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AN INTRAMUSCULAR AND SUBCUTANEOUS INJECTION PROCESS FOR ADMINISTERING DRUGS

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AUTHOR'S CONTRIBUTION

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

An injection guide comprises a holder being cylindrical shape. The holder is having a provision for insertion of a syringe. A base frame means to support for the syringe holder; primary angle unit and secondary angle unit, said units having a predetermined degree of angle varying from to a primary pointer and a secondary pointer, the primary pointer and the secondary pointer being connected to primary angle unit and secondary angle unit respectively. A slit being oval shape means to insert the needle; said slit being centrally placed in the said injection guide.

Aim and Objective: To provide am anually operated intramuscular and subcutaneous injection process.

Methods: Injections are administered invarious angles. Intramuscular injection is administered at 90°.Subcutaneous injection is at 45°.Intravenous injection is administered at 20° and intradermal injection is at 10 to15°. Many times errors in administration of injections were noted by health care professionals and as a result patient suffers from the complications which sometimes very severe and even in the case, the death might be happened due to this error.

Results: For intravenous (20° angle), intramuscular (90° angle) and intradermal (10° angle)injection, except length of the syringe holder, the dimension of other components was varied and it was selected as per the type of the injection.

Conclusion: Not only primary and secondary angle unit of the device but also length of the syringe holder is critical in order to achieve the desired angle for the injection**.**

Keywords: Subcutaneous; intra-dermal; intramuscular; syringe; injection process.

1. INTRODUCTION

Intramuscular injection is a common clinical procedure, with 16 billion injections administered each year in a variety of health care settings worldwide. The Widespread use of drugs refers to the class of drugs that can be delivered via this route, including sedatives, hormonal therapy, vaccines,

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tumor immunotherapy, immune-suppressants, long-acting anti-psychotics, vitamins, and antibiotics. The intramuscular route offers a potential advantage by improving drug absorption and bio-availability compared to the oral and other parenteral routes and may be used when oral drug tolerance is poor, and to ensure treatment adherence. Previous inter-ventional and observational studies have evaluated intramuscular injection techniques that reduce pain with many focused on childhood immunization [1-2]. However, it is not a benign procedure, and unsafe injection practices are estimated to have a significant impact on patient morbidity and mortality and result in millions of dollars in direct medical costs on an annual basis. Although there is significant research over 8 decades on the procedure and techniques for administering drugs by the intramuscular route, instruction materials and physician practice do not always reflect research-based practice. An integrated review of the literature has resulted in the development of a guideline for evidence-based practice [3-6].

The paper describes about a process to aid in inserting the needle of syringes and the like into body conduits such as veins. The process includes a pair of members which are placed on the opposite sides of a vein, parallel to the longitudinal axis thereof, thereby preventing lateral movement of the vein while it is being pierced by the needle. A method is provided to aid in inserting the needle to the desired depth. The paper features how the device is effective for other route of administration such as intramuscular, subcutaneous and intradermal process [7].

The study describes a volume-adjustable micro-injection method. The method includes a base structure having a syringe positioning structure and a grip, in which the syringe positioning structure can flexibly accommodate injection syringes with different volumes; a holding structure capable of flexibly adjusting an injection angle of syringe content for easier operation; a qualitative controller capable of accurately controlling injection volume; a pressure pushing structure to hold and push a plunger; an injection controller interlinked with the qualitative controller and the pressure pushing structure; and an eject structure facilitating the operation and replacement of injection syringes [8].

This study discloses about an artery stabilizer device process, with a slide over which a technician can guide as yringe, is provided for restraining targeted artery while technician inserts the needle of the syringe into the artery. In the process a pair of stabilizer fingers holds the artery in place while the syringe is maneuvered over the slide of a shaft which is connected to a base above the stabilizer fingers. A finger-hold platform emanates from the bottom of the shaft, and a gauze dressing member with a removable gauze pad is attached to the bottom of the platform, allowing the technician to quickly apply a dressing over the wound created by the needle insertion procedure. In the method an artery stabilizer adjustment track allows the technician to alter the width between each stabilizer finger. The paper is silent on how the device is effective for other route of administration such as intramuscular, subcutaneous and in tradermal process [9].

The paper provides an intravenous injection method which is comprising a supporting base frame and one or more guider arms connected to the base frame whereby the guider arm or arms can be used to engage with a protrusion from a transfusion set. It is done in such a way that the contour of the guider arms helps the trajectory of the transfusion needle into the vein of the patient during the act by a user of attempting veni-puncture access for medicinal infusion or blood sampling. It is basically a guiding apparatus for winged type infusion set where the needle of the latter can be assisted to follow a fixed or adjustable or feel enhanced injection tranjectory path aided by guide thus enabling IV process made easier safe. The apparatus assists only for insertion of shaft of venous accesses needles. The previous researches doesn't point how to pierce the vein at 20° (which is the exact angle for intravenous injection) [10] to give single dose of IV injection by simple manner i.e. injection needle attached with syringe [11].

