

Commonest Mode of Heparin Administration in Inpatient Department of Mayo Hospital

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Introduction: Heparin is the most commonly used anticoagulant. It can be given intravenously as well as subcutaneously. It is widely used throughout the world. Its use is associated with complications. Bleeding is the commonest one. The present study is done to find out the most common mode of heparin administration in inpatient department of Mayo hospital, Lahore.

Objectives: To study the commonest mode of heparin administration in inpatient department of Mayo hospital.

Study Design: It is a descriptive study.

Setting: The study was conducted in cardiology, cardiac surgery and all the medical units of Mayo hospital, Lahore.

Duration of Study: The study was conducted from November 2008 to January 2009.

Subjects: Two hundred patients, both sexes were included in the study.

Methods: A thorough and methodical clinical history was taken to rule out inherited and acquired bleeding and platelet disorders of thrombocytopenia and qualitative platelet disorders. It was supported by relevant investigations. Patients were anticoagulated with heparin (unfractionated or low molecular weight) intravenously or subcutaneously as per advice of physician. Unfractionated heparin was administered either in twenty four hour continuous infusion after a loading dose or subcutaneously six hourly. Low molecular weight heparin was given subcutaneously in single or 2 divided doses. Commonest mode of heparin administration was noted. Patients were observed for period of seven days.

Results: Out of 200 patients 185 patients were given intravenous heparin and 15 patients were given subcutaneous heparin. 14 patients developed different bleeding complications.

Conclusion: Intravenous heparin administration is commonest route of administration in our set up however it is not the safest mode.

Key Words: Intravenous Heparin, low molecular heparin, subcutaneous heparin. Mode of administration.

Introduction

Heparin is commonly used drug for thromboprophylaxis and treatment of many clinical conditions.¹ It is a naturally occurring sulfated glycosaminoglycan. It has a unique pentasacchride structure which binds to and inhibits anti-thrombin III. This type of heparin is called unfractionated heparin (UFH). Enzymatic cleavage of unfractionated heparin yields low molecular weight heparin (LMWH).²

The use of heparin in hospitals is unavoidable. It is in clinical use for more than sixty years.³ About one third of hospitalized patients receive heparin in different clinical situations like cardiology, vascular surgery, invasive procedures, acute coronary syndrome, venous thromboembolism, atrial fibrillation, peripheral occlusive disease, dialysis and extra corporeal circulation.⁴

Unfractionated heparin can be administered either intravenously or subcutaneously. With intravenous administration of heparin anticoagulation is achieved rapidly.⁵ Dose of heparin is adjusted according to the weight of patient. In order to measure the anticoagulant effect of unfractionated heparin laboratory tests are performed. They also help to adjust the dose to maintain therapeutic levels. Activated

partial thromboplastin time (aPTT) is the most commonly used laboratory test for monitoring unfractionated heparin therapy.⁶ The normal therapeutic range of aPTT is 1.5 to 2.5 times the control value. Subcutaneous administration of heparin is associated with unreliable bioavailability and delayed anticoagulation.⁵

Low molecular weight heparin has become available over the last twenty years. It is administered by subcutaneous route. It has advantages of more predictable dose response pharmacokinetics and reliable anticoagulant response. It does not require laboratory monitoring.⁷

Anticoagulation is difficult therapy due to associated side effects. The use of unfractionated heparin carries the risk of minor to life threatening bleeding. Other side effects include potentially fatal heparin induced thrombocytopenia (HIT), osteoporosis and alopecia.⁸ Chances of bleeding are less with low molecular weight heparin.⁷

Objectives

To study the commonest mode of heparin administration in inpatient department of Mayo hospital.

Material and Methods

Study Design: It is a descriptive study.

Setting: The study was conducted in cardiology, cardiac surgery and all the medical wards of Mayo hospital, Lahore.

Duration of Study: The study was conducted from November 2008 to January 2009.

Subjects: Two hundred patients, both sexes were included in the study.

Selection of Patients

Inclusion Criteria:

1. Patients on unfractionated heparin and low molecular weight therapy for anticoagulation.
2. Patients of adult age group (over 12 years), both males and females.

