

# Chapter 8



## EVENTS LEADING TO THE SUSPENSION OF THE PROGRAM

SEPTEMBER 7, 1994 TO  
DECEMBER 23, 1994

On September 7, 1994, the Wiseman Committee determined that it was appropriate for the Pediatric Cardiac Surgery Program to resume full service, which it did for the next three and a half months. Following the deaths of five more children, however, the program was stopped, pending the institution of an external review. The program has not reopened since the suspension.

The events of that three-and-a-half-month period are described and discussed in this chapter. It should be noted that, during this period, Dr. Brian Postl assumed the position of head of pediatric services. While Postl was originally under the impression that the problems of the PCS program had been resolved, he became increasingly concerned about the program. As problems mounted, he sought more information and took steps that he had reason to believe would address problems in the program.

As opposed to the first half of 1994, many of the difficult operations that were carried out and deaths that occurred during this period involved newborns. As a result, the neonatal intensive care unit became increasingly involved in the care of children from the Pediatric Cardiac Surgery Program. Representatives of that unit played a key role in the decision to suspend the program in December 1994. At the same time, as the following text indicates, the program continued to be plagued with problems in communication and with concerns about the surgeon's technical abilities.

### **SEPTEMBER 7 — THE RETURN TO FULL PROGRAM**

Following the September 7, 1994, Wiseman Committee meeting, the members of the pediatric cardiac surgery team prepared to return to a fully operational program. Some team members still harboured significant concerns about the program's ability to provide appropriate care for patients with heart defects of high complexity. As was the case before the original slowdown of May 17, that concern rested almost exclusively with the nurses and the anaesthetists.

Although the program had been through a hiatus in providing care for patients with complex anomalies, it was obvious that little had been learned from the experience of earlier in the year; once again, little time was spent in preparation for the return to high-risk operations.

While a number of significant issues had been identified during the committee process, none of the procedures that had been in place before May 17 were altered when the program returned to full operation in September. Case selection and preparation had been raised as a significant issue at the committee. Despite this, there was no recommendation for any additional or improved pre-operative meetings that would involve pediatric cardiac surgery team members other than the cardiologist and the surgeon.

Communication had clearly been flagged as a serious issue; yet nothing was put into place to address issues of communication on an ongoing basis. No debriefing sessions were held after difficult cases, a small step that would have gone a long way to addressing any concerns that arose intra-operatively.

The concerns expressed by the PICU and NICU staff, about procedures being performed in their units for which they were ill-prepared, had not been addressed. Preparation of the cardiac bins—which had begun as early as April—had not been completed.

The Wiseman Committee's interim report would have left the department heads, to whom it was sent, with the impression that all matters of concern had been addressed and resolved during meetings of the committee. Unfortunately, this was a false impression.

### **CRAIG'S MEETING WITH THE ANAESTHETISTS**

Dr. Doug Craig, the head of anaesthesia, met with the pediatric cardiac anaesthetists on either September 8 or 9. Dr. Ann McNeill testified that he wanted reassurances from them that, since the program would be returning to full service, the pediatric cardiac anaesthetists would be full participants in the program. At the time of that meeting, Craig was not aware that they had individually met with Dr. Suzanne Ulyot and had agreed to work in the program when it returned to full service. According to McNeill:

During the discussion he said something to the effect that if we were in the United States, we would be looking for jobs, or we would be out of jobs, or we might not have jobs, something like that.  
(Evidence, page 13,346)

Dr. Harley Wong felt intimidated by Craig's comments as to what would have happened "if they had been in the United States." Because Wong had already decided to participate fully in the Pediatric Cardiac Surgery Program once it returned to full operation, Craig's comments did not have an impact on his decision to participate. However, he indicated that the comment had a chilling effect on his view about the support that the hospital was prepared to give to the anaesthetists in the future, if they once more withdrew services.

Craig testified that his statement about the United States came from his experiences on the Board of the American Anesthesia Educational Association. He said he had learned that in the United States hospitals were running "roughshod" over anaesthetic departments that were seen to be getting out of line.

The point I came back to was that if you don't sort of toe the line, there is a risk in the U.S. that you will lose your job, in a very abrupt way. In some context, I recall that I said that if you were in the

United States, and I guess saying whatever they were saying and doing, whatever they were doing, that you might get fired or would get fired, if you were in the United States. So that was the context.

It was never, as I heard it, converted that if you don't do something or do something that you will get fired. I never threatened to fire them, that I am aware of. (Evidence, pages 34,537–34,538)

After Craig had made his comment, McNeill told him that the section of pediatric cardiac anaesthesia had already made the decision to participate fully when the program returned to full activity.

The nature and tone of the discussion reflected the anaesthetists' lack of support for the decision to return the program to full activity. Craig recalled that there was heat generated at the meeting, although he could not recall how the discussion became so heated.

Dr. McNeill, I know was, I guess the heat generation leader, she was the most vocal, and she was the one that called me a few days later to apologize for her tone in the meeting. And I'm not sure that was on behalf of them all or herself. Whatever it was, I accepted the apology.

Dr. Heinz Reimer was unusually vocal for himself. And that is the meeting at which he, I guess in essence blurted out at some point, you know, that for a surgeon to be effective in this kind of a program, the surgeon has to be an exceptional surgeon, I remember him saying that, and that Dr. Odim is only an average surgeon, I heard him say that. The context of that, I don't recall, but I recall him saying that. (Evidence, pages 34,535–34,536)

The anaesthetists' reluctant return to the program clearly reflects the ineffectiveness of the Wiseman Committee process in addressing their concerns. While Craig's comment about what might have happened to them if they had been in the United States might not have been intended to intimidate, it could hardly have had any other effect. It seems that the message was being conveyed that the anaesthetists had been 'catered to' and while they had had their way, this was not to happen again.

It is likely that the meeting with Craig did have an impact on the anaesthetists' willingness to speak out. Five more children died before the end of the year, and although there was still cause for concern over some of the same issues that had been raised earlier in the year, the voices of the anaesthetists were much more muted. Less than a week after the program returned to full activity, another child died.

## **THE CASE OF MARIETESS TENA CAPILI**

### **ISSUES**

Marietess Tena Capili died on September 13, 1994, after undergoing surgery to repair a complex series of congenital heart defects.

The issues to which this case gives rise are:

- Should the operation have been performed in Winnipeg or should Marietess have been referred out of province?
- Were Marietess's parents provided with sufficient information to allow them to give informed consent to the procedure?
- What caused the superior vena cava syndrome?

- Should the surgical team have kept Marietess in the OR until the cause of the superior vena cava syndrome from which she was suffering was identified?
- What was the cause of death and was it preventable?

## BACKGROUND AND DIAGNOSIS

Marietess Tena Capili was born on December 15, 1991, at St. Boniface General Hospital to Sarah Marie Tena and Benedict Santos Capili. At birth, Marietess was diagnosed with a complex congenital heart defect. Tests showed she had:

- a double outlet right ventricle
- a hypoplastic left ventricle
- a hypoplastic mitral valve annulus (not depicted in diagram 8.1)
- a ventricular septal defect
- an atrial septal defect
- severe subpulmonary stenosis
- anomalous pulmonary venous drainage
- an interrupted inferior vena cava with azygous continuation to the right superior vena cava
- a left superior vena cava draining to the coronary sinus.

This was a very serious and complex set of heart problems. It is worth reviewing what each of these defects is and how they interacted in Marietess's case.

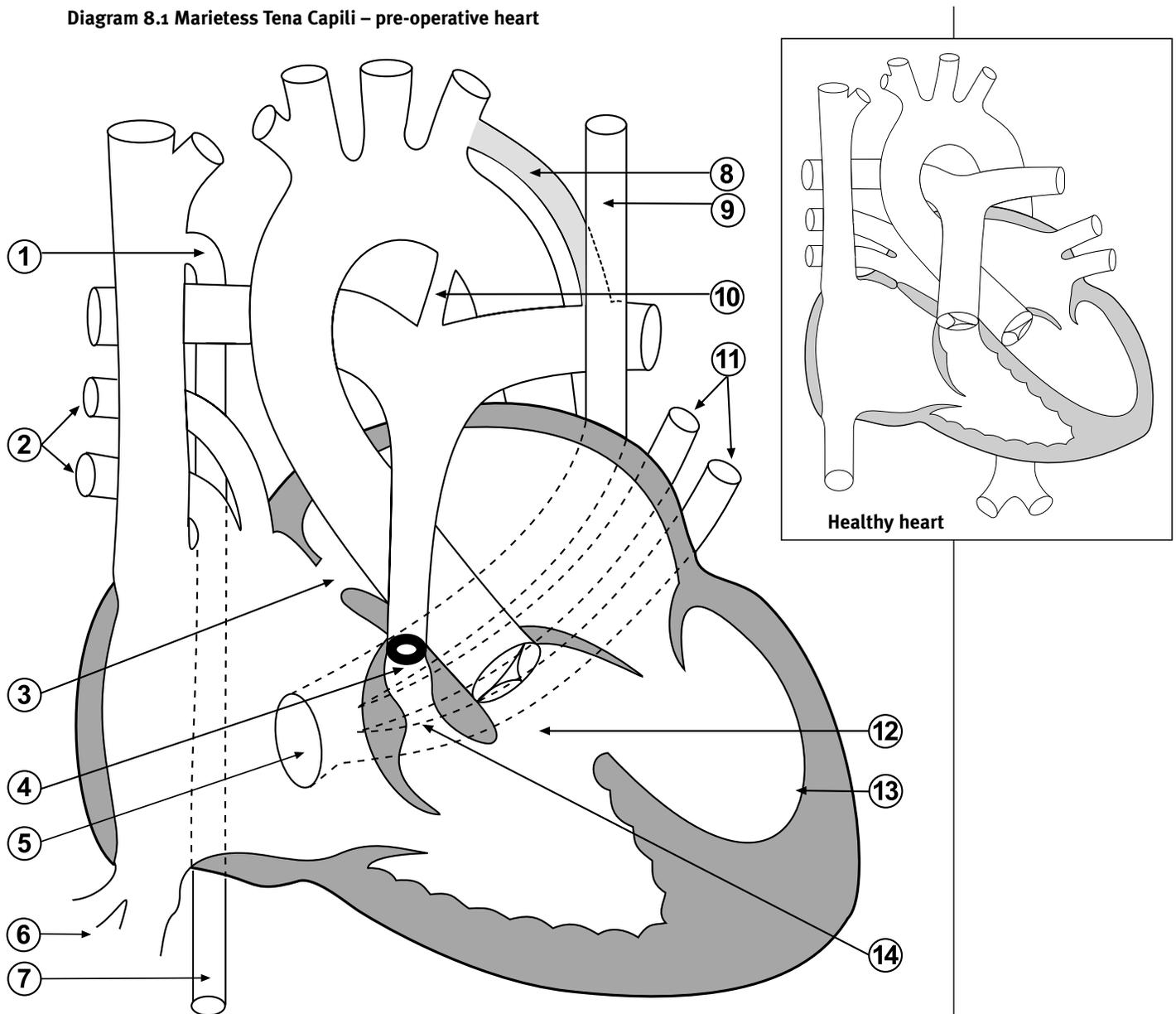
Both of the great arteries, the aorta and the pulmonary artery, arose from the right ventricle, giving the right ventricle two outlets. Because of the Double Outlet Right Ventricle (DORV), Marietess's aorta was connected to the right ventricle, rather than to the left ventricle. Her left ventricle was also underdeveloped or hypoplastic. Dr. Jonah Odum described Marietess as having a single ventricle or pump because the left ventricle was so small. Furthermore, the ring (or annulus) of the mitral valve connecting the left atrium to the left ventricle was underdeveloped.

There was a large VSD in the septal wall between the right and left ventricles, which was described as non-restrictive, in that the hole allowed free left-to-right shunting of blood. There was also an ASD in the septal wall between the left atrium and right atrium. This allowed blue blood to flow from the right atrium to the left atrium.

In fact, Marietess did not have a normal atrial structure, since there was an incomplete differentiation between the left and right atria. The lung drainage, instead of connecting to the left atrium, connected to the back of what amounted to a common atrial chamber. The right and left pulmonary veins brought oxygen-rich blood back to this common chamber, thus mixing the red blood with oxygen-poor blue blood.

There was a narrowing just before Marietess's pulmonary valve opening, increasing the resistance to blood flow from the right ventricle to the pulmonary arteries. In Marietess's case, this stenosis actually served to protect against congestion of the lungs.

Diagram 8.1 Marietess Tena Capili – pre-operative heart



- |  |  |
|--|--|
| 1 – Azygous vein   | 8 – Left Blalock-Taussig shunt   |
| 2 – Anomalous pulmonary venous drainage (Right pulmonary veins draining to the right atrium) | 9 – Left superior vena cava  |
| 3 – Atrial septal defect   | 10 – Patent ductus arteriosus  |
| 4 – Bicuspid stenotic pulmonary valve  | 11 – Anomalous pulmonary venous drainage (Left superior vena cava draining left pulmonary veins at coronary sinus) |
| 5 – Coronary sinus   | 12 – Ventricular septal defect with overriding aorta (Double outlet right ventricle)                               |
| 6 – Hepatic veins draining to right atrium instead of to inferior vena cava                  | 13 – Hypoplastic left ventricle  |
| 7 – Azygous continuation of inferior vena cava   | 14 – Severe subpulmonary stenosis  |

Marietess's vena cava system was also quite unusual. In essence, the interrupted inferior vena cava meant that Marietess did not have an inferior vena cava. To compensate for the absence of this blood vessel, blood flow from the lower body came up behind the heart through the azygous vein. This vein usually connects the inferior and superior vena cavae. While Marietess did not have a functioning inferior vena cava, she had two superior vena cavae, rather than one. Blood from the azygous vein drained into the right superior vena cava and then into the common atrial chamber of Marietess's heart. The additional, left superior vena cava drained blood from the left side of her head and her left arm and entered her heart at the coronary sinus. This is the site through which blood normally drains from the heart muscle after oxygenating the heart muscle itself. As a result of the presence of the left superior vena cava, this sinus was enlarged. Thus, blood from the left SVC joined the venous return from the heart muscle and emptied into the common atrial chamber. Marietess's patent ductus arteriosus remained open on its own.

Marietess had, essentially, only one functioning ventricle: the right ventricle. All the surgical plans developed for her were designed to optimize that ventricle's pumping capacity. In addition, she had muscular obstruction below her pulmonary valve. This compromised blood flow to her lungs. Both these factors necessitated a systemic to pulmonary artery shunt (a left-modified Blalock-Taussig shunt). This shunt joined the left subclavian artery to the left pulmonary artery, to provide more pulmonary blood flow. Some blood would be ejected out of the aorta and go to the body and organs, but some blood would flow back to the pulmonary artery via the shunt to be oxygenated in the lungs and then return to the heart.

Dr. Kim Duncan treated Marietess following her birth in 1991. His initial plan for treatment was to insert a Blalock-Taussig (B-T) shunt as a palliative measure and then carry out a definitive repair when Marietess was older and stronger. When Marietess was three months of age, Duncan performed the initial palliative repair as planned. Duncan revised the B-T shunt when Marietess was six months old, to allow more blood to flow to her lungs.

Marietess continued to be seen at the Variety Children's Heart Centre. When Dr. Niels Giddins examined her on December 13, 1993, she had no specific cardio-respiratory symptoms. Her chest was clear, her peripheral pulses were good and her liver was not enlarged. While she was cyanotic and had clubbing of her fingers and toes, she did not need any medications. Her mother was told that since Duncan had left Winnipeg, it might be necessary for Marietess to undergo surgery in Saskatoon. A follow-up appointment was scheduled for early 1994.

## THE DECISION TO OPERATE

On May 2, 1994, Giddins presented Marietess's case at a CVT conference. In Odim's opinion, Marietess was at the point of outgrowing her shunt, which was creating a volume overload on her right ventricle. He suggested a bilateral, bi-directional, cavo-pulmonary shunt, with removal of the existing B-T shunt and an atrial septectomy. This surgery is a Fontan-type procedure, sometimes referred to as a bilateral Glenn procedure or a Kawashima operation.

In the procedure that Odim proposed, the right superior vena cava was to be surgically connected to the right branch of the pulmonary artery, instead of to the right atrium. The left superior vena cava was to be surgically connected to the left branch of the pulmonary artery, instead of entering the coronary sinus. It is called

bilateral because it involves the superior vena cava on both the left and right sides of the body. It is called bi-directional because the blood from the right superior vena cava flows to both the right and left lungs. It is called a cavopulmonary shunt because it was to connect the vena cava with the pulmonary arteries.

