

ABSTRACT #23

OBJECTIVE MONITORING OF INJECTION PRESSURE DURING NERVE BLOCK INJECTIONS Lakshmanasamy Somasundaram, Takashige Iwata, Christopher Robards, Richard Claudio, Camille, Marina Yufa. St. Luke's-Roosevelt Hospitals, New York, NY.

INTRODUCTION

Neurologic injuries are relatively rare but serious complications of peripheral nerve blocks (PNBs)^{1,2}. To avoid an intraneural injection, clinicians have traditionally relied on subjective assessment of resistance to injection using a "syringe feel" technique. This is because peripheral nerves are organized in densely packed fascicles³; consequently, intraneural injection results in higher injection pressure as compared to perineural injections.^{2,4,5} Recently, several methods have been suggested to assess the pressure on injection during PNBs, such as compressed air technique⁶, electronic infusion pumps with pressure monitoring and feedback control⁷ as well as in-line disposable injection monitors. We report our experience with recently introduced in-line injection pressure monitor during peripheral nerve blockade (BSmart™, Concert Medical, Needham, MA), and discuss its clinical use (**Figures 1 and 2**).

METHODS

A retrospective review of anesthesia records of patients who underwent various type of surgery and received peripheral nerve blocks from January 1, 2006 to October 31, 2006 was conducted. Demographic data, type of nerve block, neurologic and any other complications, including intravascular injections, infections, hematoma (assessed using our departmental quality assurance program), and the pressure data during nerve block injections were reviewed.

RESULTS

Of the total of 76 who received nerve blocks, 28 patients received interscalene brachial plexus block, 13 infraclavicular brachial plexus block, 11 lumbar plexus block, 5 sciatic nerve block, 8 femoral nerve block, and 11 popliteal block. All patients were sedated using midazolam (MEAN 3.99 mg +/- 1.57 SD) and alfentanil (MEAN 1045.6 mcg +/- 656.7 SD), XX of blocks were performed in anesthetized patients. There were no neurologic or significant other complications. Injection pressure monitoring was successfully used in all blocks; all PNBs were performed with injection pressure levels below 20 psi.

DISCUSSION

In both cadaveric and in vivo models of nerve injury, high injection pressures (>20 psi) were required to injure a fascicle through an intraneurally placed needle, leading to neurologic injury^{5,8}. Assessment of resistance to injection has been suggested as a part of the standard documentation procedure.⁸ However, subjective assessment of resistance to injection varies among clinicians and no clinically useful monitors have been available to objectively monitor and document resistance (pressure) to injection to allow a meaningful intervention should the injection pressure be abnormal.⁹

In our routine use of the in-line injection pressure monitoring during peripheral nerve blocks, the information provided by BSmart was universally useful in standardizing the injection pressure

allowing for documentation of the injection pressure with all nerve blocks. Objective monitoring allows standardizing injection pressure regardless of the learned “feel” or experience of the person performing the actual injection. It is not known whether the routine use of injection pressure monitoring will prevent neurologic injury, however, avoidance of injection pressures >20 psi should theoretically prevent intrafascicular injection as a mechanism^{2,5,8,10}. Further studies are required to establish whether monitoring injection pressure during peripheral nerve block can potentially reduce the incidence of neurologic injury due to inadvertent intraneural needle placement.

