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TITLE :

PLASMA VOLUME EXPANSION IN PREGNANCY HYPERTENSION

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INTRODUCTION

Hypertension is a common complication of pregnancy and remains an important cause of perinatal morbidity and mortality. In patients with hypertension in pregnancy there appears to be relative hypovolaemia[1,2], generalized vasoconstriction[3], increased peripheral and systemic vascular resistance[4] and a low cardiac output.[5]

It has been suggested that, at least in some cases, these haemodynamic changes may be due to "under-filling" of the circulation due to a low total circulating albumin[6] with a low central venous pressure[1,7] and reduced venous return[8]. This "under-filling" may also be associated in some cases with an increased capillary permeability resulting in

leakage of albumin and other plasma proteins from the intravascular to the extravascular space[9]. With the hypovolaemia and decreased cardiac output there may be a decrease in blood flow to both the kidneys and the uterus, both of which may have serious pathological consequences[10].

REVIEW OF PAST LITERATURE AND BACKGROUND TO STUDY

There seems little doubt that in pre-eclampsia the blood volume is relatively decreased. This decrease is approximately 15% (500-600ml) when compared to normal pregnant values at comparable gestational age. Table I presents the plasma volumes in normal and pre-eclamptic pregnancies and is a summary of the literature[11].

The question that is often asked is whether the blood volume decrease is the result of the hypertension or is a significant factor per se in the etiology of the disease. In America it is generally believed that the hypovolaemia is a secondary effect[12,13], whereas in some European centres the pre-eclamptic patient is considered to have primary, relative hypovolaemia and may be treated with blood volume expanders[14,15].

It is possible that pre-eclampsia begins with the failure of the patient to appropriately increase her blood volume[2,16] and this relatively reduced blood volume is considered to resemble chronic shock[1,14]. See Fig 1.

It is postulated that the hypovolaemia and "circulatory shock" may cause poor tissue and organ perfusion[15] and that

this is exacerbated by the increased blood viscosity which occurs in pre-eclampsia.[17,18] Various workers have used plasma volume expanders to increase the plasma volume in such patients and claim that renal and possible placental perfusion may be improved by such treatment.[15,19,20] some believe that plasma volume expansion can reverse the disease process long enough to prolong pregnancy sufficiently to allow fetal lung maturity to occur before delivery is necessary.

The use of plasma volume expanders dates back to Czerny (1894).[21] He elicited haemodilution with the use of gum arabic (acacia), gelatin, egg albumin, peptone and blood serum. Dieckmann (1931) used 500-1000ml of 6% acacia to expand the plasma volumes of 3 pre-eclamptic -eclamptic patients.[22] He observed diuresis, haemodilution and clinical improvement.

Hill (1940) appears to have been the first to use human plasma proteins for the purpose of expanding the plasma volume.[21] over the next 25 years human plasma was used by many investigators, most of whom reported a decrease in haemotocrit and an increase in urinary output following therapy.[19,21,23,24]

Vara (1950) may have been the first to use a plasma substitute for expansion of the plasma volume.[25] He used dextran and also reported haemodilution and diuresis. Subsequently several investigators have used different plasma substitutes.[1,15,26]

Gallery, Delprado and Györy (1981) [27] studied the effect of plasma volume expansion with 500ml stable plasma protein substitute (SPPS) in 6 normal non-pregnant women, six normotensive and 11 hypertensive volunteers in the third trimester of pregnancy. They found that the plasma volume contraction of pre-eclampsia was associated with an increase in the interstitial compartment of extracellular fluid volume and that the infusion of the plasma volume expander produced significant amelioration of hypertension for 48 hours associated with partial reversal of the disturbance of fluid distribution.

Gallery, Mitchell and Redman (1984)[28] used two different solutions of a purified plasma protein fraction to expand the plasma volumes of 20 women with chronic hypertension. They reported a significant fall in blood pressure, a rise in plasma volume and a suppression of circulating prostaglandin metabolites in response to this therapy. In another study of 35 patients, the same authors attempted to find out why the blood pressure falls in response to volume expansion.[29] Their conclusion was that this may

be a response to the release of an endogenous vasodilator. Alternatively they suggested that the infusion may act by causing suppression of an endogenous vasoconstrictor mechanism such as the renin-angiotensin-aldosterone axis.

Groenendijk, Trimbos and Wallenburg (1984) monitored 10 pre-eclamptic patients with Swan-Ganz thermodilution catheters before and after plasma volume expansion with between 1500ml and 3500ml Haemacel.[5] Their findings suggested a low cardiac output state caused by hypovolaemia in pre-ecplamptic patients. After volume expansion they observed an increase in cardiac index, a partial reduction in systemic vascular resistance and an insignificant drop in blood pressure. Vasodilation with dihydralazine resulted in a further decrease in systemic vascular resistance, a fall in blood pressure and a further increase in cardiac index. They concluded that in pre-eclampsia the capacity to vasodilate is inadequate , possibly due to an elevated vasopressor sensitivity.

Studies on cardiac output in pre-eclampsia have reached widely varying conclusions. In the study described above by Groenendijk, Trimbos and Wallenburg the cardiac output was found to be decreased. Benedetti, Cotton, Read and Miller (1980) in a study of 10 patients using flow directed

pulmonary artery catheters showed an increase in cardiac output in pre-eclampsia.[30] Berkowitz has used Swan-Ganz catheters in the study of severe pre-eclampsia and in a discussion of the hemodynamics of these patients he found the left ventricular function to be in the normal or hyperdynamic range.[4] His data suggested increased cardiac effort to overcome significant systemic vascular resistance.

AIMS OF PRESENT STUDY

The objective of this study was to determine the effect of plasma volume expansion with 500ml of stabilised human serum (SHS) on the blood pressure, central venous pressure, plasma volume, capillary permeability and renal function in women with hypertension in pregnancy. The effect on serum prostacyclin and thromboxane A_2 levels was also to be studied.

It should also provide an opportunity to determine whether any of the potentially adverse haemodynamic features of hypertensive pregnancy can be reversed by plasma volume expansion. The role of prostacyclin and thromboxane A_2 could also be assessed.

If beneficial changes are produced these may indicate a possible therapeutic role for plasma volume expansion.

DESIGN AND METHODS

A prospective study was undertaken on 21 patients to determine the effect of plasma volume expansion on:

1. blood pressure (BP)
2. pulse rate (PR)
3. central venous pressure (CVP)
4. haematocrit (HCT)
5. plasma volume (PV)
6. capillary permeability (CP)
7. 24hr urine volume (UV)
8. serum creatinine (SCR), urea (SU) and urate (SUR)
9. creatinine clearance (CC)
10. serum total protein (STP) and albumin (SAL)
11. serum prostacyclin (PGI_2) and thromboxane A_2 (TxA_2).

All the patients in this study conformed to the following selection creiteria :

1. Gestational age greater than 20 weeks.
2. Diastolic BP of 90 to 119 mmHg.
3. Receiving no medication.
4. No other complications or medical disorders.
5. Free and informed consent obtained.

Every third patient was treated as a control in which the

same observations were made under identical conditions but plasma volume expansion was not performed and CVP was not measured.

Patients were studied under standardised resting conditions over a 3 day period and the timetable of investigation is shown in Table II.

The BP recordings on Day 1 and Day 3 were performed 6 hourly by standard sphygmomanometry. On day 2 the BP was recorded with a Bresco computerised blood pressure manometer. Technically this made recording the BP easier and also excluded any possible observer bias. The BP results obtained by these two methods were analysed seperately.

The plasma volumes were measured using standardised Evan's blue dilution technique with the patients resting on their left side.[31,32] Blood samples were collected at 0, 10, 20, 30 and 60 minutes. The plasma volumes referred to in this study are based on the 10 minute specimen. The remaining specimens were used to determine the capillary permeability based on the disappearance rate of the Evan's blue dye from the circulation.[9]

The CVP was measured with a venous pressure manometer.

The HCT in venous blood was measured in duplicate by Hawksley micro-centrifuge.

The serum creatinine and creatinine clearance was determined by specific creatinine assay.

The serum urate, urea, total protein and albumin was measured by standard auto analyser technique (SMAC 12).

The plsama volume measurements were made immediately before plasma volume expansion, 2 hours after the start of plasma volume expansion and again after 24 hours. All other measurements were made immediately before plasma volume expansion and again after 24 hours.

The serum prostacyclin and thromboxane A_2 levels were measured immediately before and 2 hrs after plasma volume expansion. Patients were accepted for this part of the study if the following criteria were fulfilled :

1. No vaginal examination had been performed within the previous 24 hours
2. No evidence of uterine activity
3. No history of ingestion of anti-prostaglandins within previous 2 weeks.

A 16 guage cannula was sited in an antecubital fossa vein in all patients and remained in-situ for 1 hr before blood

samples were obtained without constriction. The levels of 6-keto-prostaglandin $F_{1\alpha}$($PGF_{1\alpha}$) and thromboxane B_2 (TxB_2) were measured (these being the stable metabolites of prostacyclin and thromboxane A_2 respectively). The cannulas were again left undisturbed for 1 hr before the 2nd samples were obtained. The blood samples, having been taken without constriction, were placed into cooled polystyrene tubes containing EDTA, theophylline and aspirin solution and placed on ice. The samples were spun down within 1 hr at 4°C and the serum frozen. The prostanoids were extracted within 72 hrs and stored at -20°C for later batch radioimmunoassay using an ^3H Radioimmunoassay kit (Seragen).

The plasma volume was expanded with 500ml of Stabilized Human Serum (SHS) (Western Province Blood Transfusion Service), the infusion running over 90 minutes. The composition of SHS is shown in Table III.

The statistical difference of the observations before and after plasma volume expansion were analysed by paired t tests.

$$t = \bar{d} \div \sqrt{\frac{SD^2}{n}}$$

The difference between the plasma volume expansion groups (PVE GRP) and the control groups (CONTROL) were analysed

by unpaired t test.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{SD^2}{n_1} + \frac{SD^2}{n_2}}}$$

The capillary permeability was determined from the disappearance rate of intravenously injected Evan's Blue dye from the circulation (EBDR). The disappearance of dye from the blood with time has been found to fit best to a linear regression model after logarithmic transfer of the dye concentration.[9] Paired t tests were used to analyse the differences of the slopes before and after plasma volume expansion.

The changes in prostacyclin and thromboxane levels were best analysed using the sign test. Prostaglandin data obtained in our department has been found to have a skewed distribution (Angela Railton - unpublished data). The changes in the prostacyclin to thromboxane A_2 ratios were analysed by paired t test.

Significance $p < 0.05$.

RESULTS

CHANGES UP TO 6 HOURS AFTER PLASMA VOLUME EXPANSION

1. Blood pressure, pulse pressure and pulse rate.

The systolic and diastolic blood pressures, pulse pressures and pulse rates before and 2 hours after plasma volume expansion are shown in Table IV. The values at 4 hours and 6 hours after plasma volume expansion are shown in Tables V and VI respectively. A summary of the results is illustrated in figure 2.

There was a significant fall in diastolic blood pressure at 2 hours and 4 hours after plasma volume expansion. The systolic blood pressure was unchanged at 2 hours and 6 hours with a significant decrease at 4 hours after plasma volume expansion. This resulted in a significant rise in pulse pressure at 2 hours after plasma volume expansion. In the control group the blood pressure and pulse pressure remained unchanged throughout.

The pulse rate was significantly increased 2 hours, 4 hours and 6 hours after plasma volume expansion.

2. Central venous pressure (CVP)

The mean central venous pressure before and after plasma volume expansion is shown in Table VII. There was a significant rise in CVP at 2 hours, 4 hours and 6 hours after plasma volume expansion. ($p < 0.001$) The individual results are illustrated in figure 3.