All the oxygen-depleted blood that normally drained into the right atrium would, in this case, be draining through both of the superior vena cava into the lungs. The right superior vena cava was attached to the right pulmonary artery and the left superior vena cava was attached to the left pulmonary artery. In addition, a septostomy was performed to remove the remnants of the septal wall between the right and left atria. The result was that blood flow from her body would continue to drain into the right superior vena cava, which would also drain the right upper body. The left side of her upper body would continue to drain into the left superior vena cava. Therefore most of the venous or blue blood, which would normally be directed through the right side of the heart, would flow through the pulmonary arteries to the lungs by gravity, without the benefit of any pumping action from the right ventricle.

According to Dr. Glenn Taylor, the success of the operation depended on two things. First, there had to be low resistance to blood flow in the pulmonary arteries. Second, there had to be maintenance of a satisfactory gradient of pressure between the central venous pressure and the pressure within the common atrial chamber, which was also receiving the venous drainage from the lungs. The central venous pressure was the driving force for perfusion of the lungs, in comparison to systemic arterial pressure being the driving force where there was a Blalock-Taussig shunt (Exhibit 336, page 8.1).

While the pressures in a heart are always important, in this repair the pressures are particularly important. This is because the patient's blood circulation depends on a single pump, the right ventricle, to send the blood through both the body and the lungs. If there is any backup of blood flow, because pressures downstream are elevated, the child's heart will quickly start to fail. A variety of factors, including medications, blood clots, and suturing, can work independently or jointly to raise or lower pressures in the veins, with dramatic and potentially fatal impact.

## CONSENT

Giddins testified that, during the spring of 1994, he felt that the parents' understanding of their daughter's heart problem was continuing to grow as a result of regular discussions with him and Odim. He also said he could not recall any discussion with the family about having the procedure performed outside Manitoba.

On June 6, 1994, Odim met with Ben Capili, Sarah Tena and Sarah's mother, Teresida Tena. At the end of the meeting, the family gave verbal consent to surgery.

Odim was asked what he recalled telling Marietess's parents about risk.

Again I separated out the risks, as I usually do, into the risks of cardiopulmonary bypass, and the risks of Fontan operations, issues of prolonged chest tube drainage from the lung, issues of perhaps it not working, and that circulation not being tolerable. But we felt with the data we had in terms of the ventricular function and the AV valve function that if the pulmonary vascular resistance was reasonable that there was every good chance that it should work and told her that given 100 children like her, anywhere from 7 to 10 would have a problem with the operation. (Evidence, pages 25,436–25,437)

Ben Capili, Sarah Tena and Teresida Tena all testified. Because Ben Capili had to absent himself from part of the June 6 meeting to take care of Marietess, he was not present for some of the conversation with Odim. All three testified that Odim gave them no information as to the slowdown in the program. They were not told that only low-risk procedures were being performed in Winnipeg during the summer of 1994.

Sarah Tena recalled that at this meeting, Odim drew a diagram of Marietess's heart. Marietess's condition, she concluded, was more complex than she had earlier understood. She testified that Odim told her that he wanted to do a Fontan procedure. This would result in Marietess being left with a three-chambered heart that was fully functional. She recalled that she had asked twice about the risk to her child from the procedure, and was told by Odim that Marietess had a 97 per cent chance of success. She was told, however, that Marietess might be in the three per cent risk category for morbidity or mortality.

In her testimony, Sarah's mother, Teresida Tena, also confirmed that Odim gave this risk percentage at the meeting. Teresida Tena suggested that the operation take place in Toronto, since a friend's son had undergone surgery there and had done well. She testified that Odim had assured them that they were capable of doing the procedure in Winnipeg. Sarah Tena accepted that as fact, particularly since Marietess had been so well treated previously by Duncan.

When the meeting ended, the family was told that an operation would be scheduled, although they were not given an indication as to when surgery might take place. Sarah Tena thought it would take place during the summer.

Giddins testified that the success rate for operations of this type was 90 per cent, placing it on the high end of the moderate risk scale. He noted that the decision to set a date for Marietess's surgery took place in August. At the time that the operation was scheduled, the Winnipeg team was only handling low and medium-risk cases, with the decision to move to high-risk cases not being made until September. In his testimony, Cornel stated that he thought the risk of complications for this procedure was about seven to eight per cent.

The family was informed of the date for surgery in a letter dated August 30. They were told that Marietess would undergo her operation on September 13, 1994. Sarah Tena testified that the family thought that this was very short notice, but they did not raise any objections.

## PRE-OPERATIVE STATUS

On September 12, Sarah Tena took Marietess to the HSC. The admitting medical student described Marietess's condition as stable. She had been experiencing fatigue and shortness of breath when playing and her oxygen saturation had fallen. She was somewhat cyanotic, and her fingers were clubbed.

Sarah Tena met with Odim again that day. She testified that Odim once more explained the procedure, although this time she said he told her that the risk was 93 per cent, a figure consistent with Cornel's assessment. Sarah Tena said that since she had already signed the consent form, she felt she was committed to going ahead with the operation.

Dr. Jo Swartz conducted an anaesthetic assessment on September 12. Swartz identified a number of issues that she believed could create difficulties with the procedure. Marietess had a slow atrial rate, a sign

that she might require pacing. Because she was cyanotic, there was an increased risk of blood clots. Swartz classed Marietess as ASA IV, a sign that her overall condition presented a constant threat to her life.

It should be noted that there was no evidence presented to this Inquest that suggested that any errors were made in the diagnosis, in planning the operation, or in carrying out pre-operative care.

## THE OPERATION — SEPTEMBER 13

On the morning of Tuesday, September 13, Marietess underwent an operation in which:

- a bilateral and bi-directional caval pulmonary anastomosis was created (this term refers to the joining of the superior vena cava to the pulmonary arteries);
- the opening in the septal wall between her two atria was enlarged;
- her Blalock-Taussig shunt was removed; and
- her patent ductus arteriosus was closed.

The surgical team is set out in the accompanying chart.

**TABLE 8.1: Persons involved in the operation on Marietess Tena Capili, September 13, 1994**

<i>OR team member</i>	<i>Persons involved</i>
Surgeon	J. Odum
Surgical assistant	S. Sharpless
Anaesthetist	J. Swartz, R. Debrouwere (resident)
Scrub nurses	C. Weber, S. Scott
Circulating nurses	C. Youngson, B. Zulak
Perfusionists	D. Smith, C. McCudden

**TABLE 8.2: Length of phases of the operation on Marietess Tena Capili, September 13, 1994**

<i>Phase of the operation</i>	<i>Time taken</i>
Induction	2 hours 10 minutes
Bypass	4 hours 34 minutes
Aortic cross-clamp	22 minutes
Total surgical time	9 hours 1 minute
Total operating-room time	11 hours 56 minutes

There were four significant events during surgery. They were:

- Cannulation issues;
- Problems with distension of the heart;
- Coagulopathy and surgical bleeding; and
- Superior vena cava syndrome.

### *Cannulation issues*

Before Marietess went on bypass, a problem with cannulation gave rise to bleeding and a fall in blood pressure. Youngson testified that it appeared to her that Odim was having difficulty cannulating the superior vena cava. In particular, she thought, he was not using an appropriately sized cannula. She said:

No, to me it looked too big. I pointed it out to him at some point in time—I can remember looking over, I was circulating nurse, I was around at the top of the bed and looking over the top and watching him cannulate.

I could see that this cannula wasn't going to go into this vessel. You know, I didn't say anything at first. Then as he struggled to get it in, I know I sort of quietly said, it's too big, it's too big. And I thought, well, maybe he would be the only one that would hear me say that. And he tried a couple of times, and I think he tore the vessel. So he stopped, and he had to suture the vessel. I think then he went to a smaller cannula and cannulated.

I think at that point in time, I can't remember if this was the first, second or third cannula, venous cannula that went in. I think it was either the first or second, and Marietess was bleeding at that point in time and starting to—her blood pressure was starting to fall and things were starting to, you know, get a little more urgent. (Evidence, pages 8,581–8,582)

Once the cannulas were inserted and the lines connected, blood was supposed to flow to the bypass machine. However, the perfusionist reported that the flow from the child was low. Youngson testified that at this point the operative field was very disorganized. However, she was able to see that one of the cannulas was clamped, preventing a flow of blood away from the body. She told the surgeon and the line was unclamped. Swartz confirmed this event in her testimony. Marietess was transfused and treated for the fall in blood pressure. These events took place at approximately 1145 hours.

When Odim was questioned about this series of events, he suggested that the problem was that the anaesthetist had not prepared for what he termed 'volume overload' in time to prevent a drop in blood pressure. He gave the following account:

I know that that dissection was difficult, because it was in the area of the chest of the previous shunt and there had been a couple of operations on that side. So dissecting out the shunt was quite difficult on the left side and the left superior vena cava was essentially quite near that area.

When we had, that was sort of the last structure that was cannulated, the aorta was cannulated, the right atrium was cannulated, and the right SVC or superior vena cava was cannulated, and that was a large structure. When we cannulated the left SVC, it was a little difficult when we opened, and I had to make a couple of passes with the cannula. During those attempts was when the blood volume was infused.

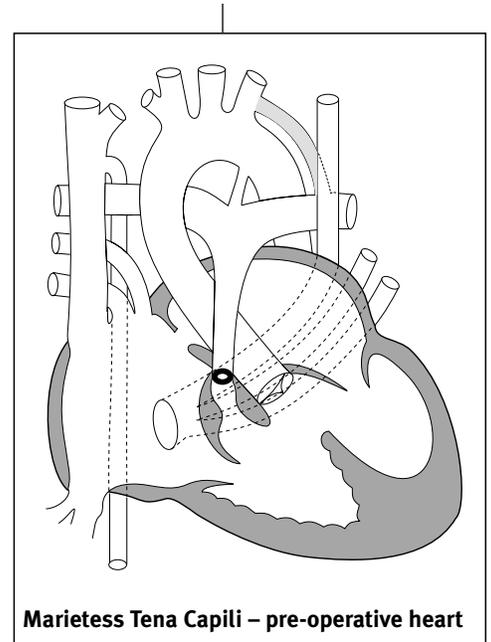
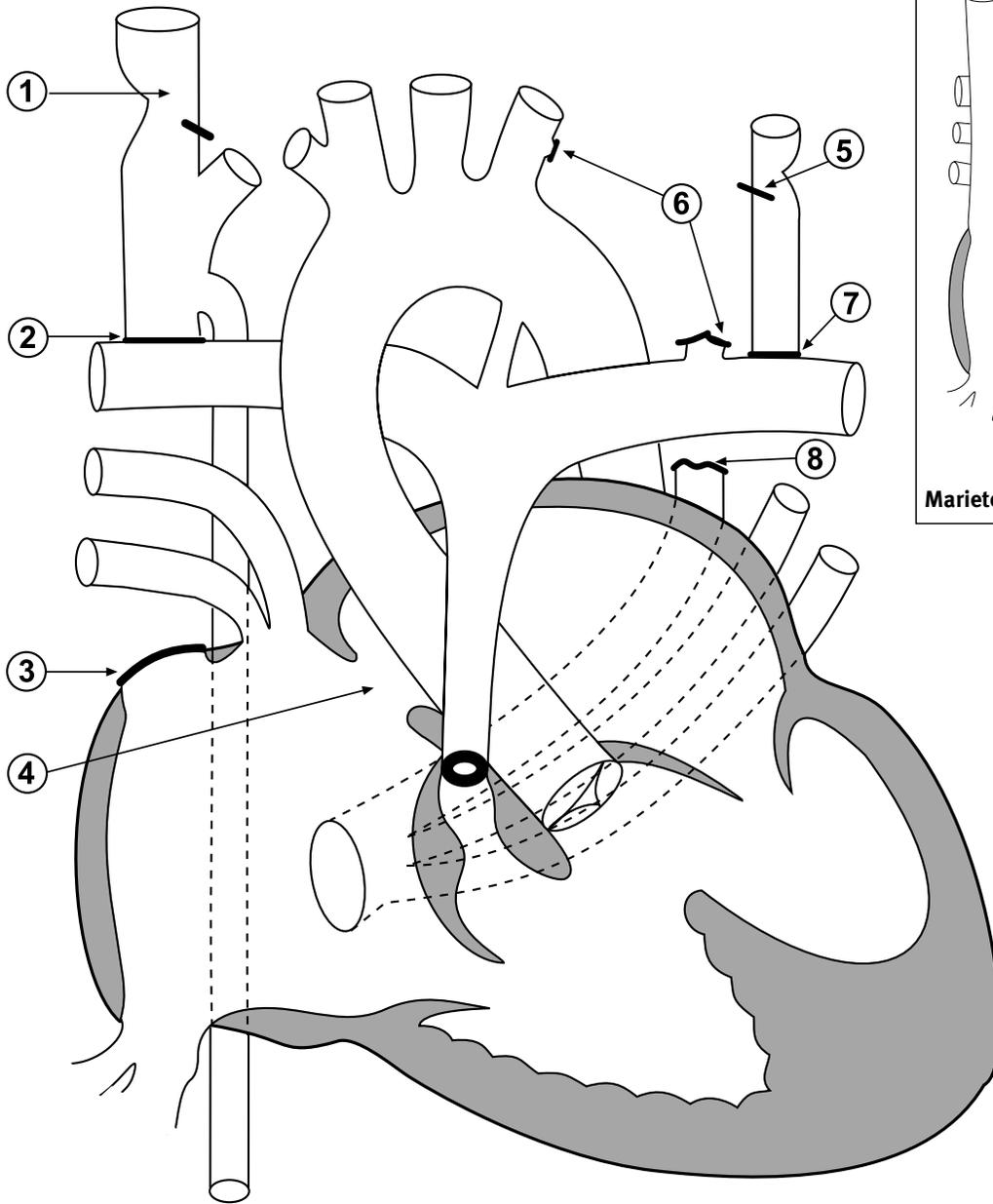
Now, typically what happens is if there is some coordination between surgeon and anaesthetist, the blood pressure is low prior to opening that vessel, you volume load beforehand so that when you do open the vessel to put the cannula in, your tank is not empty. And I think the volume loading occurred a little late here.

Q: Okay. So let's back up on that. You indicated if there is coordination between the surgeon and the anaesthetist –

A: That's right.

Q:—then you might volume load beforehand, anticipating that problem?

Diagram 8.2 Marietess Tena Capili – post-operative heart



- 1 – Suture narrowing of right superior vena cava (discovered at autopsy)
- 2 – Connection of right superior vena cava to right pulmonary artery
- 3 – Divided right superior vena cava
- 4 – Surgical enlargement of opening in septal wall between atria
- 5 – Suture narrowing of left superior vena cava (discovered at autopsy)
- 6 – Takedown of left Blalock-Taussig shunt
- 7 – Connection of left superior vena cava to left pulmonary artery
- 8 – Divided left superior vena cava

A: Exactly, because when you cannulate and you compress structure and open structure, you know by definition that you are going to have some blood loss as you open the vein. If your blood pressure is low beforehand, what anaesthesiologists will do is actually start giving volume, knowing that the next step is going to be opening that cava. (Evidence, pages 25,457–25,458)

Odim said that three vessels had already been cannulated and that Swartz should have provided more volume beforehand, thus making the procedure smoother. He said that this would have prevented the drop in blood pressure and the need to treat Marietess with drugs. He also indicated that he could not recall the clamped line to which Youngson referred.

### *Problems with distension of the heart*

At 1440 hours, Marietess's heart became distended (or filled with blood due to a lack of drainage of blood from the heart). Swartz testified that the problem occurred because the catheter that was inserted into the heart to drain (or vent) it of blood had been displaced. She testified:

In this case, it appeared what happened was that the vent had come out and the heart had gradually swollen up or filled up. And if it fills up to the point where it is not being—where the arterial blood going in is not enough, is not of high enough pressure with the pressure within the heart, the heart becomes ischemic. (Evidence, page 16,092)

In this situation the heart was not short of blood—it was actually filling up with blood. However, that blood was not leaving the heart, and the pressure from this build-up was keeping the oxygen-rich blood from entering the heart muscle. Swartz testified that Odium replaced the catheter and she treated Marietess with neosynephrine. Surgery then proceeded.

