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A New Technique for Cannulating Lymphatic Vessels: Experience in 150 Extremities

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Summary

A simple new instrument designed to automatically direct the needle into the lumen of a lymphatic duct has been developed. Experience with this new technique for cannulating lymphatic vessels is reported in 150 individual extremities. The cannulator reduces the time, skill and effort currently required for needle placement.

The cannulation of a lymphatic vessel remains an arduous procedure even for those with keen eyes and sure hands. This difficulty has somewhat limited the use of lymphangiography (1).

The inability of most physicians to hold a fine needle perfectly steady makes the procedure difficult. Using this premise, a simple device has been developed to stabilize and direct the needle into the lymphatic duct.

The instrument is a 1.0 by 1.4 cm sterile plastic lymph duct cannulator. It consists of three parts: the needle inserter, the lymph duct holder and the lymph duct occluder (Fig. 1). The cannulator is designed to automatically direct the needle into the lumen of the lymphatic vessel while holding the distended duct firmly in place.

This lymph duct cannulator has been utilized in 150 individual extremities and experience with the new technique is described.

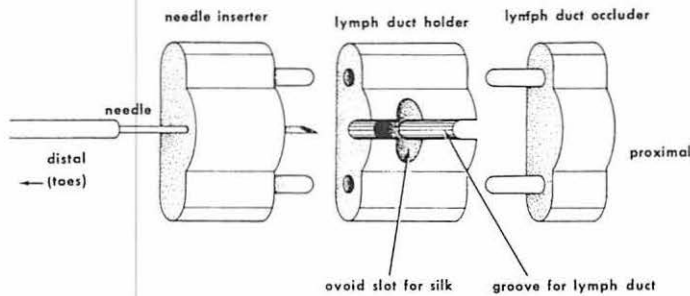


Fig. 1 Diagram of the cannulator showing its three parts; the needle inserter, the lymph duct holder, and the lymph duct occluder.

Method

A flat area on the dorsum of the foot is selected for the skin incision. This allows stable placement of the lymph duct cannulator. Either a 1.0 cm transverse or vertical skin incision is employed. The dye-filled lymphatic vessel is isolated by blunt dissection utilizing a modification of the technique described by *Kinmonth* et al in 1955 (2). It is necessary to completely isolate the vessel by meticulously removing the perilymphatic tissue. This allows the duct to be easily distended facilitating cannulation of the vessel. The duct should be adequately distended.

After a segment of lymphatic duct 1.0 cm in length has been isolated, a loop of 4-0 silk is placed around the vessel. When positioning the silk, do not allow the duct to become twisted. If the duct is twisted, a stricture will occur in the lymphatic vessel making it difficult to cannulate the duct. The duct is then placed in the groove of the lymph duct holder. The silk is positioned in the ovoid slot provided in the lymph duct holder (Fig. 2). A loose overhand knot is tied in the silk. The lymph duct occluder is then moved into place occluding the proximal vessel (Fig. 3).

The skin over the duct distal to the incision is massaged. This milks the lymph cephalad and distends the duct until it fills the groove in the lymph duct holder. The needle inserter is then moved into place. The vessel is now dilated and held in position. It is fixed proximally by the lymph duct occluder and distally by the needle inserter. (Fig. 4).

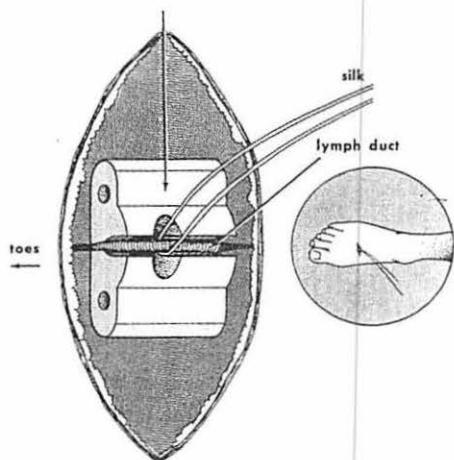


Fig. 2 The lymphatic vessel is positioned in the groove provided in the lymph duct holder. The silk is positioned in the ovoid slot.

