Description

Field of the invention

The invention relates to a puncturing and catheterizing device for the human and animal body with a metallic puncture needle and a cannula which surrounds the puncture needle in the region between its point and rear end and through which, after the puncture needle has been pulled out, a longer guidewire can be inserted into the body, which then, after the cannula has also been pulled out, serves as a guide for a catheter to be inserted.

Prior art

Devices of this type are known as catheters for body vessels such as, for example, veins, or body cavities such as, for example, the abdominal cavity. Thus, US-A-4,128,173 describes a catheter set and its use for treatment of the abdominal cavity. First, the abdominal cavity is punctured with a cannula in which there is a puncture needle. The puncture needle is withdrawn from the cannula and a guidewire is pushed through the cannula into the abdominal cavity. The cannula is drawn off from the guidewire. After a catheter tube has been pushed over the guidewire to the desired target site in the abdominal cavity, the guidewire is removed. Now, for example, fluid can be supplied to the abdominal cavity or fluid removed from it via the catheter tube.

However, the known devices are not suitable for puncturing and catheterizing nerve tracts, since in such a procedure it is very difficult to insert the puncture needle correctly into the inside of the nerve sheath or into the space between the nerve sheath and nerve.

US-A-3,682,162 discloses a puncture needle at whose point two electrodes end. The electrodes can be supplied with electrical impulses from an impulser via electrical connections at the rear end of the puncture needle. By means of the muscle contractions triggered by the electrical impulses, the needle serves to detect certain nerves and then to anaesthetize these by injection of a local anaesthetic through the puncture needle.

However, devices of this type permit only a direct injection of substances through the puncture needle, without there being any possibility, after insertion of the puncture needle into the interspace between the nerve sheath and nerve, of inserting a longer catheter and for a longer period.

The present invention is based on the object of taking measures with a device of the type in question in order to enable this to be used for puncturing and catheterizing nerve tracts.

The object is achieved by making the puncture needle electrically conductive from its point to its end projecting out of the cannula and equipping the rear end with an electrical connecting piece.

The insertion of nerve catheters can be substantially simplified with such an embodiment of the device. An electrical impulser such as is commercially available under the designation neurotracer can be connected to the electrical connecting piece of the puncture needle, and it thus becomes possible to feel the way exactly inside the nerve sheath with the puncture needle and the surrounding cannula and to establish undesirable deviations immediately. If an undesirable deviation occurs, the current pulse given no longer reaches the nerve and the physician performing treatment can immediately detect, by the reaction of the patient, that he must guide the needle elsewhere.

Figure 1 shows, on an enlarged scale, a puncturing and catheterizing device for the human body with an electrical connecting piece for connection to an electrical pulser; the puncture needle and the surrounding cannula are shown broken off.

Figure 1A shows schematically a drawing of a piece broken out of the cannula of the device from Figure 1 with a guidewire (mandrin) passing through, which can be used for insertion of a nerve catheter.

Figure 1B shows schematically, also on an enlarged scale, a piece of a nerve catheter to be inserted into the human body by means of the guidewire.

(12)

Figure 2 shows schematically a puncturing and catheterizing device of the type shown in Figure 1 with a different design of the electrical connecting piece and a flexible tube for sterile covering of the electrical connection lead.

The puncturing and catheterizing device shown in the drawings can be used to establish a connection of the inside of a nerve sheath accommodating a nerve with the surrounding environment. In medical treatment, such a connection is used, for example, in order to catheterize the inside of the nerve sheath, infuse treatment agents or the like. For this purpose, relatively long catheters must also occasionally be inserted to sites deep within the body, as with the insertion of vein catheters.

The puncturing and catheterizing device shown has a puncture needle 3 which has a point 1, and which is, for example, 60 mm long and is suitable for insertion into the body in the same way as the needle of an injection syringe.

The puncture needle consists of electrically conductive material and has at its rear end an electrical connecting piece 5, which is to be described in more detail and is equipped with an electrical connecting lead 7.