### *Surgical bleeding and coagulopathy*

At 1648 hours, the team began to wean Marietess from bypass. Her blood pressure was low and she had a metabolic acidosis, suggesting that her heart was not beating well enough to meet the metabolic needs of her body.

Marietess was bleeding from the sites where the vena cava had been connected to the pulmonary arteries, and she also had a coagulopathy. In response, the team transfused over five times her blood volume into her. The coagulopathy was also treated with medication, and Odium addressed the surgical bleeding.

### *The superior vena cava syndrome*

After Marietess's chest was closed, Swartz became concerned that, when she listened to the chest with a stethoscope, the left side of her chest did not sound as good as the right side. Swartz therefore requested that a chest X-ray be performed. While this was being done, Odium left the OR to speak with the parents. As the X-ray was being taken, Marietess's head became increasingly swollen and purple-coloured. Swartz thought that Marietess was developing what is known as superior vena cava (SVC) syndrome. This syndrome results from partial or complete obstruction of blood flow in the superior vena cava. Swartz and Odium provided different accounts of what transpired once Odium returned to the OR.

Swartz testified that when Odum returned, the pressures in Marietess's left external jugular vein were measured. According to Swartz, Odum was concerned that:

the adrenaline was causing vasoconstriction and that we were infusing the adrenaline into the external jugular vein. He had put in a left atrial line, and we moved the adrenaline from the left external jugular to the left atrial line, and then we measured the pressure in her external jugular. (Evidence, page 16,127)

A pressure reading of 35 millimetres of mercury (mm Hg) was measured in Marietess's left external jugular vein (a vein that connects to the left superior vena cava that is returning blood to the lungs). This measurement was about twice what Swartz believed the value should have been. Swartz concluded that the increased pressure showed a blockage in blood flow from the brain. This blockage was causing the brain to swell and was also starving the lungs of blood.

Patients who undergo Fontan procedures are usually kept in a head-up position to assist blood flow from the head to the heart. However, because she had just had an X-ray, Marietess was lying on her back when Odum returned. Odum testified:

And one of the, either technicians or nurses at the head of the table said, oh, by the way, we had been running epinephrine through that line that was transducing this pressure, but we have taken it out and we have put it in another line. And at that point I was concerned about a pharmacological, pharmacologically induced obstruction on this side related to epinephrine and its vasoconstriction or vaso tightening effects in the system. (Evidence, page 25,482)

In his testimony, Odum explained that he believed the signs of the SVC syndrome were being caused by a response to the epinephrine (or adrenalin). He also indicated that he thought other team members shared the same belief, since he believed they had switched the epinephrine to another site, once the swelling had become apparent.

Odum testified that it was not common to infuse a vasoconstrictor, such as epinephrine, into the pulmonary system, since pulmonary vessels are prone to constricting. He said that it was more appropriate to infuse vasodilators into such a system. Odum testified that he had no problem with Marietess being treated with epinephrine, but he did not want the drug infused into the left external jugular vein (which flowed to the lungs).

He testified that he suspected that the problem was caused by the epinephrine because pressures had been stable for the two hours that he took to close the chest. For all these reasons, he concluded that recent administration of epinephrine had led to a constriction and the SVC syndrome.

This differs from Swartz's account in that Odum indicated that the switch in the site of infusion of the adrenalin was made before he returned to the OR. It is a significant point because, while they were in the OR, Odum and Swartz had a serious disagreement about both the cause of the SVC syndrome and how it should be addressed.

While Odum suspected that the adrenalin had caused the pressure elevation, Swartz believed there was a physical obstruction. Odum claims that he reached his conclusion about the role that the drug played in bringing on the SVC syndrome, in part because team members told him that after the pressures increased they had switched the adrenalin site. However, according to Swartz, the adrenalin was moved from the left jugular line to the left atrial line at Odum's direction after he returned to the OR and after the SVC had been

detected. There was also no indication, she said, that the other team members believed the problem was linked to the adrenalin.

At the time, Swartz suggested to Odum that either an echocardiogram or a 'line-a-gram' be performed to detect any blockage. In a line-a-gram, dye is injected into the bloodstream or into the line and an X-ray is taken. This X-ray provides an indication of where blood flows and where any blockages might lie. According to Swartz:

I had seen this before, actually. It was a similar problem, and we had done a line-a-gram, we had identified an obstruction. The patient had an obstruction because of clot, actually, and the clot was removed and the pressures came back down. And since that was a simple problem, it seemed to me, maybe this was an equally simple problem. (Evidence, page 16,136)

Swartz believed that it would be preferable to identify the problem in the OR, where, if necessary, the source of the swelling could be addressed, rather than attempting to address it in the PICU.

Odum testified that he believed the problem was caused by the adrenalin and could be best treated with drugs in the PICU. He said he did not wish to carry out the types of tests that Swartz was recommending because he felt such tests would not have indicated the cause of the blockage, merely its location. Odum also testified that the dyes used in a line-a-gram could also lead to problems.

Swartz and Odum consulted with Giddins, who also felt that the problem was a narrowing or spasm in the vein caused by medication flowing through the left external jugular line. Giddins agreed with Odum that the best course of treatment would be to take Marietess to the PICU and begin hyperventilation and vasodilator therapy. Swartz testified that she was very unhappy with the decision to leave the OR. She also testified that Giddins told her that Marietess's appearance was not uncommon.

In his testimony Giddins could not recall a serious disagreement between Swartz and Odum and himself over whether or not Marietess should be taken out of the OR. Giddins was asked if consideration was given to stabilizing her in the operating room.

No. In the opinion of all, at the end of the operation, there were set strategies that were felt to be best carried out in the intensive care unit and, in fact, would not be as ideally done in the operating room. (Evidence, pages 4,019–4,020)

Swartz, however, insisted that she made it very clear that, in her opinion, it was not the best strategy to move Marietess to the PICU.

## POST-OPERATIVE COURSE

During transfer to the PICU, one of the lines that Odum had constructed fell apart and had to be repaired. Marietess's condition never significantly improved, once she was transferred to the PICU at 2020 hours. She was cyanotic, air entry to her lungs was poor and she had a severe respiratory and metabolic acidosis. Her head and neck remained swollen. While the pressure in her left external jugular decreased for a period of time, it remained high. As a result, the flow of blood to her lungs and heart remained poor. This lack of blood flow played a major role in the heart failure that led to Marietess's death.

Dr. Ellsabette Doyle, who admitted Marietess to the PICU, indicated in her notes that Marietess was at risk of impaired blood flow to her brain and her lungs and also at risk for heart rhythm problems. In his testimony, however, Giddins said that Marietess's condition was normal for a child following this procedure.

Odim wanted to have Marietess treated with vasodilators and nitroglycerin as soon as possible in the PICU, in an attempt to dilate her vein and lower her pressures. Swartz had ordered nitroglycerin while the team was in the OR; however, treatment with this drug was not started until 2047 hours, almost half an hour after her arrival in the ICU. No satisfactory explanation has been offered for this delay.

The pressures in the left external jugular vein dropped to the mid-twenties once Marietess was in the PICU. Giddins concluded that: "It appeared that the measures that we had planned on starting in the operating room during transfer were working." (Evidence, page 4,004) Odim felt that during the first few hours in the PICU, Marietess's condition was "moving slowly in what appeared to be the right direction." (Evidence, page 25,548)

However, Marietess's perfusion remained poor, and while the pressure in the left external jugular did drop, it never approached an acceptable reading. After approximately three hours in the PICU, those readings began to increase once more. Between 2100 and 2130 hours, the pressure in her left jugular vein ranged between 29 and 33 millimetres of mercury.

A chest X-ray taken in the PICU showed how seriously Marietess's heart was failing: both her lungs were collapsing and the X-ray report described them as airless. The team undertook a variety of steps to try to improve her condition, including using hand ventilation. However, her oxygen saturation continued to fall, while the amount of carbon dioxide in her blood increased. Marietess was treated with vasodilators, at their maximum doses.

Odim and Giddins felt that, given Marietess's fragile condition, they could not perform a line-a-gram. As time passed, the pressures on the right side of her body began to rise.

Marietess also experienced an abnormally fast heart rhythm, called junctional ectopic tachycardia (or JET), which reduced her cardiac output. Attempts were made to slow the heart rate by cooling Marietess and treating her with digoxin. At 0110 hours, Marietess had her first cardiac arrest. The team in the PICU began cardiac compressions, which were continued intermittently until 0313 hours, when Marietess died.

## THE FAMILY ON THE DAY OF SURGERY

Ben Capili and Sarah and Teresida Tena were all at the hospital on the morning of the operation. According to Ben Capili, Lois Hawkins came out to speak with the family about the progress that was being made. Sarah Tena testified that Hawkins came to see them about every four hours. When they asked why the operation was taking so long, Sarah Tena recalled being told that the procedure had started late and there had been problems with unexpected bleeding. Teresida Tena also said that Giddins also brought the family updates on surgery during the course of the day. She testified that at 1730 hours Giddins informed them that there had been bleeding, but that it was under control.

Ben Capili testified that Odim came out of the OR to tell them that the operation had gone well and her blood flow was improving. As a result, they were told, Marietess would not have such severe cyanosis and

would be looking less blue when they next saw her. Teresida Tena and Ben Capili also testified that, at the end of the operation, Hawkins told them that Marietess would no longer be blue when they saw her next.

When the family finally saw Marietess in the PICU at approximately 2100 hours, they were shocked. Her head was not only very blue, it was swollen. The nurse in the PICU told them that Marietess was in serious condition. No one spoke to them about her prospects. However, while they were at her bedside, an alarm sounded, and the nurse told them that they had to leave. The family left the PICU and waited for news. Sarah Tena was allowed to see Marietess after a while. Although Marietess was still heavily sedated, her mother spoke to her.

Giddins told them that Marietess was in critical condition. According to the family, however, there was no suggestion that Marietess would not survive the night, and Ben Capili and Teresida Tena went home. Sarah Tena stayed behind. When a nurse told her that Marietess's condition was getting worse, she phoned Ben Capili and Teresida Tena at approximately 0200 hours and told them to come back to the hospital. The family sat in the waiting room. Giddins informed them that Marietess's condition was poor and that it would take a miracle for her to survive. He came out one final time to tell them that she had died. A short while later, Odum came out to speak with the family.

Sarah Tena testified that, during the course of the whole evening, from the time that the operation was completed and Marietess was taken to the PICU, they had not been able to see her, except for a few minutes. The family, with some justification, believed that the seriousness of Marietess's situation was not properly communicated to them throughout the operation or the post-operative period.

## OPERATIVE REPORTS

Odum prepared two summaries of this operation. One was his operative report; the second was a letter that he wrote on September 14 to Grewar. In both he indicated that there were no technical difficulties during surgery. In the letter to Grewar, he wrote that Marietess's condition on return to the PICU was "satisfactory but critical." He also wrote:

Of concern in the Intensive Care Unit was an increase in venous pressure on the left side with accompanying signs of superior vena cava syndrome.

The left-sided pressures which had been corresponding to the right-sided central venous pressures shortly after operation peaked at 35 cm of water. With infusion of Nitroglycerin through the system on the left side these pressures started to drop and her clinical condition improved. (Exhibit 5, page CAP 52)

He stated that after a period in which Marietess's condition moved in what he thought to be the right direction, Marietess experienced high central venous pressures, poor ventilation, and a collapse of her lungs. He wrote that:

We considered taking her back to the operating room to take-down this Fontan type connection and reconstruct a systemic to pulmonary artery shunt but felt that she would not survive another bypass run. (Exhibit 5, page CAP 52)

Odum indicated that if any new information emerged from the post-mortem, he would forward it to Grewar.

In his operative report, Odim stated:

In the head up position there was some clinical improvement of the upper head edema and we returned to the Intensive Care Unit where Nitroglycerin was selectively infused into the left venous side with evidence of resolving high venous pressure. (Exhibit 5, page CAP 87)

In his testimony, Cornel stated that the bleeding that preceded coming off bypass was an important problem that took considerable action to correct. In his report, he wrote:

The surgeon did not report any technical difficulties with venous cannulation but judging from the anaesthetic record there were significant difficulties and cannulation problems with these cases represent [sic] serious technical complications. (Exhibit 353, page 52)

In his report for this Inquest, Dr. Robert Hudson noted that in neither his operative report nor his letter to Grewar did Odim discuss the incident of hypotension (low blood pressure) that occurred at the time of initial cannulation in the OR. He noted that “severe hypotension just prior to CPB can aggravate the adverse effects of CPB on the heart.” (Exhibit 307, page 8.11) Hudson also stated that he could find no evidence in the record to suggest that the nitroglycerin infusion resolved the high venous pressure as Odim suggested. Throughout her stay in the PICU, Marietess’s pressures remained high. Soder was asked if he believed that the pressures were ever resolved. He pointed out that, throughout her stay in the PICU, Marietess’s venous pressures were above 20, often by significant amounts.

We get very concerned with pressures over 20, we are moderately concerned between 15 and 20, 20 is kind of the upper limit of what is acceptable. And even if you have pressures around 20 after one of these, you would like to see them over the next 24 hours come down into the mid teens.

So, in my opinion, the fact that the pressures were in that range and the patient was doing very, very poorly in terms of being acidotic, there clearly was much evidence that this was not going the way it should. (Evidence, page 44,156)

The evidence would therefore seem to suggest that both the operative report and the letter to Grewar were incomplete and misleading. Contrary to the indication in those documents, there were serious technical difficulties during this operation. Those difficulties lengthened the operation and may have put stress on Marietess’s heart. Odim should have mentioned the hypotension and the bleeding that occurred during cannulation. The letter to Grewar also left the impression that the SVC syndrome was identified in the PICU rather than in the OR. Neither the letter nor the operative report mentioned Swartz’s proposal to have tests done in the OR to determine the cause of the SVC syndrome.

In the letter to Grewar, there is mention of a discussion in the PICU about whether or not Marietess was strong enough to be returned to the OR. This was a discussion that Swartz testified she did not take part in or was even aware of. If Odim thought it appropriate to mention this later discussion (whose conclusion appears to have been foregone), one has to wonder why he failed to mention the earlier discussion in the OR with Swartz.

There was nothing satisfactory about Marietess’s condition when she arrived in the PICU. Her perfusion was poor and never significantly improved. The evidence suggests that the treatment that Odim and Giddins settled upon did not address her underlying problems. Those problems were only identified at her autopsy.

## POST-MORTEM FINDINGS

Dr. Susan Phillips conducted the autopsy on September 15, 1994, with Swartz present as an observer. The autopsy report was completed on November 29, 1994. The autopsy made two important discoveries. The first discovery was that both of Marietess's superior vena cavae had been narrowed by the purse-string sutures that Odim employed when cannulating. The narrowing was more severe at the superior vena cava on the left (into which the left jugular vein drained) than at the superior vena cava on the right.

The second discovery was of a fresh clot or hematoma surrounding her left pulmonary artery and the hilum of the left lung. The hilum is the area where airways, blood and lymphatic vessels and nerves enter or leave the lungs. Phillips wrote that these two factors were the likely cause of the poor blood flow to Marietess's lungs, particularly on the left side. The narrowing of the superior vena cavae would have reduced blood flow to the heart. In the same way, the hematoma would have pressed on the pulmonary artery and also reduced blood flow to the heart.

Taylor believed that the clot likely arose from the removal of the Blalock-Taussig shunt. Soder testified that he believed it was likely that the clot did not form until the post-operative period, since Marietess was treated with anti-clotting agents during the operation. He also said that it was likely that it did not cause the high pressures noted immediately after surgery, since blood could still flow into the right lung if entry to the left lung were blocked by the clot.

## FINDINGS

At the outset of this section, the following issues were identified:

- Should the operation have been performed in Winnipeg or should Marietess have been referred out of province?
- Were Marietess's parents provided with sufficient information to allow them to give informed consent to the procedure?
- What caused the superior vena cava syndrome?
- Should the surgical team have kept Marietess in the OR until the cause of the superior vena cava syndrome from which she was suffering was identified?
- What was the cause of death and was it preventable?

### *Should the operation have been performed in Winnipeg or should Marietess have been referred out of province?*

#### ■ Findings

This was a very complex operation, requiring, as Dr. Walter Duncan indicated, excellence in performance. Given the problems that the team had experienced up to that time, it is likely that this case was beyond the capabilities of the team in September 1994.

