This invention relates to hypodermic needles as used with syringes. More particularly it relates to a needle having a shield which need not be removed prior to use of the needle and which can be disposable along with the needle itself. In addition the shielded needle may have an antiseptic and anesthetic means attached to the end of the shield.

It has been recognized that it is desirable to shield a hypodermic needle from the patient's view, particularly when it is to be used in the area of the face and mouth, in order to avoid frightening or alarming the patient. Sliders or covers as an integral part of a syringe are disclosed in United States Patents Nos. 1,845,036 to Busher, 1,921,034 to La Marche, 2,571,653 to Bastin and 2,845,065 to Gabriel as well as 2,876,770 to White. While such covers attached to the syringe body adequately shield the needle from view until use they present problems of sterilization after use and are therefore not compatible with the disposable needles currently finding increased utilization.

An object of the present invention is to provide a shielded hypodermic needle for use in a syringe with a shield integral with the needle and not the syringe and thus disposable with the needle.

A further object of the invention is to provide such a collapsible needle shield which will maintain a positive pressure on the area of tissue surrounding the point of injection so as to provide a degree of pressure anesthesia.

Yet another object of the invention is to provide a collapsible needle shield having integral with it an absorbent pad which can be saturated with an antiseptic and/or a topical anesthetic.

Other objects of the invention will be apparent from the description which follows:

FIGURE 1 is a side view of a syringe with an attached needle shielded according to the invention.

FIGURE 2 is a view of the end of the needle which is attached to the syringe, showing the annular opening for the end of the syringe.

FIGURE 3 is a partial view of the end of the shielded needle with a removable cover in place.

FIGURE 4 is a sectional view of an embodiment of the shield of the invention including a spring, the shield being shown before use of the needle.

FIGURE 5 is a sectional view of the shield of FIGURE 4 after use of the needle.

FIGURE 6 is a sectional view of an embodiment of the shield of the invention with a self-compressible shield, the shield being shown before use of the needle.

FIGURE 7 is a sectional view of the shield of FIGURE 6 after use of the needle.

In FIGURE 1 the shielded needle B is attached to the syringe A with the end 11 of the syringe abutting and entering into the collar 13 of the shielded needle. A protective cap 15 covers the needle end of the shield 17 until just before use of the needle. In FIGURE 2 can be seen the annular space 19 inside the collar 13 around the needle 21 into which space the end 11 of the syringe A is inserted. Prior to the use of the needle the annular space 19 and the end of the needle 21 are protected by a replaceable cover 23, as can be seen in FIGURE 3.

The invention can be described in detail with reference to FIGURES 4 and 5 which illustrate one embodiment of the invention. The needle 21 is fixed in a hub 25 having a collar 13. A spring 27 fits around the hub 25 and abuts the collar 13. Immediately surrounding the spring 27 is a shield 17. Positioned in the end of the spring 27 is an absorbent pad 29 which can be impregnated with an antiseptic and/or an anesthetic and forming a shield end wall penetrable by the needle 21. Holes 31 are provided near the end of the shield 17 to permit the escape of air as the shield is collapsed. A protective cap 15 covers the absorbent pad 29 as well as the holes 31 in the shield 17, thereby protecting the sterility of the needle 21 and the absorbent pad 29 prior to use. This protective cap 15 is removed just before the needle is to be used.

Another embodiment of the invention is shown in FIGURES 6 and 7. It differs from that of FIGURES 4 and 5 in that no spring is used but the shield 17 is made in a compressible shape and of a material which resists compression, thereby maintaining pressure on the tissue at the point of injection. Holes 31 to permit the escape of air are provided along the length of the shield 17 and the protective cap 15 has been accordingly extended the length of the shield 17. A guide tube 33 has been provided to extend above the absorbent pad 29 to guide the needle 21 through the absorbent pad 29 when the shielded needle is used and also to keep the needle 21 in line with the absorbent pad 29 when the absorbent pad is used to swab the area of the injection prior to the injection. It is to be understood that any of these features can also be incorporated in the embodiment shown in FIGURES 4 and 5 if desired.

The hub 25 can be made of any shapeable or formable material such as wood, metal, plastic and the like, although a plastic such as polyethylene, polyypropylene, nylon or a phenolic is preferred. The needle 21 can be any conventional hollow hypodermic needle. When a spring 27 of metal, plastic or other suitable material is used the shield 17 can be of any compressible material such as metal foil, treated paper, a film of plastic such as polyethylene or polypropylene, or the like. When no spring is used the shield 17 is pleated or otherwise preformed to compress in a regular manner and is made of a material which will resist compression sufficiently to maintain some pressure on the pad against the tissue surrounding the point of injection. Certain plastics are suitable for this material, such as intermediate and high density polyethylene and the like.