3. Plasma volume

The plasma volume measurements before and 2 hours and 24 hours after plasma volume expansion are shown in Table VIII and illustrated in figure 4. There was a significant mean increase of 1,85 litres in the plasma volume 2 hours after plasma volume expansion. As only 500ml of SHS was infused this increase in plasma volume was unexpected and will be discussed later. There was no significant change in the control group.

4. Capillary permeability

The disappearance rate of the intravenously injected Evan's Blue dye from the circulation (EBDR) before and 2 hours after plasma volume expansion is shown in Table IX. There was no significant change.

CHANGES 24 HOURS AFTER PLASMA VOLUME EXPANSION

1. Blood pressure, pulse pressure and pulse rate

The blood pressures, pulse pressures and pulse rates before and 24 hours after plasma volume expansion are shown in Table X.

There were no significant changes before and 24 hours after plasma volume expansion. The control group also showed no change.

2. Central venous pressure

The change in CVP 24 hours after plasma volume expansion is shown in Table VII. The increase after 24 hours is significant. ($p < 0.001$)

3. Plasma volume

The plasma volume measurements 24 hour after plasma volume expansion are shown in Table VIII. There is no significant change after 24 hours.

4. Haematocrit

The values for haematocrit before and 24 hours after plasma volume expansion are shown in Table XI. No change was noted. The haematocrit was not measured in the 6 hours following plasma volume expansion.

5. Renal Function

The 24 hour urine volume, creatinine clearance, serum creatinine, serum urea and serum urate before and 24 hours after plasma volume expansion did not differ in the two groups. See Table XII.

6. Capillary permeability, total protein and albumin

The changes in the disappearance rate of the intravenously injected Evan's blue dye from the circulation (EBDR) before and 24 hours after plasma volume expansion are shown in Table IX. The increase in serum albumin reaches significance. (Table XIII)

CHANGES IN PROSTAGLANDIN LEVELS BEFORE AND 2 HOURS AFTER PLASMA VOLUME EXPANSION

The changes in prostacyclin and thromboxane A_2 was determined by measuring the levels of 6 keto $PGF_{1\alpha}$ (the stable metabolite of prostacyclin) and of thromboxane B_2 (the stable metabolite of thromboxane A_2) before and 2 hours after plasma volume expansion.

These changes were analysed statistically using the sign test and are shown in Table XIV. The number of patients with an increased level of 6 keto $PGF_{1\alpha}$ and a decreased level of thromboxane B_2 after plasma volume expansion was significant. The mean 6 ketp $PGF_{1\alpha}$ to thromboxane B_2 ratios before and 2 hrs after plasma volume expansion are shown in Table XV.

DISCUSSION

Pregnant women with either chronic hypertension or gestational hypertension have contracted plasma volumes.[31] A low plasma volume is related to a low birth weight and a poor pregnancy outcome.[10,33,34]

The relationship of blood volume , total vascular capacity and central venous pressure in normotensive and hypertensive pregnancies has been poorly studied. Colditz and Josey (1970)[35] reported that the mean CVP in non-pregnant patients was 9 cmH_2O and progressively fell during pregnancy to 3.8 cmH_2O in the third trimester. (See Table XVI) Cloeren, Lippert and Hinselman (1973)[1] found a mean CVP of -4.2 cmH_2O in 15 hypertensive patients. This was increased after plasma volume expansion to a mean of 2.4 cmH_2O .(See Table XVI) in the present study the mean value before expansion was 2.3 cmH_2O and this increased after volume expansion to approximately 6.7 cmH_2O which was then maintained for 24 hours. The data is meagre but these findings nevertheless suggest that at least some hypertensive patients may have a reduced CVP and that there may be true "under-filling" of the circulation and that this may be reversed by plasma volume expansion with 500ml SHS.

After plasma volume expansion there was a significant decrease in the diastolic blood pressure at 2 hours and 4 hours, a significant increase in pulse pressure at 2 hours and a significant increase in pulse rate at 2 hours, 4 hours and 6 hours. This suggests that there is an increase in cardiac output in response to plasma volume expansion with 500ml SHS, but that this effect is relatively short lived.

The fall in diastolic blood pressure in response to plasma volume expansion is surprising and suggests that not only is there a passive increase in the vascular capacity but also an active arterial or arteriolar vasodilatation. The changes in the prostaglandin levels after plasma volume expansion in this study suggest that the prostaglandins may be a mediating factor. There was a significant increase in prostacyclin and a decrease in thromboxane after plasma volume expansion. The relationship of prostacyclin to thromboxane by comparison of the ratio of 6 keto $PGF_{1\alpha}$ to thromboxane B_2 before and after plasma volume expansion also suggests a tendency to prostacyclin dominance after expansion.

Prostacyclin is a vasodilator and an increase could account for the decrease in diastolic blood pressure. The effect is probably similar to the hypotensive effect reported by

Lidler et al (1980)[36] after prostacyclin infusion in pregnant hypertensive patients. The only previous study of the prostacyclin response to plasma volume expansion in hypertensive pregnancies suggested that prostacyclin release was suppressed by the vasodilatation caused by the volume expansion. (Gallery, Mitchell, Redman 1984).[29]

Botha, Leary, Asmal (1980)[37] and Pace-Asciak et al (1978)[38] have shown that not only does distension and stretch cause a release of prostacyclin from the rat's aorta but this effect is increased in hypertensive rats. The effect of plasma volume expansion in lowering the blood pressure may thus be due to the local release of prostacyclin in the walls of the resistant arterioles as a result of distension of the blood vessel.

An alternative explanation for the fall in blood pressure would be the presence of a direct vasodilating agent in the SHS. In natural plasma protein substitutes a direct vasodilating agent has been found which is a protein of molecular weight approximately 100,000 and stable in plasma.[39] The effect however is short-lived and has disappeared two to three minutes after stopping the infusion. Perhaps an initial brief period of vasodilatation accompanied by volume expansion allows resetting of blood pressure and volume homeostatic

mechanisms with subsequent prolongation of the beneficial clinical effect. However, a local release of prostacyclin is probably a more plausable explanation for the fall in diastolic blood pressure.

The increase in pulse pressure, pulse rate and plasma volume immediately after the infusion of SHS suggests that there is an increased venous return and an increased cardiac output. This may have the potential beneficial effect of increasing renal and possibly uterine blood flow, though this effect is not sustained.

The changes in creatinine clearance, serum creatinine and serum urea 24 hours after plasma volume expansion did not reach statistical significance. It is possible that, as with the cardiovascular system, the beneficial changes in the renal system were lost at 24 hours after plasma volume expansion and that if the renal function tests had been repeated within 6 hours after expansion a significant change may have been observed. It is also possible that any increase in renal blood flow in response to plasma volume expansion may have led to an increase flow though the renal cortex and not through the glomeruli so that little change in the glomerular filtration rate was noted.

The mean increase in plasma volume of 1.85 litres 2 hours after plasma volume expansion suggests that though SHS is reputedly iso-osmotic, it does increase the colloid osmotic pressure and does cause a transfer of fluid from the extravascular to the intravascular space. No significant change was noted in the capillary permeability as measured by the disappearance rate of the intravenously injected Evan's blue (EBDR) after palsma volume expansion. Considering the increase in plasma volume, this finding may be difficult to explain. The Evan's blue dye dilution technique for measuring plasma volume has been extensively used and widely accepted in the past. When injected intravenously the Evan's blue immediately binds to albumin and mixing is considered to be complete by 10 minutes, with very little of the dye having left the circulation. The following possibilities cast doubt on the method of measuring capillary permeability in this study and could explain the findings :

1. There may be an abnormality in the mixing of Evan's blue in gestational hypertensives. In hypertensives there is a tendency towards a shift in blood volume from the peripheral circulation to the central circulation.[40] It is likely that mixing is fast in the central blood volume and markedly slowed down in the constricted peripheral vascular bed. The effect of plasma volume expansion may again affect the peripheral circulation and influence the mixing of the dye. The change in the cardiac output is unlikely to affect the mixing of the dye.[41]

2. The rate of protein exchange between the intravascular and extravascular compartments is also a confounding factor. It is likely that the Evan's blue attached to this carrier albumin is moving from the circulation into the extracellular space and then slowly being released back.[42] There was a significant increase in serum albumin after plasma volume expansion and it is likely that rate of protein exchange was also altered.
3. Water may have shifted between the interstitial space and the intravascular space whilst the measurements were being performed. The patients in this study remained in a supine position before and during the observation periods, making this explanation unlikely. In retrospect, the use of the Evan's blue disappearance rate as a measure of capillary permeability may not be acceptable.

The effect of plasma volume expansion with 500ml SHS may thus be a beneficial one in terms of lowering of blood pressure, increasing blood volume and increasing cardiac output with a possible increase in renal and uterine blood flow. Though this effect is relatively short-lived, plasma volume expansion may provide a useful physiological approach to the reversal of the deletrious effects of severe hypertension in the acute situation particularly when associated with hypovolaemia.

FURTHER RESEARCH

SHS may not be the optimal solution for plasma volume expansion. A better preparation may be a hyperosmotic 20-24% albumin solution which may increase the plasma volume as well as the oncotic pressure and result in a more prolonged effect. It could be that the infusion should continue until a certain CVP is reached or that the infusion is repeated on one or more occasions in order to achieve a more prolonged beneficial effect. This form of therapy represents a potentially useful adjunct to traditional anti-hypertensive regimens, particularly in the acute management of severe pregnancy hypertension. The measurement of plasma proteins, the plasma oncotic pressure, the CVP and pulmonary capillary wedge pressure may be important adjuvants in the management of these patients.

Figure 1

DEVELOPMENT OF SYMPTOMS OF SEVERE PRE-ECLAMPSIA[14]

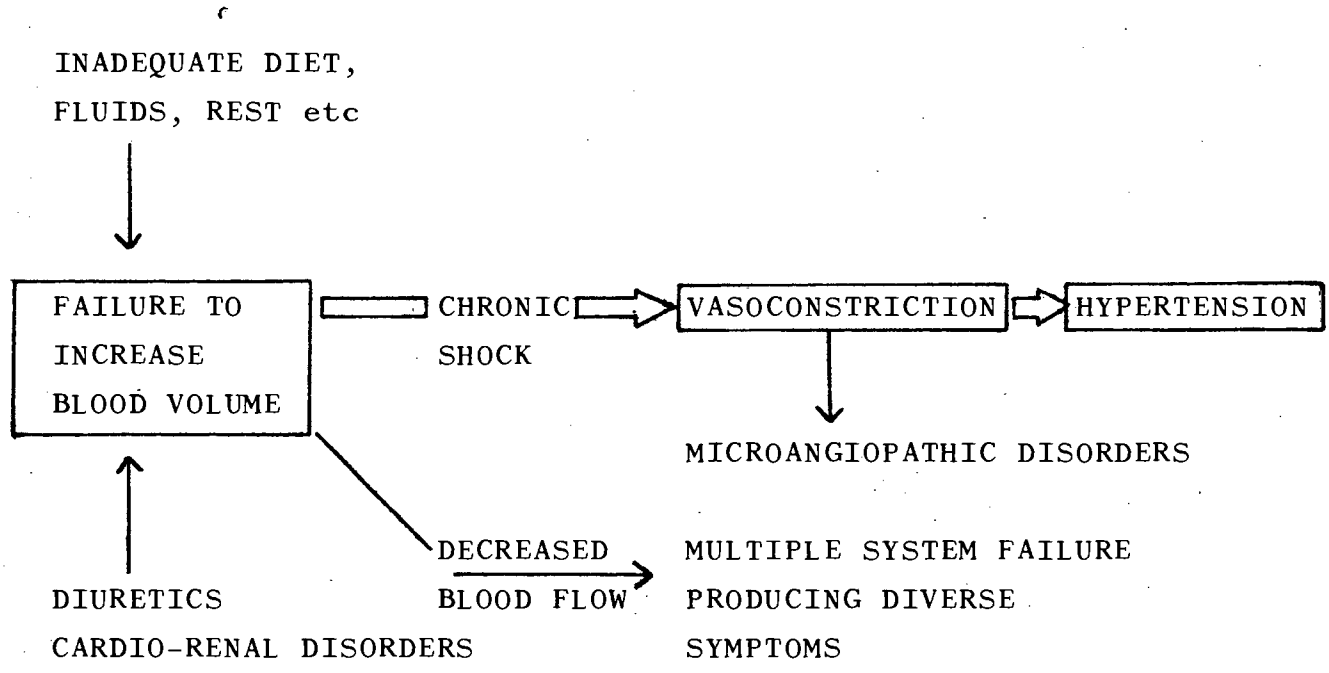

Figure 2

SUMMARY OF RESULTS OF SYSTOLIC BLOOD PRESSURE (SBP), DIASTOLIC BLOOD PRESSURE (DBP), PULSE PRESSURE (PP) AND PULSE RATE (PR).

