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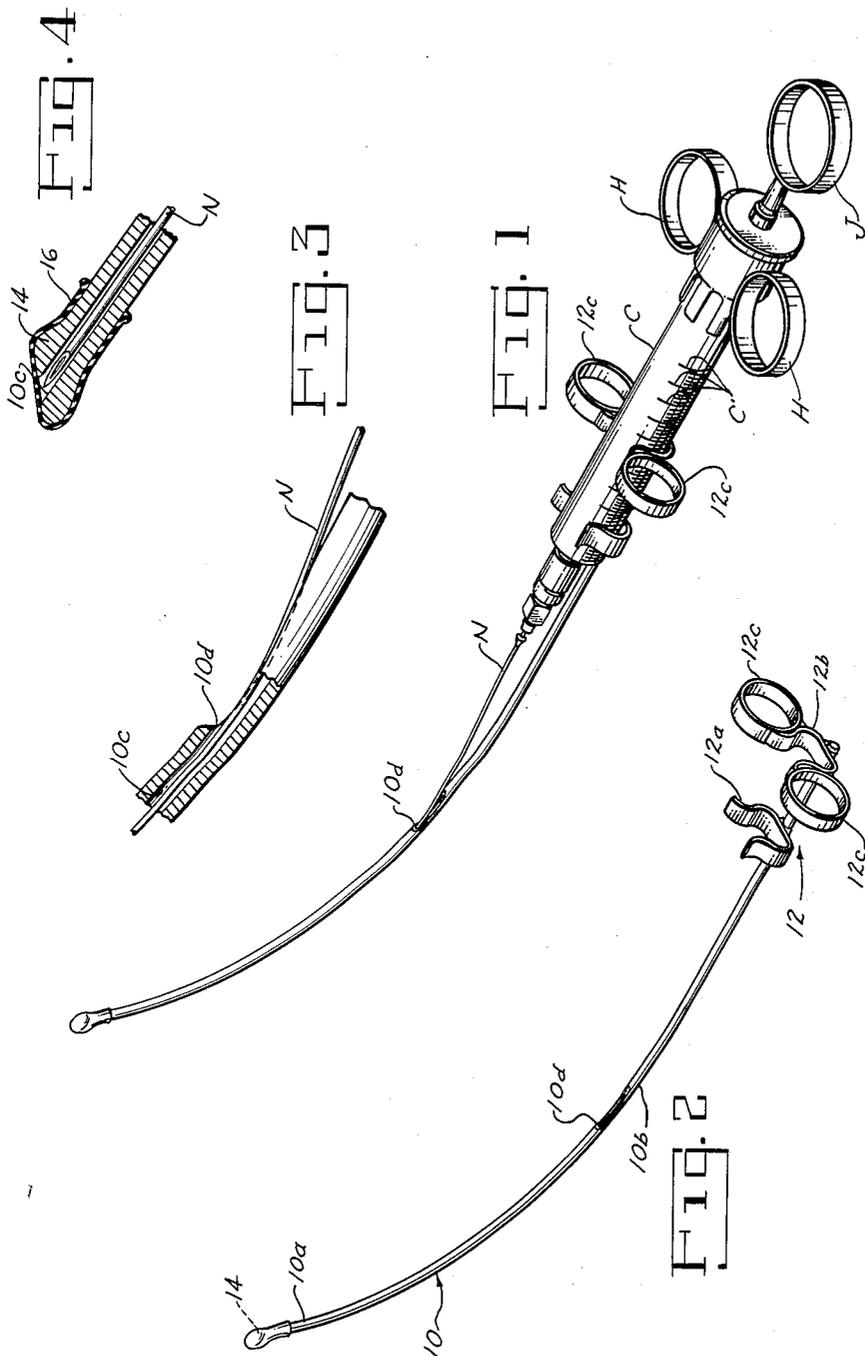
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2,740,404

