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Use of the CompuFlo® system to identify the epidural space in obstetric-gynecological area. A single-center retrospective study.

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Dear Editor,

although epidural anesthesia (EA) is frequently used, the success rate is different and complications, as accidental dural puncture (ADP), may occur due to incorrect needle placement [1]. This is mainly observed with the commonly used technique of “Loss-Of-Resistance” at the pressure exerted by the anesthesiologist's thumb on the plunger of a syringe containing saline, or air, which is injected through an epidural “Tuohy” needle. Pressure control during injection of local anesthetics has recently been studied both on simulator and in large a review of the literature concerning peripheral blocks [2-3]. To limit complications, a new device is being proposed (CompuFlo® Epidural System, CompuFlo®, Milestone Scientific, Livingston, NJ) [4]. It is a computer-controlled drug-delivery system, able to measure the pressure at the tip of the needle during its progression through the tissues. The needle is connected via an arterial line extension tubing to a saline-filled syringe, whose plunger is controlled with real time feedback by CompuFlo®. Thanks to the fluid column through the epidural needle, CompuFlo® measures pressures obtained at the injection site four times a second, displaying a pressure/time curve on a dedicated digital monitor. During insertion, a continuous acoustic signal produced by CompuFlo® guides the operator too: when the needle runs into higher density tissues (i.e. in ligamenta) and the pressure at the injection site rises, the device produces a higher tone; when the pressure suddenly decreases (i.e. in the epidural space), a sudden fall in the tone of the audio output is clearly adudible [5].

After the device has obtained the qualification at European level (CE), our Unit has inserted it into the clinical practice for difficult cases. After obtaining the approval of the local ethics committee, and registering in the National Clinical Trials registry, a retrospective study was conducted on the case series collected at the tertiary referral obstetrics gynecological center of Careggi University Hospital.

From January to December 2017, 141 consecutive women were recruited. In all patients a lumbar epidural catheter was placed using the CompuFlo® according to the following method: after identification of the interspinous space and local anesthesia of the skin, a Tuohy needle was inserted subcutaneously. The needle was connected to CompuFlo® via a dedicated tubing set (Epidural Disposable Kit, Milestone Scientific, Livingston, NJ), the procedure was started and the epidural needle was advanced slowly to obtain a continuous reading of the pressure in the crossed tissues, while a pressure/time curve was displayed on the screen. A sudden drop in pressure once the ligamentum flavum has been crossed, maintained for more than 5 seconds and the fall in the tone of

the acoustic signal emitted by the device, indicated the identification of the epidural space (Figure 1).

In 85% of cases, the epidural catheter was correctly positioned within the first two attempts. The average time of the procedure was 76.07 sec (range 48.9-98.15). A third attempt was necessary in 15% of cases. Of the 141 patients who underwent the catheter positioning using CompuFlo®, none developed complications. All the epidural blocks worked properly.

CompuFlo® epidural system seems to be effective and safe in identifying the epidural space, also in difficult cases, minimizing the incidence of adverse events. Our retrospective study needs to be validated by larger RCTs.

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Figure 1: Pressure/time curve at the tip of Tuohy needle and saline infused volume during epidural space identification registered using the CompuFlo® system.