Title: TRIAL OF DOUBLE LUMEN EPIDURAL CATHETER FOR CLINICAL ANESTHESIA

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Introduction. A new double lumen epidural catheter which can be passed through a 17 gauge Tuohy needle with distal and proximal ports separated by 5cm has been developed. The objectives of this catheter were: 1) To provide a border band of epidural anesthesia using a smaller anesthetic volume per spinal segment. 2) To provide greater anesthetic flexibility in procedures where the region of required anesthesia may vary over time, such as during labor or may require a larger than expected operative field. In such cases, it is possible to expand or change the analgesic region by injecting the anesthetic drug from the proximal or distal port of the catheter.

Material and Method. The new double lumen epidural catheter consists of two Teflon tubes (see Fig. 1). The inner lumen opens at the distal port which is situated at the end of the catheter. The outer lumen opens at the proximal port which is separated by 5cm from the distal port. Each lumen has a separate opening for anesthetic injection so it is possible to inject anesthetic agents through each lumen independently.

Sixteen urologic patients scheduled for transurethral resection were studied. Informed consent from the patients and institutional approval were obtained. Epidural catheters were inserted into the L3-4 interspace using a paramedian approach. The catheter was then inserted upwards for a distance of 5cm in the epidural space. Pin-prick tests were done with No. 22 gauge hypodermic needles 15 minutes after the 1% Lidocaine injection to map the region of analgesia.

1) Comparison of the spread of analgesia between one port injection and two port injection in the same patients.

1% Lidocaine 5ml was injected separately from the proximal and distal port of the catheter 15 minutes later pin-prick tests were done to measure the region of analgesia. The efficiency of analgesia was calculated from the following equation:

ml per spinal segment = volume of anesthetic agents injected (ml)/number of dermatomes blocked

The day after operation the catheter used during the operation was withdrawn 2.5cm and 10ml of 1% Lidocaine was injected from the distal port (see Fig. 2). 15 minutes later pin-prick tests were done to map the region of anesthesia and efficiency of analgesia was calculated using the formula shown above.

2) The expansion of the anesthetic region following sequential injection through distal then proximal ports (see Fig. 3).

1% Lidocaine 10ml was injected from the distal port in six patients. After 15 minutes pin-prick tests were done. Following this procedure the same volume of 1% Lidocaine was injected from proximal port and after 15 minutes pin-prick tests were done again.

Results. 1) Using 10ml of Lidocaine through the distal port alone produced a region of analgesia from Th 8.5±0.7 to L4.3±0.62. Using 5ml per port through the proximal and distal port, a region of analgesia from Th 8.5±0.83 to S 2.8±0.87 was obtained. Thus, a wider band of analgesia could be obtained with the double lumen catheter. The efficiency of analgesia was 1.33±0.17ml per spinal segment for the distal port injection compared to 0.86±0.04 for the combined use of the distal and proximal ports. This difference in efficiency was significant at $p<0.05$ using the paired T-test, N=10. Values are expressed as mean ±SEM.

2) For sequential injection through the catheter, a region of analgesia from Th 7.33±0.71 to L1.5±0.7 was obtained after injection through the distal of 10ml of 1% Lidocaine. This region expanded caudaly to the S 3.67±1.33 level after injection of 10ml of 1% Lidocaine through the proximal port (see Fig. 3).

Discussion. Bromage[1] speculates that during epidural anesthesia, injected anesthetic agent will accumulate in a large droplet about the injection port and then gradually expand in a longitudinal direction. Using the double lumen catheter, two droplets are formed with longitudinal spread between them. This allows the epidural space to be covered more widely and uniformly than with conventional epidural anesthesia with a decrease in the required ml of anesthetic per spinal segment.

Reference. 1) Bromage PR: Epidural Analgesia, W.B. Saunders, Co., Phila., 1978, p153.

**Fig 1. Double Lumen Epidural Cathe.**

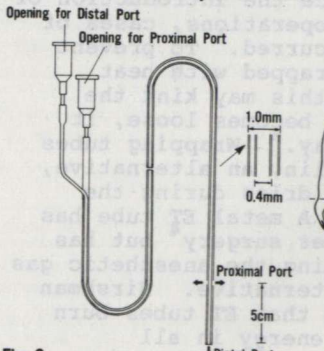


**Fig 2. Injection Site for the Comparison of One Port vs. Two Port Analgesia**

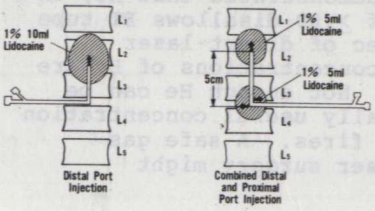


**Fig 3. Sequential Port Injection for Analgesia**