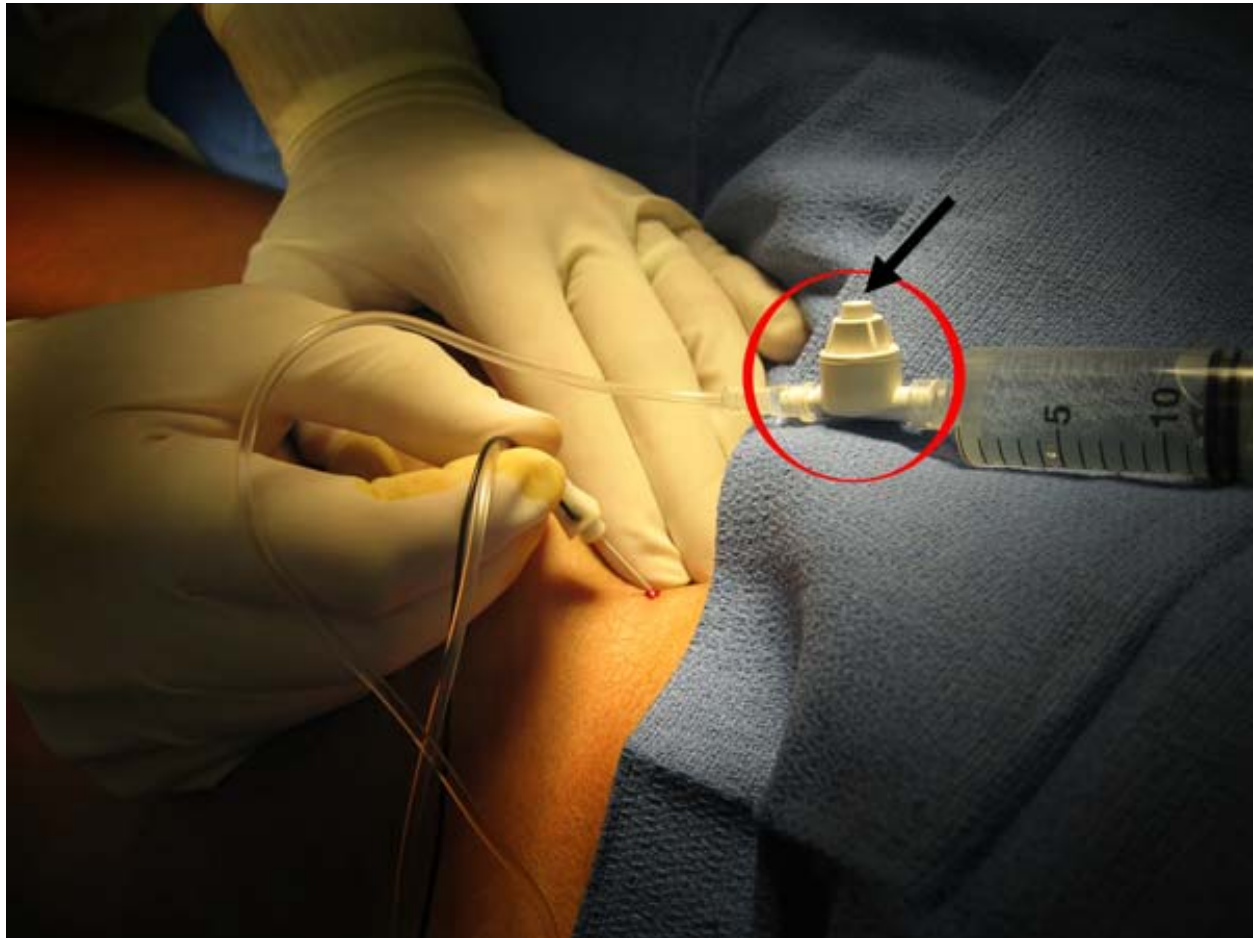


FIGURE 1.

Injection pressure monitoring during femoral nerve block. When the nerve is localized, the injection is being made while monitoring the injection pressure as indicated by the piston (arrow) on the in-line injection pressure monitor (BSmart™, Concert Medical, Needham, MA).

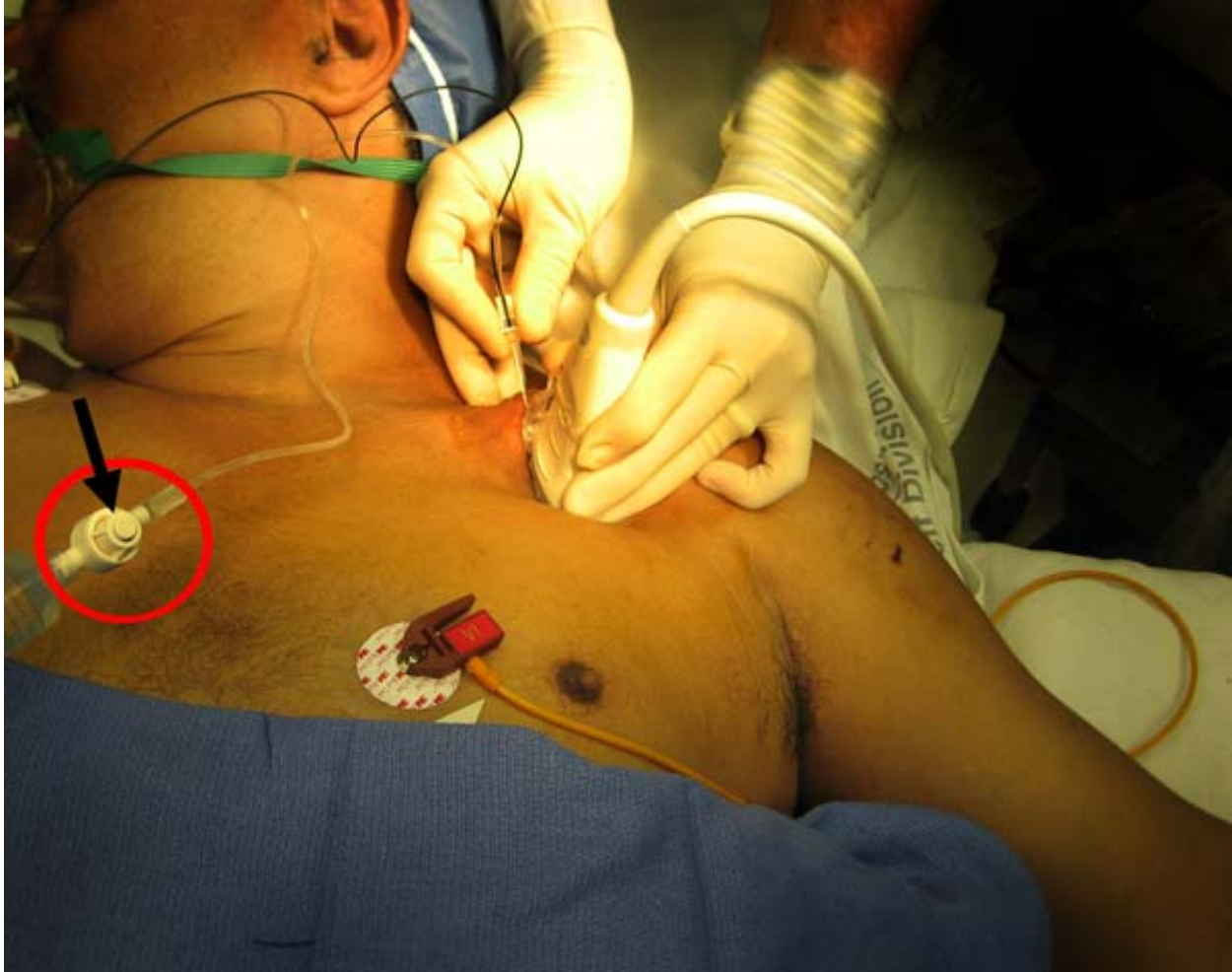


FIGURE 2.

Injection pressure monitoring during ultrasound-guided infraclavicular brachial plexus block. When the plexus is localized, the injection is being made while monitoring the injection pressure as indicated by the piston (arrow) on the in-line injection pressure monitor (BSmart™, Concert Medical, Needham, MA).

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