INJECTION NEEDLE GUIDE

Filed Feb. 21, 1955

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

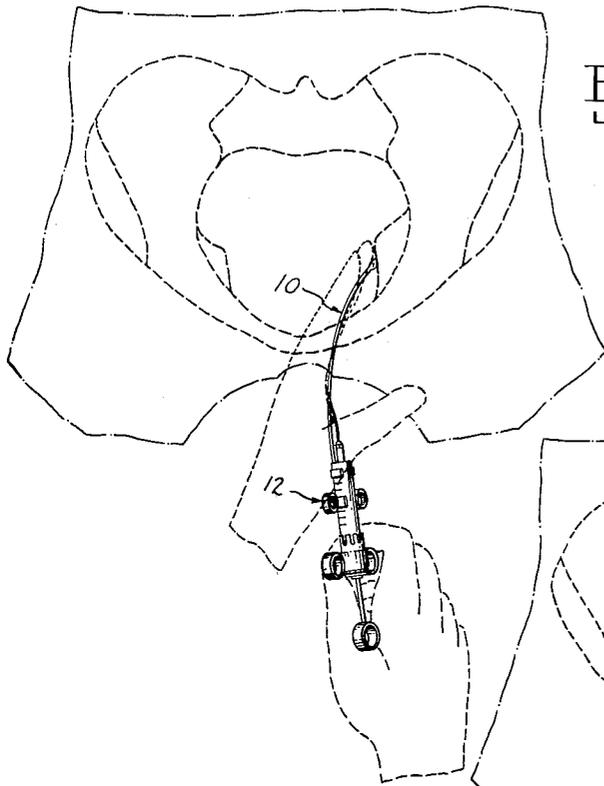


Fig. 5

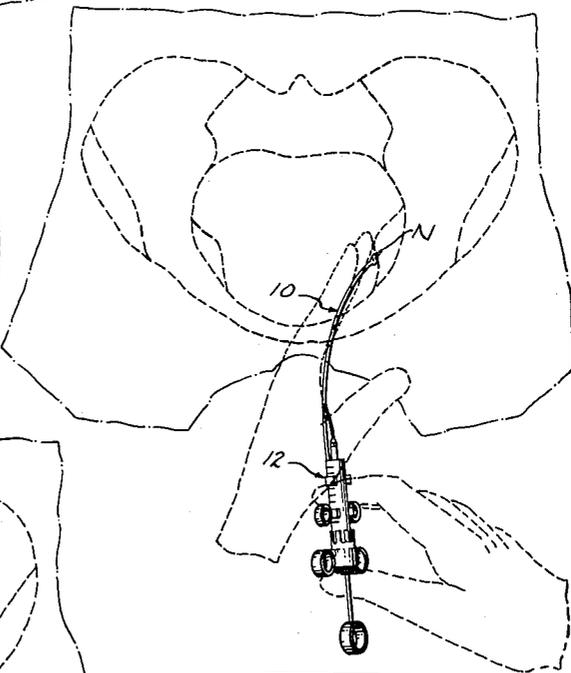


Fig. 6

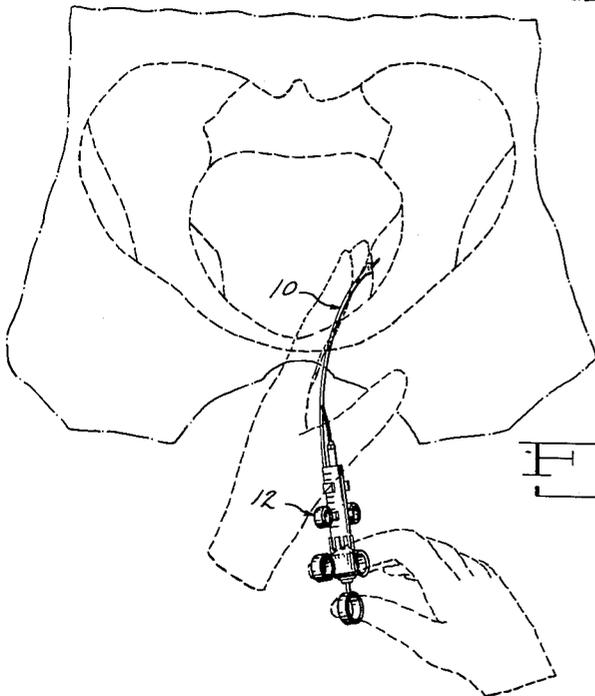


Fig. 7

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1

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INJECTION NEEDLE GUIDE

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7 Claims. (Cl. 128—215)

This invention relates to a device permitting injection of anesthetics or other medicants locally into the wall of a body cavity and is herein illustratively described by reference to its application for the anesthetic injection of the pudental nerve by access through the birth canal of a female preparatory to child delivery. However, it will be recognized by those skilled in the art that the novel features comprising the present invention are not necessarily restricted to the illustrative details herein disclosed. The present invention is directed to improvements in and a variation of the needle guide disclosed in my co-pending application Serial No. 422,298, filed April 12, 1954, now issued as Patent No. 2,712,314, July 5, 1955.