The puncture needle 3 can be connected onto an electrical pulser, which is not shown in more detail and is commercially available, for example, under the designation "neurotracer", by means of the electrical connecting lead 7. The pulse given by the electrical pulser enables the physician performing treatment to move the puncture needle 3 forwards inside the nerve sheath. As soon as the puncture needle 3 and its surrounding insulating cannula 9 has been inserted into the human body and has penetrated a nerve sheath, the current pulses passed in can act on the nerve and then lead to an externally visible motor reaction of corresponding parts of the body, for example the hand.

As long as the puncture needle remains in the nerve sheath, the electrical pulses passed in via the

puncture needle remain effective for triggering off motor reactions of the part of the body. As long as these motor reactions are visible, the physician performing treatment knows that he has passed the puncture needle, and with it the cannula, correctly along the space between the nerve and nerve sheath.

Moreover, the puncture needle needs to be passed only a short way along the nerve sheath, and then already provides a sufficient guide for the cannula 9, which can then be pushed against the puncture needle 3 into the nerve sheath by means of the handling piece 11.

As shown, the cannula 9 is somewhat shorter than the puncture needle 3, so that the point 1 projects forwards out of the insulating cannula 9. The insulating cannula consists of a suitable plastic material and is also appropriately designed narrow, in order to facilitate insertion into a nerve sheath.

In order to facilitate the joint insertion of puncture needle 3 and cannula 9 initially required, a handling piece 13 at the rear end of the puncture needle 3 is pushed together telescopically, at 15, with a collar 17 at the rear end of the cannula 9, this push-fit connection easily being undone in order to push the cannula 9 forwards over the puncture needle 3 in the manner shown.

After the puncture needle 3 has been withdrawn, the collar 17 of the cannula 9 is used in the further treatment, and also for insertion of a guidewire 19, the so-called mandrin, which is shown schematically inside the cannula 9 in Figure 1A and which, after the cannula 9 has also been withdrawn from the body, can also be used for insertion of a nerve catheter 21 in the manner indicated schematically in Figure 1B. The guidewire 19 and nerve catheter 21 are, for example, 25 cm in length.

The electrical connecting piece shown in Figure 1 has a metallic needle 23, which is inserted into the rear end of the puncture needle 3 and thus makes an electrically conductive connection. (The space shown is merely to enable the needles to be shown more clearly, and is in no

way an insulating space).

The metallic needle 23 itself can also be a hollow needle and can be provided with a rear connecting piece 25, so that injections and the like can be carried out even when the electrical connection is made.

The metallic needle 23 is surrounded by a connecting plug 27, which can be pushed together with a connecting socket 29 on the rear handling part 13 of the puncture needle 3. The connecting plug 27 thereby at the same time serves to fix the electrical connecting lead 7 leading to the electrical pulser.

It goes without saying that the male cone of the connecting plug 27 fits tightly into the female cone of the connecting socket 29, so that suction can also be effected during the puncturing operation with an injection syringe mounted on the connecting piece 25.

As can be seen from Figure 2, an electrical connection for the rear end of the puncture needle 3' can also be made by an arrangement in which an electrical conductor 31, which is connected electrically to the puncture needle at 33, is inserted through the side of the connecting socket 29' of the puncture needle. A simple connection to an electrical pulser can also be made in this manner, via lead 7'.

Figure 2 also illustrates schematically the arrangement of a flexible tube 35 which can tightly surround the electrical conductor 31, and especially also its exit point, issuing from the connecting socket 29. This provides the possibility of keeping the electrical connecting pieces, such as the conductor 31 and the line 7', on the device itself short, and instead, with an appropriately long embodiment of the flexible tube 35, to bring the lead from the electrical impulser close up to the puncturing and catheterizing device in a sterile manner. This device can certainly be mass-produced under sterile conditions, and when used, it is necessary only to draw the flexible tube 35 over the lead from the electrical pulser so that the sterility of the environment is not endangered by this

lead.

The electrical connecting piece at the rear end of the puncture and catheterizing device can also be realized in various other ways, which are not shown or described here in more detail.

Thus, for example, the electrical connection can be made by means of a so-called crocodile clip at an exposed piece provided for this at the rear end of the puncture needle.

