



The effect of subcutaneous injection duration on bruising due to Clexane (enoxaparin) injection in patients with ACS hospitalized in CCU and Post CCU wards in Vali-e Asrhospital of Fasain 2014

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ABSTRACT

The aim of this study was to compare the duration of subcutaneous injection of Clexane on the bruising caused by the same. The sample included 80 patients with ACS under treatment with Clexane in CCU and Post CCU wards. For each patient, two 10-second subcutaneous injections (experimental group) and a 30-second injection (control group) of Clexane were performed in the abdominal area. The interval between injections was 12 hours and the bruising was measured using a flexible plastic ruler 48 and 60 hours after each injection. The size of bruising caused by 30-sec. injections was significantly less than that of 10-second injections. The average size of bruising for 30-second injections in 48 and 60 hours after injection was 15.65 ± 10.67 and 12.98 ± 8.12 respectively. No bruising conditions observed 48 and 60 hours after 30-second injections were significantly lower than after 10-second injections. In most cases, bruising after 10- and 30-second injections was significantly higher in women than in men. There was no significant difference between bruising and age. It is suggested that the subcutaneous injection duration be increased to 30 seconds to enhance the quality of care and minimize the unpleasant and stressful experience for patients.

Keywords: Clexane, subcutaneous, injection duration, bruising size

INTRODUCTION

The use of anticoagulants is a common treatment method for patients with thromboembolic diseases or patients at risk of developing thromboembolism (1). Although subcutaneous injection of anticoagulants is a repeated clinical practice done by nurses, it often leads to problems such as bruising, bleeding, hematoma and pain in the injected area (2). Studies suggest that subcutaneous injection of Clexane causes bruising in more than 90% of cases (3). Bruising refers to color change that is equal to or greater than 2 sq. mm. (4). This condition is caused following the withdrawal of blood from damaged blood vessels into the subcutaneous tissue. The blood seeps into the surrounding interstitial tissues, leading to pain, inflammation and skin discoloration. Usually, bruise maximizes within 48 hours and starts to vanish from 60 to 72 hours later (5). Bruising limits the injection area and causes anxiety, disturbance in body image, and denial and rejection of treatment. It also reduces patient's confidence in the efficacy of nurses (6). Proper and safe implementation of drugs is one of the most important responsibilities of nurses (7). Different injection techniques have often been suggested as possible causes of bruising and even induration. That is why it is important for nurses to use the right techniques, which can protect patients against adverse effects caused by the injection (8). Researchers believe that the size of the needle used, the injection site, reduced solution volume, and

prolonged injection duration can impact bruising at the injection site (9). The 10-second injection duration has been accepted as a standard and convenient duration for subcutaneous injection of anticoagulants such as heparin. However, injection speed can cause side effects such as bruising (10).

Although many studies have used various methods to minimize bruising following injection of anticoagulants such as heparin, little research has been done about the duration of bruising on the bruise size. In the study by Balci Akpınar et al, heparin was injected to each patient with COPD via three techniques: 10-s injection duration; 30-s injection duration; and waiting 10 s before withdrawing the needle after 10-s. The results showed that the second and third injection techniques resulted in significantly smaller and less bruises than the 10-s duration injection technique (11). In another study titled “the effects of injection duration on site-pain intensity and bruising associated with subcutaneous heparin” by Chanet et al, the effects of different injection durations (10- and 30-seconds) on site-pain intensity and bruising were compared. The study was conducted over a period of 7 months on 37 patients with heart failure who received heparin. Bruising area was measured 48 and 60 hours after injection. Results of the study showed that 30-second injection significantly reduced the amount of bruising in the injected area (12). Another study by Zayback et al in 50 hospitals in Izmir, Turkey compared two heparin injection methods (10- and 30-second duration). The results showed that 64% and 42% induration is created after 10-second and 30-second injection methods, respectively. Also, bruising caused by the 30-second injection was less than that caused by 10-second injection (13). Given the importance of the issue and the lack of studies on the amount of bruising caused by subcutaneous injection of Clexane, this study compares two methods for subcutaneous injection of Clexane (10- and 30-second methods) to determine their effects on bruising in the injection area.

