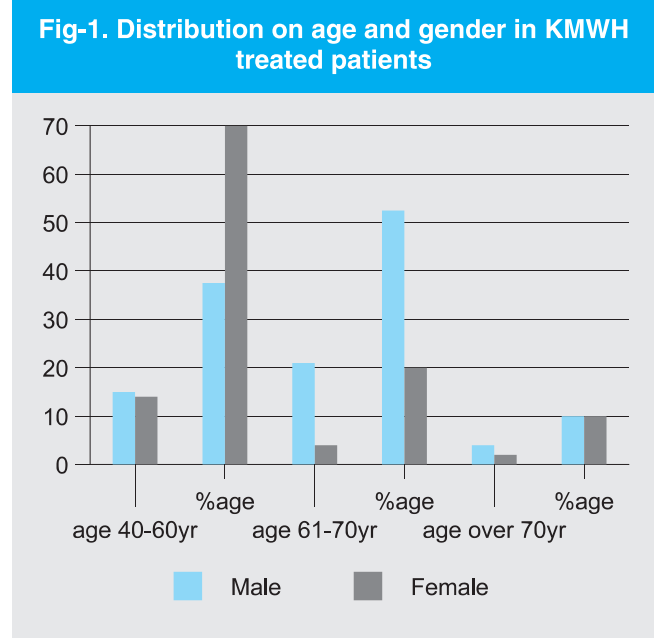
DATA ANALYSIS

DVT was confirmed by duplex ultrasound scanning. Exclusion criteria rule out the need for confounding variables. The variable information pertaining to protocol proforma was entered and edited by using Microsoft excel. Categorical data were analyzed for significance using Chi square test to study the role of LMWH in DVT prophylaxis in high risk patients. The analysis was performed using SPSS (version 15)¹⁴.

RESULTS

Of the 40 male patients in LMWH treated group 52.5% were between ages of 61-70 years while there were 20 (70%) females in the age range of 40-60 years in the same group. In the control group with no chemoprophylaxis there were 35 males and 25 females with the same higher percentage pattern as observed in LMWH group (Figure-1).

In chemoprophylaxis group irrespective of sex and age, maximum number (39) of patients were those having history of DVT based on four options as risk profile (viz., documented history of DVT, Family history of DVT, bed confinement or immobilization, pelvic or long bone fracture). Medical factors (viz., leg swelling, ulcers,



varicose veins, congestive heart failure, cancer, obesity, estrogen hormone therapy, pregnancy or confining air/ground traveling) resulted as risk profile in 38 patients while 30 patients showed surgical/trauma factors in chemoprophylaxis patients. While in control group these numbers were 35, 35 and 34 for history of DVT, medical factors and surgical/trauma factors respectively (Table-I).

On the 5th post operative period, when the patients were fully mobilized, Doppler scanning was performed. Only one female patient out of control group showed the evidence of DVT after Doppler study while remaining all

	LMWH Group (N=60)			Control Group (N=60)		
	Age 40-60 yrs	Age 61-70 yrs	Age over 70 yrs	Age 40-60 yrs	Age 61-70 yrs	Age over 70 yrs
Gender						
Male	15 (37.5%)	21 (52.5%)	4 (10%)	14 (40%)	17 (48.6%)	4 (11.4%)
Female	14 (70%)	4 (20%)	2 (10%)	18 (72%)	5 (20%)	2 (8%)
Risk factor						
History of DVT	21 (54%)	17 (43.5%)	1 (2.5%)	22 (62.8%)	12 (34.3%)	1 (2.9%)
Medical factor	20 (52.6%)	16 (42.1%)	2 (5.3%)	20 (57.1%)	13 (37.1%)	2 (5.7%)
Surgical trauma	17 (56.7%)	12 (40%)	1 (3.3%)	23 (67.6%)	10 (29.4%)	1 (2.9%)

patients of either group showed no DVT.

The analysis of the data using SPSS resulted in significant chi-square values on the basis of points for age (31.85), history of DVT (136.24), medical factor (34.87) and surgical/trauma factors (105.21) at $p = 0.05$. However, there was non-significant difference between LMWH group and control group for chemoprophylaxis.

DISCUSSION

The study highlighted several important concerns being using LMWH as prophylaxis of DVT in high risk patients after general surgery. It is difficult to confirm DVT while looking at risk factors separately. So, there should be a mechanism for surgeons which help them in DVT confirmation. A risk profile proforma based on many factors used in this study proved effective to decide about risk status of patients¹⁵.

The categorical analysis of the data using SPSS resulted in chi-square values showed that there was significant difference in age factor, history of DVT, Medical factor, surgical trauma factor and interpretation on the basis of points. However, there was non-significant difference between LMWH group and control group for chemoprophylaxis. This non-significant difference is due to small data set. Moreover, it also suggested the effectiveness of compression stockings in reducing risk of DVT in high risk patients after general surgery. However, there was one incidence of DVT in control group indicating the more effectiveness of LMWH as prophylaxis where no such incidence was reported during six months.

LMWH, administered subcutaneously is effective for DVT prophylaxis. It has become anticoagulant of choice for preventing DVT in most surgery procedures¹⁶. Its long half life precludes the need for laboratory monitoring and is more effective than unfractionated heparin in preventing recurrence of DVT. In patients and out patients uses of LMWH have equivalent safety and efficacy¹⁷. There is also less chance of bleeding, hematoma formation and heparin induced thrombocytopenia¹⁸.