16

Patent Claims

1. A puncturing and catheterizing device for the human or animal body with a metallic puncture needle (3;3') and a cannula (9) which surrounds the puncture needle (3;3') in the region between its point (1) and rear end and through which, after the puncture needle (3;3') has been pulled out, a longer guidewire (19) can be inserted into the body, which then, after the cannula (9) has also been pulled out, serves as a guide for a catheter (21) to be inserted, wherein the puncture needle (3,3') is electrically conductive from its point (1) to its end projecting out of the cannula (9) and is equipped with an electrical connecting piece (5; 31,33) at the rear end.

2. A device as claimed in claim 1, wherein the puncture needle (3;3'), as known per se, is hollow and the electrical connecting piece (5) at the rear end is designed such that an unimpeded flow of liquid through the puncture needle (3;3') is possible.

3. A device as claimed in claim 2, wherein the electrical connecting piece (5;31,33) is formed from a hollow metallic needle (23) which can be inserted into the rear end of the puncture needle (3;3') and to which an electrical connecting lead (7) can be connected.

4. A device as claimed in any one of the preceding claims, wherein the exit site of the electrical lead (31) at the rear end of the puncture needle (3;3') is surrounded by a flexible tube (35) which can be drawn over an electrical lead (7') brought up from outside.

* C L M S *

As printed

Claims

1. A puncturing and catheterizing device for the human or animal body with a metallic puncture needle (3; 3') and a cannula (9) which surrounds the puncture needle (3; 3') in the region between its point (1) and rear end and through which, after the puncture needle (3; 3') has been pulled out, a longer guidewire (19) can be inserted into the body, which then, after the cannula (9) has also been pulled out, serves as a guide for a catheter (21) to be inserted, characterized in that the puncture needle (3; 3') is electrically conductive from its point (1) to its end projecting out of the cannula (9) and is equipped with an electrical connecting piece (5; 31, 33) at the rear end.

2. A device as claimed in claim 1, characterized in that the puncture needle (3; 3'), as known per se, is hollow and the electrical connecting piece (5) at the rear end is designed such that an unimpeded flow of liquid through the puncture needle (3; 3') is possible.

3. A device as claimed in claim 2, characterizec in that the electrical connecting piece (5; 31, 33) is formed from a hollow metallic needle (23) which can be inserted into the rear end of the puncture needle (3; 3') and to which an electrical connecting lead (7) can be connected.

4. A device as claimed in any one of the preceding claims, characterized in that the exit site of the electrical lead (31) at the rear end of the puncture needle (3; 3') is surrounded by a flexible tube (35) which can be drawn over an electrical lead (7') brought up from outside.

Revendications

1. Dispositif de ponction et de cathétérisme pour le corps humain ou le corps d'un animal, comportant une aiguille de ponction métallique (3; 3') et une canule (9) entourant l'aiguille de ponction (3; 3') dans l'intervalle compris entre sa pointe (1) et l'extrémité postérieure, par laquelle on peut introduire dans le corps, après avoir retiré l'aiguille de ponction (3; 3'), un fil de guidage (19) plus long, qui sert alors, après que l'on ait retiré également la canule (9), de guidage pour un cathéter (21) à poser, caractérisé en ce que l'aiguille de ponction (3; 3') est réalisée de façon à être électriquement conductrice de sa pointe (1) à son extrémité sortant de la canule (9), et comporte, à son extrémité postérieure, un élément de raccordement électrique (5; 31, 33).

2. Dispositif selon la revendication 1, caractérisé en ce que, de façon en soi connue, l'aiguille de ponction (3; 3') est creuse, et en ce que l'élément de raccordement électrique (5) situé à l'extrémité postérieure est conformé de façon à permettre un écoulement de liquide sans obstacle à travers l'aiguille de ponction (3; 3').

3. Dispositif selon la revendication 2, caractérisé en ce que l'élément de raccordement électrique (5; 31, 33) est formé par une aiguille métallique creuse (23) pouvant être insérée dans l'extrémité postérieure de l'aiguille de ponction (3; 3') et à laquelle est relié un conducteur de raccordement électrique (7).

4. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que le point de sortie du conducteur électrique (31) est entouré, à l'extrémité postérieure de l'aiguille de ponction (3; 3') par un tube en accordéon (35) que l'on peut étirer sur un conducteur électrique (7') pouvant être amené de l'extérieur.