A needle guide is formed with a tubular section and an opened trough section connected thereto in aligned-spaced relationship. A clip member is formed and arranged to releasably engage an open side of the trough section so that a portion of a lymph vessel may be cradled in the trough section and secured by the clip member. During cannulation the clip is held open and a needle is inserted through the tubular section which guides the needle into the cradled portion of the lymph vessel. The clip is then closed and the needle is held in position within the vessel by the pressure of the clip member.

12 Claims, 7 Drawing Figures
VEssel CANnuLATOR AND CLAMP FOR LYMPHANGIOGRAPHY

BACKGROUND OF THE INVENTION

1. Field of the Invention
The present invention relates to lymphangiography apparatus and more particularly to a device for guiding a cannulating needle into a lymph vessel and for clamping the needle in place.

2. Description of the Prior Art
Lymphangiography is a valuable diagnostic procedure; however, it has proven to be time-consuming, difficult and tedious for radiologists to perform, particularly the steps involving cannulating the lymph vessel and securing the needle within the vessel lumen. Lymphangiography is a relatively infrequent procedure and as a result, many radiologists lack the necessary expertise to perform the procedure with ease.

Many lymphangiographic aids have been provided heretofore; however, none have offered a reliable means for puncturing the vessel and guiding the needle into the vessel lumen, which is the most recurrent technical problem in the procedure. On occasions, after the vessel was punctured, the needle passed through the wall a second time, thereby creating a leak which necessitated a second or third attempt with different vessels.

After cannulation was achieved, the needle had to be secured within the vessel and the accepted procedure was to use a ligature. While attempting to secure the needle with a ligature, the radiologists often damaged the vessel.

In an attempt to avoid the damage caused while using a ligature to secure the needle with the vessel, a device was developed wherein a flat plate was fixed to the base of a spring clip so that the plate provided a firm surface upon which the vessel could rest while the upper portion of the clip clamped the vessel in place around the needle. While this device worked well, inexperienced operators still had difficulty penetrating and cannulating the vessels successfully.

SUMMARY OF THE INVENTION
The present invention contemplates a vessel cannulator and clamp formed from a clip and modified oversized needle. The oversized needle is modified to provide a tubular section at one end and an open trough section at another end, said sections being connected by a portion of the needle from which all but about 80 per cent of the original circumference is removed. Thus, the tubular section and the trough section are spaced apart and aligned. The modified needle is then soldered to the base of a spring clip, the needle is positioned on the clip so that an arm of the clip engages an open side of the trough section.

In use, the lymph vessel is isolated and placed within the open trough so that a needle inserted through the tubular portion will be guided so as to puncture the lymph vessel and achieve cannulation, after which the clip is released so as to secure the needle within the vessel. It is to be understood that the present invention is not limited to use with lymph vessels but may be used for cannulating other types of vessels.

Thus, the present invention provides a convenient means for performing cannulation and for securing the needle within the vessel.

The primary objective of the present invention is to provide a device that simplifies the lymphangiography procedure.
Another objective of the present invention is to provide a device for guiding a needle into a lymph vessel and for clamping the needle in place within the vessel.

Another objective of the present invention is to provide a device that will significantly reduce the time required to perform a lymphangiography procedure.

Another objective of the present invention is to provide a device that prevents a cannula from passing through the wall of the lymph vessels a second time.

The foregoing objectives and advantages of the invention will appear more fully hereinafter from a consideration of the detailed description which follows, taken together with the accompanying drawings wherein one embodiment of the invention is illustrated by way of example. It is to be expressly understood, however, that the drawings are for illustrative purposes only and are not to be considered as defining the limits of the invention.

DESCRIPTION OF THE DRAWINGS

FIG. 1 shows the device of the present invention in its contemplated environment and illustrates how a vessel is positioned for cannulation.

FIG. 2 is a perspective view of the present invention showing a needle inserted into a vessel and the clamp in position.

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2.

FIG. 4 is an end view of the present invention.

FIG. 5 is a sectional view taken along line 5—5 of FIG. 4.

FIG. 6 is a sectional view taken along line 6—6 of FIG. 4.

FIG. 7 is a sectional view taken along line 7—7 of FIG. 4.

DESCRIPTION OF THE INVENTION

Referring to the figures, a needle guide, indicated generally as 10, is formed from an oversized needle, such as a number 21 needle, so as to include an open trough 12 at one end and a tubular guide section 14 at another end. A number 21 needle was chosen because it will receive with a high degree of tolerance a 27 gauge needle, which is the standard size needle used for most lymphangiography procedures. The trough section 12 has a length of approximately 5 mm and is formed by removing the top portion of the needle by filing or grinding as most clearly shown in FIG. 7. The trough and the tubular section are separated by a 2 mm segment of the original needle from which all but about 80° of the original circumference has been removed by filing or grinding. The tubular section 14 is formed by retaining an entire portion of the barrel of the needle. The outer end 15 of the tubular portion may be cut perpendicular to the guide or at an angle to facilitate insertion of a needle. The short connecting segment 16 serves to maintain a precise alignment between the tubular section 14 and the trough section 12 and to assure the proper spacing between the section.

