



International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2020; 6(2): 216-219
© 2020 IJOS
www.orthopaper.com
Received: 06-01-2020
Accepted: 10-02-2020

Dr. Laxmikanta Debata
Senior Resident, Department of
Orthopaedics, Government
Medical College, Miraj,
Maharashtra, India

Dr Alok Gadkari
Assistant Professor, Department
of Orthopaedics, Symbiosis
Medical College for Women,
Symbiosis International
University, Lavale, Pune,
Maharashtra, India

Dr Sanjay N Patil
Professor and Consultant Spine
Surgeon, Department of
Orthopaedics, Bharati
Vidyapeeth Deemed University
Medical College, Pune,
Maharashtra, India

Corresponding Author:
Dr. Laxmikanta Debata
Senior Resident, Department of
Orthopaedics, Government
Medical College, Miraj,
Maharashtra, India

Incidence of DVT in post-operative lower limb trauma patients and the role of rivaroxaban in prevention of DVT

Dr. Laxmikanta Debata, Dr Alok Gadkari and Dr Sanjay N Patil

DOI: <https://doi.org/10.22271/ortho.2020.v6.i2d.2041>

Abstract

Background: Deep vein thrombosis (DVT) is a common cause of morbidity and mortality after Orthopedic surgery. Some recent studies report an increasing incidence of VTE in the Indian subcontinent. Rivaroxaban was found to be safe and effective for thromboprophylaxis after major Orthopedic surgery across a wide range of doses.

Aim: To study incidence of DVT in lower limb trauma patients and the efficacy and safety of oral rivaroxaban, 10 mg once daily, administered postoperatively, for the prevention of venous thromboembolism.

Material and Methods: A total of 200 patients selected by simple random sampling with lower limb trauma admitted for surgery in the hospital were included in the study. The patients were randomized into two groups of 100 patients each.

RE was given oral Rivaroxaban, 10 mg once daily for the prevention of venous thromboembolism and Group E, control group, for which no prophylaxis was given.

Results: Incidence of DVT was 3% in Group RE and 6% in group E. There was statistical significant difference when two groups were compared statistically. Incidence was 7% in males and 2% in females. The mean duration of treatment in patients in Group RE was 26.32 ± 13.21 days and in Group E was 16.32 ± 4.21 days. The adverse event of bleeding in patients of Group RE was 3% and in Group E was 2% with no statistically difference.

Conclusion: DVT in Indian patients with lower limb trauma is a fair problem and hence pharmacological prophylaxis should be used only for all patients with risk factors. Rivaroxaban offers a simple, approach to the short-term treatment of DVT that may improve the benefit-risk profile of anticoagulation.

Keywords: Deep vein thrombosis, lower limb trauma, Rivaroxaban, prophylaxis

Introduction

Deep vein thrombosis (DVT) and pulmonary embolism (PE) are common causes of morbidity and mortality after Orthopedic surgery^[1, 2]. Hence, early diagnosis and treatment of a deep venous thrombosis (DVT) is essential to prevent this catastrophe^[3].

In general surgical patients without prophylaxis against DVT, the prevalence of DVT has been reported to be as high as 30%, with an associated fatality risk of 1%.^[3] Low incidence has been reported in Asians and it can be related to several factors like increased fibrinolytic activity, lack of Protein C in activated form resistance, an increased incidence of blood group "O", less fat intake, decreased incidence of obesity and climatic variations^[4, 5]. The reported lower incidence of DVT could also be because of the lack of awareness among the doctors and the patients, and unavailability of diagnostic facilities in this part of the world; thus many of the cases remain undiagnosed.

Some recent literature reports an increasing incidence of DVT in the Indian subcontinent. The increased incidence is related to increased life expectancy, changing lifestyle and better diagnostic methods. Clinical signs are not sensitive to the diagnosis of DVT. This is real in trauma patients in whom lower limb swelling, chest pain, breathlessness and fever along with pain can all occur due to injury per se.

Rivaroxaban is an active direct factor Xa inhibitor given orally. Phase 2 studies showed that rivaroxaban was potentially safe and effective for thromboprophylaxis after major orthopedic surgery across a wide range of doses [6].

This study was conducted to study incidence of DVT in lower limb trauma patients and to study the efficacy and safety of oral rivaroxaban, 10 mg once daily, administered postoperatively, for the prevention of venous thromboembolism.