Despite the conclusion of the Wiseman Committee's interim report, the team clearly continued to face a number of difficulties. In this case, there were not only problems in the operating room with cannulation and a very lengthy bypass, but also conflicts over treatment that, at the very least, showed serious communication problems. Therefore, the evidence tends to suggest that Marietess should have been referred out of province.

### *Were Marietess's parents provided with sufficient information to allow them to give informed consent to the procedure?*

#### ■ Finding

Marietess Tena Capili's parents were not informed of Odium's experience, either with this set of defects or in general. Nor were they informed of the program's recent history. This evidence tends to suggest that Marietess's parents were not provided with sufficient information to allow them to give informed consent to the procedure.

### *What caused the superior vena cava syndrome?*

From the evidence, it appears that the prime cause of the SVC syndrome was the suture narrowing at the cannulation sites. In their joint report, Duncan and Cornel wrote:

Unfortunately **the significant obstruction at the cannulation site meant that the blood could not get from the venous pool past the surgical anastomosis to the lungs.** (Underlining and bolded in the original.) Dr. Cornel and myself felt that the specimen explains the demise of this patient by demonstrating the important cannulation stenosis. (Exhibit 354, page 11)

None of the consulting witnesses who appeared before this Inquest believed that the SVC syndrome was pharmacological or drug-induced.

Cornel was asked about Odium's concern that there was pharmacological basis for the problem.

If a large dose of a vasoconstrictor substance is run directly into the lungs, yes, it can cause pulmonary, an episode of pulmonary hypertension. Whether it could be to this extent, I don't know. But it doesn't really change what I said. If the blood is not flowing through the lungs because of pulmonary hypertension, it's not flowing through the lungs. And I would then take the operation down. (Evidence, page 44,865)

Soder was also asked if adrenalin could have had the sort of effects that Marietess experienced. He replied:

It could transiently produce a profound increase in pulmonary artery pressure, but the pharmacological affects of adrenaline would last for a very short time. And after discontinuation of the adrenaline, within a few minutes, one would expect the pulmonary artery pressures to return back down promptly. It is a very short acting drug.

*The Court:* Back down to what?

*The Witness:* To the normal levels. If the theory is that the infusion of adrenaline caused pulmonary hypertension to a given level, then withdrawing the adrenaline should return the blood pressure back down to controlled levels within two to three minutes after discontinuation. (Evidence, pages 44,148–44,149)

Hudson was asked if it was wise to see if a pharmacological remedy would work. He replied that he would want to undertake a diagnostic manoeuvre, such as angiography (or the intravenous injection of dye and the taking of an X-ray to study the blood vessels). He was also asked how long it would take to see results from using a vasodilator to decrease the central venous pressure.

If you were to give a vasodilator at an appropriate dose, and I have no idea what the doses were, those drugs act rapidly. So, you would see an effect in minutes. (Evidence, page 40,010)

In discussing Marietess's post-operative care, Soder stressed that the treatment she received in the PICU was doomed to fail, since it was based on a faulty diagnosis.

This was one of the cases that Soder identified as leading to his conclusion that:

**the skill and dexterity of the surgeon performing these operations were insufficient for the challenge of successfully repairing infant hearts with complex malformations.** (Boldface in the original.) (Exhibit 345, page 8)

#### ■ Finding

The evidence suggests that the SVC problem was surgical in nature, that the surgeon's decision to transfer Marietess out of the OR was questionable and that the treatment he supervised in the PICU could not address her underlying problems. The evidence also suggests that Swartz believed this to be the case but was unable to influence Odum or Giddins on this point.

### *Should the surgical team have kept Marietess in the OR until the cause of the superior vena cava syndrome from which she was suffering was identified?*

Several of the consulting witnesses who appeared before this Inquest addressed this issue. They were generally of the view that it was inappropriate to move Marietess from the OR without first conducting further examinations as to the cause of the SVC syndrome.

Cornel testified that the increase in the left external jugular pressure meant that there was either an obstruction in the veins or an obstruction of the blood flowing into or out of the lungs. He said that either the problem with the veins had to be addressed or the repair had to be taken down and the previous shunt re-established. In either case, Cornel testified, the problem had to be addressed in the OR. He said that it would have been possible to locate the problem in the veins by attaching a needle to the end of a line connected to a pressure monitor and inserting the needle into various sites in the veins. By doing this, Odum would have been able to get pressure readings quickly.

In his report, Dr. Walter Duncan wrote that if tests had shown "compression of the anastomoses or intrinsic narrowing, urgent revision and/or decompression might have been attempted—although this would have been a high-risk undertaking." (Exhibit 20, document 363, page 10) In his testimony, he stated that tests in the OR could have identified the suture narrowing that was discovered at autopsy.

Soder testified that the team should have first looked for blockages before leaving the OR. He stated that he would have examined the sites of anastomosis where the vena cava and pulmonary arteries had been joined. If that failed to identify the problem, he said he would then have recommended that the team take pressure readings through a needle puncture, as described by Cornel. After that, he would have attempted

to reduce the pulmonary pressures, since it would appear that Marietess had some form of pulmonary hypertension.

But it is relatively, given that you can do the needle pressures, which you generally can, it makes it possible to sort this one out right in the operating room before going any further. I was surprised that this wasn't, I saw no evidence this was done.

I was surprised to find that they leaped to the conclusion that this must be pulmonary hypertension, treated [her] as such, and took [her] to the intensive care unit. (Evidence, pages 44,140–44,141)

Soder testified that the approach that Odum and Giddins employed was for the treatment of pulmonary hypertension that was caused by a medical problem and not by a mechanical or surgical problem. When asked if he would have left the operating room with the child in this condition, Soder testified:

I would have locked the door. There is no way I would have accepted a medical explanation for what I was seeing. (Evidence, pages 44,143–44,144)

In conclusion, Soder said that Marietess should not have been taken from the OR until a surgical exploration had been conducted to identify the cause of the SVC syndrome.

Hudson in his testimony suggested hunting for variations in pressures with a needle, as Cornel and Soder had both recommended.

#### ■ Finding

Based on the information in the autopsy and the opinions of the consulting witnesses, it is apparent that Marietess should not have been transferred from the OR until further tests had been carried out to determine the cause of the SVC syndrome. The evidence presented to this Inquest indicates that if the proper tests had been conducted in the OR, the surgeon might very well have discovered the suture narrowing of the blood vessels. Once discovered, the narrowing could have been addressed, allowing adequate blood flow. While there would be risks to undertaking such a repair, Marietess's life depended on the cause of the SVC problems being addressed immediately.

### *What was the cause of death and was it preventable?*

#### ■ Finding

Marietess's death was due to failure of the primary repair. While there were no problems with the connection of the vena cava to the pulmonary arteries, the surgeon inadvertently tightened the purse string sutures to the point where they narrowed the superior vena cava. This led to the SVC syndrome, which was ultimately fatal. This conclusion is supported by a number of witnesses. Cornel and Duncan wrote:

While the diagnosis and therapeutic plans were appropriate, the surgical outcome is explainable on an anatomical basis – namely the severe stenosis at the two venous cannulation sites. (Exhibit 354, page 11)

The evidence therefore suggests that Marietess's death was preventable.

## **THE APPOINTMENT OF DR. ANDREW HAMILTON**

In September 1994, Dr. Andrew Hamilton took up a position as an adult cardiac surgeon at the HSC. Because Hamilton's residency training had included pediatric cardiac surgery, Dr. Robert Blanchard and Dr. Helmut Unruh spoke to him before he started at the HSC about his undertaking pediatric cardiac surgery, in addition to his adult cardiac surgery duties. As a result, his contract stipulated that he was to spend 15 per cent of his time performing pediatric cardiac surgery. Blanchard testified that it was initially intended that Hamilton would provide relief for Odim, rather than act as his assistant.

Hamilton took up his position in mid-September. Before that time, despite the implications that such a decision had for Odim, neither Unruh nor Blanchard spoke with him about their intent to have Hamilton look after pediatric cardiac surgery patients.

Despite Unruh's and Blanchard's intentions, Hamilton worked almost exclusively as Odim's assistant. He never did provide any significant relief for Odim, who continued to perform all the pediatric cardiac surgery at the HSC. The nurses and the anaesthetists testified that Hamilton's presence contributed to the smoothness of the procedures that he assisted in. They said that he communicated well and his confidence and competence greatly improved the atmosphere in the Operating Room.

According to Hamilton's evidence, at one point during the fall of 1994 (there is uncertainty about the exact date), Blanchard and Unruh decided that Hamilton would assist Odim at cases where there was a predicted mortality of 10 per cent or higher. The evidence is also unclear as to whether or not this information was communicated to Odim. It would appear that this decision was likely made sometime following the death of Erica Bichel, on October 4.

## **DR. BRIAN POSTL IS APPOINTED HEAD OF PEDIATRICS**

On September 15, Dr. Brian Postl became head of pediatrics and child health at the HSC. Postl testified that he had been made aware of problems with the Pediatric Cardiac Surgery Program in late August or early September. Dr. Jack Bowman, who had been acting as Agnes Bishop's interim replacement over the summer months, had given Postl a short briefing on developments within the program. Bowman indicated that there had been problems, which were being addressed by a committee. A note from Bishop had given Postl similar information.

Postl said that, following his appointment, he began meeting with all the section heads who reported to him, as well as with the various pediatric health organizations in the city. He did not appreciate the magnitude of the problems that the PCS program faced for several weeks.

## SEPTEMBER 20—THE CASE OF ML

ML was an 11-month-old child who underwent an open-heart procedure on September 20, 1994. She had originally been scheduled for surgery on May 19, 1994, but her operation was deferred because of the hiatus in the program.

This procedure included:

- creation of a bilateral, bi-directional cavopulmonary anastomosis
- ligation and division of a right modified Blalock-Taussig shunt
- ligation and division of a rudimentary main pulmonary artery
- ligation and division of the patent ductus arteriosus.

Youngson and McGilton acted as scrub nurses for this operation. McNeill was the anaesthetist, while Hinam provided anaesthetic nursing services.

In her testimony, Youngson said that ML arrested during the attempt to take her off bypass. At this point the aortic cannula came out. Youngson testified:

Now, when we secure a cannula, when we cannulate initially, the aortic cannula is secured with a heavy piece of silk. It's what we call a super stitch. It's just a real heavy piece of silk that is tied around the cannula and sutured into the patient. So it holds that cannula in place so it doesn't come out.

In all this excitement, I don't think that super stitch was put in. So the cannula came out. (Evidence, page 8,600)

According to Youngson's testimony, there was a danger that air would enter the cannula if it was being re-inserted quickly, as it was in this situation, and time was not taken to clear any air from the tip of the cannula. Youngson testified that she felt it necessary to remind Odum to de-air the cannula.

ML was put on bypass for a second time. At that point, the team did not know why she was arresting. After approximately half an hour, there was a second attempt to wean her off bypass. Once more her heart began to arrest.

According to Youngson's testimony, Odum seemed to think the arrest was being caused by a reaction to protamine or to blood products. Youngson testified that Hamilton disagreed, saying that it was something the surgeons were doing in the operative field that was causing the problem. McNeill, McGilton and Hinam corroborated Youngson's account of the difference of opinion between Odum and Hamilton over the cause of the arrest. McGilton testified that Hamilton stated that the arrests were linked to the surgeon's touching a certain part of ML's heart with the forceps. Eventually ML was weaned from bypass.

Youngson observed that ML had experienced considerable bleeding throughout the operation. She felt the child should not have left the OR until the bleeding was controlled. Despite these concerns, ML was taken to the PICU. Hamilton could not recall this case, and Odum was not asked about it.

ML was sent to the PICU without her sternum being closed. She had a lengthy stay in the PICU, and the first night was particularly difficult. Dr. Murray Kesselman attended ML in the PICU. Her significant bleeding problems continued from the time of her arrival until the next morning, requiring constant attention and blood transfusion. In addition, she had a difficult time with hypotension (low blood pressure) related

to her ongoing bleeding. Kesselman called Odim back to the unit several times during the evening, to look for the cause of the bleeding. For the first few times, Odim said, the bleeding was the result of a coagulopathy. Kesselman was not certain that that was the case; however, he testified, “The surgeon comes and looks around and says there is nothing for me to suture. So, that’s what you go with. That’s what you have to deal with and cope with.” (Evidence, page 34,067)

ML’s condition did not respond to treatment for coagulopathy and, in Kesselman’s opinion, she was in serious danger from ongoing blood loss. She suffered a cardiac arrest late that night, but was resuscitated. At about 0700 hours the next morning, Odim sutured blood vessels in ML’s chest and the rapid blood loss stopped. This clearly suggests the blood loss was surgical and not a coagulopathy, as Odim had earlier insisted. From then on, the PICU team was able to stabilize her. She was discharged on October 16.

### **WISEMAN’S MEMORANDUM TO THE DEPARTMENT HEADS**

On September 22, 1994, Dr. Nathan Wiseman sent a memorandum to Blanchard, Craig and Postl, announcing that the committee he chaired had recommended that the Pediatric Cardiac Surgery Program continue at a full level of activity. The committee was still going to meet regularly, and updates would be provided to the three heads.

### **ODIM’S LETTER OF SEPTEMBER 26**

At the same time that the Pediatric Cardiac Surgery Program was returning to full operation, Odim wrote a letter to Blanchard outlining his assessment of the program. The contents and tone of this letter of September 26 suggest that Wiseman may have been too optimistic in his assessment of the work his committee had done to re-establish a measure of trust and confidence amongst team members.

Odim wrote that, when he had come to Winnipeg six months earlier as a young surgeon involved in restarting a complex and depleted program, he realized that the experience would not be easy. The letter went on to exhibit a high degree of frustration and even anger over the events of mid-May.

Within two and one-half months of my welcome here, and unbeknownst to me, there was a concerted effort by the department of anesthesia at the Children’s Hospital to derail the efforts of a building, albeit fledgling, pediatric cardiac surgery program. In effect, this was accomplished by a “walk-out” and an alleged circulated memo to department heads and leaders within the Health Sciences Centre. I was not sent a copy of this memo and hence have neither read this manifesto nor did I receive the common professional courtesy of a priori discussion of their concerns. Naturally, these events have led me to question not only the commitment of these individuals to pediatric cardiac surgery, but their motives and more importantly, their character or lack thereof. In addition, I must confess that the basic trust that develops between surgeon and anesthetist as they care for a child in the operating theatre has certainly eroded [sic] by this conduct. One only hopes that this state of affairs is remediable and not irrevocable. (Exhibit 19, Document 255)

Odim testified that he was not imputing a specific motive to the anaesthetists, but was wondering aloud why they would have refused to provide anaesthetic care without first consulting him. He agreed that a lack of trust could have an effect on the course of an operation. In his testimony, Odium said that in late September he continued to trust the anaesthetists, adding:

I don't think there was an issue of trust. At the time, my sense was that it was just a personality situation, some individuals seemed to hang tenaciously to their own concepts and practice, and I attributed some of that difficulty to personality, not trust or lack of trust. (Evidence, page 25,599)

When the portion of his letter that stated that the basic trust between surgeon and anaesthetist had been eroded was read back to him, Odium testified:

Let's take a step back. The conduct is referring to the fact that they would withdraw services without the professional courtesy of discussing issues with the surgeon.

Now, if this is their typical conduct, then how do I know when I go into the battle field that issues won't be discussed with me? And that's the intent, or that's the meaning of that statement. It has nothing to do with the fact that I didn't trust them. My concern was that if they could take a step like that, without discussing things with me, then I have to be concerned that this could happen in future, in the operating room, where there is silence and no communication. And that's the background to that statement. So the conduct I'm referring to is the manner in which things had happened. (Evidence, page 25,600–25,601)

Odim wrote that during the suspension of the program, 10 children had been sent out of province, with a 30 per cent mortality rate. In actuality, 14 cases had been transferred out of Manitoba during the hiatus. He complained that during this period, the anaesthetists dictated who could undergo cardiac operations in Winnipeg. While the program was now going to be working at full service, he said, there were a number of obstacles to its long-term success. To Odium, these obstacles related to anaesthetic services.