As pointed out in said co-pending application Serial No. 422,298, a successful nerve block may be effected for easing and shortening childbirth labor by injecting the pudental nerve subjacent to each lateral wall of the birth canal where the nerve follows beneath the ischial spine. The ischial spine constitutes a protuberance which can be located by palpation. With the aid of the palpatory finger or fingers, the distal end of the needle guide formed as or with a retractor element is correctly located for directing the needle tip into the wall tissue at the correct spot. In both the earlier form and in the present form of the instrument, the formerly difficult and sometimes impossible operation of injecting a lateral wall of a body cavity is made both convenient and possible by imparting a selected form or curvature to the needle guide so that the flexible needle tip is directed through the guide bore into the wall tissue at a large incidence angle (i. e. adequate for depth penetration) so as to penetrate directly through the tissue in the correct direction and not be deflected laterally by glancing off hard tissue. An instrument of this character enables the injection of anesthetics or other medicants into body cavity walls safely, reliably and quickly, with or without benefit of visibility of the injection location, although conveniently with the benefit of precise positioning of the distal end of the guide by palpation. The instrument therefore makes possible the injection of body parts which would otherwise be inaccessible to an injection needle because of obstructions, lack of visibility and possible dangers of laceration of tissues in the process of introducing the needle to the injection site.

An object of the present invention is a relatively compact and easily handled injection needle guide of the character described and attaining the above-mentioned objectives.

Another object of the invention is an injection needle guide means which may be inserted into restricted spaces by palpatory techniques or otherwise, and in the specific example, such a guide means which may be employed for anesthetic injection of the pudental nerve trunks as previously mentioned.

Another object is an injection needle guide instrument which facilitates determining and controlling the depth of needle penetration and facilitates handling of the

2

syringe and associated guide during needle penetration and during subsequent liquid injection by actuation of the syringe plunger. A related object is an improved injection needle guide adaptable to mounting the same on or in fixed association with standard syringes, thereby considerably facilitating the insertion and manipulation of the cooperating instruments.

Still another and more specific object of the invention is an injection needle guide provided with means preventing contamination of the needle and injected fluid by contact thereof with possibly infectious body secretion fluids during positioning of the instrument at the injection site. A related specific object is such a compact needle guide instrument having a retractor element on the distal end thereof which retractively engages the cavity wall, i. e., establishes a firm and unobstructed contact with the basic wall tissue to be perforated by the needle, so as to prevent gathers of intervening or secondary tissues from obstructing needle penetration, and an anti-contamination retractor cover of relatively soft material protecting the tissues against irritating or lacerating contact with the retractor directly, which cover serves also as a closure element sealing the needle guide bore against fluid infiltrations during placement of the instrument.

In the illustrated form of the invention, the novel features reside in the combination including an injection needle guide comprising an elongated, preferably curved (at least for most lateral wall injections) guide member in the form of a tube, having a longitudinal guide bore therein for reception of a flexible injection needle, said tube having a handle end and a distal end. On the distal end of said tube a retractor element is formed, comprising an enlargement specially shaped to retractively engage the wall tissue of the ischium in the disclosed application of the invention. A liquid impervious glove-like cover of flexibly resilient membranous material best exemplified by surgical rubber, such as that used in surgical gloves, slips over the end of the retractor head to insure a smooth non-irritative surface on the retractor element, and seals the guide bore against penetration of possibly infectious body fluids during insertion of the instrument. This sheath is pierced by the injection needle for making the injection. The handle end of the guide member carries a mount for a cylinder-and-piston type syringe and includes means for slidably engaging the syringe cylinder for lengthwise movement therein relative to the needle guide tube. The existing graduations on the conventional syringe cylinder then cooperate with a stationary (relative to the guide tube) element on the mount for gauging the depth of needle penetration effected by advancing the syringe bodily in the mount.

These and other features, objects and advantages of the invention will become more fully evident from the following description thereof by reference to the accompanying drawings.

Figure 1 is a perspective view of the injection needle guide, with a conventional injection syringe carried in the mount thereon.

Figure 2 is a perspective view of the instrument without the syringe.

Figure 3 is a fragmentary side view of the guide member illustrating an injection needle entering the guide bore near the handle end of the guide tube.

Figure 4 is a longitudinal sectional view of the distal end of the needle guide illustrating the retractor element and the anti-contamination protective cover thereon.

Figures 5, 6 and 7 are views illustrating successive stages in the operating procedure for injecting the pudental nerve trunk employing the improved needle guide.