During this study there were no case reported for any

severe complication. Only two patients showed transient foot swelling and pain. It is important for all patients, regardless of whether they have received prophylaxis, to be alert to the possibility of thromboembolic complications and to investigate this by objective means whenever appropriate. The usual duration of prophylaxis with LMWH in trials has been 7 days. A 7 day period of prophylaxis covers the time of major risk of thromboembolic complications, but it is possible that later episodes could be prevented by continuation of therapy.

Additional clinical trials are suggested involving more number of patients and sufficient time to examine more rigorously the efficacy of LMWH for the prophylaxis of DVT.

CONCLUSIONS

Low molecular weight heparin administration is effective and definitely easier to use for the prevention of venous thromboembolism in surgical patients having high risk of developing VTE. All patients under surgery should be assessed for DVT by using risk factors profile used in this study. VTE prophylaxis should be the standard of care in the practice of surgery.

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REFERENCES

1. Russell RCG, Williams NS, Bulstrode CJK. Bailey & Love's Short Practice of Surgery 24th Edn. London: Arnold, Hodder Headline group; 2004: 969.
2. Chaouat A, Weitzenblum E, Strasbourg. **Prophylaxis of deep vein thrombosis in total hip replacement: which heparin and what duration?** Respiration 1998; 65: 345-46.
3. Goldhaber SZ, Dunn K, MacDougall RC. **New onset of venous thromboembolism among hospitalized patients at Brigham and Women's Hospital is caused more often by prophylaxis failure than by withholding treatment.** Chest 2000; 118: 1680-84.
4. Anderson FA, Wheeler HB, Goldberg RJ, Hosmer DW, Patwardhan NA, Jovanovic. B, Forcier A, Dalen JE. **A Population-based perspective of the hospital incidence and case-fatality rates of deep vein thrombosis and pulmonary thromboembolism: the Worcester DVT study.** Arch Intern Med 1991; 151: 933-

- 38.
5. US Bureau of the Census. **Statistical Abstract of the United States: 2000**. 120th Edn. Washington, DC; 2000.
 6. Silverstein MD, Heit JA, Mohr DN, Petterson TM, O'Fallon WM, Melton LJ 3rd. **Trends in incidence of deep vein thrombosis and pulmonary embolism: a 25-year population-based study**. Arch Intern Med 1998; 158: 585-93.
 7. Bauer KA. **The thrombophilias: well-defined risk factors with uncertain therapeutic implications**. Ann Intern Med 2001; 135: 367-73.
 8. Haeger K. **Problems of acute deep vein thrombosis. I. The interpretation of signs and symptoms**. Angiology 1969; 20: 219-23.
 9. Hwang WS. **The rarity of pulmonary thromboembolism in Asians**. Singapore Med. J 1968; 9: 276-79.
 10. Chau KY, Yuen ST, Ng THK, Ng WF. **An autopsy study of pulmonary thromboembolism in Hong Kong Chinese**. Pathology 1991; 23: 181-84.
 11. Leizorovicz A, Turpie AG, Cohen AT, Dhillon KS, Angchaisuksiri P, Wang CJ. **Epidemiology of Post-operative venous thromboembolism in Asian countries**. Int J Angiology 2004; 13: 101-08.
 12. Leizorovicz A, Turpie AGG, Cohen AT, Wong L, Yoo MC, Dans A, for the SMART Study Group. **Epidemiology of venous thromboembolism in Asian patients undergoing major orthopedic surgery without thromboprophylaxis**. The Smart Study. J Thromb Haemost 2005; 3: 28-34.
 13. Anonymous. **National Guidelines on the Prophylaxis and Management of Venous Thromboembolism(VTE)**. 1st Edn. Karachi: Sanofi-aventis Pakistan Limited 2006.
 14. SPSS for Windows, Release Version 15.0, (© SPSS, Inc., 2001, Chicago, IL, www.spss.com).
 15. Dhillon, KS, Askander A, Doraisamy S. **Postoperative deep-Vein Thrombosis in Asian patients is not a rarity**. J Bone Joint Surg Br 1996; 78-B: 427-30.
 16. Daniel AA, Avery BN. **Thrombosis and Coagulation: Deep Vein Thrombosis and Pulmonary Embolism Prophylaxis**. Surg Clin North Am 2005; 85(6): 56-59.
 17. James TL, Frederic SB. **Critical care of vascular diseases and Emergencies**. In: Frederic SB, Darryl YS, Janine REV. Current Critical Care Diagnosis and Treatment. 3rd Edn. Lange; 2004: 644.
 18. Frederick D, Ann L, Anthony V, Marcus B, Victor F, Edward G, Terry H, Neil H, Bruce K, John K, Richard M, Greg O, Walter P, Theodore R, Paul S, Peter S, Clifford S, Douglas WW. **Practice parameters for the prevention of venous thromboembolism**. Dis Colon Rectum 2000; 43(8): 1037-47.

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Correspondence Address:
Dr. Muhammad Sajid Sheikh
Associate Professor of Surgery
Punjab Medical College,
Faisalabad.

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**“To succeed, one must be
creative and persistent.”**

(John H. Johnson)