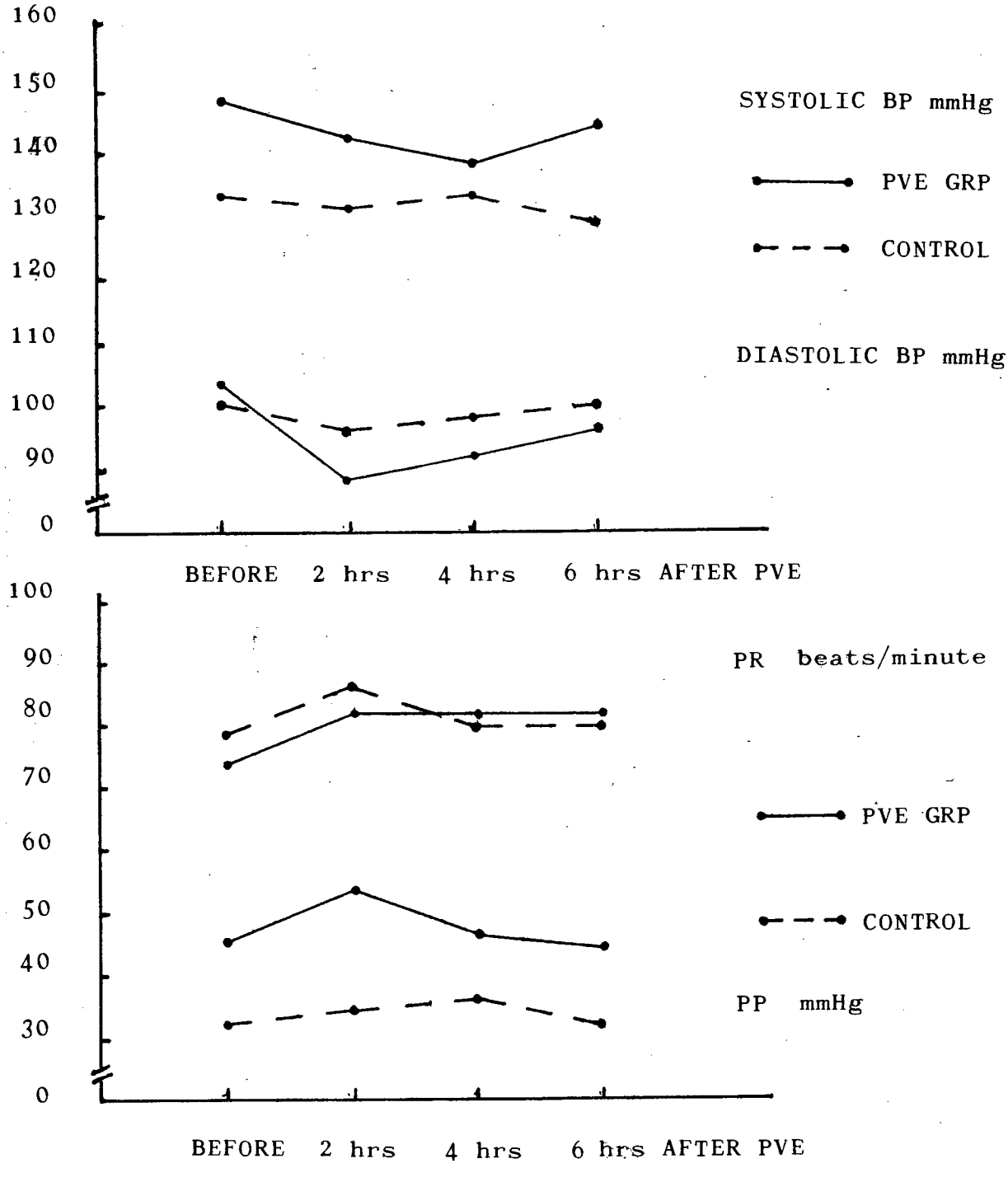

Figure 3

INDIVIDUAL CVP RESULTS BEFORE AND AFTER PLASMA VOLUME EXPANSION (PVE).

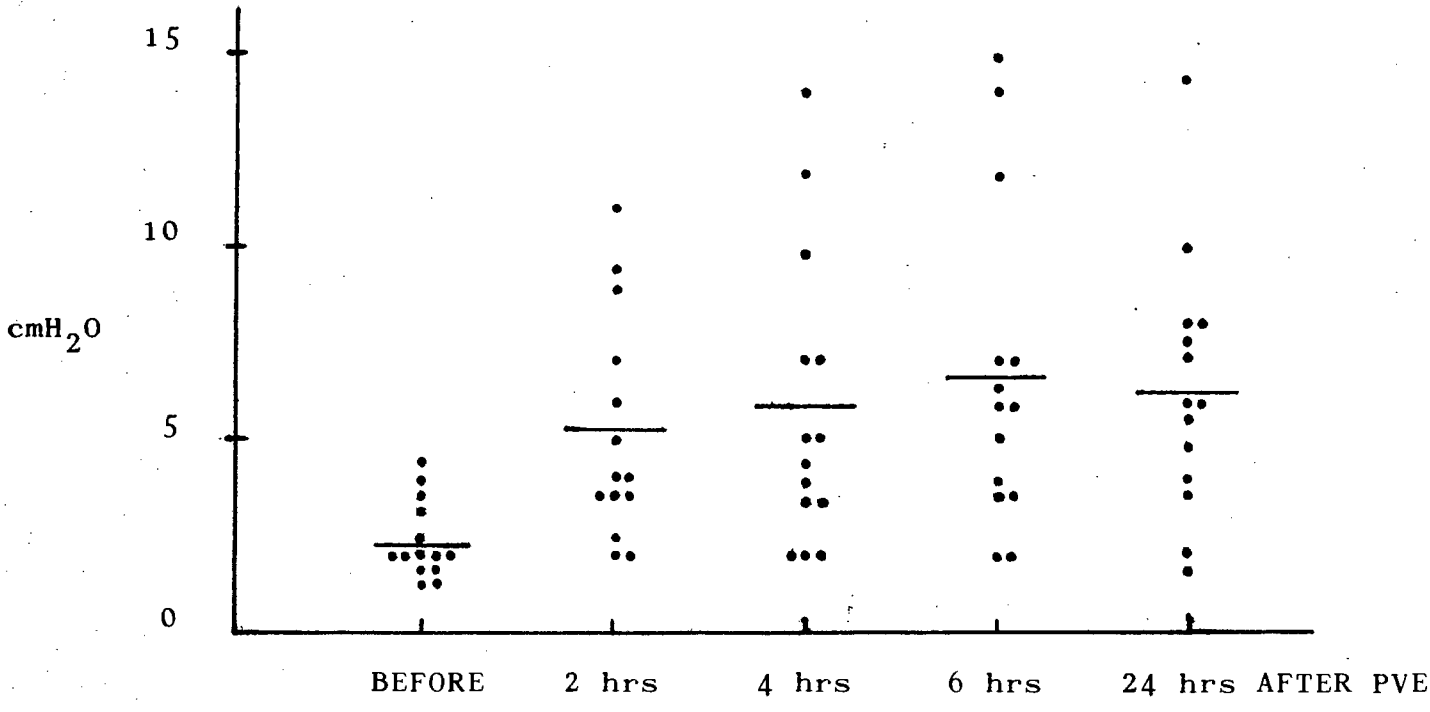

Figure 4

HISTOGRAM SUMMARY OF PLASMA VOLUME (PV) RESULTS IN THE PLASMA VOLUME EXPANSION GROUP (PVE GRP) AND THE CONTROL GROUP.

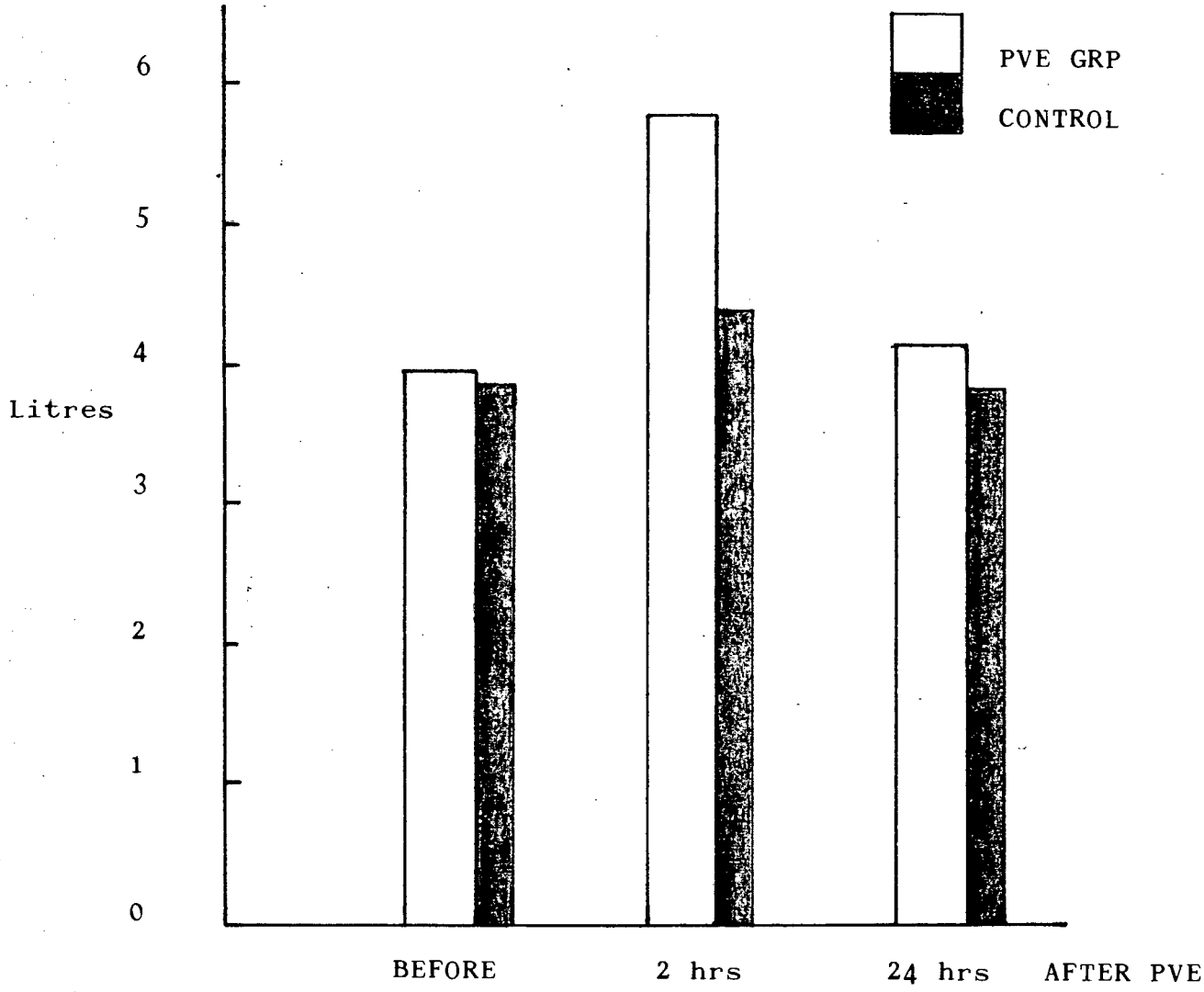

TABLE I

PLASMA VOLUMES IN NORMAL AND PRE-ECLAMPTIC PREGNANCIES

Author	Normal Pregnancy		Pre-Eclamptic Pregnancy		
	Cases	Mean (ml)	Cases	Mean (ml)	Decrease (%)
Werkö and co-workers	4	3865	9	3145	18
Freis and Kenny	7	4287	5	3045	29
Roettger	20	3383	18	2890	15
Cope	29	3470	14	2820	19
Friedberg and Lutz	10	3104	17	3257	+5
Kolpakova	20	3309	15	2918	12
Hønger	20	3800	19	3300	13
Haering and co-workers	18	3721	21	3148	15
Broder and Spetz	46	4245	34	4010	5
MacGillivray	18	4040	35	3535	12
Blekta and co-workers	55	3133	14	2590	17
Totals and Means	247	3668	201	3150	14

