APPARATUS FOR FACILITATING THE INSERTION OF A HYPODERMIC SYRINGE NEEDLE

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FIG. 2

FIG. 1

FIG. 3

FIG. 4

FIG. 5

FIG. 6

FIG. 7

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This invention relates to an apparatus for facilitating the insertion of a hypodermic syringe needle. In particular it relates to such a device which is designed to improve the ease with which material may be injected into or withdrawn from the vein of a human being.

Where it is desired to withdraw blood from the vein of a human being or to inject a fluid substance into a vein, it is conventional to employ a hypodermic syringe. However, in utilizing such instruments, considerable difficulty is often encountered in causing a syringe needle point to properly penetrate a person's flesh so as to enter the interior of a vein.

The problems involved in properly injecting a hypodermic needle point into a vein are widely known. While a variety of devices have been previously developed to facilitate the proper insertion of a hypodermic syringe needle into a vein, such devices have in general been characterized by substantial structural or operational defects.

One device heretofore sought to be employed comprises a spatula-like instrument which must be employed separately but in conjunction with a hypodermic syringe. A person utilizing this device must manipulate it in one hand while attempting to manipulate a hypodermic syringe with the other hand. In addition to being awkward and cumbersome and raising serious problems of coordination, the technique entailed in the use of this device seriously limits the freedom of operation of its user.

Other vein stabilizer structures have been devised. One such device is characterized by a slanted support supporting a movable vein-depressing member as well as a movable hypodermic syringe. This device, in addition to requiring the concurrent manipulation of two separate components, is characterized by such structural complexity and awkwardness as to seriously impede its practical utility. Another device known in the art is characterized by a separate vein stabilizer or holder which may be strapped to a person's arm. Here again, however, this device also requires manipulation by an attendant apart from and in addition to the manipulation of a hypodermic syringe.

Problems commonly involved in attempting to stabilize a vein to facilitate the insertion of a hypodermic needle entail the maintaining of control over the degree to which flesh is depressed in the vicinity of a vein so as to avoid bruising and the continuous and accurate defining of a "target" area into which a syringe needle is to be advanced. Additional points of concern have related to the ease with which a vein stabilizer may be manipulated along a vein so as to select a desirable site for needle penetration and the reliability with which a selected vein area may remain continuously stabilized while a syringe needle is advanced and inserted.

It is a principal object of the present invention to provide an improved vein stabilizer structure which enhances the ease with which a hypodermic syringe needle may be inserted and which substantially obviates the difficulties of previously known vein stabilizer structures.

It is a particular object of the invention to provide a structurally simple, inexpensive, and lightweight vein stabilizer which may be conveniently and readily attached directly to a conventional hypodermic syringe.

It is a further object of the invention to provide such an improved vein stabilizer which may be utilized solely by manipulating a syringe with one hand.

An additional object of the invention is to provide such an improved vein stabilizer by means of which relatively accurate control over the degree of flesh depression may be automatically maintained.

It is also an object of the invention to provide such an improved structure which continuously indicates and defines the area into which a hypodermic syringe needle point is to be inserted, which area generally faces the needle point and the syringe manipulator.

It is likewise an object of the invention to provide such an improved apparatus which may be readily repositioned or slid along a vein while maintaining a continuous vein stabilizing action.

The preferred apparatus presented through this invention for accomplishing the foregoing objectives is characterized by a unique combination of frame means, connecting means adapted to secure the frame means to a hypodermic syringe, and stabilizing means.

The stabilizing means of this apparatus includes spaced leg portions which are adapted to extend generally longitudinally of a hypodermic syringe when the frame means is connected thereto. This leg means, at least in part, is slidably received by the frame means. The leg portions, at least prior to the insertion of a needle carried by the syringe, are adapted to extend beyond the point of the needle. A connecting portion extends between the leg portions of the stabilizing means. This connecting portion, at least prior to the insertion of the needle, is adapted to be disposed generally outwardly of the point of the needle.

In the preferred and most advantageous embodiment of the invention, the stabilizing means is characterized by a unitary, resilient and generally U-shaped member. In this preferred embodiment, each leg portion of the stabilizing means, when the frame means is connected to a syringe, is deflected generally away from the axis of the needle of the syringe and then is deflected generally back toward the axis of the needle to define substantially straight, flesh-depressing portions. The connecting portion of the stabilizing means, in the preferred embodiment, extends from these flesh-engaging portions generally toward the axis of the syringe needle and is of generally concave configuration in the direction facing these flesh-engaging portions.

