Comparison of Cost of In-Hospital Standard Heparin Therapy with Low-Molecular Weight Heparin in an Outpatient Setting in DVT Patients

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Abstract

Background- Deep venous thrombosis (DVT) is a fast-growing disease which is being dedicated significant human and financial resources. The objective of the current study was to compare the cost of current methods of heparin therapy; unfractioned heparin (UFH) and low-molecular weight heparin (LMWH), in the treatment of deep venous thrombosis.

Methods- This was a cross-sectional study on 146 patients with DVT which was carried out at the cardiology ward between 2002 and 2004. The number of admission days and the total in-patient and out-patient costs of therapy were evaluated.

Results- The results revealed that in-patient treatment with standard heparin (UFH) cost US $240. with a mean 8.5 days of hospital stay, while treatment with LMWH (Enoxaparin) cost US $80.

Conclusion- Considering all the benefits of LMWH including desired efficacy, greater ease of administration, fewer laboratory monitoring requirements, earlier hospital discharge, feasibility of using LMWH safely on an outpatient basis instead of an in-patient basis, cost-effectiveness and better individual and social activities during the treatment period, it is suggested that LMWH at least be used in low-risk patients instead of intravenous heparin, also sparing them hospital admission ***(Iranian Heart Journal 2009; 10 (4):52-56).***

Key words: deep venous thrombosis ■ heparin ■ cost

Deep venous thrombosis (DVT) is a common vascular disease associated with pelvic and proximal lower limb veins thrombophlebitis.[1] DVT risk factors including overweight, immobility, use of oral contraceptives, pregnancy, cigarette smoking and intravenous drug abuse has made the prevalence of this disease increasingly high.[2-4] On the other hand, DVT complications such as pulmonary embolism can put patients' lives at risk, such that 600,000 cases of pulmonary embolism and 60,000 mortalities due to this complication (in part originating from DVT) are reported in the United States each year.[5]

Post-thrombotic syndrome is another complication with physical disability and may lead to recurrence of the disease.[2,3] The long time period of warfarin therapy is associated with complications such as the increased risk of hemorrhage. All of the above-mentioned issues indicate that tight control and timely treatment of patients contribute significantly to the patents' quality of life.

In recent years and with the production of low molecular-weight heparin (LMWH) and identifying its advantages over standard heparin (unfractioned heparin, UFH), treating patients with LMWH instead of UFH has always been a matter of choice, since unlike

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UFH which is injected intravenously and needs tight daily control of activated partial thromboplastin time (aPTT) to adjust the dosage for each patient individually, LMWH is injected subcutaneously, needs no aPTT control and can be administered in an outpatient setting by the patient or attendance.[6-8] In addition, the hemorrhagic complications of LMWH is significantly less than those of UFH.[9] Considering the greater cost of LMWH, it has always been a matter of economic question whether an approach can be taken to achieve the best treatment results for a lower budget.

Therefore, in this study, we have assessed the cost-effectiveness of these drugs considering the conventional medical expenses in public hospitals in Iran.

Methods

This was a cross-sectional study on 146 patients with DVT which was carried out at the cardiology ward of Imam Reza (A.S.) Hospital in Mashhad, Iran, between 2002 and 2004.

The following data was gathered from medical files and analyzed by SPSS software and the expenses were compared to those of out-patient therapy with Enoxaparin. The analyzed data and information included:

A) the mean number of days for which patients with DVT were hospitalized in the cardiology ward,

B) hospital expenses for intravenous UFH therapy:

1) expenses of each day in hospital in regular multi-bed rooms (hoteling expenses),
2) nursing expenses which equals to 6% of hoteling expenses,
3) Expenses for intravenous administration of 5000 IU heparin every four hours as customary traditional treatment at our hospital,
4) the mean expenses for daily aPTT lab tests during patient admission,
5) expenses for routine lab tests performed for each admitted patient at least once during the admission period (tests such as ECG, CBC, creatinine, FBS, cholesterol and triglycerides),

C) Estimating the expenses for outpatient LMWH therapy: the cost of treatment with LMWH was estimated for 1 mg/kg twice daily for five days.

Meanwhile, costs regarding warfarin and prothrombin time (PT) and international normalized ratio (INR) lab tests were the same in both approaches, hence they were not estimated.

Exclusion criteria: Since some of the patients were admitted in hospital for less than five days due to mortality or leaving the hospital on personal inclination, and some others were admitted more than 15 days due to serious underlying problems, patients with admission durations of less than 5 days or more than 15 days were excluded from our study in order to reach the mean number of hospitalization days of patients who were treated only for DVT.

Results

Out of 146 files, according to the above-mentioned criteria, 125 files were studied. The mean hospitalization period was 8.48 ±2.57 days and the mean number of days in which intravenous heparin was administered was 6.5 days.

The mean duration in which aPTT lab tests were performed was estimated as 7 days.

Expenses for UFH therapy for each patient (with mean admission duration of 8.5 days) was US $240. Details regarding these data are shown in Table I.

