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An Increase in Prostacyclin Accompanies Reduction of Blood Pressure Following Peritoneal Closure in Patients Undergoing Cesarean Section

To the Editor:—In our practice of providing epidural anesthesia (2% mepivacaine) for patients undergoing cesarean section, we frequently observe a reduction of blood pressure (BP) associated with peritoneal closure near the end of the operation. To better quantify this response, we performed a prospective study in fifty patients. Table 1 shows the changes in BP measured by automatic blood pressure cuff (Nippon Colin Co., Japan) and heart rate (HR) measured by ECG at three different stages related to peritoneal closure. Baseline values are the mean of three measurements during the 10 min before the start of peritoneal closure. Maximal changes were observed at 5 ± 1 min (mean ± SD) after the start of the closure. BP significantly decreased while HR increased. Blood pressure and HR returned to baseline values within 20 min. Lactated Ringer's solution was administered at a constant rate of 20–30 $ml \cdot kg^{-1} \cdot h^{-1}$ throughout the procedure in all patients.

At the completion of this study, we were unable to explain the mechanism of this reduction of BP. However, the report by Seltzer and his associates[1] which appeared soon after our first observation has stimulated us to measure prostacyclin (PGI_2) which mediates vasodilatation following mesenteric traction. Informed consent from each patient was obtained. Table 2 shows the changes in BP and the concentration of plasma 6-keto-$PGF_1\ \alpha$ ($PGF_1\ \alpha$), which is the stable breakdown product of PGI_2, in four patients undergoing elective cesarean section. Arterial blood samples were obtained before the epidural administration of 2% mepivacaine and at two different stages in relation to peritoneal closure. All samples were immediately centrifuged. The plasma was harvested and frozen at −20° C for subsequent analysis of $PGF_1\ \alpha$ concentrations by the radioimmunoassay method. The limit of detection of our assay was 0.05 pmol/ml, and the intra- and interassay coefficients of variation were 9% and 12%, respectively. BP changes observed in these patients were similar to those in table 1. Striking increases in $PGF_1\ \alpha$ concentration were associated with the reduction of BP. In all patients, this reduction was accompanied by erythema and/or flushing of their faces and palms.

These results strongly suggest that the reduction of BP was due, at least in part, to vasodilatation mediated by PGI_2 as hypothesized by Seltzer and his associates.[1] It is a practice by our obstetricians to deliver the body of uterus on to the abdominal wall after delivery and then return it into the abdominal cavity just prior to closure of peritoneum. This procedure was practiced in all patients of both groups and might cause mesenteric traction or directly stimulate intestinal mucosa from which PGI_2 might be released. Based upon the above, we speculate that release of PGI_2 may occur during surgical procedures in the abdomen including but not restricted to intentional traction of mesenterium. The reduction of BP may not easily be related to mesenteric traction during complicated surgical procedures because it may be masked by varying anesthetic depth if general anesthesia is used, and/or with changes in the intravascular fluid volume.

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TABLE 1. Changes in Blood Pressure and Heart Rate

	Before Start of Peritoneal Closure (Baseline)	Maximal Change in Blood Pressure and Heart Rate	20 Min after Start of Peritoneal Closure
Blood pressure (mmHg) (systolic/diastolic)	117 ± 2/65 ± 2	97 ± 2/49 ± 2*	113 ± 2/63 ± 2
Heart rate (/min)	97 ± 2	109 ± 3*	93 ± 2

Values are given as mean ± SE.

* $P < 0.05$, significantly different from baseline (paired Student's t test).

TABLE 2. Changes in Blood Pressure and PGF1α Concentration Associated with Peritoneal Closure

	Blood Pressure (mmHg) (Systolic/diastolic)				PGF1α Concentration (pmol/ml)		
Patient No.	Before Administration of 2% Mepivacaine	1 Min before Start of Peritoneal Closure	5 Min after Start of Peritoneal Closure	20 Min after Start of Peritoneal Closure	Before Administration of 2% mepivacaine	5 Min after Delivery	5 Min after Start of Peritoneal Closure
No. 1	128/69	125/75	98/50	127/69	0.24	0.47	6.29
No. 2	131/89	125/76	92/46	126/75	0.06	0.82	6.38
No. 3	115/55	95/45	82/50	115/60	0.16	0.26	4.11
No. 4	144/85	145/82	89/47	130/67	0.12	0.25	2.59