TABLE II

TIMETABLE OF INVESTIGATION

DAY 1

BP and PR 6 hrly for 24 hr

24 hr urine collection

Overnight fast (before plasma volume measurement)

DAY 2

Before Plasma Volume Expansion

CVP

Haematocrit, serum creatinine, urea urate

Plasma volume 0, 10, 20, 30, 60 min

2nd 24 hr urine collection commenced

Serum prostacyclin and thromboxane A_2

Plasma volume expansion over 90 min

BP, PR, CVP recorded every 15 min during expansion

2 hr after plasma volume expansion

Repeat plasma volume measurements

BP, PR, CVP 2 hrly for 6 hr

Repeat prostacyclin and thromboxane A_2

DAY 3

24 hr after start plasma volume expansion

BP,PR 6 hrly for 24 hr

CVP

Plasma volume 0, 10, 20, 30, 60 min

Haematocrit, serum creatinine, urea and urate.

3rd 24 hr urine collection commenced.

TABLE III

COMPOSTIION OF STABILISED HUMAN SERUM (SHS)

Total protein	50g$^{+}_{-}$5g/L
Albumin	31g$^{+}_{-}$2g/L
Immunoglobulin G	7,75g$^{+}_{-}$1,25g/L
Immunoglobulin A	1,65g$^{+}_{-}$0,35g/L
Immunoglobulin M	1,25g$^{+}_{-}$0,75g/L
Sodium	120-140 mmol/L
Potassium	3-4 mmol/L
Calcium	1-1,5 mmol/L
Chloride	120-140 mmol/L
Osmolarity	260$^{+}_{-}$20 mOsm/kg
pH	7,5$^{+}_{-}$0,5
Erithrocyte Antibodies:	Anti-A and Anti-B titres are both 1 in 4 or less at 20°C

Serum proteins also present :
Alpha-1-antitrypsin, haptoglobin, alpha-2-macroglobulin, caeruloplasmin, transferrin and haemopexin. Stabilised Human Serum contains no detectable lipoproteins or fibrinogen. No preservative is present in Stabilised Human Serum.

Each unit negative for HBsAg.

TABLE IV

THE SYSTOLIC (SBP) AND DIASTOLIC (DBP) BLOOD PRESSURES (mmHg), PULSE PRESSURES (PP) AND PULSE RATE PER MINUTE (PR) BEFORE AND 2 HOURS AFTER PLASMA VOLUME EXPANSION (PVE)

	BEFORE (Mean ± SD)	2HR AFTER (Mean ± SD)	DIFFERENCE $\bar{d}$ (Mean ± SD)	
PVE GRP SBP	148 ± 16	142 ± 19	3.9 ± 9.7	$0.1 < p < 0.5$
CONTROL SBP	133 ± 20	131 ± 16	1.7 ± 11.8	$p > 0.5$
	$0.05 < p < 0.1$			
PVE GRP DBP	103 ± 9	89 ± 9	13.7 ± 6.8	$p < 0.001$
CONTROL DBP	100 ± 14	96 ± 14	4.1 ± 6.9	$0.1 < p < 0.5$
	$p > 0.5$			
PVE GRP PP	45 ± 17	53 ± 19	7.6 ± 12.5	$0.02 < p < 0.05$
CONTROL PP	32 ± 10	34 ± 10	2.4 ± 10.6	$p > 0.5$
	$p = 0.05$			
PVE GRP PR	73 ± 10	81 ± 14	7.8 ± 7.9	$0.001 < p < 0.01$
CONTROL PR	78 ± 8	86 ± 4	8.5 ± 7.5	$0.02 < p < 0.05$
	$0.01 < p < 0.5$			

TABLE V

THE SYSTOLIC (SBP) AND DIASTOLIC (DBP) BLOOD PRESSURES (mmHg), PULSE PRESSURES (PP) AND PULSE RATE PER MINUTE (PR) BEFORE AND 4 HOURS AFTER PLASMA VOLUME EXPANSION (PVE)

	BEFORE (Mean ± SD)	4HR AFTER (Mean ± SD)	DIFFERENCE $\bar{d}$ (Mean ± SD)	
PVE GRP SBP	148 ± 16	138 ± 22	9.9 ± 11.5	$0.001 < p < 0.01$
CONTROL SBP	133 ± 20	133 ± 24	0.7 ± 12.3	$p > 0.5$
	$0.05 < p < 0.1$			
PVE GRP DBP	103 ± 9	92 ± 11	10.3 ± 9.7	$0.001 < p < 0.01$
CONTROL DBP	100 ± 14	98 ± 16	2.5 ± 5.2	$0.1 < p < 0.5$
	$p > 0.5$			
PVE GRP PP	45 ± 17	46 ± 17	0 ± 12.0	$p > 0.5$
CONTROL PP	32 ± 10	36 ± 9	3.8 ± 11.0	$0.1 < p < 0.5$
	$p = 0.05$			
PVE GRP PR	73 ± 10	81 ± 10	7.4 ± 7.8	$0.001 < p < 0.01$
CONTROL PR	78 ± 8	80 ± 8	3.2 ± 5.9	$0.1 < p < 0.5$
	$0.01 < p < 0.5$			

TABLE VI

THE SYSTOLIC (SBP) AND DIASTOLIC (DBP) BLOOD PRESSURES (mmHg), PULSE PRESSURES (PP) AND PULSE RATE PER MINUTE (PR) BEFORE AND 6 HOURS AFTER PLASMA VOLUME EXPANSION (PVE)

	BEFORE (Mean ± SD)	6 HR AFTER (Mean ± SD)	DIFFERENCE $\bar{d}$ (Mean ± SD)	
PVE GRP SBP	148 ± 16	144 ± 20	3.9 ± 11.4	$0.1 < p < 0.5$
CONTROL SBP	133 ± 20	129 ± 15	3.8 ± 9.6	$0.1 < p < 0.5$
	$0.05 < p < 0.1$			
PVE GRP DBP	103 ± 9	100 ± 10	2.8 ± 9.1	$0.1 < p < 0.5$
CONTROL DBP	100 ± 14	96 ± 14	3.7 ± 2.3	$0.001 < p < 0.01$
	$p > 0.5$			
PVE GRP PP	45 ± 17	44 ± 16	2.0 ± 13.9	$p > 0.5$
CONTROL PP	32 ± 10	32 ± 9	0.4 ± 11.1	$p > 0.5$
	$p = 0.05$			
PVE GRP PR	73 ± 10	81 ± 9	7.3 ± 8.9	$0.001 < p < 0.01$
CONTROL PR	78 ± 8	80 ± 10	2.8 ± 10.9	$p > 0.5$
	$0.01 < p < 0.5$			

TABLE VII

CENTRAL VENOUS PRESSURE (cmH_2O) BEFORE AND 2 HOURS, 4 HOURS, 6 HOURS AND 24 HOURS AFTER PLASMA VOLUME EXPANSION (PVE).

	BEFORE	2HR AFTER	4HR AFTER	6HR AFTER	24HR AFTER
MEAN	2.3	5.2	5.8	6.7	6.3
RANGE	1 to 4.5	2 to 11	2 to 14	2 to 15	1.5 to 14

TABLE VIII

THE PLASMA VOLUME (litres) BEFORE AND 2 HOURS AND 24 HOURS AFTER PLASMA VOLUME EXPANSION (PVE).

	BEFORE (Mean ± SD)	2 HR AFTER (Mean ± SD)	
PVE GRP	3.94 ± 0.59	5.79 ± 1.40	$p < 0.001$
CONTROL	3.83 ± 0.70	4.37 ± 0.90	$0.1 < p < 0.5$
	$p > 0.5$		

	24 HR AFTER (Mean ± SD)	
PVE GRP	4.14 ± 0.73	$0.1 < p < 0.5$
CONTROL	3.82 ± 0.85	$p > 0.5$

TABLE IX

THE CAPILLARY PERMEABILITY (EBDR) BEFORE AND 2 HOURS AND 24 HOURS AFTER PLASMA VOLUME EXPANSION.

	BEFORE (Mean$\pm$SD)	2 HR AFTER (Mean$\pm$SD)	DIFFERENCE $\bar{d}$ (Mean$\pm$SD)	
PVE GRP EBDR	-0.00103 ± 0.002	-0.00123 ± 0.001	0.00019 ± 0.003	$p > 0.5$
CONTROL EBDR	0.00527 ± 0.015	-0.00131 ± 0.001	0.00657 ± 0.016	$0.1 < p < 0.5$
	$0.1 < p < 0.5$			

	24 HR AFTER		
PVE GRP EBDR	-0.00394 ± 0.007	0.00291 ± 0.007	$0.1 < p < 0.5$
CONTROL EBDR	-0.00180 ± 0.002	0.00707 ± 0.015	$0.1 < p < 0.5$

TABLE X

THE SYSTOLIC (SBP) AND DIASTOLIC (DBP) BLOOD PRESSURES (mmHg), PULSE PRESSURES (PP) AND PULSE RATE PER MINUTE (PR) BEFORE AND 24 HOURS AFTER PLASMA VOLUME EXPANSION (PVE).

	BEFORE (Mean ± SD)	24 HR AFTER (Mean ± SD)	DIFFERENCE $\bar{d}$ (Mean ± SD)	
PVE GRP SBP	147 ± 14	148 ± 13	2.1 ± 8.8	$0.1 < p < 0.5$
CONTROL SBP	142 ± 13	140 ± 22	2.2 ± 11-9	$p > 0.5$
	$0.1 < p < 0.5$			
PVE GRP DBP	99 ± 6	96 ± 9	2.3 ± 5.9	$0.1 < p < 0.5$
CONTROL DBP	97 ± 7	93 ± 13	4.0 ± 8.2	$0.1 < p < 0.5$
	$p > 0.5$			
PVE GRP PP	48 ± 10	52 ± 5.436	3.8 ± 7.7	$0.05 < p < 0.1$
CONTROL PP	46 ± 7	47 ± 12	1.7 ± 10.5	$p > 0.5$
	$p > 0.5$			
PVE GRP PR	83 ± 8	82 ± 9	1.1 ± 8.3	$0.1 < p < 0.5$
CONTROL PR	87 ± 6	85 ± 8	2.7 ± 11.8	$p > 0.5$
	$0.1 < p < 0.5$			

TABLE XI

THE HAEMATOCRIT (%) BEFORE AND 24 HOURS AFTER PLASMA VOLUME EXPANSION

	BEFORE	24 HR AFTER	
PVE GRP	34 ± 5	34 ± 5	$p > 0.5$
CONTROL	36 ± 4	36 ± 5	$p > 0.5$

$0.1 < p < 0.5$

TABLE XII

THE CREATININE CLEARANCE ml/min (CC), SERUM CREATININE μmol/l (SCR), SERUM UREA mmol/l (SU), SERUM URATE mmol/l (SUR) AND 24 HOUR URINE VOLUME ml/24 HR (UV) BEFORE AND 24 HR AFTER PLASMA VOLUME EXPANSION (PVE).

