

## Original Research Article

# Thrombophlebitis at infusion sites in surgical ward: a clinical study

Rajeev Dwivedi<sup>1</sup>, Atul Kumar Singh<sup>2\*</sup>, A. P. S. Ghaharwar<sup>2</sup>

<sup>1</sup>Department of Anaesthesiology, <sup>2</sup>Department of Surgery, S. S. Medical College, Rewa, Madhya Pradesh, India

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**\*Correspondence:**

Dr. Atul Kumar Singh,

E-mail: [drraj786@gmail.com](mailto:drraj786@gmail.com)

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### ABSTRACT

**Background:** Peripheral venous Cannulation is indispensable in admitted patients in surgical ward, thrombophlebitis following infusion is seldom serious, but its effects on postoperative recovery, hospital stay and hence burden of disease are magnanimous. The objective of the study to know the common sites of thrombophlebitis, Frequency of thrombophlebitis in relations to type of fluid and drugs used, and to find out the incidence of thrombophlebitis in relation to diseased condition and type of surgical patient.

**Methods:** this prospective observational study was conducted on 300 patients admitted in surgical ward of S.S Medical College and associated S.G.M. hospital, Rewa (M.P.) patients selected randomly. These Patients were visited daily for any sign and symptoms at infusion site. The incidence of thrombophlebitis according to common infusion sites, in relations to type of fluid and drugs used and in relation to diseased condition and type of surgical patients were recorded. The tool designed to collect the data were sociodemographic Performa and observational check list.

**Results:** In total 300 patients the incidence of thrombophlebitis is highest (100%) in Saphenous vein (Lower Limb) minimum (17%) in Basilic vein (Upper Limb). Incidence of thrombophlebitis is higher in earlier days (within 2 days) of infusion with Dextrose containing fluid (D5%+ D10%) and higher in critically ill and emergency operated patients.

**Conclusions:** Thrombophlebitis is still an important ongoing problem in admitted patients in surgical ward. Incidence is highest in saphenous vein, with dextrose containing fluid and in critically ill & emergency operated patients. It has definite relationship with site of infusion site, type of fluid, illness of patients and nature of operation

**Keywords:** Basilic vein, Critically ill, Intravenous cannulation, Surgical ward, Saphenous vein, Thrombophlebitis incidence

### INTRODUCTION

In hospitalized patients up to 80% receive intravenous (IV) therapy at some time during their admission.<sup>1</sup> The peripheral venous catheterization is a commonly done invasive procedure to administer medications, fluids and bio products.

The most common complication associated with it is thrombophlebitis with incidence varying according to different settings (3.7% - 67.24%).<sup>2</sup> Thrombophlebitis is the inflammation of the vessel wall due to the formation of blood clot. Clinical signs of phlebitis are localized redness, warmth, swelling and palpable venous cord.<sup>3</sup>

Over the last two decades, studies about phlebitis have divided the risk factors into four main groups: patient characteristics, therapy administered health professional practices and cannula characteristics.

The condition may resolve easily or proceed to complications like DVT, pulmonary embolism, septicemia, cellulitis, nodule formation or hyper pigmentation of skin. Moreover, it causes patient discomfort and insertion of a new catheter at a different site is required.

The complications associated with peripheral IV cannula and IV therapy can have a devastating effect on patient's

health and quality of life and also increase the costs of health care through prolonged hospital stay and treatment.

Given thrombophlebitis can put patient's safety at risk, this study is aimed to identify its incidence and associated riskfactors in our local community.

**METHODS**

This study was a prospective observational study on 300 admitted patients selected randomly admitted in surgical ward of S.S Medical College and associated S.G.M. hospital, Rewa (M.P.) Who had a cannula inserted, after approval by the institutional review board and ethics committee.

After taking written informed consent from hospitalized patients having inserted cannula.

These patients interrogated, in detail to record history, observation and clinical findings were recorded in prescribed proforma.

Site and surroundings of vene-puncture were observed daily for any sign and symptoms of thrombophlebitis during or after infusion.

- Pain or Discomfort
- Tenderness.
- Erythema (Redness)
- Swelling
- Blockage of Vein
- Cord like thickening of vein

The severity of thrombophlebitis was graded according to the sign and symptoms, in their grade.<sup>4,5</sup>

- Grade-I: Pain and Tenderness
- Grade-II: Redness, Swelling and Blockage of Vein.
- Grade-III: Cord like thickening of vein.

Grading of scale suggested by Bhandari et al. was originally used to grade trombophlebitis among children. There may be difference in its application for grading thrombophlebitis among adult patients.

We are able to identify another grading scale from Infusion Nurses Society during the preparation of this manuscript.