In describing the invention, reference will be made to the preferred embodiment illustrated in the application drawings.

In the drawings:

FIGURE 1 is a perspective view illustrating a conventional hypodermic syringe to which a preferred form of the stabilizer means of this invention has been attached;

FIGURE 2 is a sectional view of the FIGURE 1 assembly as viewed along the section line 2--2;

FIGURE 3 is a fragmentary, elevational view showing the FIGURE 1 apparatus about to be engaged with a person so as to stabilize a vein;

FIGURE 4 illustrates, in a fragmentary fashion, the FIGURE 1 assembly with the vein stabilizer in flesh engagement so as to stabilize a vein;

FIGURE 5 is a fragmentary view of the FIGURE 1 assembly illustrating the manner in which a hypodermic syringe needle is inserted into a vein while the vein remains stabilized;

FIGURE 6 is an enlarged, fragmentary, plan view of the FIGURE 1 assembly as viewed along the direction 6--6 of FIGURE 4; and

FIGURE 7 is an enlarged sectional view of a stabilized vein into which a hypodermic syringe needle has been inserted as viewed along section line 7--7 of FIGURE 5.

In FIGURE 1 there is illustrated an assembly compris-
ing a conventional hypodermic syringe 1 to which is attached a preferred form of the vein stabilizer means 2 of the present invention.

Hypodermic syringe 1, in a conventional manner, includes a barrel 5 and a needle 6. A preferred form of the stabilizer means 2 comprises a frame 6, connecting clips 7 and 8, and generally U-shaped, vein-stabilizing member 9.

In the embodiment of the stabilizer means 2 shown in the application drawings, the frame 6 and connecting clips 7 and 8 may be fabricated as unitary components from a piece of resilient sheet metal. The clips 7 and 8 may each be defined by portions of this sheet material which are bent out of the general plane of the frame 6 to define opposing, resilient, syringe barrel-embracing means. Thus, clip 8, as shown in FIGURE 2, is defined by resilient portions 8a and 8b which cooperate to define a generally C-shaped clip 8.

With clips 7 and 8 both comprising generally C-shaped, resilient attaching means, the assembly 2 may be quickly attached to or detached from the barrel portion 3 of a hypodermic syringe 1. With this slightly curved configuration, it will be understood, of course, that the resilience of the clips 7 and 8 should be such as to effectively secure the assembly 2 against movement in relation to the syringe barrel 3 while injections or fluid withdrawals are being made.

The generally U-shaped stabilizer member 9 is fabricated of spring-like or resilient material such as stainless steel.

Spring-like, stabilizer member 9 includes leg portions 9a and 9b which are in spaced, parallel relationship and extend generally longitudinally of the syringe 1 when assembled with the frame 6 and syringe 1 as shown in FIGURE 1. A generally accurate connecting portion 9c extends between the outermost ends of the leg portions 9a and 9b as shown in FIGURE 1.

As shown, stabilizer member 9 comprises a unitary, flattened, wire-like member. The cross section of each leg portion 9a and 9b, as shown in FIGURE 2, is generally rectangular and is elongate in a direction transverse of a median plane P common to the stabilizer 9, frame 6, and hypodermic syringe 1.

Leg portions 9a and 9b are slidably received by the frame 6. As shown in FIGURE 3, this slideable mounting of the leg portions 9a and 9b may be accomplished by bent-over, frame edge portions 6a and 6b which define leg-portion openings 6c and 6d, respectively. As shown, frame edge portions 6a and 6b may be discontinuous in nature, i.e., interrupted where the components of the clip members 7 and 8 are bent away from the base 6. Where clip members 7 and 8 are fabricated as separate components attached to the base 6, the bent-over frame edge portions 6a and 6b would preferably be continuous in nature.

Resilient leg portions 9a and 9b are slightly curved, as shown in FIGURES 1 and 3, so as to tend to diverge away from the axis X of the needle 5 in a direction extending from the frame 6 towards point or free extremity 5a of the needle 5. With this slightly curved configuration, the leg portions 9a and 9b will remain in continuous, resiliently biased, friction engagement with inner wall portions of the leg-portion-receiving, frame openings 6c and 6d.