	BEFORE (Mean ± SD)	24 HR AFTER (Mean ± SD)	DIFFERENCE $\bar{d}$ (Mean ± SD)	
PVE GRP CC	93 ± 44	101 ± 45	8.0 ± 38.9	$0.1 < p < 0.5$
CONTROL CC	101 ± 35	96 ± 33	5.5 ± 32.1	$p > 0.5$
	$p > 0.5$			
PVE GRP SCR	64 ± 10	59 ± 9	4.3 ± 10.3	$0.1 < p < 0.5$
CONTROL SCR	59 ± 14	59 ± 12	0.0 ± 8.3	$p > 0.5$
	$0.1 < p < 0.5$			
PVE GRP SU	3.2 ± 1.0	2.7 ± 0.8	0.4 ± 0.85	$0.05 < p < 0.1$
CONTROL SU	3.1 ± 0.7	3.1 ± 0.9	.07 ± 0.57	$p > 0.5$
	$p > 0.5$			
PVE GRP SUR	0.28±0.06	0.28±0.07	0.003±0.03	$p > 0.5$
CONTROL SUR	0.35±0.10	0.35±0.12	0.006±0.02	$0.1 < p < 0.5$
	$0.1 < p < 0.5$			
PVE GRP UV	1334±816	1378±504	43.3±593.3	$p > 0.5$
CONTROL UV	1254±478	1514±701	261.1±453.5	$0.1 < p < 0.5$
	$p > 0.5$			

TABLE XIII

THE SERUM TOTAL PROTEIN g/l (STP) AND SERUM ALBUMIN g/l (SAL) BEFORE AND 24 HOURS AFTER PLASMA VOLUME EXPANSION (PVE).

	BEFORE (Mean ± SD)	24 HR AFTER (Mean ± SD)	DIFFERENCE $\bar{d}$ (Mean ± SD)	
PVE GRP STP	61 ± 6.3	63 ± 6.7	1.7 ± 3.6	$0.1 < p < 0.5$
CONTROL STP	63 ± 4.9	62 ± 4.8	0.6 ± 2.2	$p > 0.5$
	$0.1 < p < 0.5$			
PVE GRP SAL	32 ± 2.8	33 ± 3.5	1.1 ± 1.9	$0.02 < p < .05$
CONTROL SAL	34 ± 2.9	34 ± 2.8	0.3 ± 0.7	$0.1 < p < 0.5$
	$0.1 < p < 0.5$			

TABLE XIV

THE CHANGE IN 6 KetoPGF$_{1\alpha}$ AND THROMBOXANE B_2 BEFORE AND 2 HOURS AFTER PLASMA VOLUME EXPANSION (PVE).

PVE GRP	PATIENTS WITH INCREASED LEVEL	PATIENTS WITH DECREASED LEVEL	
6 Keto PGF_1 (n=11)	9	2	$0.02 < p < 0.05$
Thromboxane B_2 (n=13)	3	10	$0.02 < p < 0.05$

CONTROL	PATIENTS WITH INCREASED LEVEL	PATIENTS WITH DECREASED LEVEL	
6 Keto PGF_1 (n=7)	4	3	$0.05 < p < 0.1$
Thromboxane B_2 (n=7)	6	1	$0.05 < p < 0.1$

TABLE XV

THE MEAN 6 KETO $PGF_{1\alpha}$ TO THROMBOXANE B_2 RATIO BEFORE AND 2 HOURS AFTER PLASMA VOLUME EXPANSION (PVE).

	BEFORE	2 HR AFTER	
PVE GRP (n=11)	2.37	3.07	$0.1 < p < 0.5$
CONTROL (n=7)	3.53	2.46	$0.1 < p < 0.5$
	$p > 0.5$		

TABLE XVI

THE CENTRAL VENOUS PRESSURE (cmH_2O) IN NORMAL AND AND HYPERTENSIVE PREGNANCIES.

	COLDITZ AND JOSEY (1970)				CLOEREN et al (1973)	
	NON PREGNANT (n=7)	FIRST TRIMESTER (n=4)	SECOND TRIMESTER (n=6)	THIRD TRIMESTER (n=8)	BEFORE PVE (n=15)	AFTER PVE (n=15)
MEAN	9.0	7.5	4.0	3.8	-4.2	2.4
RANGE	7.8 to 11.2	6.5 to 8.7	3.6 to 4.6	2.0 to 4.4	-7 to 0	-3 to 5.5

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APPENDIX 1

EXAMPLE OF DATA SHEETS USED DURING THE TRIAL TO RECORD THE FINDINGS OF EACH PATIENT.

UNIVERSITY OF CAPE TOWN REPRODUCTIVE MEDICINE RESEARCH UNIT

PLASMA VOLUME EXPANSION PROJECT 1985

SURNAME

FIRST NAME

HOSPITAL NUMBER

TRIAL NUMBER

DATE OF TEST

TRIAL (1) CONTROL (0)

AGE

GRAVIDA

PARA

HEIGHT (CM)

WEIGHT (KG)

AVERAGE 24HR SBP

DBP

PULSE RATE

24HR URINE VOLUME (ML/24HR)

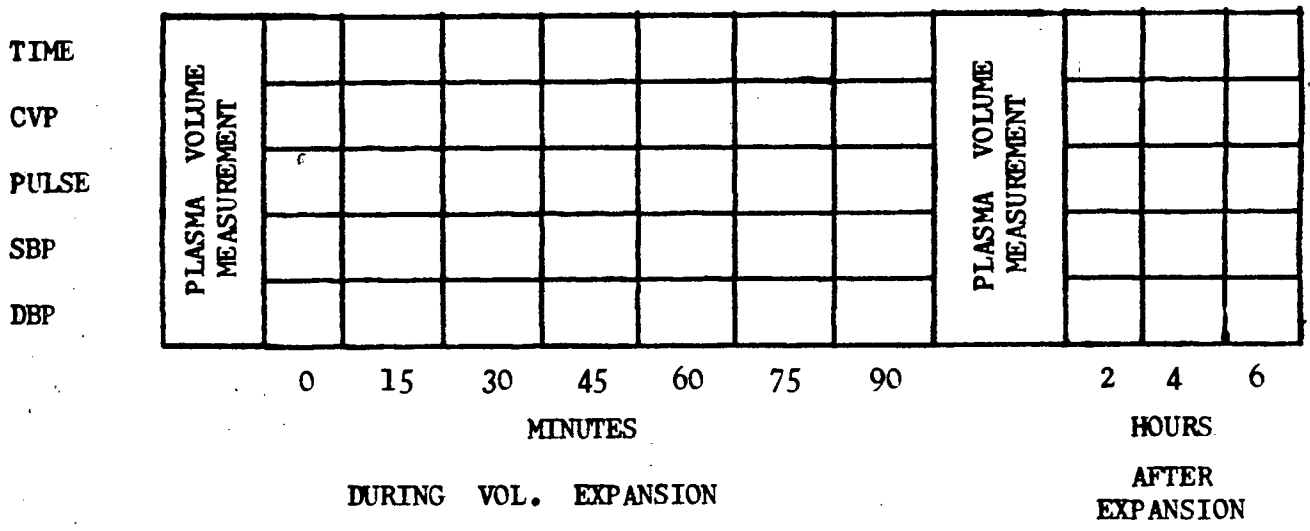
PROTEIN (MG/24HR)

CREATINE CLEARANCE (ML/MIN)

DURATION OF PREGNANCY (WKS)

PLASMA VOLUME EXPANSION PROJECT 1985

DAY 2 OBSERVATIONS



DAY 2

SERUM Na (mmol/l)

SERUM K (mmol/l)

SERUM TOTAL PROTEIN (g/l)

SERUM ALBUMIN (g/l)

SERUM CREATININE (umol/l)

SERUM UREA (mmol/l)

SERUM URATE (mmol/l)

HAEMATOCRIT

PLASMA VOLUME BEFORE EXPANSION 10 MIN

20 MIN

30 MIN

60 MIN

PLASMA VOLUME AFTER EXPANSION 10 MIN

20 MIN

30 MIN

60 MIN

CVP BEFORE EXPANSION

CVP AFTER EXPANSION

SBP BEFORE EXPANSION

DBP BEFORE EXPANSION

PULSE RATE BEFORE EXPANSION

SBP AFTER EXPANSION 0 HRS

2 HRS

4 HRS

6 HRS

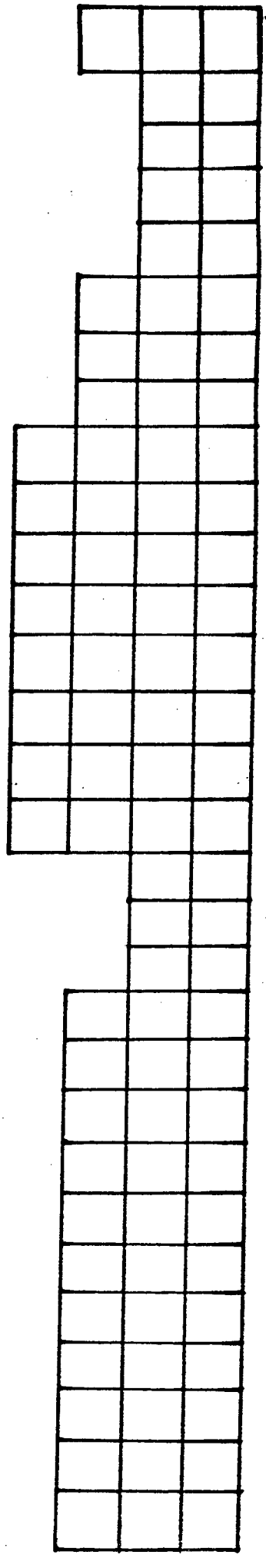
DBP AFTER EXPANSION 0 HRS

2 HRS

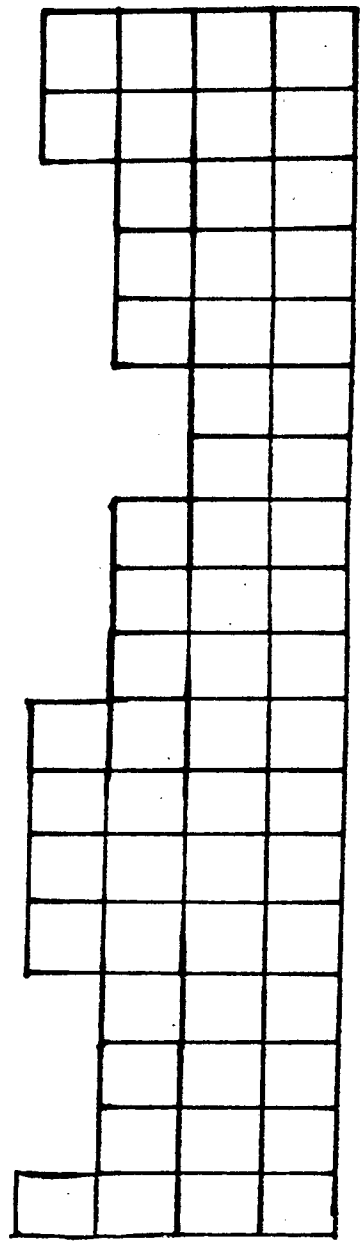
4 HRS

6 HRS

PULSE RATE AFTER EXPANSION



DAY 3



24HR URINE VOLUME (ml/24hrs)

PROTEIN (ug/24hrs)

CREATININE CLEARANCE (ml/min)

SERUM Na (mmol/l

SERUM K (mmol/l)

SERUM TOTAL PROTEIN (g/l)

SERUM ALBUMIN (g/l)