1.1 Objectives

The objective of the present research was inding an injection process which facilities intravenous process without use of jelcos /scalpel.

2. METHODS

An insulin injection method (1 cc syringe long with needle, 1 mL dose) through subcutaneous route (45° as standard angle) was performed on diabetic patient conducted at Krishna Institute of Nursing Sciences and Krishna Hospital, Karad. where a syringe holder were taken in practice that is having a cylindrical shape in which there is a provision of insertion of a syringe of 1cc (for 1 mL), 2cc (for 2 mL), 5cc (for 5 mL) and 10 cc (for 10 mL) which is as per the need. The internal and external diameter of the syringe holder was taken as per the width of the syringe. The length of the syringe holder was taken so that it can adjust the syringe to get the desired angle for the injection. The critical length of the syringe holder was 46.96 m. The length of base was taken as per the type of injection. The length of the base is 26.83-54.5

mm while the width is 16-28.8 mm. The left side on the base, there was primary angle unit which presents a chart of 15°, 45° and 90°. One could select 45° for subcutaneous injection and 90° for intramuscular injection. The primary pointer on the primary angle chart that shows the current degree on chart. On the other hand, at right side on the base, there is secondary angle unit which presents a chart of 10° divisions up to 90°. One could select 10°-15° for intradermal injection and 20° for intravenous injection. The secondary pointer on the secondary angle chart shows the current degree on chart. Primary angle unit along with primary pointer and secondary angle unit along with secondary here is primary unit system and secondary unit system respectively. The present paper also comprises an oval slit which is centrally located in the design Fig. 3 means to insert the needle into the skin layer. The width of the slit is 4mm while the length is 45 mm. The present process includes a screw with nut to attach syringe holder to the angle charts. The present process also includes a stopper to limit the injection holder to move above 90°. In the process the syringe holder, the base and the other major components as used in the said injection guider is made of plastic known in art.

3. RESULT

Insulin injection (1cc syringe along with needle, 1mL dose) through subcutaneous route (45° as standard angle) was performed on diabetic patient at Krishna Institute of Nursing Sciences and Krishna Hospital, Karad wherein the process includes,

i) Syringe holder:

Length of the syringe holder: 25 mm, 35 mm, 46.92 mm and 55 mm
External diameter of the syringe holder: 10 mm
Internal diameter of the syringe holder: 7 mm

ii) Base:

Length of the base: 26.83 mm
Width of the base: 16 mm

iii) Primary and secondary unit angle along with pointer and other component as above

For intravenous (20° angle), intramuscular (90° angle) and intradermal (10° angle) injection, except length of the syringe holder, the dimension of other components was varied and it was selected as per the type of the injection. The Table 1 is illustrating the observation that was noticed during the process.

Fig. 1a and 1b illustrates an injection device in accordance with the present process described in the paper.

The Fig. 2 illustrates the syringe holder that is having a cylindrical shape in which there is a provision of insertion of a syringe of 1cc (for 1mL), 2cc (for 2mL), 5cc (for 5mL) and 10cc (for 10mL) which is as per the need. Figure 3 illustrates the oval slit shape of syringe. The internal and external diameter of the syringe holder is as per the width of the syringe.

Table 1. Relation between length of the syringe holder and angle of the injection

Length of Syringe holder of the injection	**Injection route (angle)**			
	10°	**20°**	**45°**	**90°**
	(intradermal)	**(intravenous)**	**(subcutaneous)**	**(intramuscular)**
25 mm (comparative example)	Unstable syringe	Unstable syringe	Unstable syringe	Unstable syringe
35 mm (comparative example)	Unstable syringe	Unstable syringe	Unstable syringe	Unstable syringe
46.92 mm (inventive example)	Stable syringe	Stable syringe	Stable syringe	Stable syringe
55 mm (comparative example)	Syringe is not moved	Syringe is not moved	Syringe is not moved	Syringe is not moved