When I arrived here in Winnipeg there was no leadership within the division or group for pediatric cardiac anesthesia. There are four part-time individuals of varying expertise and experience who participate in cardiac anesthesia at the Children's Hospital. It is difficult to figure out, on a case-to-case basis, which of the individuals is scheduled, particularly given the varying level of expertise and experience and the complexities of the cases. Furthermore, because of the limited caseload, no one of this group gets an opportunity to develop any considerable experience in order to maintain their skills in a rapidly changing field. In fact, skills in intraoperative transesophageal echocardiography, a standard throughout North America is lacking. While I am very sympathetic to their anxiety and comfort level, particularly since these individuals are all part-time who for the most part are involved in minor surgical, office based, day surgical, low anesthetic risk procedures at the Children's Hospital. Given the part-time nature of their commitment to pediatric cardiac surgery, it is quite understandable why such a group find four and sometimes five anesthetists necessary to cover 50–60 open heart procedures over a twelve month period. Unfortunately, this sharing of commitment and responsibility, dilution of experience, does not make for better patient care. When the pediatric cardiac surgery team evolved and it became readily apparent that there was no leadership in pediatric cardiac anesthesia, a spokesperson, who in my opinion has the least experience and expertise in pediatric cardiac anesthesia, was elected by vote. This is simply not a satisfactory solution. In addition, attempts to find out what the requirements are for maintaining skills in pediatric cardiac anesthesia at the Children's Hospital have been in vain. When rebuilding a pediatric cardiac surgical service commitment from all players is mandatory. Moratoriums simply skirt around the fundamental issues while rust and a loss of skills accrue from inactivity. (Exhibit 19, Document 255)

Odim then stated it was necessary to make more use of the expertise of the adult anaesthetic staff. He said there should be only two anaesthetists providing services on pediatric cardiac cases. He also believed that it might be necessary to recruit at least one of these two persons. Another solution would be to place cardiovascular anaesthesia under a single head. Odium also called for the consolidation of post-operative care.

In closing the letter, Odium stated that he would welcome an external review of the entire Pediatric Cardiac Surgery Program.

To date, our internal review process has focused primarily on surgical issues. I think an expansion of this process to include other aspects, in particular the competence of pediatric cardiac anesthesia and the requirements for maintenance of skills in these areas. I think these issues are critical if the Children's Hospital is to discard its present masquerade as a tertiary care Children's Hospital for the province and central Canada. (Exhibit 19, Document 255)

Odim testified that he was not questioning the competence of the anaesthetists; instead, he was requesting an examination that would ask if people could maintain their competence while doing a limited number of cases.

Odim provided Blanchard with both a mission statement and a summary of his proposals. The latter included the development of a single cardiovascular anaesthesia service and the move to have two anaesthetists provide care for pediatric cardiac surgery, consolidation of the two ICUs and the appointment of a nurse clinician. In addition, Odium sought to expand service into the United States and establish relations with a pediatric cardiac centre in the Third World.

Odim also wished to perform pediatric heart transplants. Blanchard said he thought that the latter point in particular was unrealistic in Winnipeg.

Blanchard testified that he was surprised at the strength of feeling in the letter. He said that he had spoken to Odium on occasion during the summer and had been left with the impression that progress was being made on the issues in pediatric cardiac surgery. Blanchard was asked:

Reading this letter, did it seem to be that perhaps that dissension, instead of being remedied by the Wiseman Committee, was ongoing and festering?

*Blanchard:* That's all I could infer from this. (Evidence, page 36,597)

Blanchard was then asked:

I guess what I was ultimately coming to is, after you read this letter and after you spoke to him, did you give consideration to either having—taking some steps, either an external review, slowing down the program, or doing something to get at these issues. Because if the letter is an accurate reflection of what Dr. Odium thought, it would suggest that the Wiseman Committee had not succeeded in a lot of these, in the issues in terms of inter-personal conflict. Would you agree with that statement?

*Blanchard:* That was my assumption. So when I spoke with him I told him, you know, that he has suggested an external review. I said that an external review is a very serious matter, and I said, you know, if there is an external review, you will come under very, you know, strict scrutiny, as well as anaesthesia or whatever other things you might be concerned about. So you need to realize that too. But I said, do you really think that the problems are of that nature?

And he said—well, I don't remember exactly what he said, but he was willing to go ahead with an external review, but at the same time he felt that the program was functioning okay. So I said, well, I will run this through the department heads, and we will talk about an external review.

*Question:* So based on that assurance, and I guess whatever other information you had about the program, you allowed the program to continue and then started discussions about an external review, correct?

*Blanchard:* Yes. (Evidence, pages 36,600–36,601)

Odim testified that several weeks after receiving the letter, Blanchard spoke to him a second time about an external review. He testified that Blanchard recommended waiting until Dr. William Lindsay arrived. Lindsay was coming to Winnipeg as the new head of cardiovascular and thoracic surgery and cardiology for both the HSC and St. Boniface General Hospital. Once he arrived, it was hoped that Lindsay might conduct a review of the program.

Odim's letter must be considered from a number of perspectives. First of all, it raises a number of quite legitimate matters. It was quite legitimate for Odium to question whether or not the program would be better served if there were only two, as opposed to four, anaesthetists. It was also quite legitimate to propose a different approach to post-operative care. Representatives from the Department of Anaesthesia did not agree with Odium's view on how many anaesthetists should provide care in the program. This was a matter of legitimate debate, just as the post-operative care issue was one on which there could be legitimate and differing points of view.

However, there is a great deal about this letter that is disturbing. Throughout the entire Wiseman Committee review, the evidence indicates that Odium acted in a restrained manner and raised only a limited number of issues. A number of witnesses indicated that he did not give any sign of having been personally wounded by what was undoubtedly a very distressing event, namely the May 17 memorandum and withdrawal of services.

Yet it is clear from this letter that the anaesthetists' withdrawal had touched him deeply. That is understandable. But many of the views expressed in this letter are little more than petulant. While Odium was not sent a copy of the May 17 memorandum, he was present at a meeting where it was discussed on the morning of May 17. He had every opportunity to read it and respond to it at that time. He seems to have stubbornly refused to do so, however.

Odim's comments on the anaesthetists' character and motives raises a more serious issue. It is not surprising that he harboured strong feelings towards the anaesthetists, but it is clear that these feelings went beyond personal dislike. In this letter he was indicating that, as a surgeon, he had lost much of his trust in them as anaesthetists. There is no indication that he raised this issue during the previous three months when the program was restricted to low-risk cases. If he had done so, then it is likely that it would have sparked a heated but needed discussion at the Wiseman Committee.

It is difficult to believe that the committee could have concluded that the program was ready to go back to full service if Odium had tabled such a letter or given voice to the sentiments in the letter at a committee meeting.

It is clear that Blanchard also found this letter disturbing. When Blanchard distributed the letter to them at the end of October, Postl and Craig were also disturbed by it. It was clear to all of them that an external review was necessary. Their intention was to have Lindsay conduct this review.

The letter, however, should have led Blanchard to question the wisdom of allowing the program to remain at full service. It would have been the proper thing to immediately speak to Wiseman and to have asked for his views on the issues it raised. Blanchard also should have distributed it to the other department heads immediately, instead of waiting until the end of October to show it to them.

## **SEPTEMBER 27—THE CASE OF JB**

On September 27, JB, a six-month-old child, underwent surgery to close a ventricular septal defect and an atrial septal defect, and to ligate a patent ductus arteriosus. Surgery was complicated because she suffered from pulmonary hypertension.

In this operation, Odum was assisted by both Hamilton and Hancock. According to Wong, who provided the anaesthetic, the operation was marked by problems with cannulation.

Wong testified that the patient ran into trouble during insertion of the venous cannula. At that point, he said, there was a significant loss of blood and a drop in blood pressure. He attempted to raise the blood pressure by treating JB with medication, but was becoming worried that JB would arrest before she could be placed on bypass. “So I said to the surgeons, if you don’t get this child on bypass now, this child is going to die.” (Evidence, page 19,923) Wong testified that the surgical field was full of blood, the team had initiated sucker bypass and the patient had not been cannulated. Shortly after that, the child was successfully cannulated and the operation proceeded.

In their evidence Odum, Hancock and Hamilton said they could not recall problems with cannulation in this case. The PICU resident’s notes corroborate Wong’s version of events, in that they indicate that, on transfer of the patient to the PICU, Wong told her that there had been difficulties with cannulation and sucker bypass had been instituted.

JB was discharged on October 18, 1994.

## **THE SEPTEMBER 28 MEETING OF THE WISEMAN COMMITTEE**

The Wiseman Committee met on September 28. Much of the meeting was spent discussing post-operative care. Preliminary acceptance was given to what was referred to as the ‘One Team – One Location Model.’ Under this model, post-operative care would be provided in a single setting by a team that allowed the neonatal intensive care unit staff to participate. Further meetings with the heads of the PICU and the NICU, along with the respective nursing officials, were recommended.

According to the minutes as well, a number of cases were discussed, including one death (the Tena Capili case) and the ML case, in which the child was taken to the ICU in critical condition and had made a slow recovery. There was also discussion about the cancellation of a case, accompanied by a disagreement between those who thought that the program should take on all cases and those who wished to take a more conservative approach. The other issue of longstanding dispute discussed at this meeting was the treatment of post-operative bleeding. As in the past, committee members did not resolve their disagreement; nor did they agree on a particular plan of action on the matter, other than to treat all cases post-operatively in one ICU setting.

Youngson had prepared some notes on the Tena Capili case and had provided them to Wiseman before the meeting. At the end of the meeting, Wiseman pushed Youngson’s notes forward on the table, to let her know that she should speak then if she wished to address the case. Youngson testified:

I just shook my head.

Because by that point in time, there was just no way I was going to say anything any more. I had seen what happens, I had seen some kind of unpleasant things at that meeting, or heard of unpleasant things happening at that meeting, and there was no way at that point in time that I was going to speak out any more. (Evidence, page 8,554)

The fact that Youngson did not speak out at this meeting about the Tena Capili case is an indication of the degree to which the nurses had been silenced by the review process.

## **SEPTEMBER 30— THE MEETING OF DEPARTMENT HEADS**

On September 30, Postl met with Blanchard and Craig. They provided him with a briefing of the history of the Pediatric Cardiac Surgery Program in 1994.

Later that day Postl wrote to Wiseman, asking to see a copy of the case reviews that had been undertaken by the Wiseman Committee (Exhibit 19, Document 257). On October 21, Wiseman responded that there had been no detailed minutes or records concerning individual cases.

The review was carried out specifically to look for problems and to look for common themes with respect to problems which had been encountered.

The individual case reviews would occur at the Mortality Review Committee, both at the College and hospital level. I believe these are subject to the Evidence Act and are essentially not available.

I can supply you with a list of cases and the associated mortality attached to that list which comprised the initial experience. This perhaps will be of some assistance. (Exhibit 19, Document 263)

This response once more underscores the inadequacy of the committee process. The committee had been mandated to look at the underlying questions of mortality and morbidity; yet, after recommending a return to full service, it had no records that could be shared with Postl. It is to Postl's credit that he expected that there would be case reviews and that he sought to familiarize himself with them. It should be noted that Wiseman's response (which came three weeks after Postl's request) would have left Postl with the erroneous impression that the committee had produced no documentation.

On the same date, Postl also wrote to Boyle, asking for an update on issues relating to pediatric cardiac surgery. Boyle never responded in writing to this request. However, Postl said that he spoke with Boyle about the issue a number of times and was made aware that nursing staff still had problems with the program.

Postl also testified that, as part of his orientation that autumn, he spoke with Giddins, who as acting section head for pediatric cardiology reported to him. Neither Ward nor Giddins expressed concerns about the program's ability to provide full service. Kesselman informed Postl that he was satisfied with the workings of the Wiseman Committee. Postl also spoke about Odum to Hancock, who told him that he was performing very well.

During the fall, Postl became involved in discussions with both Seshia and Kesselman about the possibility of centralizing post-operative care for pediatric patients who had undergone open-heart surgery.

Seshia testified that the NICU staff did not believe there had been any increased morbidity or mortality as a result of any post-cardiac surgery children being treated in the NICU. However, she said, the NICU staff recognized that the interests of the patients were paramount. Since it was the surgeon's wish to have all the patients treated in the PICU, and since there was a low volume in the NICU, she said "it made sense to have them all looked after in one place by a smaller team of individuals." (Evidence, page 33,514)

On September 30, Seshia met with the NICU staff to discuss the amalgamation of post-operative care of pediatric cardiac surgery patients. At that meeting the NICU staff gave general approval to the proposal.

### **THE END OF SEPTEMBER: THE NURSES ARE DISTRESSED**

By the end of September, many of the nurses were once more disturbed and distressed by the operation of the Pediatric Cardiac Surgery Program. Joan Borton, a nurse clinician with the VCHC, was so troubled that she sought to limit her involvement with the parents whose children were being treated at the VCHC. Her lack of confidence in the program increased when she overheard Odum and Giddins discussing a recently completed operation, with Odum expressing surprise to discover that the child's anatomy was not what he had expected.

She also testified that in September she spoke with Kesselman and concluded that he had doubts about the program as well.

Because the comment that I remember him making was that none of his family or his friends would be done at Children's Hospital at this point in time. I said, yes, but, Murray, that's what I have a problem with, if we wouldn't allow our own children to be done in this hospital, why do we allow other people's children to be done? It should be the same.

*Q:* His response to your comments?

*A:* He nodded his head. He didn't verbally say anything after that. (Evidence, pages 18,233–18,234)

In his testimony, Kesselman had indicated that he was satisfied with the Wiseman Committee procedure and its outcome. He was not questioned about this conversation with Borton.

Donna Feser, a senior PICU nurse, testified that the PICU nurses were not informed about the decision to take on high-risk cases in the autumn. They could, however, tell that there was a change from the types of cases that were being scheduled. This gave rise to considerable anxiety among the nursing staff, since they expected high-risk children to return from the OR in poor condition.

Feser gave this description of her memory of the fall of 1994.

For me that's when everything started to blend together that fall. My anxiety level got to the point, from my perspective I started to get into a position where I was, I would call it a functional role. I was having such a difficult time dealing with all of the emotions from what I was seeing in the unit, the sick kids were coming out with so many complications and so many—especially all of the open chests and all of the pacemakers that were, extra pacemakers that we were seeing. We were seeing kids that were really very, very sick, much sicker than we were used to seeing from the previous program.

I mean, like I said, it got to the point where I really had a difficult time in even wanting to come to work, because I really felt, every time I came to work I was feeling quite sick. It was very difficult to

see these kids struggle, struggle to survive, see these parents suffer, you know, see them, you know, bring their children into us and, you know, trusting us and hoping for the best. And you know, there were many deaths that we had a very difficult time dealing with. (Evidence, pages 30,002–30,003)

She said that, in the past, she would not expect a child with a VSD to arrive in the PICU with an open chest, with excessive bleeding, with clots, or with a need for a pacemaker, but that was the way they arrived during the period when Odum was operating.

Youngson testified that she also attempted to change her role to limit her contact with parents at about this time. She had already decided that she was not going to be involved in pediatric cardiac cases after February 1995, if things continued as they were. She had even considered telling parents to “take your baby and run.” (Evidence, page 8,779) She found it hard to take the children from the arms of their mothers and carry them into the operating room.

When asked why she did not warn parents away from the program when she had so many doubts about it, she said:

Well, first of all, when I see these parents, we are literally at the door of the operating room. They have gone through all of the pre-op teaching sessions, they have gone through all of the stress of preparing themselves for this particular event, and I can't imagine anything could be more stressful for a parent than something like this. I could sort of paint a picture of what it would be like if I had gone out to this parent and said, stop, you can't do this, take your baby and run or whatever. I wouldn't have said it like that, but just don't take this child, I don't want to take your child in.

What would have happened then would have been that all hell would have broke loose. They would have called Dr. Odum, they would have called Dr. Wiseman probably, called the director of nursing up. There would have been this big group of people come to this, wherever we were, waiting room or wherever. I would have been very upset by then, probably crying. There would have been Dr. Odum and Dr. Giddins and whomever, calm, cool, collected. I would have looked like an over emotional, almost crazy person. You know, they would have just thought, they would have talked to the parents, they would have said, maybe this nurse is just overreacting, maybe she is over emotional.

As a parent, I think it would depend on the parents, would they have listened? Maybe they would have backed off, maybe they would have said let's wait another day and rethink this. Maybe they would have listened to Dr. Odum, listened to Dr. Giddins, whom they knew and had met several times before, and don't forget they are just meeting me for the first time at that point. I don't think it would have done any good. I think perhaps I could have saved that one child, and I still think about that from time to time. But there would have been more kids come in, the next kid—I would have been out of there. I would not have had that job any more. I would have been out of there. The program would not have stopped, and there would have been more kids come in the next day or the next week. And nothing good would have come out of that. (Evidence, pages 8,779–8,780)

Given that there is a growing expectation that nurses act as patient advocates, and take an oath to conduct themselves with honesty and integrity, safeguard the quality of nursing care and protect patients from unsafe, incompetent or unethical care, some might argue that Youngson should have spoken to the parents about her concerns.