SERUM CREATININE (umol/l)

SERUM UREA (mmol/l)

SERUM URATE (mmol/l)

PLASMA VOLUME 10 min

20 min

30 min

60 min

AVERAGE 24HR SBP

DBP

PULSE RATE

CVP

APPENDIX 2

GLOSSARY OF ABBREVIATIONS

CC	Creatinine clearance (ml/min)
CVP	Central vanous pressure (cmH_2O)
DBP	Diastolic blood pressure (mmHg)
DYE CONC	Evan's blue dye concentration measured spectrophotometrically
EBDR	Evan's blue disappearance rate
GEST	Gestational
HCT	Haematocrit (%)
PGI_2	Serum prostacyclin
PP	Pulse pressure (mmHg)
PR	Pulse rate (beats per minute)
PRU	Proteinuria (mg)
PT	Patient
PV	Plasma volume (l)
PVE	Plasma volume expansion
SAL	Serum albumin (g/l)
SBP	Systolic blood pressure (mmHg)
SCR	Serum creatinine (μmol/l)
STP	Serum total protein (g/l)
SU	Serum urea (mmol/l)
SUR	Serum urate (mmol/l)
TxA_2	Serum thromboxane A_2
UV	Urine volume (ml)

APPENDIX 3

SUMMARY OF INDIVIDUAL RESULTS

(1) PLASMA VOLUME EXPANSION GROUP (PVE GRP)

PATIENT NO 1 - 14

(2) CONTROL GROUP

PATIENT NO 1 - 7

PVE GRP PATIENT No. 1

PT AGE (yrs)	39	GRAVIDA	6	HEIGHT(cm)	150
GEST AGE (wks)	30	PARA	5	WEIGHT(kg)	76

DAY 1

AV 24hr SBP	135	AV 24hr DBP	93	PR	85
24hr UV	1800	24hr PRU	0	CC	167

DAY 2 BEFORE PVE

SBP	134	DBP	95	CVP	4	PR	62
STP	66	SAL	35	SCR	64	SU	2·2
SUR	·19			PGI_2	—	TxA_2	—

DYE CONC	10	·151	20	·141	30	·159	60	·149	HCT 40
PV		3558		3810		3379		3606	

DURING PVE

SBP	134	127	134	128	133	118	143
DBP	95	95	87	93	97	103	96
CVP	4	3·5	2·5	4·5	4	5	7
PR	62	63	69	73	70	79	69

0 15 30 45 60 75 90 min

2,4,6hrs AFTER PVE

131	120	120
78	83	94
5	4·5	7
54	87	85

2 4 6 hrs

2hrs AFTER PVE

DYE CONC 10	·111	20	·116	30	·114	60	·112	PGI_2 —
PV	4840		4631		4712		4797	TxA_2 —

DAY 3 24hr AFTER PVE

Av 24hr SBP	130	Av 24hr DBP	90	CVP	7·5	PR	84
24hr UV	1500	24hr PRU	0	CC	123	SUR	·17
STP	68	SAL	35	SCR	61	SU	2·2

DYE CONC	10	·113	20	·094	30	·105	60	·111	HCT 37
PV		4399		5288		4734		4478	

PVE GRP PATIENT No. 2

PT AGE (yrs)	35	GRAVIDA	6	HEIGHT(cm)	153
GEST AGE (wks)	26	PARA	4	WEIGHT(kg)	80

DAY 1

AV 24hr SBP	174	AV 24hr DBP	106	PR	106
24hr UV	1000	24hr PRU	0	CC	178

DAY 2 BEFORE PVE

SBP	170	DBP	96	CVP	1·5	PR	95
STP	54	SAL	30	SCR	63	SU	2·8
SUR	·29			PGI_2	600	TxA_2	157

DYE CONC	10	·125	20	·122	30	·119	60	·118	HCT 33
PV		3875		3971		4071		4105	

DURING PVE

SBP	170	175	179	155	161	152	159
DBP	96	114	112	94	102	97	108
CVP	1·5	8	4·5	8·5	5·5	7	7
PR	95	104	88	88	86	99	95

0 15 30 45 60 75 90 min

2,4,6hrs AFTER PVE

	172	160	170
	99	100	114
	11	14	14
	104	99	96

2 4 6 hrs

2hrs AFTER PVE

DYE CONC	10	·093	20	·098	30	·093	60	·084	PGI_2 843
PV		5209		4943		5209		5767	TxA_2 279

DAY 3 24hr AFTER PVE

Av 24hr SBP	170	Av 24hr DBP	110	CVP	8	PR	90
24hr UV	1250	24hr PRU	0	CC	119	SUR	·30
STP	59	SAL	33	SCR	63	SU	2·2

DYE CONC	10	·170	20	·163	30	·165	60	·158	HCT 34·5
Pv		3570		3724		3678		3841	

PVE GRP PATIENT No. 3

PT AGE (yrs)	21	GRAVIDA	1	HEIGHT(cm)	152
GEST AGE (wks)	32	PARA	0	WEIGHT(kg)	69

DAY 1

AV 24hr SBP	155	AV 24hr DBP	100	PR	80
24hr UV	750	24hr PRU	680	CC	76

DAY 2 BEFORE PVE

SBP	157	DBP	112	CVP	4·5	PR	56
STP	53	SAL	29	SCR	55	SU	2·1
SUR	·21			PGI_2	—	TxA_2	500

DYE CONC	10	·196	20	·183	30	·183	60	·175	HCT 24
PV		3435		3679		3679		3848	

DURING PVE

SBP	157	146	136	156	142	150	158
DBP	112	119	120	113	115	114	117
CVP	4·5	9·5	10	12	9·5	8·5	11
PR	56	73	68	66	80	69	70
	0	15	30	45	60	75	90 min

2,4,6hrs AFTER PVE

156	147	134
90	82	109
9·5	10	15
54	76	78
2	4	6 hrs

2hrs AFTER PVE

DYE CONC	10	·127	20	·126	30	·129	60	·118	PGI_2 —
PV		5302		5344		5220		5706	TxA_2 293

DAY 3 24hr AFTER PVE

Av 24hr SBP	160	Av 24hr DBP	108	CVP	14	PR	90		
24hr UV	1000	24hr PRU	1712	CC	85	SUR	·22		
STP	53	SAL	28	SCR	57	SU	1·9		

DYE CONC	10	·134	20	·130	30	·126	60	·140	HCT 24
PV		4175		4304		4440		3996	

PVE GRP PATIENT No. 4

PT AGE (yrs)	33	GRAVIDA	5	HEIGHT(cm)	162
GEST AGE (wks)	30	PARA	4	WEIGHT(kg)	87

DAY 1

AV 24hr SBP	166	AV 24hr DBP	110	PR	80
24hr UV	1500	24hr PRU	1306	CC	178

DAY 2 BEFORE PVE

SBP	173	DBP	114	CVP	2·5	PR	75
STP	61	SAL	34	SCR	57	SU	3·6
SUR	·26			PGI_2	600	TxA_2	264

DYE CONC	10	·178	20	·183	30	·179	60	·187	HCT 41·5
PV		3583		3485		3563		3410	

DURING PVE

SBP	173	165	174	163	174	161	180
DBP	114	107	117	114	109	110	107
CVP	2·5	4·5	5	6·5	9	10	10·5
PR	75	80	78	76	78	83	76
	0	15	30	45	60	75	90 min

2,4,6hrs AFTER PVE

	172	180	180
	98	107	106
	9	7	7
	95	90	89
	2	4	6 hrs

2hrs AFTER PVE

DYE CONC	10	·159	20	·155	30	·154	60	·161	PGI_2 715
PV		4011		4114		4141		3961	TxA_2 221

DAY 3 24hr AFTER PVE

Av 24hr SBP	163	Av 24hr DBP	108	CVP	7·5	PR	94		
24hr UV	1250	24hr PRU	720	CC	112	SUR	·32		
STP	66	SAL	34	SCR	62	SU	2·9		

DYE CONC	10	·133	20	·132	30	·123	60	·111	HCT 39
PV		4064		4095		4394		4869	

PVE GRP PATIENT No. 5

PT AGE (yrs)	42	GRAVIDA	8	HEIGHT(cm)	162
GEST AGE (wks)	36	PARA	7	WEIGHT(kg)	66

DAY 1

AV 24hr SBP	164	AV 24hr DBP	106	PR	80
24hr UV	1050	24hr PRU	0	CC	135

DAY 2 BEFORE PVE

SBP	159	DBP	116	CVP	2	PR	77
STP	58	SAL	30	SCR	70	SU	5·7
SUR	–			PGI_2	486	TxA_2	207

DYE CONC	10	·115	20	·103	30	·112	60	·125	HCT 33
PV		5219		5828		5359		4802	

DURING PVE

SBP	159	156	145	146	148	150	154
DBP	116	114	101	111	110	114	109
CVP	2	6	6·5	5	6	8	6
PR	77	71	77	74	72	76	72

0 15 30 45 60 75 90 min

2,4,6hrs AFTER PVE

	172	143	150
	100	101	105
	2	2	4
	79	79	77

2 4 6 hrs

2hrs AFTER PVE

DYE CONC	10	·099	20	·093	30	·092	60	·092	PGI_2 671
PV		6063		6454		6524		6524	TxA_2 200

DAY 3 24hr AFTER PVE

Av 24hr SBP	166	Av 24hr DBP	110	CVP	3·5	PR	77		
24hr UV	1480	24hr PRU	0	CC	86	SUR	–		
STP	65	SAL	34	SCR	70	SU	3·2		

DYE CONC	10	·114	20	·110	30	·105	60	·108	HCT 32
PV		5588		5791		6067		5898	

PVE GRP PATIENT No. 6

PT AGE (yrs)	26	GRAVIDA	3	HEIGHT(cm)	149
GEST AGE (wks)	28	PARA	3	WEIGHT(kg)	83

DAY 1

AV 24hr SBP	143	AV 24hr DBP	98	PR	92
24hr UV	429	24hr PRU	1063	CC	49

DAY 2 BEFORE PVE

SBP	160	DBP	95	CVP	1·5	PR	77
STP	49	SAL	28	SCR	70	SU	4·3
SUR	·36			PGI_2	671	TxA_2	193

DYE CONC	10		20		30		60		HCT
	·139		·131		·127		·121		28
PV	4580		4859		5013		5261		

DURING PVE

	0	15	30	45	60	75	90 min
SBP	160	152	168	153	163	159	156
DBP	95	93	94	92	93	96	90
CVP	1·5	4	6	3·5	7	7	8
PR	77	74	63	80	89	95	87

2,4,6hrs AFTER PVE

	2	4	6 hrs
	150	165	154
	86	98	109
	3·5	12	12
	82	88	82

2hrs AFTER PVE

DYE CONC	10		20		30		60		PGI_2
	·103		·096		·096		·096		878
PV	6180		6631		6631		6631	TxA_2	146

DAY 3 24hr AFTER PVE

Av 24hr SBP	154	Av 24hr DBP	98	CVP	10	PR	84		
24hr UV	960	24hr PRU	4664	CC	71	SUR	·38		
STP	48	SAL	27	SCR	79	SU	5·0		