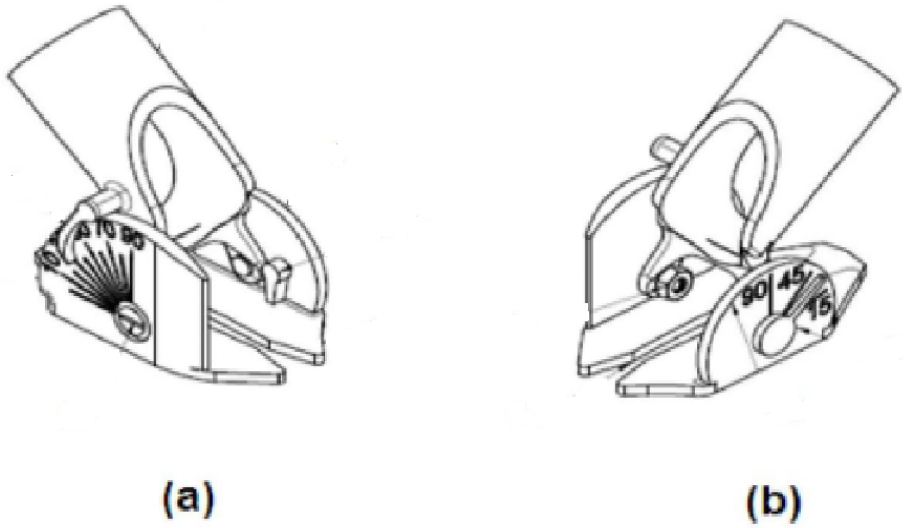

Fig. 1. An injection guide

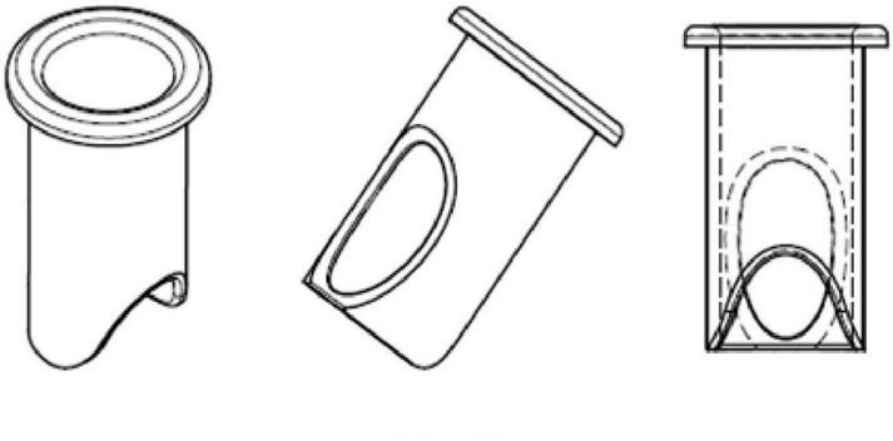

Fig. 2. cylindrical shape

Fig. 3. oval slit

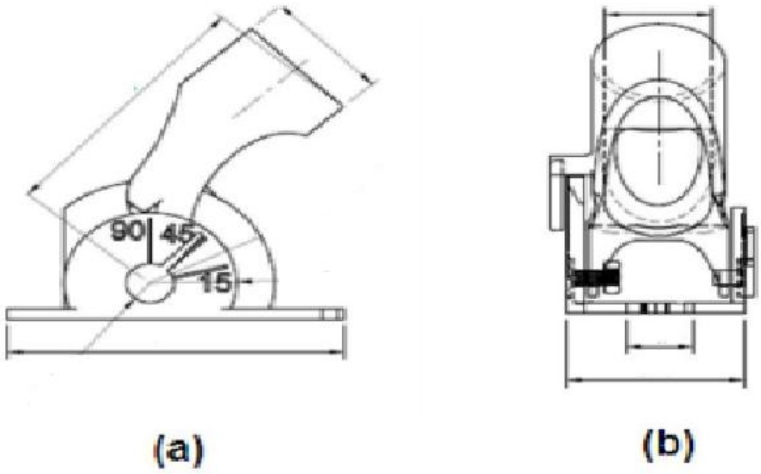

Fig. 4a and 4b. illustrating a side view and front view respectively of the device

The length of the syringe holder taken in such way so it can adjust the syringe to get the desired angle for the injection. The critical length of the syringe holder is about 46.96 mm. Fig. 4 illustrates a side view (4a) and front view (4b) of the device in accordance with the syringe holder.

As shown in Fig. 4a and 4b is an illustration of side view and front view respectively of the device

4. DISCUSSION

Keeping these aspects in mind the present paper describes about an intramuscular, intradermal and intravenous injection process that comprises a holder being cylindrical shape. This process can be prove helpful the physician to maximize the therapeutic effect of the administered drug while minimizing or eliminating patient injury and discomfort associated with intramuscular, intradermal, and interventional injections. The holder is having a provision for insertion of a syringe. A base frame that means to support for the syringe holder. Apart from that a primary angle unit and secondary angle unit having a predetermined degree of angle varying from 10° to 90° to support the syringe. The primary pointer and a secondary pointer the primary pointer and the secondary pointer being connected to primary angle unit and secondary angle unit respectively and a slit having oval shape means to insert the needle. The slit being centrally placed in the said injection guide where the syringe holder being fixed to the primary unit system or the secondary unit system such that the needle of the syringe can attain an angle varying from 10° to 90° where the length of the syringe holder is 46.92 mm.

5. CONCLUSION

It can be concluded that not only primary and secondary angle unit of the device but also length of the syringe holder is critical in order to achieve the desired angle for the injection. Although the foregoing description of the present paper has been shown and described with reference to particular studies thereof, it has been presented for purposes of illustration process. There are not very solid data attributing pain in injection site to buffers, and several associated confounding factors in the studies make it difficult to reach conclusions.Preservatives, which are required in the case of multiple-dose preparations, can increase the sensation of pain. The future research regarding this topic can be conducted in an efficient manner with the use of different methodologies. The proper availability of time and budgets are required in order to collect data from various respondents.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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