Materials and Methods

The present observational hospital based study carried out at Tertiary Institute over a period of two years to assess the incidence of DVT in post-operative lower limb trauma patients and to assess the role of rivaroxaban in DVT prophylaxis. The study was conducted after obtaining clearance from the Ethical Committee of the institute and permission from the appropriate authority.

A total of 200 patients selected by simple random sampling with lower limb trauma admitted for surgery in the hospital were included in the study.

Inclusion Criteria

- Patients with age of 18 years or more
- Lower Limb Trauma case who underwent surgery.
- Willing to participate in the study

Exclusion Criteria

- Cases other than lower limb trauma
- Patients with existing DVT
- Patients who have been started with fibrinolytics for DVT prophylaxis
- Conservatively managed patients
- Refused to give written consent

Selected patients are subjected for serial measurements of Blood pressure and routine investigations such as, blood sugar levels, HbA_{1c}, Lipid Profile, Serum electrolytes and Venous Colour Doppler of Lower Limb.

The patients were divided randomly into two groups of 100 patients each.

- Group RE = was given oral Rivaroxaban, 10 mg once daily for the prevention of venous thromboembolism and
- Group E = Control group for which no prophylaxis was given

Data was collected and analyzed for drug efficiency.

Results

Majority of patients in Group RE were in age group 21-40 years (46%) while patients in Group E were in age group 21-40 years (43%). The mean age in group RE was 35.84 years and group E was 36.02 years. Out of total 200 patients, 159 were males while 41 were females. There were 78 (78%) and 81 (81%) male patients among Group RE and Group E respectively. Out of total 100 patients, hypertension, diabetes mellitus, IHD, stroke and other diseases was present in 8%, 5%, 6%, 2% and 3% of patients in Group RE respectively and in 6%, 4%, 7%, 3% and 4% of patients in Group E respectively. There was no age, gender and co-morbidity difference when two groups were compared statistically. ($p>0.05$)

Table 1: Incidence of DVT by age distribution

	Group RE (n=100)	Group E (n=100)	Total
Age group			
Upto 20	00	00	00
21-40	01	03	04
41-60	01	02	03
>60	01	01	02
Sex			
Male	02	05	07
Female	01	01	02

It was observed that incidence of DVT was 3% in Group RE and 6% in group E. There was statistical significant difference when two groups were compared statistically. ($p< 0.05$). It was observed that incidence of DVT was 7% in males and 2% in females. The incidence of DVT was 2% and 5% male patients among Group RE and Group E respectively. There was no gender difference when two groups were compared statistically. ($p>.05$)

Table 2: Surgical Characteristics

Surgical characteristics	Group RE (n=100)	Group E (n=100)	P value
Interval from trauma to surgery (Days)	3.24± 1.23	3.76 ± 1.42	P>0.05*
Duration of surgery (hours)	2.18 ± 1.09	2.65 ± 1.13	P>0.05*
Complications during surgery	03	02	P>0.05*

($P>0.05$; Statistically not significant)

The mean duration of interval from trauma to surgery in patients in Group RE was 3.24± 1.23 days and in Group E was 3.76 ± 1.42 days. This difference in interval from trauma to surgery in patients in two groups was statistically not significant. ($P>0.05$)

The mean duration of surgery in patients in Group RE was 2.18 ± 1.09 hours and in Group E was 2.65 ± 1.13 hours. This difference in duration of surgery in patients in two groups was statistically not significant. ($P>0.05$)

The complications during surgery were 3% and 2% patients among Group RE and Group E respectively. There was complication difference when two groups were compared statistically. ($p>.05$)

Table 3: Efficacy of Drug

Efficacy	Group RE	Group E	P value
Dose (mg)	09.46	32.18	P<0.05*
Duration (Days)	26.32	16.32	P<0.05*

($P<0.05$; Statistically significant)

The mean dose in patients in Group RE was 9.46 ± 3.21 mg and in Group E was 32.18 ± 14.21 mg. This difference in dose of drug in patients in two groups was statistically significant. ($P< 0.05$). The mean duration of treatment in patients in Group RE was 26.32± 13.21 days and in Group E was 16.32 ± 4.21 days. This difference in dose of drug in patients in two groups was statistically significant. ($P< 0.05$).

