



UTILIZATION OF THE COMPUFLO® IN DETERMINING THE PRESSURE OF THE EPIDURAL SPACE – A PILOT STUDY

Oscar Ghelber, M.D., Ralf Gebhard, M.D., Peter Szmuk, M.D.,
Gbadebo Adebayo, M.D., Carin A. Hagberg, M.D.

Department of Anesthesiology, The University of Texas Medical School at Houston Houston, Texas, USA

INTRODUCTION

Proper identification of the epidural space is crucial for efficient and safe epidural anesthesia. However, the current techniques for identification of the epidural space rely on the subjective perception of the operator by the "loss of resistance" to air or saline. The introduction of a method or device that can identify the epidural space with an objective tool could potentially decrease the incidence of side effects and increase the success rate of the procedure and patient safety. 1-3 A novel computerized device, the CompuFlo® (Figure 1), was utilized to detect the difference in pressure between the ligamentum flavum and the epidural space.



Figure 1: The CompuFlo®

References:

Anesth Analg 2003; 96:1183-7.
Anaesthesia 2002; 57:768-72.
Masui 2002; 51:927-30.

METHODS

Following institutional approval and written consent, 20 adult obstetric patients scheduled to receive epidural anesthesia were enrolled into this preliminary study. Epidural anesthesia was performed using the traditional "loss of resistance" technique. The CompuFlo® was attached to the Tuohy epidural needle when the operator initially introduced the needle into the supraspinous ligament (baseline pressure), after the operator reached the ligamentum flavum (ligament pressure), and after the operator encountered a "loss of resistance" (epidural space). Measurements of the pressure encountered at the tip of the needle were recorded for 5 seconds at each location. After the final pressure reading, the CompuFlo® was disconnected from the epidural needle and epidural anesthesia was administered in the usual fashion with 0.2% ropivacaine.

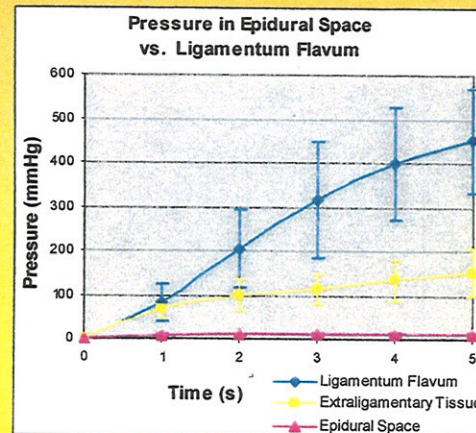


Figure 2: Comparison of the pressure in the extra ligamentary tissues, ligamentum flavum, and epidural space

RESULTS

The following mean pressures were calculated: ligamentum flavum, extraligamentary tissue, and epidural space. These pressures are shown as a comparison to time in the graph below. The epidural space exhibited significantly ($p < 0.001$) lower pressures than both the extraligamentary tissue and the ligamentum flavum after 1 second of measurement. The extraligamentary tissue exhibited significantly ($p < 0.001$) lower pressures than the ligamentum flavum after 2 seconds of measurement (Figure 2). The compliance of the tissues was calculated as the volume of fluid injected over 5 seconds divided by the change in pressure. The 3 types of tissues were clearly identified by their compliance (Figure 3).

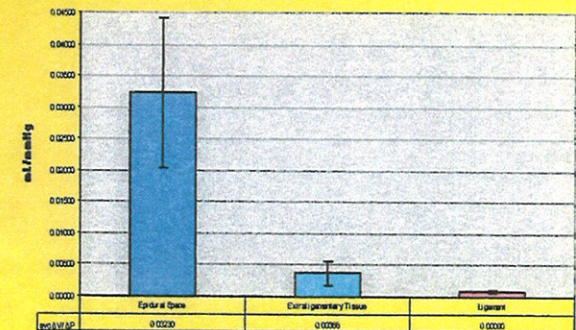


Figure 3: Tissue Compliance

DISCUSSION

The CompuFlo® is able to reliably identify pressure characteristics of the different tissues, including the decrease in pressure of the epidural space in all the cases. Within seconds, the location of the needle can easily be determined, with higher pressures indicative of being in the ligamentum flavum. Further studies are warranted with the use of this device.