Prophylactic topical heparin can prevent or postpone intravenous cannula induced superficial thrombophlebitis

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SUMMARY

Intravenous cannulation is a cornerstone of today's medical practice. Maintaining a single indwelling intravenous (IV) cannula for long duration is limited by the development of superficial thrombophlebitis (ST). It is a self limiting inflammation and thrombosis of superficial veins. ST presents with fever, pain, erythema, tenderness and cord like swelling. The incidence of ST is high and usually occurs within 72 h of IV cannula insertion. The current standard medical therapy for ST is topical heparin application for 7 days. Heparin acts by preventing coagulation rather than lysing a formed clot. So, if topical heparin is started prophylactically even before ST sets in, i.e. from day 1 of IV cannula insertion it can prevent or postpone ST more effectively. It increases the indwelling time of a single IV cannula and can be very useful in high risk groups requiring IV cannulation like patients receiving cancer chemotherapy, ICU patients and infants. It decreases the need for recurrent cannulations and associated morbidity thereby improving patient compliance. It also prevents extended hospital stay due to ST and related complications. High incidence of ST justifies the use of prophylactic topical heparin with all IV cannulations. Prophylaxis will be better than treatment in managing patients with IV cannulas.

Background

Intravenous cannulation has become an indispensable part of hospital based patient management. It has simplified the process of giving an intravenous drug therapy for longer durations. Superficial veins of upper limbs are the most favored. Ideally intravenous (IV) cannula should be changed every 24 to 48 h to prevent cannula related complications [1]. A major limiting factor which prevents the extended usage of single IV cannula is the development of superficial thrombophlebitis (ST). ST is a benign self limiting inflammation and thrombosis of superficial vein. This can occur in response to the drug injected or due to the cannula itself [1]. The incidence is estimated to be 26% with majority occurring within 72 h of IV cannula insertion [2]. ST presents with fever, pain, erythema, tenderness and cord like swelling localized to the area of IV cannula insertion. It can lead onto deep venous thrombosis and embolism causing extended hospital stay [3]. The modes of therapy for ST include compression, anti-inflammatory drugs, topical and intravenous anticoagulants and surgical therapy [4]. A safe and effective currently recommended treatment for IV cannula induced ST is topical heparin application for 7 days [5]. ST is relatively difficult to treat and slow to resolve. It takes 4–12 weeks for the lesions to heal completely.

The hypothesis

The current standard therapy for ST is to start topical heparin when symptoms and signs of ST appear. However, if topical heparin is started prophylactically from day 1 of IV cannula insertion it can prevent or postpone the development of ST, thereby decreasing the need for frequent change of IV cannula and the morbidity associated with it.

Evaluation of hypothesis and discussion

The basic pathology behind ST is a foreign body reaction caused by the indwelling cannula or the injected intravenous drug, leading onto aseptic inflammation and clot formation. When clinical symptoms and signs of ST appear, the process of inflammation and clot formation has already set in. Anticoagulant heparin acts predominantly by inhibiting coagulation and has a very little effect on preformed clots [6]. So, topical heparin started after diagnosing ST will have a poor efficacy and is estimated to be 44.3% [5]. If topical heparin is started prophylactically even before ST sets in, it can act effectively in preventing clot formation and thereby decreasing or postponing the development of ST.
Prophylactic topical heparin application around the IV cannula site can potentially bring down the incidence of ST and its associated complications. It can decrease the morbidity associated with frequent changing of IV cannulas and can improve patient compliance. It will be of prime advantage in patients receiving cancer chemotherapy who usually require IV cannulas for longer period of time in spite of the increased tendency of those drugs to cause ST. Maintenance of IV cannula is even more important in newborns and infants where incidence of ST is relatively high and getting IV access is more challenging than in adults. Patients in intensive care units also require IV cannulation for prolonged periods. Here lies the significance of increasing the duration of indwelling IV cannula which can be well achieved by prophylactic topical heparin.

Topical heparin is relatively cheap and easy to apply and devoid of any significant side effects. It also cuts down the money spend on IV cannulas, treatment of ST and related complications and decreases the chances of potential extended hospital stay.

Conflicts of interest statement

None declared.

Conclusion

Prophylaxis with topical heparin can be better than the treatment with topical heparin in managing a patient with intravenous cannula. The high incidence of ST associated with intravenous cannula usage justifies the need for prophylactic topical heparin application in all patients who require an IV cannula.

References