Table 4: Adverse Events

Adverse Events	Group RE	Group E	P value
Bleeding	03	02	P>0.05*
Elevated liver enzymes	02	02	P>0.05*
Drug interactions	01	01	P>0.05*

($P>0.05$; Statistically not significant)

The adverse event of bleeding in patients of Group RE was 3% and in Group E was 2% with no statistically difference. ($p>0.05$). The adverse event of elevated liver enzymes in patients of Group RE was 2% and in Group E was 2% with no statistically difference. ($p>0.05$)

Discussion

In the present study, it was observed that majority of patients in Group RE were in age group 21-40 years (46%) while patients in Group E were in age group 21-40 years (43%). The mean age in group RE was 35.84 years and group E was 36.02 years. There was no significant difference in age distribution in all two groups. ($p>0.05$). Smit Shah *et al.* [7] in a study determined the prevalence of DVT and its complication observed most of the patients were from younger age group (21-60 years; 72.8%) with the mean age of 52 years (age range 14-90 years). The demographic profile of our patients is comparable to others literatures. In Rajagopalan *et al.* [9] study; it was found 54% patients were from age group 21-60. In a study done by L Chinglensana *et al.* [10] on clinical profile and management of deep vein thrombosis of lower limb observed majority of patients were less than 45 years old with no sex preponderance.

Out of total 200 patients, 159 were males while 41 were females. There were 78 (78%) and 81 (81%) male patients among Group RE and Group E respectively. There was no gender difference when two groups were compared statistically. ($p>0.05$). Smit Shah *et al.* [7] in a study determined the prevalence of DVT and its complication in 125 patients with lower limb trauma and observed out of 125 patients, 107 were male and 18 female (M: F=5.9:1).

Out of total 100 patients, hypertension, diabetes mellitus, IHD, stroke and other diseases was present in 8%, 5%, 6%, 2% and 3% of patients in Group RE respectively and in 6%, 4%, 7%, 3% and 4% of patients in Group E respectively. There was no significant statistical difference in co-morbidity amongst two groups. It was observed that incidence of DVT was 3% in Group RE and 6% in group E. There was statistical significant difference when two groups were compared statistically. ($p<0.05$). In a study done by L Chinglensana *et al.* [10] on clinical profile and management of deep vein thrombosis of lower limb observed the life-time prevalence of DVT is 3.1% and tends to rise towards older age groups. Smit Shah *et al.* [7] in a study determined the prevalence of DVT and its complication observed out of 125 patients, 6 patients were DVT positive (4.8%). In a study done by L Chinglensana *et al.* [10] on clinical profile and management of deep vein thrombosis of lower limb observed age of the patients with DVT ranged from 16 years to 75 years (mean 41 years). It was observed that incidence of DVT was 7% in males and 2% in females. The incidence of DVT was 2% and 5% male patients among Group RE and Group E respectively. There was no gender difference when two groups were compared statistically. ($p>0.05$)

In a study done by L Chinglensana *et al.* [10] on clinical profile and management of deep vein thrombosis of lower limb observed prevalence of DVT higher in women (3.5%) compared with men (2.4%). The mean duration of interval from trauma to surgery in patients in Group RE was 3.24 ± 1.23 days and in Group E was 3.76 ± 1.42 days. This difference in interval from trauma to surgery in patients in two groups was statistically not significant. ($P>0.05$). The mean duration of surgery in patients in Group RE was 2.18 ± 1.09 hours and in Group E was 2.65 ± 1.13 hours. This difference in duration of surgery in patients in two groups was

statistically not significant. ($P>0.05$). The complications during surgery were 3% and 2% patients among Group RE and Group E respectively. There was complication difference when two groups were compared statistically. ($p>0.05$). The mean dose in patients in Group RE was 9.46 ± 3.21 mg and in Group E was 32.18 ± 14.21 mg. This difference in dose of drug in patients in two groups was statistically significant. ($P<0.05$). The mean duration of treatment in patients in Group RE was 26.32 ± 13.21 days and in Group E was 16.32 ± 4.21 days. This difference in dose of drug in patients in two groups was statistically significant. ($P<0.05$)