**Exclusion Criteria**

Unconscious patients and haemodynamicaly unstable patients were excluded from this study.

**Research Methodology**

- Research Methodology: Quantitative approach

- Research design: Non-experimental design (descriptive research design)
- Setting of the study: Surgical ward of S.S Medical College and associated S.G.M. hospital, Rewa (M.P.)
- Population: Patients with inserted cannula admitted in surgical ward.
- Sample and Sample size
- Patients with inserted cannula (0-70 years)
- Sample Size: 300
- Sampling Technique: Randomized
- iVariables
- Site of inserted cannula
- Fluid used and duration
- Diseased condition and type of surgical patient.
- Descriptive statistics used to analyze the variable, frequency and percentage.

**RESULTS**

A total of 300 admitted patients with insert cannula were successfully recruited for this study.

On analysis following observation were recorded.

**Table 1: Incidence of thrombophlebitis in relation to different vein used.**

Name of Vein	Limb Vessel	No. of thrombophlebitis	%
Cephalic vein	Upper limb	60	22
Basilic vein	Upper limb	46	17
Ante Cubital vein	Upper limb	90	33
Vein on dorsum of hanc	Upper limb	76	28
Total		272	100
Saphenous vein	Lower limb	28	100
Total		28	100

The incidence of thrombophlebitis in saphenous vein (100%) is highest, ante cubital vein (33%), vein on dorsum of hand (28%), cephalic vein 22% and basilic vein 17% is lower.

As it is evident from table incidence of thrombophlebitis is higher in earlier days of infusion with dextrose containing fluid (D5% +D10%) as major fluid in infusion.

The incidence of thrombophlebitis is higher in earlier days (within 2 days) of infusion in critically ill and emergency operated patients while not operated (conservative) and routine operated patients it occurs later days of infusion (after 3 days).

After 5 days it is 100% in all type of patients.

**Table 2: Incidence of thrombophlebitis in relation to duration of infusion (in days) with fluid Used.**

Fluid used	No. of patients	Thrombophlebitis in Days					
		<1	1	2	3	4	>5
RL	267	-	14 (5%)	61 (23%)	98 (36%)	183 (69%)	267 (100%)
DNS	227	-	10 (4%)	49 (22%)	85 (37%)	171 (75%)	227 (100%)
D5 %	138	1 (1%)	43 (31%)	67 (49%)	95 (69%)	138 (100%)	-
D10 %	98	4 (4%)	35 (36%)	55 (56%)	98 (100%)	-	-
ISO M	88	-	5 (7%)	16 (18%)	32 (36%)	57 (65%)	267 (100%)
ISO G	25	-	-	4 (4%)	11 (44%)	19 (76%)	25 (100%)
ISO P	21	-	-	2 (10%)	7 (33%)	15 (71%)	21 (100%)
NS	17	-	-	1 (6%)	5 (29%)	11 (65%)	17 (100%)

**Table 3: Incidence of thrombophlebitis in relation to duration of infusion (in days) with condition of patients.**

Condition of Patients	No. of patients	Thrombophlebitis in Days					
		<1	1	2	3	4	>5
Not Operated (Conservative)	122	-	17 (14%)	56 (46%)	99 (81%)	116 (95%)	122 (100%)
Routine Operated	56	-	5 (9%)	20 (36%)	32 (57%)	54 (96%)	56 (100%)
Emergency Operated	76	1 (1%)	15 (20%)	46 (61%)	74 (97%)	76 (100%)	76 (100%)
Critically ill Patients	46	4 (9%)	20 (43%)	46 (56%)	46 (100%)	46 (100%)	46 (100%)

## DISCUSSION

Thrombophlebitis is the most common complication of intravenous catheters and can lead to many complications and increased costs. It is now established that the etiology of thrombophlebitis is multifactorial. Various physical, biochemical, bacteriological, experimental and physiological studies have been performed to assess the pathophysiology and to decrease the incidence of Thrombophlebitis.

The location of catheter placement has been found by previous studies to influence the incidence of peripheral venous catheter thrombophlebitis. Catheters placed on the lower limbs have been found to have higher incidence than catheter in veins of upper limb in this study. Similarly Landbeck et al., Maki and Ringer 1991, Cicolini et al., have found in their studies that risk is lower when catheter inserted in upper limb.<sup>6,7,8</sup> Thus veins of upper limb should be considered, instead of lower limbs, due to the risk of embolisms and thrombophlebitis.<sup>9</sup>

In this study it was evident that incidence of thrombophlebitis is higher when we used dextrose containing fluid as major fluid as compare to non-dextrose containing fluid. Certain solutions of low pH and high osmolarity are associated with increased risk of thrombophlebitis.<sup>11</sup> The pH of many widely infusion fluid is kept on the acid side in order to prevent caramelisation.

