Section: Pharmacology

Original Article

ISSN (0): 2347-3398; ISSN (P): 2277-7253

Comparison of Different Concentration of Heparin in Prevention of Infusion-Associated Phlebitis

Devesh Gupta[1], Ishteyaque Ahmad[2], Shaily Gupta[3]

[1]Associate Professor, Department of Pharmacology, Al Falah School of Medical Science and Research Centre, Dhauj, Faridabad, Haryana, [2]Assistant Professor, Department of Pharmacology, Al Falah School of Medical, Science and Research Centre, Dhauj, Faridabad, Haryana, [3]Assistant Professor, Department of Ophthalmology, Al Falah School of Medical, Science and Research Centre, Dhauj, Faridabad, Haryana.

Abstract

Background: Superficial thrombophlebitis (ST) is a common inflammatory thrombotic disorder in which a thrombus develops in a vein located near the surface of the skin. The present study was conducted to compare different concentration of heparin in prevention of infusion-associated phlebitis. **Subjects and Methods:** This study was conducted on 68 patients of both genders. Patients were divided into 2 groups. Group I patients received 6–8 drops of topical solution of heparin and group II patients received 1g of topical gel over the cannulated vein every 8 hourly. In all patients visual infusion phlebitis scale was recorded. **Results:** Out of 68 patients, group I received topical solution of heparin (1000 IU/ml) and group II patients received 1g of topical gel (200 IU/g). The number of patients who developed thrombophlebitis in group I was 16 and in group II was 24. Grade I thrombophlebitis was seen 6 in group I and 15 in group II, grade II was seen 10 in group I and 9 in group II. The difference was significant (P< 0.05). The mean time to develop thrombophlebitis in grade I in group I was 59.1 hours and in group II was 58.2 hours, in grade II was 62.4 hours and 61.6 hours in both groups respectively. The difference was significant (P< 0.05). **Conclusion:** Authors found that topical solution of heparin was more effective in the prevention of infusion-associated phlebitis than heparin gel.

Keywords: Phlebitis, Heparin, infusion.

Corresponding Author: Dr. Ishteyaque Ahmad, Assistant Professor, Department of Pharmacology, Al Falah School of Medical, Science and Research Centre, Dhauj, Faridabad, Haryana.

Received: December 2019
Accepted: December 2019

Introduction

The term phlebitis refers to the presence of inflammation within a vein, whereas thrombosis indicates the presence of clot within the vein. Superficial thrombophlebitis (ST) is a common inflammatory thrombotic disorder in which a thrombus develops in a vein located near the surface of the skin.[1]

Anticoagulant heparin acts predominantly by inhibiting coagulation and further progression but has a very little effect on preformed clots. Superficial thrombophlebitis is managed with topical heparin application for 7 days.[2] Topical application of heparin for 7 days is the standard medical therapy. Initiating prophylactic topical heparin, before thrombophlebitis sets in, that is, from Day 1 of IV cannula insertion, can be more effective in preventing or delaying thrombophlebitis.[3] Heparin prevents coagulation rather than lysing a formed clot. Initiating prophylactic topical heparin, before thrombophlebitis sets in, i.e., from Day 1 of IV cannula insertion, can be more effective in preventing or delaying thrombophlebitis.[4]

A study conducted in the emergency medical and surgical units of our hospital have reported the incidence of phlebitis associated with peripheral intravenous (IV) cannula to be 29.8%. However, the incidence can be as high as 75% and although the etiology is frequently obscure, it is speculated that IV catheters cause endothelial trauma and inflammation which then leads to venous thrombosis. Further, existing clinical evidence suggests that improving penetration of topical products can provide higher concentration and hence effectively manage superficial thrombophlebitis.[5] The present study was conducted to compare different concentration of heparin in prevention of infusion-associated phlebitis.

Subjects and Methods

This study was conducted in department of Pharmacology. It comprised of 68 patients of both genders. Patients were informed regarding the study and written consent was taken. Ethical approval was obtained prior to the study.