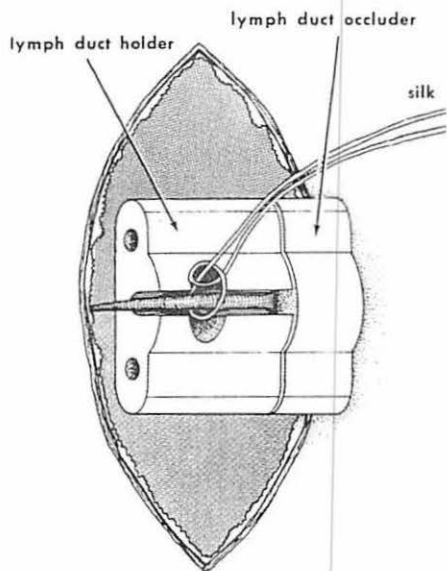


Fig. 3 The duct is positioned in the lymph duct holder. The proximal duct is occluded by the lymph duct occluder.

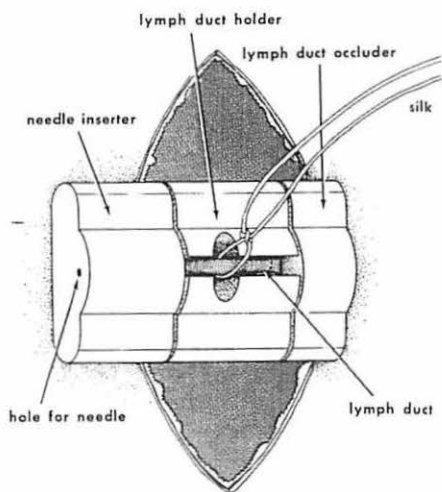


Fig. 4 The needle inserter is positioned. The lymphatic vessel is held in position by the cannulator.

A lymphangiography needle set is attached by its connecting tubing to a saline-filled syringe. A loop of tubing is fastened to the patient's skin by a Steri-Strip*.

The needle is gently advanced through the hole in the needle inserter introducing the needle into the lumen of the duct. The bevel of the needle may be rotated to facilitate its placement in the vessel. A small amount of saline is injected to further dilate the lymph vessel. The needle is then advanced past the ovoid slot holding the silk being careful not to advance the needle beyond the end of the lymph duct holder. The needle and duct are easily seen in the groove against the white background of the cannulator. The silk ligature is then tightened around the duct containing the needle in a single overhand knot. The excess silk is trimmed. It is important to enter the duct distal to the ovoid slot. If the vessel is entered beyond the ovoid slot, the silk will stabilize the needle but will not prevent backflow and cealage of the dye around the needle. A Steri-Strip is placed over the

*Steri-Strip skin closures; Minnesota Mining and Manufacturing Co., St. Paul, Minnesota, No. 1547; 1/2 x 4 in.

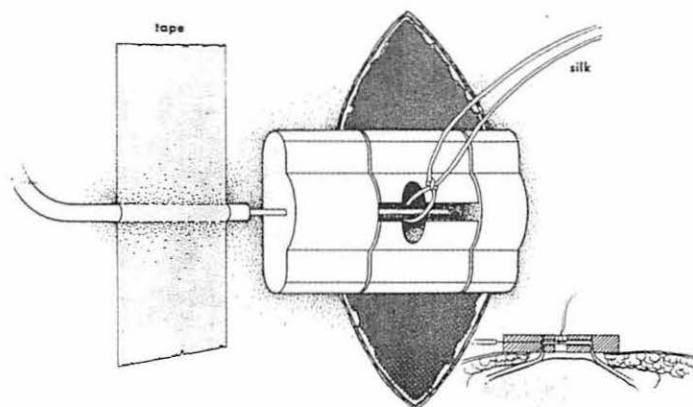


Fig. 5 The lymphangiography needle is inserted into the lumen of the duct.

needle to prevent recoil of the needle (Fig. 5). The lymph duct occluder is removed (Fig. 6). A tiny air bubble is injected with the saline to ascertain the position of the needle. If there is a leak, the air will bubble at the site of the leak. The needle should then be repositioned. If the needle is properly situated, air will be seen entering the lymphatic duct.