Referring to the drawings, the disclosed form of the improved needle guide comprises an elongated tube 10, preferably of stiff material, metal or hard plastic, having

3

a distal end portion 10a, and an opposite handle end portion 10b. The needle guide bore 10c extending lengthwise of the tube, is of a slightly larger diameter than the diameter of the injection needle N. The tube is notched at 10d, at or near the handle end portion thereof to form a side opening in the tube for insertion of the needle into the guide bore. The manner in which the tube is cut or notched to form the receiving opening 10d for the needle is shown in detail in Figure 3. Obviously the details of formation of the guide member providing for the reception of the needle into the guide member bore are subject to design variation.

The needle guide tube 10, that is the portion thereof between the opening 10d and the distal end, is of generally arcuate form, and the notching of the guide tube to form the needle-reception side opening 10d is on the concave side of the curve, as illustrated.

The handle end portion 10b of the guide tube extends appreciably beyond the needle insertion opening 10d to form the support or base for a syringe mount 12. The syringe mount comprises two longitudinally spaced resilient clips 12a and 12b mounted in alignment on the concave side of the curved guide tube to retentively grip and hold the glass cylinder C of a standard syringe as illustrated. The tines of these clips are of such form and resilient stiffness as to permit longitudinal sliding of the syringe cylinder lengthwise of the guide tube at will, but not so easily as to permit the syringe to become accidentally shifted lengthwise out of a selected preset position by jarring or normal handling of the combination instrument.

A pair of outwardly projecting handle elements 12c are mounted on the opposite tines of the endmost clip 12b, and preferably are in the form of rings disposed in a common plane perpendicular to the axis of the handle portion 10b of the guide tube. The conventional syringe has a pair of ringlike handle elements H mounted on opposite sides of the cap on the control end of the syringe cylinder C. The plunger handle J is also in the form of a ring designed to receive the doctor's thumb, whereas the handle elements H receive the first and second fingers of the hand in order to advance the syringe plunger. However, in order to advance the syringe needle through the guide tube 10 for tissue penetration preliminary to plunger actuation, the handle elements 12c on the mount may be used cooperatively with the handle elements H on the syringe for slidably advancing the syringe cylinder C lengthwise in the mount clips. The usual calibration markings C' on the side of the syringe cylinder C serve as a convenient and workable means by which the cylinder may be correctly positioned lengthwise in the mount initially, and by which the desired depth of penetration of the injection needle into the body tissue may be determined. For this purpose, one of the mount clips 12a or 12b, for instance, may be used as an index or reference by which the syringe calibrations are interpreted in terms of needle position and displacement, or a separate index marker may be used.

In the example, the retractor means comprises a bulbous enlargement 14 formed on the distal end of the guide tube 10, with a generally flattened end face inclined obliquely to the length of the guide tube immediately adjoining the retractor or distal end of such tube. The angle of incline in the example is about 45 degrees with such axis, measured in the plane of curvature of the guide tube, and is such that application of the end face of the retractor to the ischial spine covering tissue provides generally flat or full-surface contact of such end face therewith while the guide bore 10c in the distal end of the guide tube intersects the contacted tissue at a relatively blunt angle for direct penetration of such tissue by the needle. Obviously, the shape of the retractor means 14 in general will be determined by the specific application for which the instrument is designed.

4

A sealing cover element in the form of a sheath or glove 16 preferably of soft surgical rubber and conveniently of the thickness of surgical glove material is fitted tightly over and around the retractor 14 so as to provide tissue protective cover on the retractor and to close the end opening of the guide tube bore 10c against infiltration of secretion fluids which could contaminate the injection needle and possibly cause infections. While this glove or nipple 16 may have a normally closed slit therein aligned with the axis of the guide bore 10c, it is preferred that it be initially imperforate so as to avoid any possibility of contamination and so as to protect the membranous tissues of the body against the possibility of laceration by accidental projection of the needle tip through the end of the bore during the insertion of the instrument. Deliberate advancement of the needle will readily cause perforation of the sheath 16 to inject the adjacent wall tissue.

It will be noted that the enlargement on the distal end of the guide tube serves the purpose of a retractor by which the mucous membrane of the body cavity wall is retractively engaged, that is, is ironed out and pressed aside in order to permit direct penetration of the needle through the tissue to the desired depth. However, such enlargement serves also as a retaining means for holding the anti-contamination cover 16 in place. The lip of the cover snugly encircles the tube at the base of the retractor. Thus, in order to remove the cover, it is necessary to deliberately peel it off the end of the guide instrument and it will, therefore, not become dislodged accidentally inside the body cavity. A fresh cover may then be used for each injection.