MATERIALS AND METHODS

This is a quasi-experimental study with a control and an experimental group that was carried out on 70 patients (35 patients in the control group and 35 patients in the experimental group) admitted to the CCU and Post CCU wards in the Vali-e Asr hospital of Fasa. The subjects were over 30 years and received Clexane via subcutaneous injection. The subjects were selected via purposive sampling method. For each patient, two subcutaneous injection durations were used: 10-second injection (technique A) for the control group, and 30-second injection (technique B) for the control group. The bruising size was measured 48 and 60 hours after each injection and the two measurements were compared. Measurement of bruising was carried out using a flexible plastic ruler. Data were collected using a researcher-made checklist. All subcutaneous injections were carried out by 2 trained nurses using one type of syringe and injected only in the area around the abdomen. The same Clexane produced by one pharmaceutical company was used. Patients were instructed not to manipulate (touch or massage) the injection area. Data were collected over 6 months. Data were analyzed using SPSS via descriptive, Wilcoxon, Mann-Whitney and Kruskal-Wallis tests.

RESULTS

From the 70 patients studied, 42 (60%) were men and 28 (40%) were female. 35 patients were hospitalized in CCU and 35 patients in the Post CCU. Most patients were in the age range of 35 to 55 years and only 5 percent had more than 65 years. The results of Wilcoxon test showed that no bruising conditions observed 48 and 60 hours after 30-second injections were significantly higher than after 10-second injections ($p < 0.05$). (Table 1)

Comparing bruising size based on gender via Mann-Whitney test showed that women had more bruising compared to men in both types of 10- and 30-second injections ($P = 0.001$) (Table 2). No bruising conditions observed 48 and 60 hours after 30-second injections were significantly lower than after 10-second injections ($P = 0.02$ and $P = 0.001$ respectively). No significant difference was observed between = age group and bruising size in the two types of injections.

Table 1. Comparison of bruising size among patients treated with 10- and 30-second Clexane subcutaneous injection

Injection duration Bruising size	10-second injection Mean ± SD	30-second injection Mean ± SD	mean difference CI% 95	Wilcoxon test results
48-hour bruising	21.7±16	14.24 ± 2.38	4.21 (7.68 - 0.52)	p=0.001
60-hour bruising	15.65 ± 10.67	12.98 ± 8.12	5.96 (6.48 - 1.94)	p=0.02

Table 2. Comparison of bruising due to subcutaneous injection of Clexane by gender

Gender bruising	female	male	average rating		Mann-Whitney U test result
	Mean \pm SD	Mean \pm SD	female	male	
48 hours after 10-second injection	22.94 \pm 16.42	17.05 \pm 10.41	25.55	18.40	0.05
48 hours after 30-second injection	17.63 \pm 11.84	15.31 \pm 6.3	25	18.7	0.07
60 seconds after 10-second injection	15.65 \pm 16.18	12.54 \pm 7.56	23.05	20.87	0.001
60 seconds after 30-second injection	12.71 \pm 12.11	12.7 \pm 5.55	23.34	20.69	0.001

DISCUSSION AND CONCLUSION

The results showed that the size of bruising created after the 30-second injection was significantly less than that of bruising after 10-second injection. The absence of bruising after 30-second injection was less than after 10-second injection. Studies indicate that slow injection of anticoagulants may reduce the pressure in the injection area and the tissue trauma and can give more opportunity to the tissue to absorb the drug. This is consistent with results of studies by Balci Akpınar, Zayback and Chan *et al.*