However, as she indicated, she was in a very difficult position—and was essentially torn between her professional responsibilities and her growing moral qualms. She and the other OR nurses cannot be faulted for their actions. While nurses are expected to act as advocates, the expectation is that they restrict their actions to those areas that they are professionally competent to judge.

Secondly, there is an expectation that they would take their concerns about a fellow medical professional to that professional first. If the concerns continue, the expectation is that the nurse would then speak with a supervisor, who would then deal with the matter or move the matter further up the line of responsibility. If this fails to bring about a satisfactory resolution, the nurse would then be expected to report the matter to a professional licensing body.

When a matter lies outside a nurse's specific area of expertise (nursing), the general expectation has been that the nurse would not take concerns directly to patients or the parents of patients. When Youngson had raised any concerns with Odum, she had not found him receptive. She had also raised her concerns repeatedly with her own supervisors.

They, in turn, had acted appropriately: Karin Dixon had brought the concerns to the attention of Isobel Boyle, and Boyle in the spring of 1994 had brought the concerns to the attention of Bishop, Wiseman and, according to Boyle's testimony, the responsible vice-president, Susan VanDeVelde-Coke. Once the Wiseman Committee process had moved the program back to doing high-risk cases, Youngson and other nurses had good reason to believe that their voices would not be heard. While they continued to raise their concerns with their supervisors, the ineffectiveness of that process drove Youngson to consider taking her concerns to the broader public.

To recap: within weeks of the program resuming full activity, it appears that the surgeon had no faith in the anaesthetists, that many of the anaesthetists were alarmed by the events in surgery and that some nurses were concerned about the morality of their continued involvement with the program.

### *Whistle-blowing*

There is a considerable body of material about the phenomenon of 'whistle-blowing' in medicine. In this context, whistle-blowing refers to the situation where a person relays information to someone outside the regular reporting process of a hospital in order to reveal something that has happened, in an attempt to bring about a more public investigation. Obviously, with the issues of confidentiality and privacy that go with medical treatment, hospital personnel cannot easily speak publicly about how a particular patient or group of patients have been treated or are being treated in a particular facility, by a particular doctor, or within a particular medical program. As well, with hospitals having put in place processes for staff members to relay their concerns about treatment, it is reasonably expected that if the proper process is used, proper steps will then be taken to address legitimate concerns.

There may be reasons why someone may become frustrated. The process may be too slow. The concern may not be accepted for reasons that are not appropriate, for example, a doctor's view being given greater weight than a nurse's, simply because of differences in status. (It must be kept in mind that doctors largely control review processes within hospitals.) For nurses, there is the additional matter of overcoming the historical burden of silence expected of their profession. Nurses who speak out, particularly in a manner that is critical of doctors, are still seen as committing an act of disloyalty, regardless of the legitimacy of the concern. Alternatively, the hospital may not be interested in investigating the issue, perhaps for reasons of legal liability.

Little protection exists for 'whistle-blowers' in the Canadian medical system, particularly if the system does not validate their complaints. Given the outcome of the Wiseman Committee process, Youngson had

good reason to fear that her complaints would not be validated by the hospital, even if she went public with them. The problems that confronted Youngson and the other nurses in getting heard do not reflect a lack of professional responsibility on their part; rather, they appear to reflect the historically subordinate role that the nursing profession has played in our health-care system.

The issue of whistle-blowing was raised with the Inquest as something that required redress in Manitoba's medical-care system. There does appear to be merit to that view. In this case, none of the persons involved actually went outside the processes available to address the concerns they had. While those with concerns appear to have spoken with all those in positions of authority who they could identify, none of their actions came close to involving people who were outside the very institution that had a responsibility to do something about those concerns. However, the concern that Youngson had about going to speak to authorities outside the hospital and the personal and professional risk she ran on doing so, point to the need for change in this area. Chapter Ten contains recommendations for changes to protect whistle-blowers.

## THE CASE OF ERICA BICHEL

### ISSUES

Erica Nicole Bichel died on October 4, 1994, after undergoing a first-stage Norwood procedure. Her case gives rise to a number of issues:

- Should the Winnipeg team have attempted another Norwood procedure, given its recent history and its level of experience?
- Should Erica have been transferred out of Winnipeg?
- Should the operation have taken place before October 4?
- Were her parents provided with sufficient information to allow them to give informed consent to the procedure?
- Was Erica given adequate myocardial protection?
- What was the cause of death and was it preventable?

### BACKGROUND AND DIAGNOSIS

Erica Bichel was born at the Victoria General Hospital in Winnipeg, on Thursday, September 29, 1994, at 2301 hours. The third daughter of James and Judith Bichel, Erica had a normal delivery at only 36 weeks gestation.

On her admission to the nursery at the Victoria General at 0010 hours on September 30, the initial nursing assessment found Erica to be alert, active, with pink colouring and in no respiratory distress. There was no detectable heart murmur. Over the next 24 hours, however, as her ductus arteriosus began to close, Erica's condition started to deteriorate. Her colour became dusky, her respiratory rate increased and she had trouble feeding. On October 1, the Neonatal Transport Team transferred Erica to the HSC, arriving at 1651 hours. This was just over 40 hours after she had been born.

Erica was admitted to the NICU at 1700 hours. By 1930 hours, she was pale and mottled, with increased duskiness. Her heart rate was rapid at 178 beats per minute, her blood pressure had dropped and her oxygen saturation had fallen. A chest X-ray revealed her heart size to be at the upper limits of normal and the findings suggested pulmonary edema.

She was diagnosed with:

- tricuspid atresia
- an atrial septal defect
- anomalous pulmonary venous connection
- transposition of the great arteries
- a hypoplastic aortic arch with coarctation
- a small VSD
- severe hypoplasia of the right heart.

The ductus arteriosus had closed, but reopened after Erica had been given prostaglandin.

Tricuspid atresia meant that Erica lacked the normal opening (or tricuspid valve) between the right atrium and right ventricle. The large atrial connection denoted a hole in the wall between her left and right atria. The pulmonary veins usually connect to the left atrium individually; however, in this case they came together as a single vessel before connecting to the atrium. As a result of the transposition of the great arteries, Erica's aorta and pulmonary artery were each connected to the wrong ventricles. Because of the coarctation of the aorta, this blood vessel was pinched and underdeveloped. The pinching restricted blood from flowing from the heart to the rest of the body. In Erica's case, the right ventricle was severely hypoplastic (underdeveloped). This left her reliant on her left ventricle for all of the heart's pumping action to the body and to the lungs. It should be noted that she also had a hole in the septal wall between her ventricles.

The presence of an underdeveloped right ventricle and transposition of the great arteries meant that Erica had functional, as opposed to a true, hypoplastic left heart syndrome.

In their report for this Inquest, Duncan and Cornel concluded that Erica's difficulties had been properly diagnosed. If she was to survive, it was necessary that surgery take place within days of the diagnosis.

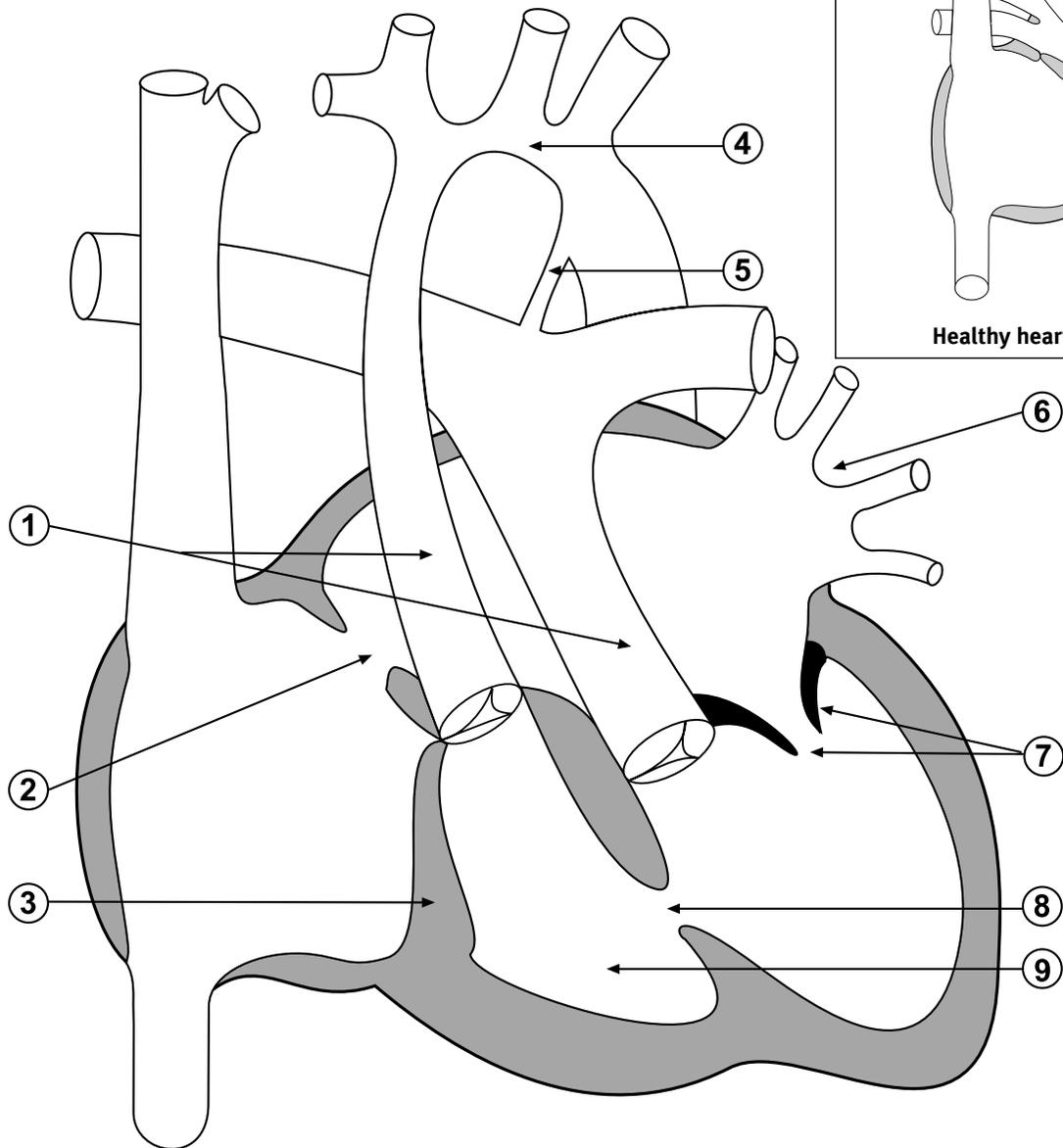
## THE DECISION TO OPERATE

Dr. Cameron Ward examined Erica on October 1 and found her to have palpable but weak pulses in her arms and legs and an enlarged liver. These findings indicated poor blood flow from the heart to the body and congestive heart failure. In his testimony, Ward described Erica as "catastrophically unwell by that stage." (Evidence of Dr. Ward, page 70) He concluded that the only treatment would be a type of Norwood procedure.

Ward treated Erica with prostaglandin to keep her ductus arteriosus open. He inserted an endotracheal tube and instituted mechanical (artificial) ventilation. He also treated her with a diuretic, Lasix, to keep her lungs clear of fluid.

Erica's heart, which had only one working ventricle, faced a number of very difficult challenges if it was to get oxygenated blood to all the parts of her body. The coarctation and the transposition created numer-

Diagram 8.3 Erica Bichel – pre-operative heart



- 1 – Transposition of the great arteries
- 2 – Atrial septal defect
- 3 – Tricuspid atresia
- 4 – Hypoplastic aortic arch (with coarctation)
- 5 – Patent ductus arteriosus

- 6 – Confluent pulmonary veins (diagnosed as anomalous pulmonary venous connection)
- 7 – Dysplasia of mitral valve
- 8 – Ventricular septal defect
- 9 – Hypoplastic right ventricle

ous problems, in terms of pressures and blood flow. To help the function of her single ventricle, Erica was given dopamine, a drug that improves the heart muscle's ability to pump. However, the tasks that her heart was required to undertake actually weakened or compromised it. As a result, she required ever-increasing doses of dopamine.

As noted in Chapter Two, there are only three options for a child with the problems that Erica faced: 1) a heart transplant, 2) a Norwood procedure as the first step in a series of staged repairs, or 3) comfort care until the child's heart fails. In Canada, transplants for patients like Erica were quite uncommon at that time.

This would be the second Norwood-type procedure that the team performed in 1994. Giddins testified that, while Erica was smaller than Daniel Terziski, who had undergone the first Norwood-type procedure, the fact that the team was "that much more integrated would potentially be in her favour." (Evidence, page 4,048) Giddins's view that the team was "that much more integrated" seems out of touch in the face of the evidence, which suggests a deepening rift existed between Odium and the anaesthetists as well as between Odium and the nurses.

Giddins testified that he approved of the decision to undertake the Norwood. He saw no reason to canvass the team members to see if they felt the program was ready to handle this case. Considering the issue of case selection that the anaesthetists had raised during the Wiseman Committee process, and the tensions within the team, this also seems to have been a particularly unwise decision.

Ward spoke to Erica's parents that evening. He testified that he told them that, unless Erica underwent a Norwood repair, she would die. He also indicated that a Norwood itself was an extremely risky procedure that would leave Erica functioning with half a heart. According to Judith Bichel, Ward told them that Erica only had a 30 per cent chance of surviving surgery, adding that the surgeon would probably give the family better odds. In his testimony, Ward said that he could not recall any consideration being given to transferring Erica out of province. He testified:

I don't think that transporting this child would have been a great option anyway. Transporting any sick neonates to another centre when they're requiring intensive care is always to the patient's detriment, and the only question is whether the detriment of that patient overcomes any—any potential benefit that you get from moving to the other centre for the surgery and/or post-operative care. (Evidence of Dr. Ward, page 78)

Ward was also asked about if he had doubts about whether or not the team should be undertaking this operation in Winnipeg.

What was my view? I guess that at that stage I was new to the program. I didn't really have a perspective at that stage as to whether I thought the surgery should or should not be performed there. My own honest opinion was that this child would likely die wherever it was operated on. (Evidence of Dr. Ward, page 79)

Odium saw Erica that evening at 2250 hours and concluded that a type of Norwood procedure was required.

On Sunday Odium spoke with Erica's parents about her condition and diagnosis. He was asked what he told the parents.

I presented those options to the Bichel family, and presented the options in Canada, really being doing nothing or a Norwood operation. And at the time the child had just been resuscitated, and the general consensus, as was my consensus, was that this was going to be a very high risk venture, even more so than usual because of the requirement for resuscitation and drug therapy. (Evidence, page 25,649)

Judith Bichel testified that Odim had explained the repair and its risks to her and her husband. He told them that Erica's chances of survival were fifty-fifty. She said that when her husband had asked if Odim had performed this procedure before, Odim had told them he had not, but that he had assisted in such operations. Why he did not tell them of his experience with the Norwood procedure in the Terziski case is open to speculation. Judith Bichel said that they were not told of any alternatives to this type of procedure; nor was a transfer to another centre suggested.

Odim testified that he could not recall if he spoke with the Bichel family about his own experience with Norwood procedures. Odim was asked if it was standard procedure to discuss either his experience with a lesion or the institution's experience with the lesion with parents.

It was not—it varied case to case, it wasn't a standard procedure to talk about my particular experience or the number of cases that I had done. It came up from time to time with certain families who queried, but it wasn't a standard approach.

*Q:* Again, the way it came up was if they asked, is that correct?

*A:* Usually, yes.

*Q:* Was there any discussion about the possibility of doing this surgery in another centre?

*A:* Not that I can recall.

*Q:* Okay. So you don't recall considering that option?

*A:* No, I don't. (Evidence, pages 25,653–25,654)

It was pointed out to Odim that the decision to undertake this very risky procedure was being taken less than a week after he had sent Blanchard a letter indicating his dissatisfaction with the program. He was asked if there was not a contradiction between the feelings expressed in the letter and the decision to undertake a Norwood.