Exclusion Criteria:

1. Diagnosed case of megaloblastic anaemia, leukemia, multile myeloma, myelofibrosis, solid tumors and metastasis, aplastic anaemia, paroxysmal nocturnal haemoglobinuria and chronic myeloid leukemia.
2. Acute and chronic idiopathic thrombocytopenia.
3. Connective tissue disorder, like S L E.
4. Post transfusion purpura.
5. Splenomegaly due to any cause.
6. Evidence of thrombotic thrombocytopenic purpura and haemolytic uremic syndrome.
7. Metabolic illness like chronic renal failure and chronic liver disease.
8. Known case of bleeding disorder

Methods

A thorough and methodical clinical history was taken to rule out inherited bleeding and platelet disorders as well as acquired cause of thrombocytopenia and quantitative platelet disorders. It was supported by relevant investigations. Patients were anticoagulated with heparin (unfractionated or low molecular weight), intravenously or subcutaneously as per advice of attending physician. Unfractionated heparin was administered either in twenty four hour continuous infusion after a loading dose or six hourly subcutaneously. Low molecular weight heparin was given in single or 2 divided doses subcutaneously. Patients were observed clinically for any signs of bleeding manifestations for seven days after the administration of heparin.

Data analysis

Different clinical presentations in inpatient department were noted. Commonest mode of heparin administration was noted and its association with different bleeding complications was recorded.

Results

A total of two hundred adult patients were included in the study. Out of these 124 (62%) were males and 76(38%) were females. These patients presented with different diseases. 84 (42%) patients were diagnosed to be suffering from myocardial infarction (61 males and 23 females), 50 (25%) were having unstable angina (28 males and 22 females), 15 (7.5%) had cerebrovascular accident (10 males and 5 females), 15 patients (7.5%) were having congestive heart failure (8 males and 7 females), 7 (3.5%) had deep venous thrombosis (2 males and 5 females) and 7 (3.5%) had valvular heart disease (3 males and 4 females). Atrial fibrillation was diagnosed in 6 (3%) patients (5 males and 1 female), 4 (2%) had peripheral vascular disease (all females). Right heart failure was diagnosed in 3 (1.5%) patients (2 males and 1 female), dilated cardiomyopathy in 3 (1.5%) patients, all males. Amongst miscellaneous group, 2 (1%) had hypertensive encephalopathy (1 male and 1 female), 1 (0.5%) had cardiogenic shock (female), 1 (0.5%) had transient ischaemic attack (male), 1 (0.5%) had pulmonary embolism (female) and 1 (0.5%) female had atrial myxoma (Table 1).

Table 1: Presenting Disease on Admission.

Diseases	Male	Female	Total
Myocardial Infarction	61	23	84
Unstable Angina	28	22	50
Cerebrovascular accident	10	5	15
Congestive Heart Failure	8	7	15
Deep Venous Thrombosis	2	5	7
Valvular Heart Disease	3	4	7
Atrial Fibrillation	5	1	6
Pripheral Vascular Disease	0	4	4
Right Heart Failure	2	1	3
Dilated Cardiomyopathy	3	0	3
Hypertensive Encephalopathy	1	1	2
Cardiogenic Shock	0	1	1
Transient Ischaemic Attack	1	0	1
Atrial Myxoma	0	1	1
Pulmonary Embolism	0	1	1
Total	124	76	200

Myocardial infarction was found to be most common disease in both males and females (84 patients, 42%).

All the patients were given heparin therapy for their different ailments. 185 (92.5%) were given intra venous heparin (118 males and 67 females). 15 (7.5%) patients were given heparin by subcutaneous route (6 males and 9

females). Out of these 15 patients 9 patients had low molecular weight heparin (Fig. 1).

Table 2: Complications During Heparin Therapy.

Complications	Male	Female	Total
Bruises, Petechia and Purpura	3	3	6
Bleeding From Gums	3	0	3
Bruises and Bleeding From Gums	1	1	2
Haematoma	0	1	1
Haemoptysis	1	0	1
Haemoptysis, Haematoma and Epistaxis	0	1	1
	8	6	14

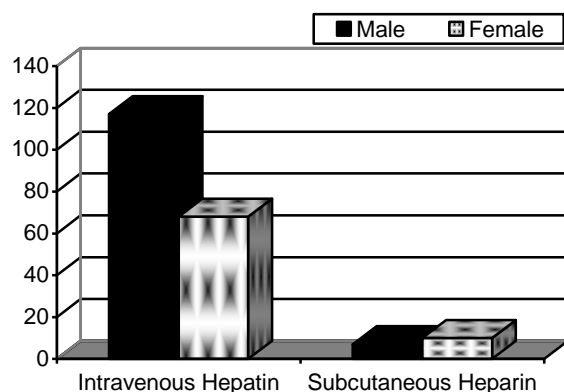


Fig 1: Mode of Heparin Administration.