Leg portions 9a and 9b, at bending points 10 and 11, respectively, are deflected away from the needle axis X and at bending points 12 and 13, respectively, are reoriented towards the needle axis X so as to define a substantially straight, flesh-engaging and vein-stabilizing leg portion sections 9d and 9e. These flesh-engaging, leg portion sections 9d and 9e are thus displaced from the projected continuation of the leg portion sections 9f and 9g which extend respectively between bending points 10 and 11 and the free ends of the leg portions.

As shown in FIGURES 1, 3, and 6, the connecting portion 9c is of generally U-shaped or concave configuration in a direction generally facing the flesh-engaging leg portion sections 9d and 9e. Connecting portion 9 is bent relative to leg portion sections 9d and 9e so as to extend from these portions generally toward the needle axis X.

With the components of the assembly disposed as shown in FIGURES 1 and 3, i.e., positioned for the initiation of an injection or blood-withdrawing operation, the leg portions 9a and 9b, which are generally symmetrically disposed on opposite sides of median plane P, extended beyond the needle point 5a. In this prior-to-injection arrangement, the connecting portion 9c is disposed generally outward of i.e., beyond, the needle point 5a.

Having described the overall structure of the assembly shown in FIGURE 1, the mode of operation of this device will now be considered. In so doing, the several advantages attributable to the invention will become more readily apparent.

FIGURE 3 illustrates the hypodermic syringe and stabilizer assembly positioned above a vein 14 into which medicinal substances are to be injected or from which blood is to be drawn. It will be understood, of course, that the syringe 1 will be held, of course, that the resilience of the clips 7 and 8 should be such as to effectively secure the assembly 2 against movement in relation to the syringe barrel 3 while injections or fluid withdrawals are being made.

The generally U-shaped stabilizer member 9 is fabricated of spring-like or resilient material such as stainless steel.

The straight and generally elongate character of the parallel, flesh-engaging sections 9d and 9e serves to isolate an elongate vein portion 14a as shown in FIGURE 4.

Flesh-depressing sections 9d and 9e may function as runners or skids to facilitate the sliding of the stabilizer 9 along the vein 14 until a desired injection site is located.

When the site is thus located, the syringe assembly may be pressed downwardly so as to cause the outer end of the stabilizer toward the needle axis will tend to exert a more or less controlled flesh-depressing force, limited by the resilience of these leg portions.

With the flesh-engaging sections 9d and 9e depressed into the fleshly portions 15 and 16 as shown in FIGURE 4, the vein portion 14a will be immobilized between these leg portion sections 9d and 9e, respectively, as shown in FIGURE 7, the generally arcuate or concave connecting portion 9c have been depressed sufficiently so as to engage the outer end of the stabilized vein portion 14a and constrict the vein flow at point 14b. This constriction of flow through the vein will tend to enlarge the stabilized vein portion 14a, assuming that the flow of blood through the vein is in a direction shown in FIGURE 3, i.e., from bending points 12 and 13 toward connecting portion 9c.

With the apparatus positioned as shown in FIGURE 4, the connecting portion 9c of the stabilizer defines an area 17 facing generally toward the needle point 5a and the person manipulating the syringe 1. This area 17 comprises a target zone toward which the needle point 5a is to be advanced.

With the flesh-engaging portions 12 and 13 depressed as shown in FIGURE 4, these portions, in cooperation with the upwardly bent and abutment-defining, connecting portion 9c, will be sufficiently depressed to push out the fleshly portions 15 and 16 to resist movement of the stabilizer 9 induced by movement of the syringe 1 toward the target zone 17. With the stabilizer 9 being thus resistive to longitudinal movement, the advancing of the syringe 1 toward the target zone 17 will cause the leg portion sections 9d and 9e to slide into the frame openings 6c and 6d respectively. As will be appreciated, the resiliently biased, frictional engagement between the slightly curved and springy, leg portion sections 9d and 9e and the inner walls of the
frame openings 6c and 6d will result in controlled, telescoping movement of the leg portions 9a and 9b into the leg-receiving openings 6c and 6d of the frame 6.

As will be appreciated, this sliding or telescoping action of the leg portions 9a and 9b enables the target area 17 to remain effectively and continuously defined by the connecting portion 9c of the stabilizer 9 while the needle point 5a is being advanced into the vein 14.

It should be noted that lateral deflection forces, created by the advancing of the needle 5, would tend to deflect the needle point 5a from the target zone 17. Such deflection tendencies are effectively offset by the lateral rigidity of the leg portions 9a and 9b, resulting from their elongate or rectangular, transverse, cross-sectional configuration.

