



*Open-Heart Surgery:*

# Our Approach

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This is a summary of 50 open heart surgeries performed at Valley Children's Hospital in Fresno, California by Dr. Sathaporn Vathayanon, Chief of Cardiac Surgery.

The equipment we use at Valley Children's Hospital for cardiopulmonary bypass, consists of a Med-Science Modular Console with 4 Mayo single roller pumps, 1 Sarns portable pump (used for ventricular sump return), Brunswick heat exchange instrument, Bentley Temptrol oxygenator and cardiotomy reservoir, Pall blood filter, Swank in-line transfusion filter and Bentley PO<sub>2</sub> analyzer.

Our standard procedure for cardiopulmonary bypass is as follows: Our priming solution consists of whole blood and 5% D/LR. To each 500 cc. of blood we add 2 cc. of sodium heparin and 5 cc. of calcium chloride. For each kilogram of body weight, we add 100 to 150 cc. of 5% D/LR.

Our initial heparin dose is 350 units/kg. One hundred fifty units are added to the prime in the oxygenator, 200 units are given to the patient. Each hour we are on bypass, we add 100 units/kg. of heparin to the oxygenator and 10 cc. of 50% dextrose. At the conclusion of bypass, protamine is given to convert heparin.

We monitor urine output and give mannitol or lasix if and when needed. We take arterial blood samples during bypass for pH, pO<sub>2</sub>, and pCO<sub>2</sub>. Sodium bicarbonate is given as needed. We monitor arterial and venous pressures, also blood and rectal temperatures.

For most cases we use a ventricular sump and moderate hypothermia of approximately 30 degrees centigrade rectally. We perfuse our patients at approximately 2500 cc./min./square meter of body surface.

We replace our blood loss during bypass with whole blood or 5% D/LR, according to the patient's need. We strive to maintain an arterial pressure of 80 to 100 mmHg, and venous pressure around 10 mmHg during bypass, and to maintain an adequate urine output.

Our oxygen saturation is good throughout the entire length of bypass. We use a combination of 100% oxygen and 95/5% CO<sub>2</sub>. For most cases, we use 2.5% CO<sub>2</sub>, unless we have a low PCO<sub>2</sub>, then we raise the CO<sub>2</sub>.

Our blood damage during bypass is minimal. We feel that by using the Pall filter in the cardiotomy return line, we are cutting down the possibility of air and fat embolism and removing red cell aggregates from the perfusate. All banked blood is run through a swank in-line transfusion filter, which filters out bank blood debris, and further insures our patients against air and fat emboli. We feel that all these extra precautionary measures give our patients a better chance for a faster and uneventful recovery.

We average approximately 110 to 120 cases per year. Our patients have done exceedingly well during bypass and also post-operatively. I feel that the following resume of 50 open-heart surgeries performed at Valley Children's Hospital from January 1, to July 1, 1972, will speak for itself as to the success of our procedure. On most of these patients no mannitol or lasix was needed. Urine output was very good. The pH, PO<sub>2</sub>, PCO<sub>2</sub> was adequate on most patients and no sodium bicarbonate was needed.

The following table is a break down of the 50 cases mentioned above, according to procedure, average age, average pump time and results:



**TABLE OF 50 PUMP RUNS**

No.	Procedure	Average Age	Average Pump Time	Results
4	Aortic Valve Replacement	44 yrs.	4 hrs. 28 min.	Living, doing well.
1	Aortic Valvulotomy	3 mos.	2 hrs. 10 min.	Living, doing well.
3	Mitral Valve Replacement	55 yrs.	3 hrs.	Living, doing well.
1	Mitral Valve Replacement Coronary-Bypass graft	65 yrs.	3 hrs. 11 min.	Living, doing well.
2	Aortic Valve Replacement Coronary-Bypass graft	54 yrs.	3 hrs. 54 min.	Living, doing well.
1	Mitral Commissurotomy	36 yrs.	2 hrs. 33 min.	Living, doing well.
2	Tetralogy of Fallot	3 yrs. 5 mos.	3 hrs. 30 min.	Living, doing well.
1	Mustard Procedure	1 yr.	3 hrs.	Expired 2 days Post-op. ✓
2	V.S.D. Repair	17 mos.	2 hrs. 30 min.	Living, doing well.
2	A.S.D. Repair	1-25 yrs. 1-19 mos.	45 min.	Living, doing well.
1	Total Correction anomalous venous return.	15 mos.	1 hr. 28 min.	Living, doing well.
1	Ventricular aneurysm	51 yrs.	2 hrs. 56 min.	Living, doing well.
1	PDA and Anomalous Pulmonary	2 wks.	3 hrs. 18 min.	Expired on table.
1	Coronary Bypass graft, Ventricular Aneurysm	42 yrs.	2 hrs. 21 min.	Living, doing well.
1	Triple Coronary Bypass graft	52 yrs.	6 hrs. 30 min.	Expired 4 mos. post-op.
1	Double Coronary Bypass graft and Ventricular Aneurysm	61 yrs.	4 hrs. 15 min.	Expired 7 das. post-op.
13	Coronary Bypass grafts	51 yrs. 10 mos.	2 hrs. 10 min.	1 expired 2 days post-op. 1 expired 4 days post-op. 1 expired 3 wks. post-op. 10 doing well.
12	Double coronary bypass grafts	54 yrs.	3 hrs. 10 min.	1 expired 4 days post-op. 11 doing well.