The pH of commercial 5% glucose saline is 3 to 4.5 and it is 3.5 to 4.5 in commercial 10% invert sugar solution.

In this study it was evident that incidence of thrombophlebitis is higher in critically ill and emergency operated patients as compared to routine operated and conservatively treated patients, which is congruent with other studies, it may be due to these patient are highly dehydrated and severely ill and required large amount of fluid to infused for longer duration.<sup>7,10</sup> However, other researchers (Reguerio Pose et al., Carbello et al.,) did not found statistically significant differences.<sup>12,13</sup>

A catheter that is used for infusion and duration a catheter is left in the vein was significantly influence the incidence of thrombophlebitis. In this study we have found incidence is almost 100% after 5 day with any condition of patient and with any type of fluid used. Similar findings have previously been reported by Uslusoy.<sup>11</sup>

The duration and site of catheterization are the only modifiable risk factors identified. The result of many studies has shown that the risk of thrombophlebitis increases with increased duration of catheterization. A randomized clinical trial in Scarborough, UK has found that there was a significant reduction of thrombophlebitis incidence when catheter was electively replaced. Thus, it is recommended the catheter should be removed or replaced in a different site after 72 hours of insertion even when there is no sign of thrombophlebitis.<sup>14,15,16</sup>

## CONCLUSION

We confirmed an increased risk of developing thrombophlebitis among lower limb catheterization, higher with dextrose containing fluid used as major fluid and higher in critically ill and emergency operated patients. The practice of electively replacing catheter every 72 hours recommended for all adult patients. All patients with venous catheter should be examined for signs of thrombophlebitis at least once daily. A suitable peripheral vein catheter chart should include date of catheterization, development of warmth, erythema, tenderness and a palpable venous cord by healthcare personnel.

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## REFERENCES

1. Sharifi J, Ghavami F, Nowrouzi Z, Fouladvand B, Malek M, Rezaeian M., et al. Oral versus intravenous rehydration therapy in severe gastroenteritis. Arch Dis Child. 1985;60:856-60.
2. Oliveria AS, Parreira PM. Nursing intervention and peripheral venous catheter related phlebitis. Systemic literature review. Referencia: Scientific Journal of the health Science Research Unit: Nursing. 2010;3:137-47.
3. Jackson A. Infection control: a battle in infusion phlebitis. Nursing Times. 1998;94:4:68-71.
4. Bhandari B, Joshi T, Tak SK, Anti -coagulant in the prevention of post- infusion thrombophlebitis in children. Indian Paeditr. 1979;46:289-94
5. Infusion Nurses Society Standards of Practice. Vascular access device selection and placement. J Infus Nurs. 2012;S37
6. Lanbeck P, Odenholt, I, Paulsen O. Dicloxacillin: A higher risk than cloxacillin for infusion phlebitis. Scand J Infect Dis. 2003;35:397-400.
7. Maki D and Ringer M. Risk factors for infusion – related phlebitis with small peripheral venous catheter. Annals of Internal Med, 1991;114:845-54.
8. Cicolini G, Bonghi AP, Di Labio L, Di Mascio R. Position of peripheral venocannulae and the incidence of thrombophlebitis: an observation study. J Adv Nurse. 2009;65:1268-73
9. Royal College of Nursing(RCN).2010. Standards of infusion therapy.
10. Tagalakis, V., Kahn,S., Libman, M and Biostein, M. .The epidemiology of peripheral vein infusion thrombophlebitis: a critical review. Amer J Med, 2002;113:146-51.
11. Uslusoy E, Mete S, Predisposing factors to phlebitis intravenous catheters: a descriptive study. J Am Ac: Nurse Pract. 2008;20;172-80.
12. Reguerio Pose M. Pheripheral venous catheters– incidence of thrombophlebitis and its determining factors. Revista de Enfermeria. 2005;28;21-8.
13. Carballo, M., Linas M. and Feijoo, M. {Phlebitis in pheripheral catheters(I). Incidence and risk factors}. Revista de Enfermeria, 2004;27:34-8.
14. Ferreira L R, Pedreira M L and Diccini S. Phlebitis among neurosurgical patients. Acta Paulista de Enfermagem. 2007;20:30-6.
15. Mermel LA and Maki DG. Infectious complications of swan- Ganz pulmonary artery catheters, Pathogenesis, epidemiology, prevention and management. Am J Respir Crit Care Med. 1994; 149:1020-3.
16. Monreal M, Quilez F, Rey-Joly C, Rodriguez S, Sopena N, Neira C, et al. Infusion phlebitis in patient with acute pneumonia. A Prospective study. Chest. 1999;115:1576-80.

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