Patient information such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Group I patients received 6–8 drops of topical solution of heparin and group II patients received 1g of topical gel over the cannulated vein every 8 hourly. In all patients visual infusion phlebitis scale was recorded. Results thus obtained

were subjected to statistical analysis using chi-square test. P value < 0.05 was considered significant.

Results

Table 1: Distribution of patients

Total- 68		
Groups	**Group I (34)**	**Group II (34)**
Agent	topical heparin solution (1000 IU/ml)	1g topical heparin gel (200 IU/g)

[Table 1] shows that out of 68 patients, group I received topical solution of heparin (1000 IU/ml) and group II patients received 1g of topical gel (200 IU/g).

Table 2: Comparison of parameters

Parameters	Group I	Group II	P value
Thrombophlebitis	16	24	0.05
Grade I	6	15	0.01
Grade II	10	9	0.91

[Table 2, Figure 1] shows that number of patients who developed thrombophlebitis in group I was 16 and in group II was 24. Grade I thrombophlebitis was seen 6 in group I and 15 in group II, grade II was seen 10 in group I and 9 in group II. The difference was significant (P< 0.05).

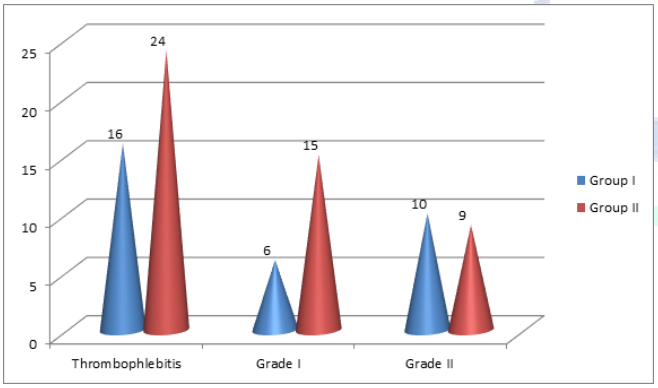

Figure 1: Comparison of parameters

Table 3: Mean time to develop thrombophlebitis in both groups

Mean time (Hours)	Group I	Group II	P value
Grade I	59.1	58.2	0.87
Grade II	62.4	61.6	0.72

[Table 3] shows that mean time to develop thrombophlebitis in grade I in group I was 59.1 hours and in group II was 58.2 hours, in grade II was 62.4 hours and 61.6 hours in both groups respectively. The difference was significant (P< 0.05).

Discussion

Intravenous (IV) cannulation is an essential component of medical practice in the current times. It assists in the administration of drugs, fluids, blood products and nutritional solutions and constitutes one of the most commonly carried out invasive procedures in hospital-based management.6 However, maintaining a single indwelling IV cannula for long duration is associated with the development of superficial thrombophlebitis. Intravenous cannulation, to administer drugs, fluids, blood products and nutritional solutions, is a significant part of hospital-based management. The use of IV cannula is often associated with the development of superficial thrombophlebitis. Topical heparin application at the site of cannulation is frequently done to prevent thrombophlebitis.[7]

In a study by Saji et al,[8] conducted in an Indian tertiary care hospital, phlebitis associated with peripheral IV cannula was experienced by 29.8% of patients. The present study was conducted to compare different concentration of heparin in prevention of infusion-associated phlebitis.

In present study, out of 68 patients, group I received topical solution of heparin (1000 IU/ml) and group II patients received 1g of topical gel (200 IU/g). The number of patients who developed thrombophlebitis in group I was 16 and in group II was 24. Belcaro et al,[9] found that patients aged 18–65 years undergoing intravenous cannulation for at least 72 h were enrolled and randomized to receive 6–8 drops of topical solution of heparin (Group sodium topical solution [QPS]) or1 g of topical gel (Group GEL) over the cannulated vein every 8 hourly for a total of 10 doses. Number of patients assessed for eligibility was 110; 26 excluded and 84 randomized. Analysis was done for 41 administered heparin QPS and 33 administered heparin gel as the rest were lost to follow-up. No phlebitis was reported in 32% of patients in QPS group and 9% in GEL group (P =0.0019). Proportion of patients with Grade I and Grade II phlebitis was 22.9% and 13.5% with QPS and 35.13% and 22.97% with gel, respectively, and the difference was statistically significant. Mean time to develop Grade I (Group QPS = 59.7 h; Group GEL = 58.46 h; P = 0.949) and Grade II (Group QPS = 62.4 h; Group GEL = 61.17 h; P = 0.732) phlebitis was comparable no adverse effects were reported in either group.

