26377 - A COMPRESSED AIR TECHNIQUE FOR MONITORING BLOCK INJECTION PRESSURES

Mark Knezevich MD, Ban Tsui, MD; University Of Alberta, Edmonton, ALBERTA, Canada

INTRODUCTION: High pressure on injection is a major factor associated with complications of intraneural injections during peripheral nerve blocks.(1) Objective and real-time pressure monitoring is beneficial as anesthesiologists vary widely in their perceptions of injection pressures and rates of injection (2)and many hold needles while an assistant performs the injection. This study's purpose was to determine if a specific but simple compressed air technique could reduce variability and allow monitoring of pressures during a simulated peripheral nerve block. Using Boyle's Law ($PV=\text{constant}$), if a set volume of air is drawn into a syringe above local anesthetic and compressed to 50% prior and during injections, pressure at the needle tip doubles with a net pressure of 760mmHg/14.7 psi. This pressure is well below the reported 1293mmHg/25 psi safety limit.(3)

METHODS: Ethics approval and consent from 30 staff anesthesiologists was obtained. The experiment consisted of anesthesiologists injecting saline into a semi-closed system containing resistance, thereby simulating a high pressure injection (ie. potential intraneural injection). This system was created by inserting a commonly used insulated needle (22G) into a heparin lock, connected to IV tubing with a pressure sensor and partially closed clamp. Anesthesiologists' injection pressures using two separate 30 mL syringes, each containing 20 ml of saline, were measured for 60 seconds using: 1) a typical "syringe feel" method (ie. usual method), and 2) the compressed air technique (ie. withdrawing 10 ml of air above the 20 ml of saline and compressing this air to 5ml prior and during injections).

RESULTS: For each anesthesiologist, injection pressures with the "syringe feel" method were higher at all time points than with the compressed air technique. In addition, over 60 seconds, the "syringe feel" method resulted in significantly higher mean peak pressures (1892 mmHg/36.6 psi) than the new technique (696 mmHg/13.5 psi)($p < 0.01$; see Figure 1). Using the "syringe feel" method, all anesthesiologists except one (96.6%) generated peak pressures above the 1293mmHg/25 psi limit. Using the compressed air technique, no anesthesiologist generated pressures close to 25 psi; the highest peak was 1016 mmHg (19.6 psi). Finally, there was much more variability amongst anesthesiologists with the traditional method.

DISCUSSION: This study demonstrated that the compressed air technique can effectively maintain injection pressures below 25 psi. This method could provide standardization for monitoring injection pressures to ensure they are well below the reported limit of <25 psi(3)and allow for minimized pressure variability generated amongst anesthesiologists and/or their assistants.

REFERENCES:

1. J Neurosurg Anesthesiol 2004; 16: 84-6
2. Reg Anesth Pain Med 2004; 29: 201-5
3. Reg Anesth Pain Med 2004; 29: 417-23

Figure 1. Peak Injection Pressures Generated by Anesthesiologists