Table I. Expenses for treatment of DVT with standard intravenous heparin

Expense type	Expense per day (US $)	No. of days/events	Total expense (US $)
Hoteling	16.50	8.5 days	140.46
Nursing	0.99	8.5 days	8.43
I.V. heparin dose 5000 IU	0.44	39 doses	16.87
aPTT lab test	0.97	7 times	7.76
Routine lab tests	5.80	1 time	5.80
Specialist visits	5.70	9 times	51.30
Disposables (including IV sets, serums, syringes, etc.)	1.00	8.5 days	8.5
Total expense			240.13

aPTT: activated partial thromboplastin time

Expenditure regarding LMWH therapy was US $80, considering the outpatient nature of this approach and the lack of need for daily aPTT lab tests.

If the mean admission period was 8.5 days for each patient, nearly 500 night-beds would be allocated overall for DVT patients at the cardiology ward in a year.

Discussion

The expenses for UFH therapy for each patient in our study was US $240. Note that this figure pertains to admissions in regular rooms with multiple beds in public hospitals with the lowest basic level of facilities. It is obvious that admissions in private rooms or in non-governmental hospitals would carry significantly higher costs.

Remarkable to mention is that this traditional method of treatment (intermittent I.V. bolus heparin therapy) as previously proved, fails to meet the therapeutic goals in 81.3% of patients. If we consider the continuous infusion method of heparin therapy, besides the cost of the previous method, we will have extra burdens including higher dosage of heparin and more frequent lab tests and more equipment needed per patient (infusion pump).[10]

The expenses for treatment of patients with DVT hospitalized between 5 to 15 days and undergoing one or more lab tests are quite high.[11] Thus, it has always been asked whether an approach could be taken which bears the least expenses while providing the best results.

In brief, LMWH has the following advantages over standard intravenous heparin:

1. It has higher predictability[12]
2. Its plasma level is dose-dependent[12]
3. Its half life is longer and its risk of hemorrhage is lower when providing anti-thrombotic effects[12-14]
4. Short-term use of LMWH has no association with thrombocytopenia with immunologic origin[12-14]
5. Risk of osteoporosis is lower when using LMWH compared to UFH[6,7]
6. Use of LMWH does not need monitoring for aPTT[6-9,14]
7. Its dosage does not need adjustment[6,7]
8. Since LMWH can be used subcutaneously with or without the help of the patient's family and does not need aPTT monitoring, the patient is indeed treated in an outpatient setting and there will be no need for hospital admission[8,15]

Perhaps outpatient treatment with LMWH seems to be associated with the risk of complications, and therefore hospital admission seems safer and more reliable for patients. There have been several studies on the efficacy of LMWH both in in-patient and outpatient settings,[8,14,15] and the results of each show that the efficacy of LMWH is more than that of UFH. Besides the advantages mentioned in previous sections, the injection of LMWH is subcutaneous which is commenced or continued at home and is not associated with an increased risk for hemorrhage or thromboembolism.[6,7,14]

In addition, studies performed on patients with DVT treated with LMWH in an outpatient setting suggest that many of these patients never needed hospital admission.[8,15] Moreover, unlike standard intravenous heparin, LMWH dosage is easy to adjust. It is noteworthy that the level of social and

physical activities was higher in subjects who received LMWH in an outpatient setting.[15]

Conclusion

The best candidates to receive LMWH in an outpatient setting are first-time DVT patients without risk factors for bleeding.[6,7] Apparently, patients with DVT due to serious underlying diseases or with risk factors for bleeding must be admitted to hospital and treated under the supervision of a physician. In these setting too, LMWH is preferred over intravenous UFH,[6,7] so that LMWH has been introduced as the best treatment of choice for patients with high risk (patients over 40 years of age, patients with a history of major surgery, patients with risk factors for DVT).[6,7,14]

In our study, the estimated costs for patients under LMWH therapy are actually significantly less than those for subjects under treatment with UFH. This was despite the fact that LMWH was used with its highest daily dosage (twice a day) and for as long as 5 days in our study, whereas some studies suggest that LMWH therapy once per day does not result in significantly different outcomes compared to the same treatment twice daily.[16,17] On the other hand, considering that 45% of admitted patients with DVT are hospitalized in cardiology wards and the mean admission period for each patient is 8.5 ± 2.5 days, almost 500 night-beds are allocated just to DVT patients annually. This could be reduced to a much less figure if LMWH was used and 500 night-beds could be dedicated to more serious patients throughout the year. Also, allocating these extra night-beds to the patients in more need (such as patients with acute MI), in addition to saving their lives, would financially provide the medical system with more income. Treating DVT patients in an outpatient setting will liberate 500 night-beds in cardiology wards annually. The subcutaneous injection of LMWH in the outpatient setting is more cost-effective compared to intravenous heparin and its associated costs (hospital admission, lab tests and medicines) in terms of treatment expenses.

Considering the advantages of LMWH including cost-effectiveness, decrease in hospital bed occupation rate, better individual and social activities, fewer complications and ease of administration, this agent can at least be used in low-risk patients instead of intravenous heparin, sparing them from hospital admission.

CONFLICT OF INTEREST: none declared.

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