Certainly the members of the team throughout the year had discussed issues of Norwood operations. It was discussed during the Wiseman committee, and there really wasn't any indication that team members felt that we should not be embarking upon offering this as a last ditch effort for families.

So at the time this procedure was contemplated, certainly the general consensus was this child was too sick to go anywhere. And secondly, if anything were to be done, it would probably have to be done here in Winnipeg. And the families were presented that option, or this family was presented that option, albeit very risky. (Evidence, page 25,655)

Cornel was asked if he thought that it would have been possible to transport Erica to another centre. He replied:

I can't really comment on the first day, but after that she was, all the time she was in hospital I think she was being managed pretty well, and I think she was deteriorating constantly. I don't think she could have, honestly. (Evidence, page 44,874)

When asked if it would have been difficult to transfer Erica, Dr. Walter Duncan testified:

Yes, I think transfer would have been quite hazardous. Again, you can argue it may not be as hazardous as performing surgery. I think that some centres in Canada would not do this type of surgery, given the information. (Evidence, page 41,446)

In a surgical note that he made at the time, Odim wrote that he reviewed all of the options including non-surgical and palliative. He also wrote:

As this is not a true HLHS [hypoplastic left heart syndrome] she falls into a more favourable category of child undergoing the stage one Norwood procedure en-route to a Fontan. The risks and attendant post-operative problems have been discussed with the family in detail. They seem to understand and give their verbal and written consent for operation. (Exhibit 3, page BIC 36)

Odim was questioned about his comments that Erica was in a more favourable category, particularly in light of his statement that hers was a very high-risk case.

[H]er single ventricle was a left ventricle as opposed to a right ventricle in true anatomic hypoplasia of the left side of the heart. And the experience and data seems to indicate that if you have a single ventricle, many a times the left ventricle seems to perform a little better, because it is more programmed embryonically and genetically to do the high pressure systemic work, as opposed to the right ventricle which has a different shape and a different genetic program, just to do pulmonary work. (Evidence, page 25,652)

Odim indicated he had planned for a period of treatment and then surgery on Tuesday morning. The hope was that controlled ventilation, prostaglandin and dopamine would stabilize Erica. However, the evidence shows that she was never in stable condition before surgery.

After the operation, Odim wrote a note to Erica's doctor, Dr. Matthew Lazar. In the letter, Odim wondered if an earlier repair would have made a difference in the outcome (Exhibit 3, pages BIC 21-22). However, none of the witnesses to this Inquest were critical of the decision to attempt to stabilize Erica's condition before surgery.

## PRE-OPERATIVE STATUS

Erica's blood pressure and central venous pressure (CVP) dropped all day on October 2, requiring an increase in the use of dopamine. Her urine output was good. She had mild pulmonary edema, for which she was treated with a diuretic. A chest X-ray showed improved ventilation of the left lobe of her lung, when compared with an X-ray taken that morning. However, there was a suggestion of collapse in the right lung and the presence of a small amount of pulmonary edema.

That day the Bichels gave verbal consent to proceed with the operation on Tuesday, October 4, 1994.

Erica's colour remained pale and dusky and she was jaundiced, a sign that her liver was failing. She was given a drug (Pavulon) to relax or weaken her muscles. This was done to decrease oxygen consumption by the muscles and make mechanical ventilation of her lungs easier. Erica required many changes to the settings of the ventilator during the day, to accommodate her declining oxygen saturation.

## A DESPERATE SITUATION

On October 3, Erica's condition remained extremely unstable. Large amounts of clear yellow secretions were suctioned from her endotracheal tube and her mouth. In the evening, she had decreased chest expansion problems and an increase in the amount of carbon dioxide in her blood, with a resultant need for

increased ventilation. The prostaglandin was also increased, with the result that her femoral pulses felt much stronger.

Erica's blood pressure dropped, but then improved with increased doses of dopamine. On admission to the HSC, she had been treated with five micrograms of dopamine per kilogram of body weight per minute. By the time she went to the operating room, she was receiving 20 micrograms per kilogram of body weight per minute. By that point, she was said to be 'inotrope dependent'. In other words, without the dopamine, Erica's heart could not have continued pumping. As Odum testified, this reduced her chances of surviving the operation. He said that from Saturday, October 1 onwards, her condition worsened:

The child then deteriorated over the next days to the point where the child was on a significant amount of inotropic agents and it became very difficult at that point because we all acknowledged that, boy, this is high risk. But it is sometimes very difficult, once you have made plans with the families, to then remove that last straw of hope two hours before going to the operating room. And it is a difficult decision, and we do think about it. (Evidence, page 25,657)

Odum was asked if he had discussed with the family the fact that what had been a high-risk case had become even higher.

Again, I don't remember. Except I remember coming in early in the morning to see the child and being amazed that a couple of hours before surgery, three or four hours before surgery, that we are on such massive doses of dopamine. And I certainly alerted the team members that many patients, most patients don't come out of the operating room when you go in. And I don't remember whether the family was there or I was able to get a hold of the family to present this to them. But we had already made plans to go to the operating room, and they had already told us to do the best we could for Erica. And you are right, it is difficult for a surgeon at the last second to pull out the rug of hope from underneath a family. (Evidence, page 25,658)

Both Cornel and Duncan were questioned about whether or not Erica had any chance of surviving surgery, given the level of her dependence on inotropes. Duncan suggested that in some cases, a child in that condition would not be taken to surgery. He testified:

Well, I think if the child requires that amount of support prior to doing a long operation, which leaves you with an imperfect result in the end, even if it's perfectly done, likelihood of survival is minimal.

Again, I have stated this had, that there may be pressures brought to bear on the team and the surgeon from the family to do anything, despite how desperate things may appear. And there is often pressures in that regard, but this child anatomically, looking at the specimen, the actual surgical techniques and anastomoses that were created appeared fine. I don't see any difficulty with anything that was done. But the heart muscle just ran out of gas. (Evidence, pages 41,444–41,445)

In his testimony, Cornel stated:

That probably of itself, the requirement for a large dose of dopamine leading up to surgery probably means that the risk was almost prohibitive of surgery, and I would probably not do a case under those conditions. But I don't mean to imply that it is wrong to try, but I think I've tried enough of those desperate cases to not want to do it anymore. (Evidence, page 44,869)

In discussing Erica's pre-operative status, Cornel wrote that:

This infant was never stable prior to surgery and the myocardial compromise must have been severe. The risk of surgery under these conditions is extremely high. I do not criticise the team for trying. (Exhibit 353, page 56)

Duncan commented in his report:

One wonders about the wisdom of an inexperienced surgical team attempting Norwood repairs, but it sounds as if the child would have died anyways before transfer might have been effected. (Exhibit 20, document 363, page 5)

In their joint report Cornel and Duncan wrote, “This was a very high risk procedure in a child already requiring potent drugs to maintain blood pressure prior to surgery.” (Exhibit 354, page 12) They indicated that in some locations, these levels would be considered so high as to stop the surgeon from undertaking the procedure.

Soder, however, said that in 1994, at the Izaak Walton Killam Hospital for Children in Halifax, “I’m reasonably certain we would have encouraged the parents to go ahead with surgery with this anatomy.” (Evidence, page 44,172)

## PREPARATION OF THE NICU

In her testimony about the Terziski case, Debra Armitage, a senior NICU nurse, said she felt that there had not been sufficient pre-operative communication from Odum regarding Daniel’s post-operative care. In his testimony, Dr. Heinz Reimer said that the NICU staff did not appear to fully appreciate the severity of Daniel’s post-operative condition.

Despite that experience, before the operation in Erica’s case, Odum did not give any special instructions to the NICU staff. He testified that:

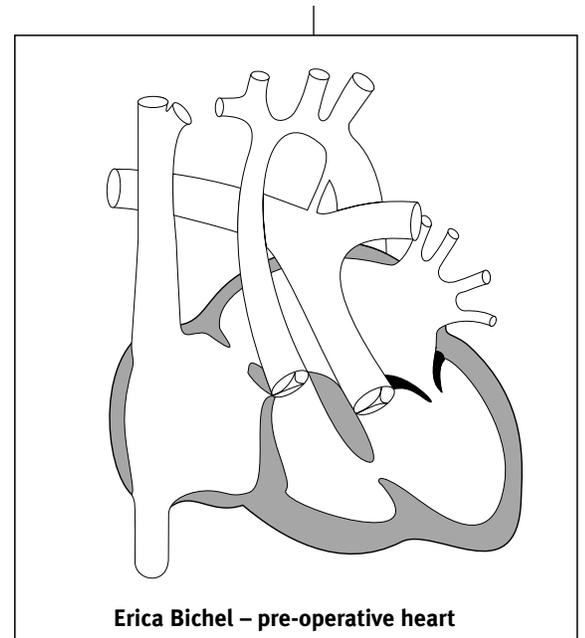
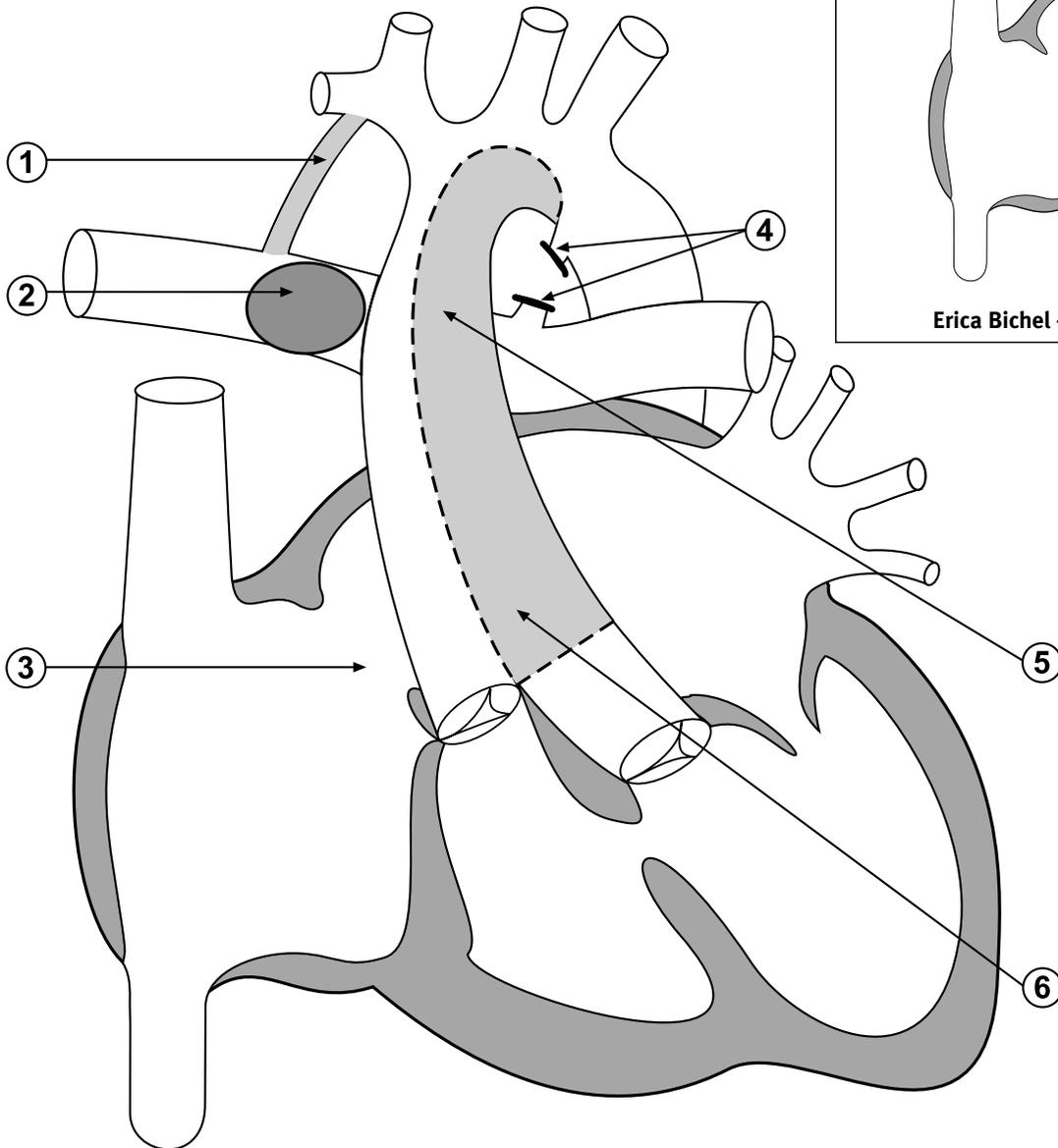
[I]t was the same unit that was taking care of this patient before we went to the operating room. So the need to advise them of this patient was really moot. They had been managing the patient and we had discussions during that time interval. So, there was no extra preparation above and beyond the usual things that we talk about in terms of managing these kids. (Evidence, page 25,659)

## THE OPERATION—OCTOBER 4

In the early hours of October 4, Erica underwent a modified Norwood Stage I procedure that included

- ligation and division of a patent ductus arteriosus; (This is a surgical closure of the ductus arteriosus.);
- atrial septectomy; (This involves removing the septal wall between the two atria.);
- aortic coarctectomy; (This involves removing the pinched section of the aorta.);
- insertion of a right Blalock-Taussig Shunt; (In this procedure, a small tube or shunt is placed between the innominate artery and the right pulmonary artery. The innominate artery is one of the three arteries that branches out of the arch of the aorta.); and
- aortic homograft augmentation of the aortic arch and main pulmonary artery to aorta bypass, creating a neo-aorta. (This procedure involves building a new aorta by connecting the pulmonary artery to the coarcted aorta and using homograft material to expand the size of the artery. When this is accomplished, the oxygenated blood returns to the left atrium through the mitral valve, enters the single

Diagram 8.4 Erica Bichel – post-operative heart



- 1 – Modified right Blalock-Taussig shunt
- 2 – Pericardial patch at confluence of right and left pulmonary arteries where trunk of pulmonary artery was disconnected
- 3 – Atrial septectomy

- 4 – Ligation and division of ductus arteriosus
- 5 – Aortic coarctectomy and homograft augmentation of ascending aorta and arch
- 6 – Division and anastomosis of pulmonary artery trunk to ascending aorta

ventricle and is pumped out the new aorta—the former pulmonary artery—and is distributed to the rest of the body.)

Consulting witnesses concluded that this was the appropriate repair for a child in Erica's condition. The operating team is set out in the accompanying chart.

**TABLE 8.3: Persons involved in the operation on Erica Bichel, October 4, 1994**

<i>OR team member</i>	<i>Persons involved</i>
Surgeon	J. Odum
Surgical assistant	B.J. Hancock
Anaesthetists	H. Reimer, J. Doer (resident)
Scrub nurses	C. Youngson, S. Scott, C. Weber
Circulating nurses	C. Weber, W. Yakinchuk, B. Zulak
Perfusionists	T. Koga, C. McCudden

**TABLE 8.4: Length of phases of the operation on Erica Bichel, October 4, 1994**

<i>Phase of the operation</i>	<i>Time taken</i>
Induction	1 hour 40 minutes
Bypass	3 hours 31 minutes
Total circulatory arrest	1 hour 40 minutes
Total surgical time	7 hours 15 minutes
Total operating-room time	9 hours 40 minutes

In his report, Cornel commented that, at one hour and forty minutes, the period of TCA was very long. Odum was questioned about the length of the procedure. He gave the following response:

That it was long, and as I said, we were putting this homograft. Many a times in the hypoplastic left heart syndromes, you have varying degrees of smallness of the aorta, and this child had a completely diminutive aorta due to the arch, and distally there was a coarct. So the entire area was two to three millimeters and had to be filleted open in the back, and then we had to rebuild that. The tissues were friable. The child had been on inotropes for two or three days and there was a lot of edema in the tissues. So from the technical point of view, it was a difficult type of a Norwood, given the anatomy. (Evidence, pages 25,669–25,670)

### *The issue of cardioplegia*

Erica's myocardial protection included deep (or profound) hypothermia with cardiac arrest. Hypothermia is a reduction in the central or core temperature of the body below 36 degrees Celsius and is achieved by infusing cold liquids intravenously and packing ice around parts of the body. With deep hypothermia, the patient is intentionally cooled to about 16 to 20 degrees Celsius. This allows the surgeon to stop the heart for about an hour and operate without either the heart moving, or tubing or blood being in the very small operative field.

In his operative report Odim indicated that “30 cc per kgm. of cold cardioplegia was administered through the arterial perfusing cannula.” (Exhibit 3, page BIC 56) However, there was no record in the perfusion sheets of any cardioplegia being given. Odim was questioned about this discrepancy.