The needle guide 10 is attached to the base 18 of a clip indicated generally as 20. Attachment may be achieved by soldering, welding or by other suitable means. Suitable clips made of a high quality steel are...
available from Divina Distributors, New Haven, Connecticut. The guide is positioned on the base of the clip so that the trough is upright and an arm 22 of clip 20 engages the open side of trough 12.

A standard 27 gauge lymphangiography needle 26 is inserted into the end of a plastic tube 28, a sufficient distance so that a tip 30 of needle 26 is a predetermined distance from the end of tubing 28. The predetermined distance should approximately correspond to the overall length of guide 10 but should not exceed the length of the guide.

During lymphangiography a 1 cm—long incision 32 is made in the skin over the vessel 34 to be cannulated. The lymph vessel is isolated and a forceps is used to place the vessel within the open trough 12 so that a portion of the vessel is supported and held along a straight line in alignment with the tubular guide. The device is then lifted slightly to create a moderate tension on the vessel and immobilize the vessel as shown in FIG. 1. The needle 26 is inserted into the tubular guide section 14 and the clip is held in the open position while the needle is advance, punctures the vessel and enters the central lumen. The clip is then released so as to secure the needle within the vessel as most clearly shown in FIGS. 2 and 3.

Since the distance between the tip 30 of needle 26 and the end of tubing 28 approximately corresponds to the length of guide 10, the needle may be freely advanced until the tubing engages the guide without fear of puncturing the vessel a second time. The same result could be achieved by placing a clamp on the needle a predetermined distance from the tip or by making a mark on the needle indicating how far the needle may be advanced.

The sides of trough 12 support the walls of the vessel and reduce the possibility of the needle tip penetrating the vessel in the event that the foot moves.

Thus, ties are not required to secure the needle within the vessel and the needle is relatively secure so that absolute immobility of the foot is not required. The present invention provides a device that greatly simplifies the lymphangiography procedure and reduces the time required to successfully perform the procedure. The device provides a guide for simplifying cannulation and preventing a second puncture of the vessel wall. A clip is provided for securing the needle within the vessel after cannulation is achieved. The device also helps to prevent the needle from puncturing the vessel should motion of the foot occur after insertion of the needle.

What is claimed is:

1. A integral device for guiding a cannula into a lymph vessel and for securing the cannula within the vessel, comprising:
   first restraining means on the device for supporting and securing a portion of said vessel along a straight line;
   second restraining means on the device for guiding the cannula along the same straight line for positioning the cannula tip within the lumen of the supported portion of the vessel;
   said second means including means for preventing said cannula from being advanced to a position where the cannula tip punctures the vessel a second time and extends out of said vessel; and
   tension means on the device for securing the cannula within the supported portion of the vessel.

2. A device as described in claim 1, wherein the guide means comprises a tubular section having an opening formed along the line of sufficient size to receive the cannula.

3. A device as described in claim 1, wherein the means for supporting a portion of the vessel comprises a trough formed along the line.

4. A device as described in claim 1, wherein the means for securing the cannula comprises a clip means for engaging the vessel supporting means and an exposed portion of the vessel.

5. A device as described in claim 4, wherein the clip means includes:
   a base fixedly attached to the support means; and
   a movable member for releasably engaging an exposed portion of the vessel supported by the support means.

6. A device for guiding a cannula into a vessel and for securing the cannula within the vessel, comprising:
   means for supporting a portion of the vessel along a straight line which comprises a trough formed along the line;
   means for guiding the cannula along the line so that the cannula tip may be advanced to a position within the lumen of the supported portion of the vessel which comprises a tubular member having an opening formed along the line of sufficient size to receive the cannula, said tubular member and trough being spaced apart to facilitate placing the vessel within the trough; and
   means for securing the cannula within the supported portion of the vessel.

7. A device as described in claim 6, wherein the means for securing the cannula within the supported portion of the vessel comprises a clip means having a base fixedly attached to the trough and a movable arm positioned to engage an exposed portion of the vessel protruding from an open side of the trough.

8. A device as described in claim 6, wherein the supporting means and the guiding means are formed from an oversized needle having an opening therethrough of sufficient size to receive the cannula, said oversized needle having a portion of its circumference removed along a portion of its length adjacent a first end and a greater portion of its circumference removed along a central portion of its length.

9. A device as described in claim 8, wherein the oversized needle has a length substantially equal to the length of the cannula so that when the cannula is fully inserted into the oversized needle, the tip of the cannula lies within the lumen of the supported portion of the vessel.

10. An apparatus as described in claim 1, wherein said tension means comprises a biased clip means for securing the cannula within the supported portion of the vessel.

11. A method for cannulating a lymph vessel comprising the steps of:
   isolating a portion of the lymph vessel to be cannulated by dissecting said vessel away from surrounding tissue;
   positioning a portion of the isolated vessel on a first clip portion shaped to support restrain and align the positioned portion of the vessel along an axis; inserting and guiding a cannula along a cannula restraining means on a second portion of said clip along said axis; and
5. A method as described in claim 11, additionally comprising the step of engaging by pressure the supported portion of the vessel and the penetrated portion of the cannula so as to secure the cannula within the supported portion of the vessel.

6. * * * * *