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Measurement of residual volume in spinal needles after spinal anesthesia[☆]



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ABSTRACT

Introduction: Spinal anesthesia involves the administration of a dose of local anesthesia into the intrathecal space of the lumbar spine, using spinal needles with varying characteristics and design. When completing the administration of spinal anesthesia, you may check the volume of fluid remaining inside the spinal needle.

Objective: To measure and compare the volume of residual fluid following the administration of spinal anesthesia using three different brands of 27 gauge spinal needles.

Methods: This is an observational analytical cross-section trial for which tree types of 27 gauge commercial needles were selected: BD Whitacre pencil point, Spinocan Quincke sharp point, and Disposable spinal needle. Following the administration of spinal anesthesia, the same operator, without detaching the syringe from the needle, deposited the residual volume into a collection tube so that a second operator quantifies the volume using a precision micropipette.

Results: The residual volume obtained from the 27G spinal needles showed a statistically significant difference in favor of the BD Whitacre needles ($P < 0.01$), compared against Spinocan Quincke and Disposable spinal needle.

Conclusions: The BD Whitacre pencil point proved to lodge less residual volume following spinal anesthesia. No clinical implications can be made from this finding and new studies are required to ratify these results.

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Medición del volumen residual en las agujas espinales tras anestesia raquídea

R E S U M E N

Palabras clave:

Anestesia de conducción
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Espacio subaracnoideo

Introducción: La anestesia raquídea consiste en la aplicación de una dosis de anestésico local en el espacio intratecal de la columna lumbar, por medio de agujas espinales cuyas características varían en calibre como en diseño. Al terminar la aplicación de una anestesia raquídea se puede comprobar un volumen remanente de líquido al interior de la aguja espinal.

Objetivo: Medir y comparar del volumen remanente de líquido posterior a la aplicación de anestesia raquídea en tres marcas comerciales de agujas espinales de calibre 27.

Métodos: Este es un estudio observacional analítico de corte transversal, se escogieron tres tipos comerciales de agujas calibre 27: BD Whitacre punta de lápiz, Spinocan Quinke punta cortante y Disposable spinal needle. Posterior a la aplicación de una anestesia raquídea, el mismo operador sin desconectar la jeringa de la aguja, depositó el volumen residual en un tubo de recolección, para que un segundo operador con una micropipeta de precisión cuantificara el volumen.

Resultados: El volumen residual obtenido de las agujas espinales 27G demostró tener una diferencia estadísticamente significativa a favor de las agujas BD Whitacre ($P < 0.01$), comparadas con agujas Spinocan Quinke y Disposable spinal needle.

Conclusiones: Se comprobó que las agujas BD Whitacre pencil point alojan menor volumen residual posterior a una anestesia espinal. No se pueden hacer implicaciones clínicas derivadas de este hallazgo. Son necesarios nuevos estudios para corroborar estos resultados.

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Introduction

Spinal anesthesia is the anesthetic technique of choice in a range of surgical procedures: general surgery, ObGy, orthopedics and urology. It is based on the injection of one dose of local anesthetic into the subarachnoid space at the level of the lumbar spine. The spinal needles used vary in their design and gauge.

Following the administration of spinal anesthesia, a residual volume may be observed in the needle. This volume may vary depending on the needle manufacturer. There are no publications researching how significant this volume is.

An inadequate dose selection is a cause for failed spinal anesthesia and according to the literature ranges between 1 and 17% of the spinal anesthesia.

The purpose of this post-interventional trial was to measure the residual volume contained inside the chamber of three 27 gauge spinal needles from three different manufacturers and to assess whether there are any statistically significant differences.

Methods

An observational, analytical, cross-section, non-randomized trial was designed, in which spinal needles used for the administration of spinal anesthesia were successively recruited.

Three brands of 27 gauge needles available in the Colombian market were collected:

- BD Whitacre pencil point spinal needle (BD Medical Franklin Lakes, NJ, USA), 27 GA 0.40 × 90 mm.
- Spinocan Quinke sharp tip (Braun Medical Inc., Bethlehem, PA, USA) 27 GA 0.42 × 88 mm.
- Disposable spinal needle (Dr.J Tianjin Hanaco Medical Co. Tianjin, China). 27 GA 0.38 × 90 mm.

To measure the residual volume, an Automatic Micropipette of 100 to 1000IU was used, (volume measurement capacity 0.1 µl up to 10 ml) EASY40+ LABBOX.

A convenience sample of 13 measurements per manufacturer of spinal needles was selected, for a total of 39 samples. For the administration of spinal anesthesia, hypodermic disposable 3 ml/cc needles were used, connected through a thread to the spinal needles.

The specimens that during their use showed evidence of failure for the administration of the drug, any defective specimens or with defects or deformities after threading the syringe to the spinal needle, were all excluded.

The involvement of anesthesiologists was required. The anesthesiologist who administered the spinal anesthesia was informed about the intention to measure the residual volume so that after preparing the dose, without disconnecting the syringe from the spinal needle, the residual volume inside the needle shall be placed in a plastic measuring tube.

The volume of the dose administered in the anesthesia, and the number of barbotages was not taken into account.

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