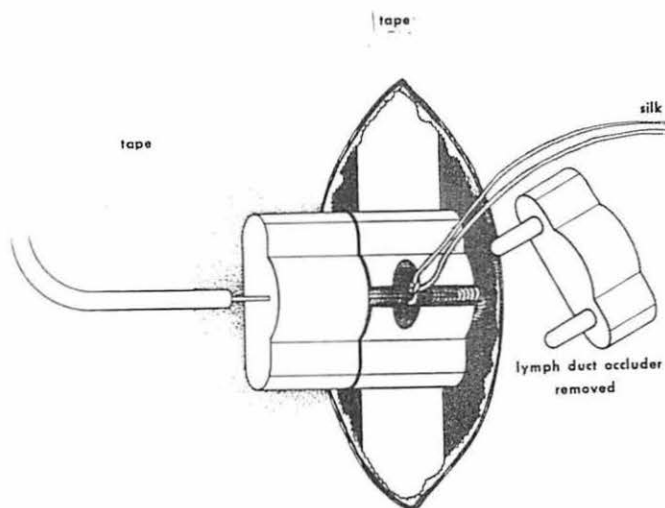


Fig. 6 The silk ligature is tightened around the duct containing the needle. The cannulator is taped in place and the lymph duct occluder removed.

A Steri-Strip is placed over the lymph duct cannulator assemblage and fastened to the skin. Ethiodol is then infused into the duct using a gravity injector. The lymphatic vessel and the needle are held firmly in place by the cannulator preventing the needle from being inadvertently removed during the infusion.

Results

To date, the new lymph duct cannulator has been employed in 150 individual extremities. In 3 patients, only one side was successfully cannulated. Thirteen physicians have utilized the technique. Eight of the physicians were residents-in-training with little or no previous experience in lymphangiography.

Discussion

One of the failures resulted from improper orientation of the cannulator pieces. It is important to orient the pieces properly. All three sections have a rounded superior surface and a flat inferior surface. When positioning the lymph duct holder it is very important that the ovoid slot used for the silk be closest to the toes. The longer segment of the groove for the lymph duct is then cephalad where it can be utilized. When this is not done, there is no room to cannulate the duct.

The remaining 2 failures resulted from technical difficulties. One is attributed to a lack of an adequate duct. The other was due to occluding of several lymphangiography needles during the procedure. The needles plugged with debris. Open basins of saline collect a surprising amount of debris from the environment. Since the failure, a closed system has been successfully employed to dispense the saline used to distend the duct.

The lymph duct cannulator method has proven easier to teach and is mastered more quickly than existing freehand procedures of lymph duct cannulation. While it is still necessary to be meticulous, the mechanical skill and dexterity required are reduced. The patient is still encouraged to remain stationary during the injection of the contrast material, however, small movements do not displace the needle because it is held firmly in the cannulator.

It is recognized that a few individuals are exceptionally endowed with keen eyes and deft hands and need no assistance in performing lymphangiography. However, it is felt that many individuals find lymphangiography laborious. These physicians will find the cannulator more helpful. The cannulator has been manufactured and is readily available**.

Addendum

Since the paper was written several statistics have changed. The cannulator has been used in 281 extremities. There have been 4 failures in which only one side was successfully cannulated. This additional failure resulted from the lack of an adequate duct. Twenty physicians have utilized the technique. Fifteen of the 20 physicians were residents-in-training.

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**North American Instrument Corporation, Hudson Falls, New York.