In this study, the incidence of bruising among male and female subjects was significantly different, so that women had larger bruising size. This is consistent with the results of research by Zayback and Chan. Also, research by Wooldrige *et al.* showed that women in all age groups had larger bruising than men following subcutaneous injection of anticoagulants (14). However, Ross *et al.* demonstrated that gender did not affect the incidence and size of bruising associated with subcutaneous injection of anticoagulant drugs such as heparin and Clexane (15). Estrogen increases the blood vessels in the skin in women. This often causes more bleeding in damaged areas compared to men. In contrast, testosterone increases the thickness of skin and subcutaneous tissue stiffness in men (16). This study also showed that despite a direct relationship between the size of bruising and aging, this relationship was not significant. In their study, Hadley *et al.* reported that the patient's age affected the area of injection site bruising, so that older patients had larger bruising at the injection site (17).

This study showed that an increase in duration of subcutaneous injection of Clexane significantly reduced the size of injection bruising. Thus, the results can be used as a guide to reduce the adverse effects of subcutaneous injection of Clexane and to train health care personnel. This can enhance the quality of care and minimize the patients' unpleasant and stressful experience.

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REFERENCES

- [1] Kalafut M, Gandhi R, Kidwell C. Safety and cost of low-molecular-weight heparin (Enoxaparin) as bridging anticoagulant therapy among patients with acute coronary syndrome. *Coron. Arkt. Dis.* 2000;11:399-407
- [2] Complication associated with anticoagulant therapy of acute thrombosis in acute coronary syndrome. *J Am Coll Cardiol.* 2001;32: 1433-40
- [3] Kuzu N, Ucar H. The effect of cold on the occurrence of bruising, haematoma and pain at the injection site in subcutaneous low molecular weight heparin (Enoxaparin). *Int J Nurs Stud* 2001;38 (1):51-9
- [4] Hayes SN. Effect of injection duration on site-pain intensity and bruising associated with subcutaneous heparin. *J Adv Nurs* 2001;35(6):882-92
- [5] Hollingsworth SJ *Et al.* Delivery of Enoxaparin for prophylaxis against deep vein thrombosis using a novel, needle-less injection devices. *Ann R Coll Surg Engl* 2000;82(6):428-31
- [6] Banning M. Medication errors: professional issues and concerns. *Nursing Older People.* 2006;18(3): 27-32
- [7] Brooker E *et al.* Foundations of Nursing Practice Fundamentals of Holistic Care, Edinburgh. Mosby Co. 2007
- [8] Ruths S *et al.* Multidisciplinary medication review in nursing home resident: what are the most significant drug-related problems? *Quality of Safe Health Care.* 2005;12(2): 176-80
- [9] Klingman L. Effects of changing needles prior to administering subcutaneous heparin injection. *Heat Lung* 2000;29: 70-5

- [10]Chenicek TE. Effects of injection durations on site administrating of Enoxaparinthe Florida State University School of Nursing Masters Thesis 2004;p;1
- [11]Balci Akpinar et al. Effect of injection duration on bruising associated with subcutaneous heparin. A quasi experimental within – subject design. *Int J Nursing Stud* 2008;45(6):812-7
- [12]Chan H et al. effect of injection duration on site- pain intensity and bruising associated with subcutaneous heparin injection .*J Adv Nurse* 2003;3(6).1361-7
- [13]Zayback A, et al. A study on the effect on the duration of subcutaneous heparin injection on bruising .*J Clin Nurse* 2008;17(3):378-85
- [14]Wooldrige JB et al. Evaluation of bruises and areas on indurations after two techniques of subcutaneous heparin injection . *Heat Lung* 1989;17(5):476-81
- [15]Ross S. et al. Heparin and haematoma: does ice make a difference .*J Adv Nurs* 1995 ;21(3):434-9
- [16]Ebersole P. Geriatric nursing and healthy aging, 1st ed, St Louis, Mosby Co 2001;pp:434-9
- [17]Hadley S, et al. Effect of syringe size on bruising following subcutaneous heparin injection . *Am J Crit Care* 1996;5(4)271-6.