The absorbent pad 29 can be made of any suitable material such as cotton, felt, sponge rubber, porous plastic, or the like which will absorb the anesthetic and antiseptic. Suitable antiseptics include iodine, hexachlorophene, merthiolate and the like while suitable anesthetics include lidocaine, benzoic acid and the like. Preferably the anesthetic and/or antiseptic is mixed in a saline or grease such as petroleum jelly, aquaphor or the like and this product is impregnated on the pad.

The guide tube 33 is made of any suitable material such as a stiff plastic. Similarly the protective cap 15 and the replaceable cover 33 are made of any suitable material such as plastic, i.e. polyethylene.

With the protective cap and replaceable cover in place the shielded needle is a sterile unit as received by the user. For use the replaceable cover 23 is removed and the shielded needle is readily attached to any cartridge syringe by screwing or force-fitting the end of the cartridge syringe into the annular space 19 inside the shielded needle. The shielded needle attached to the syringe is depicted in FIGURE 1. To make the injection the protective cap 15 is first removed and the instrument is then pressed against the place where the injection is to be made, the absorbent pad making initial contact with the tissue. If desired the absorbent pad can be used as a swab by moving it around the area prior to making the injection. The guide tube preserves the alignment of the needle with the hole in the pad during the swabbing.
If desired the attachment of the spring and the shield to the hub can be strengthened with any suitable glue or cement. While the shielded needle is particularly suited as a disposable unit, it can if desired or in an emergency be reused after sterilization of the entire unit.

The present invention provides all of the advantages of a shielded needle in a unit which is disposable and provides additional advantages in the medicated absorbent pad which it includes. Thus the needle is completely hidden from the patient's view until after the injection is made. This is particularly important with children and with those patients having a strong fear of needles and injections. The resistance to compression of the shield, whether from the spring or from the nature of the material from which the shield is made, provides for a degree of pressure anesthesia from the pressure of the pad or the circumference of the shield on the area where the injection is to be made. This is similar to the pressure anesthesia employed by some practitioners who lightly strike or press the area of injection just prior to making the injection.

The absorbent pad, while not essential to the invention, provides many additional advantages. A grave problem in all injections is the possible introduction or carrying of infection from the surface of the skin where the injection is to be made into the interior of the tissue when the needle is inserted. This problem can be overcome by careful pre-sterilization of the area where the injection is to be made. The absorbent pad of the invention, if saturated with an antiseptic, insures that the area will be sterilized and greatly simplifies the procedure. The inclusion of a guide tube in the device of the invention makes it possible to thoroughly swab the area while preserving the alignment of the needle with the hole in the pad.

The absorbent pad also provides a simple and effective means to apply a topical anesthesia to the area of the injection. This is important not only to provide greater comfort for the patient but because needle breakage during an injection often results from sudden reaction of the patient to the pain of the needle insertion. While the pad is adapted to being impregnated with an antiseptic and/or anesthetic at the time of manufacture, it can be packed dry and dipped in the medicaments just before use if desired.

An important advantage of the invention which is to be emphasized is that the entire unit is sterilized at the time of manufacture and this sterility is preserved until the injection or use of the invention. The protective cap and removable cover which seal both ends of the unit. Thus the present invention makes possible the advantages of a sterile disposable needle as well as a shielded needle, and, in the preferred embodiment, the further advantages of a medicated swabbing pad at the end of the shield.

Even with the advantages of hiding the needle in the shield and of topically anesthetizing so as to minimize patient reaction, the possibility of needle breakage still exists, as it must in any syringe needle. It had been shown that most cases of needle breakage occur right at the base or hub part of the needle assembly. With an ordinary needle, the needle is frequently inserted right up to the hub with the result that a needle broken at the hub is quite difficult to retrieve as the end of the needle is flush with the skin or tissue. In the needle of the invention however the shield, even when fully compressed, prevents insertion of the needle up to the hub. If a needle does break at the hub enough of the shield end wall penetrates into the skin or tissue to permit relatively easy grasping and removal of the needle.

It is to be understood that the scope of this invention is to be limited only by the claims following and is not limited to the particular embodiments described herein, but that the scope of the invention includes any variations and modifications which may occur to those skilled in the art and which fall within the scope of the claims.

What is claimed is:

1. A disposable hypodermic needle assembly comprising a hub adapted for attachment to a syringe, a hollow needle extending through said hub and a collapsible integral shield affixed to said hub, said shield being tubular and enveloping said needle on one side of said hub, said shield extending in the uncollapsed state beyond the end of said hub, having a shield end wall penetrable by said needle and being capable of collapsing upon itself toward said hub when said needle is inserted into a patient, said shield being made of a material which resists compression sufficiently to apply an anesthetic pressure to the area of skin pierced by said needle.

2. A disposable hypodermic needle assembly comprising a hub adapted for attachment to a syringe, a hollow needle extending through said hub and a collapsible integral shield affixed to said hub, said shield being tubular and enveloping said needle on one side of said hub, said shield extending in the uncollapsed state beyond the end of said hub, having a shield end wall penetrable by said needle and being preformed to be capable of collapsing by compressing upon itself toward said hub when said needle is inserted into a patient, said preformed shield being made of a material which resists compression sufficiently to apply an anesthetic pressure to the area of skin pierced by said needle.