During heparin therapy bleeding complications were observed in 14 patients (7%), 8 males and 6 females. Bruises, petechie and purpura were seen in 6 patients (3%), 3 males and 3 females. Bleeding from gums was observed in 3 patients (1.5%), all being males. 2 patients (1%) had both bruises and bleeding from gums (1 male and 1 female). 1 (0.5%) female patient had haematoma, 1 (0.5%) male patient had haemoptysis and 1 (0.5%) female patient had haemoptysis, haematoma and epistaxis (Table 2). It was observed that bleeding manifestations were common in patients on intravenous infusion. 11 patients (8 males and 3 females) out of 14 who developed bleeding complications were on intravenous heparin therapy. Rest of three received subcutaneous unfractionated heparin.

Discussion

We live in third world country which is burdened with communicable diseases like tuberculosis, malaria and chronic liver disease. The non communicable diseases like diabetes mellitus, ischaemic heart disease and hypertension along

with their complications are on the rise due to rapid urbanization. Management of such problems is now major health and economic issue.

For many years heparin has been used as preventive agent for many thromboembolic conditions. In medical and allied wards heparin is used as therapeutic agent in acute myocardial infarction, stroke in evolution, unstable angina pulmonary embolism and atrial fibrillation.

In our study the most common clinical presentation was myocardial infarction. The diseases of the heart are on the rise in both male and females. Urban civilization, stress full life, sedentary and affluent life styles are the major causative factors.

We have observed that 191 patients were given unfractionated and only 9 patients were given low molecular weight heparin. The commonest route of administration was observed to be intravenous route. 15 patients had subcutaneous route of administration. Nine were on low molecular weight heparin, rest were having unfractionated heparin.

Unfractionated heparin given by intravenous and subcutaneous route was having serious complications of hemorrhage. In our study 14 patients developed bleeding complications. All of them were having unfractionated heparin. In a meta analysis by Alikhan R et al observed that the use of unfractionated heparin is associated with significant increased risk of both major and minor bleeding complications. These risks are low with low molecular weight heparin.⁹ This correlates with our study. Unfractionated heparin not only causes fatal hemorrhages but it also requires increased nursing care and monitoring of anticoagulation by laboratory investigations (aPTT). Many preanalytic as well as analytic variables which are not related to the anticoagulant effect of unfractionated heparin affect the activated partial thromboplastin time test thus reducing its potential value for monitoring the heparin therapy.

Intra venous infusion is given in micro burettes having erratic flow rate. Moreover, this route is time consuming as well. Unfractionated heparin used by subcutaneous route also carries the risk of erratic absorption. This is observed by variable peak levels in the laboratory investigation (aPTT). Moreover heparin has to be stored below 25°C. Therefore the route of administration can scientifically as well as conveniently be subcutaneous route of administration. In a study by McGarry LJ et al¹⁰ it was seen that it is more effective and safe to use low molecular weight heparin for reducing the risk of venous thromboprophylaxis in seriously ill patients as compared to the unfractionated heparin.

Internationally accepted anticoagulation is by low molecular weight heparin administered by subcutaneous route. It has advantages of saving nursing time and does not require laboratory monitoring. There is either minimal or no chance of fatal hemorrhage, hematoma and HIT. Since, the administration is either once daily or twice daily as stat dose the consideration to keep the storing temperature in view is not required. In a meta analysis done by Shorr AF et al¹¹, it

was found that the prophylactic use of low molecular weight heparin compared to unfractionated heparin following ischemic stroke results in a reduction of both venous thromboembolism and pulmonary embolism. This benefit is not associated with an increased risk of bleeding.

Therefore, it should be stressed to the clinicians that the intravenous infusion form of anticoagulation by unfractionated heparin should be replaced by more accepted low molecular weight heparin by subcutaneous route.

Conclusion

We strongly recommend that the most widely used intravenous route of anticoagulation by unfractionated heparin be replaced by more convenient, safer and widely accepted low molecular weight heparin by subcutaneous route.

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