We found that Grade I thrombophlebitis was seen 6 in group I and 15 in group II, grade II was seen 10 in group I and 9 in group II. The mean time to develop thrombophlebitis in grade I in group I was 59.1 hours and in group II was 58.2 hours, in grade II was 62.4 hours and 61.6 hours in both groups respectively.

Supe et al,[10] investigated the safety and efficacy of topical heparin sodium solution 1,000 IU/mL in preventing infusion-associated superficial thrombophlebitis when applied on the skin over the cannulated vein. Treatment with investigational product, heparin sodium topical solution (1,000 IU/mL) in a dose of 6 to 8 drops was applied on the skin over the cannulated vein immediately on cannulation and then applied approximately every 8 hours for the treatment period of 48 hours (total 7 doses). It was seen that topical heparin sodium solution (1,000 IU/mL) was safe and effective in preventing and/or delaying infusion-associated superficial thrombophlebitis when applied on the skin over the cannulated vein three times a day over a period of 48 hours after cannulation.

Conclusion

Authors found that topical solution of heparin was more effective in the prevention of infusion-associated phlebitis than heparin gel.

References

1. Arun Babu T, Sharmila V. Prophylactic topical heparin can prevent or postpone intravenous cannula induced superficial thrombophlebitis. Med Hypotheses. 2010;74(5):857-8.
2. Saini R, Agnihotri M, Gupta A, Walia I. Epidemiology of infiltration and phlebitis. Nurs Midwif Res J. 2011;7(1): 22-33.
3. Bhandari B, Joshi T, Tak SK. Anti-coagulant ointment in the prevention of post-infusion thrombophlebitis in children. Indian J Pediatr. 1979;46(8):289-94.
4. Available from: http://www.vipscore.net/wp-content/uploads/2012/04/002-IV3000-A4-score-and-vein-card.pdf. Accessed on February 28, 2017.
5. Singh R, Bhandary S, Pun KD. Peripheral intravenous catheter related phlebitis and its contributing factors among adult population at KU teaching hospital. Kathmandu Univ Med J (KUMJ) 2008;6:443-7.
6. Maki DG, Ringer M. Risk factors for infusion-related phlebitis with small peripheral venous catheters. A randomized controlled trial. Ann Intern Med 1991;114:845-54.
7. Arun Babu T, Sharmila V. Prophylactic topical heparin can prevent or postpone intravenous cannula induced superficial thrombophlebitis. Med Hypotheses 2010;74:857-8.
8. Saji J, Korula SV, Mathew A, Mohan L. The incidence of thrombophlebitis following the use of peripheral intravenous cannula in post-operative patients a prospective observational study. IOSR J Dent Med Sci 2015;14:1-4.
9. Belcaro G, Cesarone MR, Dugall M, Feragalli B, Ippolito E, Corsi M, et al. Topical formulation of heparin is effective in reducing the symptoms of superficial venous thrombosis: A monocenter, observer-blind, placebo-controlled randomized study. Panminerva Med 2011;53:3-11.
10. Supe A, Subnis BM, Rao MR, Panchal VH, Lakhani RJ, Mehtalia B, et al. Novel topical quick penetrating solution of heparin in management of superficial thrombophlebitis: Results of randomized active controlled trial. Int J Pharm Sci Res 2013;4:4442-7.

How to cite this article: Gupta D, Ahmad I, Gupta S. Comparison of Different Concentration of Heparin in Prevention of Infusion-Associated Phlebitis. Asian J. Med. Res. 2019;8(4):PC01-PC03.
DOI: dx.doi.org/10.21276/ajmr.2019.8.4.PC1

Source of Support: Nil, **Conflict of Interest:** None declared.