In the application of the invention to the injection of the pudental nerve for anesthetizing the patient in child delivery, the obstetrician first locates the ischial spine on one side of the pelvic cavity. This is done by palpation with the first and second finger of the hand. The distal end portion of the needle guide, carrying the retractor 14, is then advanced along one of these fingers or along the groove formed between them to the finger tip and is then pressed thereby directly against the ischial spine. During this insertion movement the syringe is carried in the ready position in the mount 12, with the needle tip retracted just safely behind the exit of guide bore 10c. With the instrument operatively positioned (Figure 5), the handles 12c and H are grasped and squeezed together for advancing the syringe bodily in the mount (Figure 6) so as to cause the needle tip to perforate the cover 16 and penetrate the body cavity wall tissue. Figure 7 illustrates use of the handles H and J so as to inject anesthetic liquid through the needle as desired.

In order to complete the anesthetization illustrated in Figures 5, 6 and 7, the process is reversed on the opposite side of the pelvic cavity. In the application of the instrument to the opposite side of the pelvic cavity, the roles of the surgeon's hands are reversed and the instrument is held and used in precisely the same manner as before, since it is symmetrical in respect to the plane of curvature of the guide tube.

I claim as my invention:

1. Means for guiding an injection needle to a selected wall location in a body cavity, said means comprising, in combination, an elongated needle guide member having a handle end portion and an opposite distal end portion insertable into the body cavity, said needle guide member having a longitudinally extending needle guide bore therein open at opposite-end locations in said guide member to permit slidable passage of an injection needle lengthwise therethrough, retractor means fixed on the distal end of said guide member and formed to retractively engage the body cavity wall at the selected location for operatively locating the distal end opening in said guide member bore for directing the injection needle into the cavity wall, and a liquid-impervious sealing member re-

5

movably covering said retractor means and sealing the distal end opening of said guide bore against infiltration of body secretions, said sheath being subject to perforation by the injection needle tip advanced through said bore to inject the cavity wall.

2. The combination defined in claim 1, wherein the retractor means comprises an enlargement formed on the distal end of the guide member, and the sheath comprises a thin membranous rubber-like hood stretched over and around said enlargement and snugly encircling said guide member at the base of said enlargement.

3. The combination defined in claim 1, and means fixed to the handle end portion of the guide member forming a mount for a piston-and-cylinder type injection syringe connected to an injection needle extending through the guide bore, said mount including means for retentively engaging such a syringe in a manner permitting bodily movement thereof lengthwise of the guide member to advance the needle through the bore for injecting the cavity wall.

4. The combination defined in claim 3, wherein the syringe mount means comprises clamp members relatively disposed for resiliently gripping the syringe cylinder releasably therebetween and to permit lengthwise sliding movement thereof relative to the guide member.

5. Means for guiding an injection needle to a selected wall location in a body cavity, said means comprising, in combination, an elongated guide member having a handle end portion and an opposite distal end portion adapted for insertion into the body cavity, syringe mount means fixed on said handle end portion to hold an injection syringe thereon with the needle of said syringe projecting therefrom generally lengthwise of said guide member toward the distal end thereof, said guide member having a longitudinal needle guide bore therein extending from the distal end thereof to a needle-receiving opening situated between said syringe mount means and said distal end, for receiving in said bore the needle of the syringe

6

held in said mount, said mount means permitting longitudinal advance of the syringe needle lengthwise through said bore for injecting the body cavity wall, retractor means fixed on the distal end of the guide member for retractively engaging the body cavity wall at a selected location, and a rubberlike sheath covering the retractor means, and sheath forming a sealing closure for the distal end opening of the guide bore subject to perforation by the advancement of the injection needle therein.

6. In combination, an elongated injection needle guide member having a handle end portion, an opposite distal end portion and a longitudinal needle guide bore therein, a cylinder-and-piston type injection syringe having an elongated injection needle projecting endwise therefrom of a length materially exceeding the length of said guide bore, syringe mounting means on said handle end portion supporting said syringe thereon with said needle projecting lengthwise into said bore, said mounting means being formed to permit longitudinal bodily movement of said syringe relative to said guide member between retracted position with the needle tip withdrawn in said bore and extended position with such needle tip projecting out of the distal end of said bore, and a closure member of flexible liquid impervious material sealing the distal end opening of said bore against infiltration of secretion fluids therein, said closure member being subject to perforation by the needle tip to pass the needle therethrough.

7. The combination defined in claim 6, and an enlargement formed on the distal end of the guide member to function as a retractor means retractively engageable with body tissue, the closure member comprising a rubber-like hood stretched around and over such retractor means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,700,385 Ortiz ----- Jan. 25, 1955