The adverse event of bleeding in patients of Group RE was 3% and in Group E was 2% with no statistically difference. ($p>0.05$) Similarly, the adverse event of elevated liver enzymes in patients of Group RE was 2% and in Group E was 2% with no statistically difference. ($p>0.05$). Robert D. Russell *et al.* [11] in a study observed that the primary efficacy outcome occurred in 1.1% of patients in the rivaroxaban group and in 3.7% of patients in the enoxaparin group ($P<0.001$). Major bleeding occurred in 0.3% of patients in the rivaroxaban group and in 0.1% of patients in the enoxaparin group ($P=0.018$). The combined rate of major and clinically relevant non-major bleeding was 3.2% in the rivaroxaban group and 2.5% in the enoxaparin group, which was not statistically significant. Rupert Bauersachs *et al.* [12] conducted an open-label, randomized, event-driven, non inferiority study that compared oral rivaroxaban alone (15 mg twice daily for 3 weeks, followed by 20 mg once daily) with subcutaneous enoxaparin followed by a vitamin K antagonist (either warfarin or acenocoumarol) for 3, 6, or 12 months in patients with acute, symptomatic DVT. Rivaroxaban had good efficacy with respect to the primary outcome (36 events [2.1%], vs. 51 events with enoxaparin-vitamin K antagonist [3.0%]; hazard ratio, 0.68; 95% confidence interval [CI], 0.44 to 1.04; $P<0.001$).

The principal safety outcome occurred in 8.1% of the patients in each group. In the continued-treatment study, which included 602 patients in the rivaroxaban group and 594 in the placebo group, rivaroxaban had superior efficacy (8 events [1.3%], vs. 42 with placebo [7.1%]; hazard ratio, 0.18; 95% CI, 0.09 to 0.39; $P<0.001$). Four patients in the rivaroxaban group had nonfatal major bleeding (0.7%), versus none in the placebo group ($P=0.11$). Rivaroxaban offers a simple, single-drug approach to the short-term and continued treatment of venous thrombosis that may improve the benefit-to-risk profile of anticoagulation.

References

1. Blodpropp-förebyggande,diagnostikochbehandlingavvenöstromboembolism.Stockholm:SBU, 2002.
2. Geerts WH, Pineo GF, Heit JA, *et al.* Prevention of venous thromboembolism: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. *Chest*. 2004; 126(3):338S-400S.
3. Eppsteiner RW, Shin JJ, Johnson J, Van Dam RM. Mechanical compression versus subcutaneous heparin therapy in postoperative and posttrauma patients: a systematic review and meta-analysis. *World Journal of Surgery*. 2010; 34(1):10-19.
4. Lawrence JR, Xabregas A, Gray L, Ham JL. Seasonal variation in the incidence of deep vein thrombosis. *Br J Surg*. 1977; 64:777-80.
5. Nandi PL, Li WS, Leung R, Chan J, Chan HT. Deep vein thrombosis and pulmonary embolism in the Chinese

- population. Hong Kong Med J. 1998; 4:305–10.
6. Kubitz D, Becka M, Mueck W *et al.* Effects of renal impairment on the pharmacokinetics, pharmacodynamics and safety of rivaroxaban, an oral, direct Factor Xa inhibitor. *British Journal of Clinical Pharmacology*. 2010; 70(5):703-712.
 7. Shah S, Bhalodia R, Patel K, Golwala PP. Prevalence of deep vein thrombosis with lower limb trauma patients. *IJBAR*. 2015; 6(01):15-19.
 8. Rajagopalan N. Thromboprophylaxis by daletaparin sodium in elective major Orthopaedic surgery. *Indian J Orthop*. 2003; 37:94-97.
 9. Chinglensana L, Rudrappa S, Anupama K, Gojendra T, Singh KK, Chandra ST. Clinical profile and management of deep vein thrombosis of lower limb. 2013; 27(1):10-14.
 10. Russell RD, Hotchkiss WR, Knight JR, Huo MH. The Efficacy and Safety of Rivaroxaban for Venous Thromboembolism Prophylaxis after Total Hip and Total Knee Arthroplasty. Hindawi Publishing Corporation *Thrombosis*, 2013. Article ID 762310.
 11. Bauersachs R. Oral Rivaroxaban for Symptomatic Venous Thromboembolism. *N Engl J Med*. 2010; 363:2499-2510.