In describing the overall invention, reference has been made to a particularly efficacious preferred embodiment. However, those skilled in the art and familiar with this featured form of the device may well recognize modified or alternative structures which, in effect, would be equivalent to the device shown. Such modifications or alterations, or substitutions, additions or deletions involving various structural features of the invention as shown are deemed to be encompassed by the appended claims.

1. An apparatus for facilitating the insertion of a hypodermic syringe needle, said apparatus comprising:
   - frame means;
   - connecting means adapted to secure said frame means to a hypodermic syringe; and
   - stabilizing means including spaced leg portions adapted to extend generally longitudinally of a hypodermic syringe when said frame means is connected thereto, said leg means being at least, in part, slidably received by said frame means, said leg portions, at least prior to the insertion of a needle carried by said syringe, being adapted to extend beyond the point of said needle and outward of the axis of said needle, said leg portions being at least in the vicinity of said needle point forming flesh-depressing sections,
   - a generally U-shaped connecting portion extending between said leg portions,
   - said connecting portion at least prior to the insertion of said needle, being adapted to be disposed generally outward of the point of said needle and outward of said axis thereof, and said connecting portion and said flesh-depressing sections, at least prior to the insertion of said needle, being controllably deflectable toward said needle axis.

2. An apparatus for facilitating the insertion of a hypodermic syringe needle, said apparatus comprising:
   - frame means;
   - connecting means adapted to secure said frame means to a hypodermic syringe; and
   - unitary, resilient, and generally U-shaped, stabilizing means, said stabilizing means including spaced leg portions adapted to extend generally longitudinally of a hypodermic syringe when said frame means is connected thereto,
   - each of said leg portions being at least, in part, slidably received by portions of said frame means,
   - said leg portions, at least prior to the insertion of a needle carried by said syringe, being adapted to extend beyond the point of said needle,
   - said leg portions being generally symmetrically disposed on opposite sides of a median plane intersecting the longitudinal axis of said needle when said frame means is connected to said syringe, and a connecting portion extending between the ends of said leg portions opposite to the ends of said leg portions which are slidably received by said frame means.

said connecting portion, at least prior to the insertion of said needle, being adapted to be disposed generally outward of the point of said needle.

3. An apparatus as described in claim 2 wherein said resilient, U-shaped, stabilizing means comprises a metallic, spring-like member, with the cross section of each leg portion thereof being generally rectangular and elongate in a direction transverse of a median plane of said stabilizing means.

4. An apparatus as described in claim 2 wherein said leg portions of said stabilizing means, when said frame means is connected to a hypodermic syringe, tend to diverge away from the axis of the needle of said syringe in a direction toward the free extremity of said needle.

5. An apparatus as described in claim 2 wherein said resilient leg portions of said stabilizing means are curved, at least in part, so as to remain in frictional engagement with the portions of said frame means in which they are slidably received.

6. An apparatus as described in claim 2 wherein said connecting portion of said stabilizing means is formed to define a vein depressing portion which is operable to depress a vein and partially enclose an area generally facing a syringe needle and toward which said needle is to be advanced to enter said vein.

7. An apparatus as described in claim 2 wherein:
   - each leg portion of said stabilizing means, when said frame means is connected to a hypodermic syringe, is deflected generally away from the axis of the needle of said syringe and then is deflected generally back toward said needle axis to define substantially straight, flesh-depressing sections and said connection portion of said stabilizing means extends from said flesh-engaging section of each leg portion generally toward the axis of said needle and is of generally concave configuration in the direction facing said flesh-engaging sections.

8. An apparatus as described in claim 7 wherein said resilient leg portions of said stabilizing means are curved, at least in part, so as to remain in frictional engagement with the portions of said frame means in which they are slidably received.

9. An apparatus as described in claim 7 wherein said leg portions of said stabilizing means, when said frame means is connected to a hypodermic syringe, tend to diverge away from the axis of the needle of said syringe in a direction toward the free extremity of said needle.

10. An apparatus as described in claim 9 wherein said resilient, U-shaped, stabilizing means comprising a unitary, metallic, spring-like member, with the cross section of each leg portion thereof being generally rectangular and elongate in a direction transverse of a median plane of said stabilizing means.

11. An apparatus as described in claim 10 wherein said connecting portion of said stabilizing means is formed to define a vein depressing section which is operable to depress a vein and partially enclose an area generally facing a syringe needle and toward which said needle is to be advanced to enter said vein.

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