3. A disposable hypodermic needle assembly comprising a hub adapted for attachment to a syringe, a hollow needle extending through said hub, a collapsible integral shield affixed to said hub, and said shield being tubular and enveloping said needle on one side of said hub, said shield extending in the uncollapsed state beyond the end of said hub, having a shield end wall penetrable by said needle and being capable of collapsing upon itself toward said hub when said needle is inserted into a patient, said shield being made of a material which resists compression sufficiently to apply an anesthetic pressure to the area of skin pierced by said needle.

4. A disposable hypodermic needle assembly comprising a hub adapted for attachment to a syringe, a hollow needle extending through said hub, a collapsible integral shield affixed to said hub, said shield being tubular, enveloping said needle on one side of said hub, and said shield being preformed to be capable of collapsing upon itself toward said hub when said needle is inserted into a patient, said shield being made of a material which resists compression sufficiently to apply an anesthetic pressure to the area of skin pierced by said needle.

5. A disposable hypodermic needle assembly comprising a hub adapted for attachment to a syringe, a hollow needle extending through said hub, a collapsible integral shield affixed to said hub, said shield being tubular, enveloping said needle on one side of said hub, and said shield being preformed to be capable of collapsing upon itself toward said hub when said needle is inserted into a patient, said shield being made of a material which resists compression sufficiently to apply an anesthetic pressure to the area of skin pierced by said needle.

6. A disposable hypodermic needle assembly comprising a hub adapted for attachment to a syringe, a hollow needle extending through said hub, a collapsible integral shield affixed to said hub, said shield being tubular, en-
veloping said needle on one side of said hub and extending in the uncollapsed state beyond the end of said needle, and an absorbent pad positioned in the end of said shield away from said hub to form a shield end wall penetrable by said needle, said shield being preformed to be capable of collapsing upon itself toward said hub when said needle is inserted into a patient, with said pad being pierced by said needle and moving toward said hub with said shield when said shield collapses, said preformed shield being made of a material which resists compression sufficiently to apply an anesthetic pressure to the area of skin pierced by said needle.

7. A disposable hypodermic needle assembly comprising a hub adapted for attachment to a syringe, a hollow needle extending through said hub, a collapsible integral shield affixed to said hub, a coil spring abutting said hub inside said shield, said shield being tubular and with said spring enveloping said needle on one side of said hub, said shield extending in the uncollapsed state beyond the end of said needle, and an absorbent pad positioned in the end of said shield away from said hub to form a shield end wall penetrable by said needle, said shield being capable of collapsing upon itself toward said hub when said needle is inserted into a patient, with said shield being compressed as said shield collapses and with said pad being pierced by said needle and moving toward said hub with said shield as said shield collapses.

8. A disposable hypodermic needle assembly comprising a hub adapted for attachment to a syringe, a hollow needle extending through said hub, a collapsible integral shield affixed to said hub, said shield being tubular, enveloping said needle on one side of said hub and extending in the uncollapsed state beyond the end of said needle, an absorbent pad positioned in the end of said shield away from said hub to form a shield end wall penetrable by said needle, and a hollow guide tube of sufficient diameter to permit free passage of said needle centered in said pad, said shield being preformed to be capable of collapsing upon itself toward said hub when said needle is inserted into a patient, with said needle passing through said guide tube and said guide tube and pad moving toward said hub with said shield as said shield collapses, said preformed shield being made of a material which resists compression sufficiently to apply an anesthetic pressure to the area of skin pierced by said needle.

9. A disposable hypodermic needle assembly comprising a hub adapted for attachment to a syringe, a hollow needle extending through said hub, a collapsible integral shield affixed to said hub, a coil spring abutting said hub inside said shield, said shield being tubular and with said spring enveloping said needle on one side of said hub, said shield extending in the uncollapsed state beyond the end of said needle, an absorbent pad positioned in the end of said shield away from said hub to form a shield end wall penetrable by said needle, and a hollow guide tube of sufficient diameter to permit free passage of said needle centered in said pad, said shield being capable of collapsing upon itself toward said hub when said needle is inserted into a patient, with said spring being compressed as said shield collapses and with said needle passing through said guide tube and said guide tube and said hub moving toward said hub with said shield as said shield collapses.

References Cited in the file of this patent

UNITED STATES PATENTS

1,921,034 Le Marche ------------ Aug. 8, 1933
2,674,246 Bower ------------- Apr. 6, 1954
2,693,186 Riker et al. ----------- Nov. 2, 1954
2,696,212 Dunnire ------------ Dec. 7, 1954
2,845,065 Gabriel -------------- July 29, 1958
2,876,770 White -------------- Mar. 10, 1959
2,935,067 Bouet ------------- May 3, 1960

FOREIGN PATENTS

1,193,221 France ------------ Apr. 27, 1959