DYE CONC	10		20		30		60		HCT
	·118		·117		·109		·102		27
PV	5333		5379		5773		6170		

PVE GRP PATIENT No. 7

PT AGE (yrs)	39	GRAVIDA	6	HEIGHT(cm)	159
GEST AGE (wks)	24	PARA	5	WEIGHT(kg)	61

DAY 1

AV 24hr SBP	138	AV 24hr DBP	98	PR	88
24hr UV	1300	24hr PRU	472	CC	137

DAY 2 BEFORE PVE

SBP	160	DBP	90	CVP	1	PR	78
STP	62	SAL	34	SCR	53	SU	3.6
SUR	.19			PGI_2	1007	TxA_2	279

DYE CONC	10	.116	20	.121	30	.118	60	.134	HCT 29
PV		4611		4420		4532		3261	

DURING PVE

SBP	160	156	152	150	145	148	149
DBP	90	90	92	90	92	90	86
CVP	1	2.5	4	5	5	4.5	3
PR	78	74	74	70	71	84	69

0 15 30 45 60 75 90 min

2,4,6hrs AFTER PVE

158	152	148
72	78	76
3.5	3.5	3.5
90	85	84

2 4 6 hrs

2hrs AFTER PVE

DYE CONC	10	.079	20	.080	30	.080	60	.072
PV		6770		6685		6685		7428

PGI_2	357
TxA_2	236

DAY 3 24hr AFTER PVE

Av 24hr SBP	134	Av 24hr DBP	88	CVP	4	PR	95		
24hr UV	800	24hr PRU	865	CC	202	SUR	.15		
STP	70	SAL	39	SCR	44	SU	3.2		

DYE CONC	10	.161	20	.149	30	.149	60	.136	HCT 30
Pv		4116		4447		4447		4872	

PVE GRP PATIENT No. 8

PT AGE (yrs)	24	GRAVIDA	2	HEIGHT(cm)	154
GEST AGE (wks)	32	PARA	1	WEIGHT(kg)	96

DAY 1

AV 24hr SBP	150	AV 24hr DBP	98	PR	82
24hr UV	1380	24hr PRU	0	CC	131

DAY 2 BEFORE PVE

SBP	132	DBP	116	CVP	3.5	PR	64
STP	65	SAL	34	SCR	53	SU	2.5
SUR	.31			PGI_2	700	TxA_2	264

DYE CONC	10	.133	20	.117	30	.105	60	.091	HCT 38
PV		4229		4807		5357		6181	

DURING PVE

SBP	132	150	140	148	146	148	141
DBP	116	114	110	115	114	108	109
CVP	3.5	4.5	4.5	6	7	7	7
PR	64	68	60	62	56	55	55
	0	15	30	45	60	75	90 min

2,4,6hrs AFTER PVE

	137	140	154
	103	109	110
	6	5	5
	74	56	66
	2	4	6 hrs

2hrs AFTER PVE

DYE CONC	10	.061	20	.060	30	.051	60	.053	PGI_2 857
PV		9221		9378		11029		10613	TxA_2 228

DAY 3 24hr AFTER PVE

Av 24hr SBP	140	Av 24hr DBP	89	CVP	6	PR	79
24hr UV	1200	24hr PRU	0	CC	165	SUR	.32
STP	62	SAL	34	SCR	53	SU	2.1

DYE CONC	10	.113	20	.101	30	.100	60	.088	HCT 37
PV		3678		4115		4157		4723	

PVE GRP PATIENT No. 9

PT AGE (yrs)	25	GRAVIDA	2	HEIGHT(cm)	166
GEST AGE (wks)	37	PARA	1	WEIGHT(kg)	70

DAY 1

AV 24hr SBP	147	AV 24hr DBP	98	PR	80
24hr UV	1250	24hr PRU	1548	CC	147

DAY 2 BEFORE PVE

SBP	135	DBP	94	CVP	1	PR	86
STP	58	SAL	32	SCR	88	SU	3·6
SUR	·35			PGI_2	786	TxA_2	429

DYE CONC 10	·120	20	·120	30	·124	60	·113	HCT	33
PV	4484		4484		4339		4762		

DURING PVE

SBP	135	122	128	115	127	122	120
DBP	94	92	101	98	99	103	110
CVP	1	1	2	3	3	3·5	3·5
PR	86	76	84	87	84	91	90

0 15 30 45 60 75 90 min

2,4,6hrs AFTER PVE

125	116	130
88	91	94
4	5	3·5
87	88	77

2 4 6 hrs

2hrs AFTER PVE

DYE CONC 10	·086	20	·094	30	·098	60	·085	PGI_2	821
PV	6257		5724		5490		6330	TxA_2	214

DAY 3 24hr AFTER PVE

Av 24hr SBP	150	Av 24hr DBP	99	CVP	5	PR	80
24hr UV	2250	24hr PRU	2082	CC	177	SUR	·34
STP	58	SAL	33	SCR	62	SU	3·2

DYE CONC 10	·121	20	·117	30	·133	60	·133	HCT	31
Pv	4721		4882		4295		4295		

PVE GRP PATIENT No. 10

PT AGE (yrs)	17	GRAVIDA	1	HEIGHT(cm)	153
GEST AGE (wks)	36	PARA	0	WEIGHT(kg)	60

DAY 1

AV 24hr SBP	120	AV 24hr DBP	93	PR	80
24hr UV	3850	24hr PRU	1571	CC	119

DAY 2 BEFORE PVE

SBP	161	DBP	105	CVP	2	PR	74
STP	67	SAL	33	SCR	53	SU	1·8
SUR	·28			PGI_2	714	TxA_2	1571

DYE CONC	10	·191	20	·191	30	·183	60	·178	HCT 38
PV		3370		3370		3517		3616	

DURING PVE

SBP	161	169	167	167	168	160	164
DBP	105	113	116	108	115	107	107
CVP	2	3	2	2	3	3·5	3
PR	74	76	76	73	79	75	85
	0	15	30	45	60	75	90 min

2,4,6hrs AFTER PVE

	139	136	172
	83	99	106
	2	2	2
	86	79	86
	2	4	6 hrs

2hrs AFTER PVE

DYE CONC	10	·124	20	·116	30	·114	60	·105	PGI_2 543
PV		5191		5549		5646		6130	TxA_2 464

DAY 3 24hr AFTER PVE

Av 24hr SBP	145	Av 24hr DBP	95	CVP	1·5	PR	75
24hr UV	2250	24hr PRU	1074	CC	60	SUR	·24
STP	67	SAL	33	SCR	44	SU	1·8

DYE CONC	10	·121	20	·096	30	·085	60	·029	HCT 39
Pv		4890		6276		7087		20777	

PVE GRP PATIENT No. 11

PT AGE (yrs)	27	GRAVIDA	3	HEIGHT(cm)	168
GEST AGE (wks)	25	PARA	2	WEIGHT(kg)	50

DAY 1

AV 24hr SBP	128	AV 24hr DBP	90	PR	72
24hr UV	552	24hr PRU	0	CC	34

DAY 2 BEFORE PVE

SBP	125	DBP	97	CVP	3	PR	68
STP	70	SAL	29	SCR	62	SU	2.5
SUR	.36			PGI_2	543	TxA_2	157

DYE CONC	10	.181	20	.176	30	.170	60	.162	HCT 30
PV		3373		3469		3591		3769	

DURING PVE

SBP	125	129	128	129	133	135	144
DBP	97	97	89	101	96	100	96
CVP	3	3.5	4	5	4	6	6.5
PR	68	70	66	70	70	68	70

0 15 30 45 60 75 90 min

2,4,6hrs AFTER PVE

123	115	113
86	82	90
3.5	4	6
82	77	71

2 4 6 hrs

2hrs AFTER PVE

DYE CONC	10	.129	20	.128	30	.121	60	.119	PGI_2 550
PV		4733		4770		5046		5130	TxA_2 193

DAY 3 24hr AFTER PVE

Av 24hr SBP	128	Av 24hr DBP	81	CVP	6	PR	82
24hr UV	750	24hr PRU	0	CC	68	SUR	.35
STP	71	SAL	31	SCR	62	SU	2.1

DYE CONC	10	.153	20	.154	30	.146	60	.145	HCT 33
Pv		3446		3424		3611		3636	

PVE GRP PATIENT No. 12

PT AGE (yrs)	33	GRAVIDA	3	HEIGHT(cm)	157
GEST AGE (wks)	20	PARA	2	WEIGHT(kg)	72

DAY 1

AV 24hr SBP	150	AV 24hr DBP	98	PR	88
24hr UV	1250	24hr PRU	0	CC	79

DAY 2 BEFORE PVE

SBP	133	DBP	99	CVP	2	PR	87
STP	66	SAL	35	SCR	62	SU	3·6
SUR	·29			PGI_2	—	TxA_2	264

DYE CONC 10	·184	20	·183	30	·189	60	·192	HCT	35
PV	3000		3016		2921		2875		

DURING PVE

SBP	133	130	136	135	141	146	145	
DBP	99	94	92	99	92	92	102	
CVP	2	3	5·5	3·5	6	7	7	
PR	87	84	85	94	87	89	96	
	0	15	30	45	60	75	90	min

2,4,6hrs AFTER PVE

	134	135	137
	82	89	96
	4	3·5	6
	95	90	93
	2	4	6 hrs

2hrs AFTER PVE

DYE CONC 10	·139	20	·138	30	·135	60	·134	PGI_2	—
PV	3971		4000		4089		4119	TxA_2	164

DAY 3 24hr AFTER PVE

Av 24hr SBP	153	Av 24hr DBP	93	CVP	7	PR	84		
24hr UV	1800	24hr PRU	0	CC	151	SUR	·28		
STP	65	SAL	37	SCR	53	SU	2·1		

DYE CONC 10	·188	20	·185	30	·191	60	·180	HCT	35
Pv	3145		3196		3095		3285		

PVE GRP PATIENT No. 13

PT AGE (yrs)	29	GRAVIDA	2	HEIGHT(cm)	159
GEST AGE (wks)	38	PARA	1	WEIGHT(kg)	91

DAY 1

AV 24hr SBP	148	AV 24hr DBP	104	PR	72
24hr UV	1900	24hr PRU	0	CC	76

DAY 2 BEFORE PVE

SBP	152	DBP	114	CVP	2	PR	63
STP	66	SAL	30	SCR	62	SU	2.5
SUR	.35			PGI_2	164	TxA_2	128

DYE CONC 10	.134	20	.125	30	.134	60	.128	HCT	40
PV	3807		4081		3807		3985		

DURING PVE

SBP	152	128	122	141	131	141	139
DBP	114	110	103	98	109	109	114
CVP	2	3	3	6	8	9	10
PR	63	62	63	66	58	64	61
	0	15	30	45	60	75	90 min

2,4,6hrs AFTER PVE

121	134	147
105	107	106
7	7	6.5
66	68	63
2	4	6 hrs

2hrs AFTER PVE

DYE CONC 10	.094	20	.092	30	.092	60	.086
PV	5426		5544		5544		5931

PGI_2	264
TxA_2	139

DAY 3 24hr AFTER PVE

Av 24hr SBP	148	Av 24hr DBP	93	CVP	6	PR	67
24hr UV	2000	24hr PRU	0	CC	61	SUR	.34
STP	57	SAL	30	SCR	68	SU	3.5

DYE CONC 10	.160	20	.135	30	.140	60	.119	HCT	39
PV	3577		4240		4089		4810		

PVE GRP PATIENT No. 14

PT AGE (yrs)	25	GRAVIDA	2	HEIGHT(cm)	154
GEST AGE (wks)	33	PARA	1	WEIGHT(kg)	53

DAY 1

AV 24hr SBP	138	AV 24hr DBP	92	PR	76
24hr UV	672	24hr PRU	0	CC	88

DAY 2 BEFORE PVE

SBP	124	DBP	101	CVP	2	PR	70
STP	72	SAL	37	SCR	79	SU	3·9
SUR	·19			PGI_2	278	TxA_2	296

DYE CONC	10	20	30	60	HCT
PV	·128 / 4075	·114 / 4576	·093 / 5609	·104 / 5016	39

DURING PVE

	0	15	30	45	60	75	90 min
SBP	124	147	153	147	137	142	142
DBP	101	113	105	108	105	101	105
CVP	2	2	2	2	3	2	2·5
PR	70	88	66	68	66	60	65

