

"LIQUID STYLET" FOR PERCUTANEOUS RADIAL ARTERY CANNULATION

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ABSTRACT

Radial artery catheterization in elderly patients may be difficult. The "liquid stylet" created by slow intra-arterial fluid injection facilitates insertion of arterial cannulae, and proved effective in 14 consecutive patients in whom percutaneous radial artery catheterization was otherwise unsuccessful. This technique is useful when difficulty in radial artery cannulation is encountered.

KEY WORDS: ARTERIES, radial, cannulation.

INTRODUCTION

VARIOUS METHODS for insertion of radial artery catheters have been described.¹⁻⁴ Nevertheless, catheter placement occasionally meets with unexpected difficulty, more often than not in the elderly patient. The problem most frequently encountered is not identification of the artery or location of the vessel lumen but, rather, cannulation of the vessel once the lumen has been identified.

Although not previously described in the literature, a simple, inexpensive, fast, safe, and effective technique exists which can obviate the problem of "the catheter that won't thread." I call it the "liquid stylet." In contrast to wire guides, which are relatively expensive, not widely distributed, and often unavailable when and where most needed, the components of the "liquid stylet" are almost always at hand.

MATERIALS AND METHODS

The materials required are a sterile 10 ml plastic syringe and 3 ml of sterile saline solution.

The technique is as follows. With 3 ml of saline in the syringe attach the syringe securely to a 20 gauge non-tapered cannula whose distal end is located in the radial artery lumen. Vigorously pulsatile backflow of blood should be present. Aspirate 1-2 ml of blood without moving the cannula, confirming location of the cannula in the vessel lumen. The blood should be easily aspirated. Slowly and steadily inject 1-3

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ml of fluid from the syringe with one hand while the other slowly advances the catheter into the vessel lumen behind the "liquid stylet" created by the injection. When the hub of the catheter reaches the surface of the skin, aspirate 1-2 ml of blood to confirm location of the catheter tip in the artery, remove the syringe from the catheter and connect to the monitoring equipment. Flush to clear the catheter of residual blood.

RESULTS

The "liquid stylet" was used in 14 consecutive patients in whom the radial artery lumen was positively identified by vigorous pulsatile backflow, but in whom conventional cannulation techniques¹⁻⁴ were not successful. Catheterization was subsequently successful in all 14. All patients had palpable radial arterial pulses distal to the cannulation sites 48 hours following removal of the catheters.

DISCUSSION

Arterial narrowing and tortuosity coincident with aging and atherosclerosis⁵⁻⁷ occasionally make percutaneous catheterization of the radial artery difficult.

Typically, this problem manifests itself by the following sequence of events: arterial puncture is easily accomplished with a catheter with an indwelling needle; the needle is withdrawn; the catheter spurts bright red blood in synchrony with the pulse, positively identifying the lumen of the radial artery; repeated attempts are made to advance the catheter, without success; the catheter is removed, often inadvertently and the

entire process is repeated at several sites, often bilaterally, before being abandoned.

The mechanism of action of the "liquid stylet" probably consists of temporary dilatation and straightening of the narrowed, tortuous vessel by the injected fluid. Experience has shown a 10 ml syringe to be the ideal size in terms of volume of fluid held, speed of injection and amount of pressure generated over the 1-2 seconds required for actual catheter advancement.

In one investigation⁸ of the possibility of cerebral embolization due to flushing of Scribner shunts, it was calculated that 6 ml of solution injected at a rate of 20 ml/sec would be needed to reach the central arterial circulation, while 25 ml was required when injected at a slower rate of 3.5 ml/sec. A second report,⁹ which studied flushing of radial artery cannulae, showed that a volume of 3-12 ml of flush solution injected "as rapidly as possible" was required to reach the central arterial circulation. That study, reported in 1971, did not state the cannula size or whether tapered catheters were used. Use of the "liquid stylet" in conjunction with 20 gauge non-tapered catheters, injectate volumes not exceeding 3 ml and, above all, slow injection, appears to avoid the risk of cerebral sequelae.

In summary, a technique for placement of a radial artery catheter in patients in whom routine methods are unsuccessful is described. In many

otherwise "impossible" radial artery cannulation attempts, the "liquid stylet" has proved highly effective.

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RÉSUMÉ

La canulation de l'artère radiale s'avère parfois difficile, en particulier chez le vieillard, le problème le plus fréquent n'étant pas l'identification ou la pénétration de l'artère, mais plutôt sa canulation.

La technique suivante a été mise au point: une seringue contenant quelques ml de soluté physiologique permet, dans un premier temps, de s'assurer de la position intra-luminale de la pointe de l'aiguille; dans un second temps, le sang aspiré - et mélangé au soluté physiologique - est réinjecté lentement dans l'artère pendant que le cathéter est glissé de l'autre main dans la lumière du vaisseau que dilate et rectifie ce stylet liquidien. Quatorze patients consécutifs qui n'avaient pu être canulé par les méthodes usuelles, ont pu l'être avec cette technique.