2,4,6hrs AFTER PVE

2	4	6 hrs
110	93	116
82	73	90
2·5	2	2
92	73	88

2hrs AFTER PVE

DYE CONC	10	20	30	60		
PV	·065 / 8025	·079 / 6603	·095 / 5491	·075 / 6955	PGI_2	357
					TxA_2	111

DAY 3 24hr AFTER PVE

Av 24hr SBP	135	Av 24hr DBP	88	CVP	2	PR	64
24hr UV	800	24hr PRU	0	CC	63	SUR	·17
STP	70	SAL	39	SCR	53	SU	2·5

DYE CONC	10	20	30	60	HCT
PV	·183 / 3268	·169 / 3539	·165 / 3624	·153 / 3909	38

Equivalent Data
CONTROL PATIENT No. 1

PT AGE (yrs)	31	GRAVIDA	6	HEIGHT(cm)	165
GEST AGE (wks)	34	PARA	4	WEIGHT(kg)	86

DAY 1

AV 24hr SBP	168	AV 24hr DBP	110	PR	88
24hr UV	1450	24hr PRU	847	CC	102

DAY 2 BEFORE PVE

SBP	170	DBP	125	CVP	-	PR	67
STP	58	SAL	31	SCR	81	SU	4·2
SUR	·42			PGI_2	643	TxA_2	214

DYE CONC	10	·147	20	·140	30	·137	60	·135	HCT 35
PV		4013		4214		4306		4370	

DURING PVE

SBP	170	169	165	160	169	174	162
DBP	125	126	124	127	128	128	120
CVP	-	-	-	-	-	-	-
PR	67	65	67	62	70	73	70

0 15 30 45 60 75 90 min

2,4,6hrs AFTER PVE

	168	190	158
	126	132	120
	-	-	-
	79	78	78

2 4 6 hrs

2hrs AFTER PVE

DYE CONC	10	·126	20	·120	30	·120	60	·115	PGI_2 393
PV		4682		4916		4916		5130	TxA_2 193

DAY 3 24hr AFTER PVE

Av 24hr SBP	185	Av 24hr DBP	115	CVP	-	PR	77	
24hr UV	1700	24hr PRU	1966	CC	93	SUR	·43	
STP	60	SAL	32	SCR	81	SU	3·5	

DYE CONC	10	·131	20	·131	30	·127	60	·126	HCT 35
Pv		4913		4913		5068		5108	

Equivalent Data
CONTROL PATIENT No. 2

PT AGE (yrs)	17	GRAVIDA	1	HEIGHT(cm)	168
GEST AGE (wks)	31	PARA	0	WEIGHT(kg)	61

DAY 1

AV 24hr SBP	128	AV 24hr DBP	91	PR	90
24hr UV	1632	24hr PRU	0	CC	133

DAY 2 BEFORE PVE

SBP	128	DBP	87	CVP	–	PR	70
STP	63	SAL	34	SCR	35	SU	3.4
SUR	.25			PGI_2	750	TxA_2	336

DYE CONC	10	.168	20	.151	30	.151	60	.157	HCT 27.5
PV		3501		3895		3895		3747	

DURING PVE

SBP	128	117	128	114	125	111	122
DBP	87	83	95	86	87	73	85
CVP	–	–	–	–	–	–	–
PR	70	73	72	69	60	99	67
	0	15	30	45	60	75	90 min

2,4,6hrs AFTER PVE

	122	119	114
	87	90	85
	–	–	–
	84	75	71
	2	4	6 hrs

2hrs AFTER PVE

DYE CONC	10	.185	20	.169	30	.172	60	.158	PGI_2 1357
PV		3179		3480		3420		3723	TxA_2 671

DAY 3 24hr AFTER PVE

Av 24hr SBP	110	Av 24hr DBP	80	CVP	–	PR	75	
24hr UV	1820	24hr PRU	0	CC	166	SUR	.22	
STP	60	SAL	33	SCR	53	SU	3.9	

DYE CONC	10	.097	20	.092	30	.107	60	.110	HCT 27
PV		4378		4616		3969		3861	

Equivalent Data
CONTROL PATIENT No. 3

PT AGE (yrs)	24	GRAVIDA	3	HEIGHT(cm)	171
GEST AGE (wks)	32	PARA	2	WEIGHT(kg)	66

DAY 1

AV 24hr SBP	140	AV 24hr DBP	96	PR	98
24hr UV	1400	24hr PRU	530	CC	70

DAY 2 BEFORE PVE

SBP	130	DBP	94	CVP	-	PR	78
STP	70	SAL	36	SCR	62	SU	3.2
SUR	.42			PGI_2	285	TxA_2	221

DYE CONC	10	.241	20	.235	30	.211	60	.200	HCT 41
PV		2923		2997		3338		3522	

DURING PVE

SBP	130	127	132	133	121	126	141
DBP	94	102	107	99	99	102	107
CVP	-	-	-	-	-	-	-
PR	78	69	77	79	75	78	75

0 15 30 45 60 75 90 min

2,4,6hrs AFTER PVE

	129	128	120
	97	90	94
	-	-	-
	89	90	92

2 4 6 hrs

2hrs AFTER PVE

DYE CONC	10	.192	20	.182	30	.166	60	.181	PGI_2 629
PV		3669		3870		4243		3892	TxA_2 228

DAY 3 24hr AFTER PVE

Av 24hr SBP	130	Av 24hr DBP	84	CVP	-	PR	93	
24hr UV	750	24hr PRU	663	CC	58	SUR	.46	
STP	72	SAL	37	SCR	53	SU	3.6	

DYE CONC	10	.175	20	.137	30	.125	60	.141	HCT 41
Pv		2496		3188		3495		3098	

Equivalent Data
CONTROL PATIENT No. 4

PT AGE (yrs)	26	GRAVIDA	2	HEIGHT(cm)	157
GEST AGE (wks)	41	PARA	1	WEIGHT(kg)	91

DAY 1

AV 24hr SBP	130	AV 24hr DBP	95	PR	76
24hr UV	1000	24hr PRU	0	CC	94

DAY 2 BEFORE PVE

SBP	105	DBP	90	CVP	–	PR	88
STP	66	SAL	37	SCR	62	SU	29
SUR	.29			PGI_2	535	TxA_2	228

DYE CONC	10	.136	20	.124	30	.121	60	.116	HCT 42
PV		4354		4776		4894		5105	

DURING PVE

SBP	105	104	110	101	100	110	117
DBP	90	86	97	94	92	90	85
CVP	–	–	–	–	–	–	–
PR	88	86	85	94	93	90	83
	0	15	30	45	60	75	90 min

2,4,6hrs AFTER PVE

	115	121	113
	87	86	84
	–	–	–
	88	88	98
	2	4	6 hrs

2hrs AFTER PVE

DYE CONC	10	.109	20	.105	30	.103	60	.100	PGI_2 550
PV		5433		5640		5750		5922	TxA_2 279

DAY 3 24hr AFTER PVE

Av 24hr SBP	133	Av 24hr DBP	80	CVP	–	PR	100		
24hr UV	1200	24hr PRU	0	CC	310	SUR	.29		
STP	63	SAL	37	SCR		SU	2.1		

DYE CONC	10	.125	20	.115	30	.114	60	.107	HCT 42
PV		3956		4300		4337		4621	

Equivalent Data
CONTROL PATIENT No. 5

PT AGE (yrs)	33	GRAVIDA	3	HEIGHT(cm)	164
GEST AGE (wks)	20	PARA	2	WEIGHT(kg)	81

DAY 1

AV 24hr SBP	134	AV 24hr DBP	90	PR	84
24hr UV	2000	24hr PRU	–	CC	160

DAY 2 BEFORE PVE

SBP	116	DBP	86	CVP	–	PR	80
STP	69	SAL	39	SCR	44	SU	2·5
SUR	·19			PGI_2	614	TxA_2	228

DYE CONC 10	·108	20	·104	30	·105	60	·106	HCT	36
PV	4650		4829		4783		4738		

DURING PVE

SBP	116	118	118	119	120	117	121
DBP	86	81	81	76	84	70	85
CVP	–	–	–	–	–	–	–
PR	80	76	74	75	75	77	78
	0	15	30	45	60	75	90 min

2,4,6hrs AFTER PVE

	132	114	129
	78	82	79
	–	–	–
	90	80	66
	2	4	6 hrs

2hrs AFTER PVE

DYE CONC 10	·097	20	·097	30	·097	60	·097	PGI_2	1036
PV	5178		5178		5178		5178	TxA_2	371

DAY 3 24hr AFTER PVE

Av 24hr SBP	135	Av 24hr DBP	85	CVP	–	PR	80
24hr UV	3000	24hr PRU	0	CC	91	SUR	·19
STP	67	SAL	39	SCR	44	SU	1·8

DYE CONC 10	·144	20	·136	30	·136	60	·128	HCT	36
Pv	3656		3871		3871		4113		

Equivalent Data
CONTROL PATIENT No. 6

PT AGE (yrs)	27	GRAVIDA	3	HEIGHT(cm)	170
GEST AGE (wks)	40	PARA	2	WEIGHT(kg)	72

DAY 1

AV 24hr SBP	145	AV 24hr DBP	95	PR	88
24hr UV	500	24hr PRU	0	CC	72

DAY 2 BEFORE PVE

SBP	128	DBP	107	CVP	–	PR	88
STP	57	SAL	32	SCR	62	SU	2·1
SUR	·35			PGI_2	150	TxA_2	10

DYE CONC	10	·113	20	·108	30	·108	60	·112	HCT 34
PV		4572		4784		4784		4613	

DURING PVE

SBP	128	134	130	132	127	120	123
DBP	107	101	95	102	99	101	106
CVP	–	–	–	–	–	–	–
PR	88	89	77	88	75	87	83
	0	15	30	45	60	75	90 min

2,4,6hrs AFTER PVE

	123	128	124
	104	98	103
	–	–	–
	83	89	75
	2	4	6 hrs

2hrs AFTER PVE

DYE CONC	10	·099	20	·098	30	·097	60	·094	PGI_2 121
PV		5218		5272		5326		5496	TxA_2 43

DAY 3 24hr AFTER PVE

Av 24hr SBP	129	Av 24hr DBP	95	CVP	–	PR	80			
24hr UV	980	24hr PRU	0	CC	81	SUR	·35			
STP	59	SAL	33	SCR	62	SU	2·5			

DYE CONC	10	·112	20	·108	30	·098	60	·092	HCT 34
PV		4625		4796		5286		5430	

Equivalent Data
CONTROL PATIENT No. 7

PT AGE (yrs)	21	GRAVIDA	1	HEIGHT(cm)	163
GEST AGE (wks)	36	PARA	0	WEIGHT(kg)	60

DAY 1

AV 24hr SBP	151	AV 24hr DBP	101	PR	88
24hr UV	800	24hr PRU	1240	CC	71

DAY 2 BEFORE PVE

SBP	152	DBP	112	CVP	–	PR	72
STP	59	SAL	31	SCR	70	SU	3.9
SUR	.50			PGI_2	750	TxA_2	236

DYE CONC	10	.169	20	.161	30	.157	60	.158	HCT 38
PV		2814		2954		3030		3010	

DURING PVE

SBP	152	136	138	167	161	150	154
DBP	112	106	108	112	101	114	116
CVP	–	–	–	–	–	–	–
PR	72	71	68	63	61	65	67
	0	15	30	45	60	75	90 min

2,4,6hrs AFTER PVE

	128	134	144
	93	105	110
	–	–	–
	90	66	83
	2	4	6 hrs

2hrs AFTER PVE

DYE CONC	10	.146	20	.136	30	.138	60	.130	PGI_2 650
PV		3258		3497		3447		3659	TxA_2 243

DAY 3 24hr AFTER PVE

Av 24hr SBP	158	Av 24hr DBP	109	CVP	–	PR	88	
24hr UV	1150	24hr PRU	2848	CC	86	SUR	.52	
STP	57	SAL	31	SCR	70	SU	4.3	

DYE CONC	10	.176	20	.164	30	.156	60	.148	HCT 38
PV		2733		2933		3084		3250	

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