I can't resolve it. It is usually my practice with Norwoods to give a dose of cardioplegia. It is certainly possible that that dose was not given or it was aborted at some point, because the aorta was very small in this child. But it is my usual practice to give a single dose of cardioplegia in the Norwood setting. That practice is actually controversial. Some people do not, but I usually do, and I thought I had given cardioplegia.

*Q:* Now, the practice is controversial, maybe you can just elaborate on that?

*A:* It is controversial because there has been no clear benefit of cardioplegia in the setting of Norwood operations, and the use of deep hypothermia and circulatory arrest. Some people have seen a benefit, others have not.

Furthermore, because the aorta is very thin and friable and small, the technique of actually trying to get it into the small aorta and into the coronary arteries is fraught with causing problems. And so for technical reasons, some people rely purely on a deep hypothermia for myocardial protection. (Evidence, pages 25,667–25,668)

Perfusionist Todd Koga testified that, according to the perfusion record, no cardioplegia was given for this operation; nor could he remember any being given. He said that the manner in which Odim would have had to give the cardioplegia (through the arterial perfusion cannula) in such a case would be unusual. According to Koga's testimony:

Normally it's administered from the [root] of the aorta via separate, not via the main perfusing cannula but via separate cardioplegia needle, and it is usually administered with the cross-clamp in place. (Evidence, page 7,231)

Koga said that he never worked with Odim when cardioplegia was delivered through the arterial perfusion cannula.

In his report, Cornel wrote:

Cardioplegia was not given. I do not always use cardioplegia with PHCA [profound hypothermia with cardiac arrest] but usually do so and with an already compromised myocardium would be more inclined to do so. This is a comment rather than a criticism. (Exhibit 353, page 56)

In their joint report, Cornel and Duncan wrote:

We note that only hypothermia was used. However, hypothermia alone may have been a reasonable choice. (Exhibit 354, page 12)

In his testimony, Cornel said:

In the Norwood operation specifically, administration of cardioplegia is particularly difficult. It would be very unwise to try and put a cannula into the tiny little ascending aorta in a true hypoplastic left heart. Those vessels are difficult enough without any added trauma, and in those cases I would not give cardioplegia.

In a case like this where there is access to the coronary arteries through the aorta, if cooling was proceeding very easily, I was sure that the heart was stable before surgery—I might not give it if I was a little concerned about the aortic tissue, but in a case like this I might have given cardioplegia through the aortic root with a small needle. I might or might not, but it would certainly be something to consider. (Evidence, pages 44,871–44,872)

Taylor was asked if he could determine if Erica had been given cardioplegia during the course of surgery. He responded that he would have expected extensive damage to her heart if she had not received cardioplegia. He went on to say:

I can only infer from the presence or absence of myocardial injury that there may or may not have been adequate myocardial protection. So I can't say, yes, cardioplegia was given or, no, it wasn't given. All I can only say is, well, she has got a lot of damage, therefore, her protection might not have been optimal. (Evidence, pages 43,234–43,235)

In his evidence, Taylor also said that, while the heart was damaged, he could not be certain as to how much of the injury was sustained before the operation.

### *The failure to wean from bypass*

After the repairs had been completed, Erica was taken off bypass. Shortly thereafter, the pressure in her atrium fell rapidly and Erica's heart stopped. This necessitated a rapid return to bypass.

She remained on bypass for another 15 to 20 minutes. During that time, the team adjusted some of the inotropic medication with which Erica was being treated, and attempted to go off bypass a second time.

This time they were off bypass for approximately 40 minutes. However, her condition deteriorated once more and they returned to bypass. Again the inotropic medication was adjusted and another attempt was made to come off bypass. According to Odum, one of the walls (the anterolateral wall) of the left ventricle was not performing adequately. There was a progressive decline in cardiac function, and eventually Erica lost any heart rate or rhythm.

At this point, the team had to decide whether to stop treatment or put Erica on ECMO. Reimer testified:

We were dealing with a child whose heart was already failing before the procedure began. It was now continuing to fail, and it was just thought that the chance of her recovering, or her heart recovering, given a prolonged period of ECMO, was quite small. I mean, the risks of instituting ECMO are fairly high in terms of bleeding complications, neurologic complications and so on. And based on things like that, and I think Jonah mentioned something about the experience in other centres with ECMO and children with this, having had this procedure was not good. (Evidence, page 19,074)

After consultation among Odum, Reimer, Ward, Giddins and a neonatologist, a decision was made that ECMO treatment would not be successful. Erica died in the operating room at 1630 hours.

The Bichels had been advised to stay at home on the day of surgery. They received hourly updates from Lois Hawkins throughout the course of the operation. Each time she called, she told them that Erica was doing well. They finally received a call saying the operation had gone well to that point and were summoned to the HSC.

When the Bichels arrived at the HSC, they were told that Erica was still being taken off bypass. They were encouraged to go for a meal. When they returned to the NICU, they were told that Erica had died. They were then taken to a private family room. At Judith Bichel's request, Erica's body was brought to the family. The parents then spoke with Odum, Giddins, Ward and Hawkins.

## POST-MORTEM FINDINGS

Phillips performed the autopsy on October 5 in Odim's presence. According to the autopsy, Erica's anomalies had been properly diagnosed and repaired. All repairs were intact and free of attached clot and the Blalock-Taussig shunt was patent.

According to the autopsy report, there was myocardial hemorrhage (bleeding in the heart muscle) with patchy necrosis. The microscopic findings of the myocardium indicated that the necrosis was ischemic (due to oxygen deficiency) and perimortal in nature. In her testimony, Phillips explained that by perimortal, she meant that the damage could have taken place before or during surgery.

The autopsy report concluded that no anatomical explanation for death had been found. In her testimony, Phillips said:

Knowing what I know now, after going through Dr. Taylor's report, probably the heart and the brain perhaps were damaged before she even went into surgery, and then it was compounded by the surgical procedure, and she was not able to get off bypass. (Evidence, page 42,303)

In his report, Taylor wrote:

The surgical anatomy in Erica's case appeared satisfactory and her death resulted from the myocardial failure rather than an anatomical complication of the procedure. The heart demonstrated microscopic findings of acute ischemic damage, judged moderate in extent in the single histology slide available. Although this is a limited study, it was from the functional ventricle and is most likely a representative sample of the myocardium, since myocardial damage occurring with repair of congenital heart defects most often occurs globally rather than in the regional distribution of a particular coronary artery branch. The damage identified was not associated with inflammation or reparative changes and could represent injury occurring during the surgical procedure and/or up to a day or so before surgery. (Exhibit 336, page 9.1)

In short, Erica's heart had been damaged by poor perfusion, both before and during surgery. (This should not be taken as a criticism of the service provided by the perfusionists, but as a comment on her overall level of blood perfusion.)

In his testimony, Taylor said he could not determine the degree to which contraction band necrosis was the result of damage that took place before or during surgery. He said he could say with certainty that the heart was damaged before surgery, but could not say for certain if the heart was damaged during surgery.

Taylor noted that the autopsy uncovered signs of neuronal necrosis in Erica's brain. He said this indicated that she had "significant circulatory impairment before her surgery. Whether or not operating on Erica a day or two earlier might have changed the outcome can be speculated upon, however, regardless of the timing of the surgery, I believe that her prognosis would be at best 'guarded,' given the severe nature of her cardiac malformations." (Exhibit 336, page 9.1)

In his report, Hudson indicated that he thought there were four major factors that could have contributed to Erica's cardiac failure. The first was the effects of her pre-existing congenital heart problems. The other three were:

**Myocardial injury before CPB.** Hypoxemia [This refers to the poor perfusion and saturation that Erica experienced pre-operatively.] was documented before CPB. Hypoxia prior to the obligatory period of aortic cross-clamping and cessation of coronary blood flow could add to myocardial injury

because the heart would not be in the best achievable metabolic condition just before cross-clamping. In my opinion, by itself, the degree and duration of hypoxia before CPB cannot account for the severe and ultimately lethal myocardial pump failure that occurred. However, it could add to the injury produced by other factors.

**Inadequate myocardial protection during CPB.** The inability to separate from cardiopulmonary bypass without substantial inotropic and vasopressor support suggests that myocardial protection during CPB was not adequate. Of particular concern is the discrepancy between the surgeon's operative note, and the perfusion record. The surgeon's dictated note states that 30 ml/kg of cold cardioplegia was given shortly after initiation of CPB. The perfusion record indicates that no cardioplegia was given. Although hypothermia alone offers some myocardial protection, the diastolic arrest induced by cardioplegia is of greater importance in protecting the myocardium from injury during aortic cross-clamping. *Whether or not cardioplegia was given to this patient is an important fact that must be established.* [Italics and bolding in original.] The long duration of TCA would also contribute to myocardial damage.

**Myocardial injury or dysfunction after CPB.** High doses of catecholamine inotropic agents, which this patient required to separate from CPB, can contribute to myocardial injury. However, this is a no-win situation. Without the drugs, separation from CPB is impossible, so the possibility of adverse effects has to be accepted. The severe hypoxia after CPB could also aggravate myocardial dysfunction and injury. (Exhibit 307, page 9.10)

The issue of adequate cardioplegia is vexing and will be discussed below.

In reviewing the case, Cornel wrote that the "myocardial compromise was probably severe before the operation commenced and the inability to withdraw from bypass is not surprising." (Exhibit 353, page 56)

## FINDINGS

As identified in the introduction, this case gives rise to the following issues:

- Should the Winnipeg team have attempted a Norwood procedure, given its recent history and its level of experience?
- Should Erica have been transferred out of Winnipeg?
- Should the operation have taken place before October 4?
- Were the parents provided with sufficient information to allow them to give informed consent to the procedure?
- Was Erica given adequate myocardial protection?
- What was the cause of death and was it preventable?

*Should the Winnipeg team have attempted a Norwood procedure, given its recent history and its level of experience?*

*Should Erica have been transferred out of Winnipeg?*

*Should the operation have taken place before October 4?*

These three questions are inter-related and cannot be answered separately. They go to matters at the centre of this Inquest.

■ Findings

The evidence presented to this Inquest suggests that the HSC Pediatric Cardiac Surgery Program should not have been looking after all the patients who came through the door in 1994. As has been noted several times in this report, the evidence suggests that the surgeon lacked the skill, experience and dexterity to undertake a number of high-risk procedures.

This was one such procedure. Indeed, the length of time the procedure took is one more piece of evidence suggesting that the surgeon did not have the necessary skills and experience to handle high-risk operations. That being so, there should have been a protocol under which all high-risk patients would have been considered as candidates for referral out of Winnipeg.

Several witnesses raised the question as to whether or not it would have been appropriate to transfer Erica out of Winnipeg. Duncan and Cornel, for example, asked, “Were the options for transfer to another centre provided? Such a transfer might not have been conceivable given the precarious status pre-operatively.” (Exhibit 354, page 12)

Dr. Oscar Casiro, an intensivist who treated Erica, did think it would have been possible to transport Erica out of province. It is clear that transfer would have been risky. Furthermore, the evidence suggests that many centres might not have accepted Erica because she was too ill for them to consider operating on her. In the end, transfer might not have been feasible.

However, because the Winnipeg approach was essentially to take all comers, it appears that Ward, Giddins and Odim did not give consideration to transfer. In fairness to Ward, he was new to the program and had been informed that the team was capable of undertaking high-risk procedures.

However, Odim and Giddins were well aware of the problems that the team had been having and of the failure of the previous Norwood. A failure in a single case should not necessarily mean that the program should not undertake similar procedures in the future. However, the difficulties inherent in the Norwood procedure, and its extreme risk, placed it in a category of cases that the program should simply not have been attempting during 1994.

If there was to be no transfer, the only real options were to allow the team in Winnipeg to operate or to arrange for comfort care for Erica until she died. After Erica’s death, Judith Bichel said that her family doctor had suggested that Erica would have been a good candidate for a heart transplant. However, this suggestion does not appear to be widely supported by the consulting witnesses to this Inquest. In addition, while it was conceivable that another surgeon coming to Winnipeg from another location could have performed the operation, the logistics of arranging this probably exceeded the time available to the child. Furthermore,

there are real problems with bringing an outside surgeon in to undertake high-risk surgery. Advance planning and co-ordination are required.

■ Finding

There is evidence that the planning that went into this procedure was wanting in several respects. Although Erica did not survive to be transferred to the NICU, the evidence suggests that, as with Daniel Terziski, there had not been adequate planning with the NICU as to her post-operative care.

While there are real questions as to whether or not the Winnipeg team ought to have undertaken this operation, the decision to delay surgery for a number of days was legitimate. Erica was very ill when her condition was first diagnosed. It was reasonable to attempt to strengthen her before taking her to surgery. In the end, this strategy failed to bring about the desired results.

*Were her parents provided with sufficient information to allow them to give informed consent to the procedure?*

■ Finding

Erica Bichel's parents were not told of the program's recent history. The evidence suggests that they were not provided with sufficient information to determine if they had the option of taking their child to another centre for surgery. They were entitled to this information, before giving their consent to having the operation done in Winnipeg. The evidence tends to suggest that Erica's parents were not provided with sufficient information to allow them to give informed consent to the procedure.

*Was Erica given adequate myocardial protection?*

■ Finding

This seems to be a matter of some dispute among the medical professionals who have examined this case. While Odim said that he generally administered one dose of cardioplegia, the evidence suggests that he did not do so in this case. He also said that the administration of the cardioplegia was not always done in this operation in any event, suggesting that even if he did not give any cardioplegia, it was not unreasonable not to do so.

Taylor and others do suggest that there was myocardial damage, perhaps due to the lack of myocardial protection (which cardioplegia is intended to provide). However, they were unable to say with certainty whether the myocardial damage they found had occurred before or during the operation. Therefore, it is not possible to say with any degree of certainty that lack of cardioplegia led to or caused any of the myocardial damage that the child suffered.

## *What was the cause of death and was it preventable?*

### ■ Finding

Erica had a very serious congenital heart condition. The condition weakened her heart in the period before a very lengthy and risky operation and left her heart in a condition where it could not function following the procedure.

In their joint report, Cornel and Duncan wrote:

This was a very high risk procedure in a child already requiring potent drugs to maintain blood pressure prior to surgery. We believe that this death occurred due to depleted myocardial substrate reserves [The heart was too weakened to be able to continue to function.] as well as potential myocardial preservation problems. (Exhibit 354, page 12)

In other words, they were of the opinion that Erica's heart was too weak and/or damaged to survive this operation. This condition likely precluded any chance of her surviving the operation.

### ■ Finding

The evidence suggests that Erica would have stood a better chance of success in the hands of another, more experienced surgeon and surgical team, but whether or not she would have survived (given her pre-operative condition) is impossible to say. She also might have survived if she had been operated on earlier, but that would have to be weighed against the trauma that would likely have been caused to her through transportation to another facility. Given all of the available information, it is not likely that her death was preventable.

## OCTOBER 20—THE CASE OF ER

On October 20, the pediatric cardiac surgery team was involved in inserting a pacemaker in a nine-year-old patient named ER. As an infant, ER had suffered from meningococemia infection. As a result of this infection, it had been necessary to amputate a number of her limbs. The infection also affected her heart's conduction system.

At the pre-operative conference for this operation (which was attended by the surgeon, the cardiologist, the anaesthetist and the intensivist), there was discussion of what should be done if ER arrested before the pacemaker was inserted. It was decided that a transcutaneous pad would be placed on her chest. This would allow the team to use a precordial pacemaker to pace the heart by connecting it to the pads. The pads would make it possible to pace ER without a direct wire connection to ER's heart.

During surgery, ER went into complete heart block. According to Swartz, who was providing the anaesthetic for this operation, the block was in response to the anaesthetic agents she was using. Swartz said that this was a normal side-effect but was also a complication. ER was treated with a variety of drugs, but her heart did not respond, either to the drugs or to the chest compressions that had also been started. At that point, the team requested that the precordial pacemaker be brought from the ICU.

According to Swartz's testimony, the team was not able to properly connect the precordial pacemaker, which had been recently acquired. Swartz testified that it was her responsibility to connect the pacemaker.

*A* And we tried the external pacemaker, but it didn't work.

*Q* Why didn't it work?

*A* It didn't work because we didn't know—we hadn't attached her leads to the pacemaker. This was the machine that we just acquired within the last week, and we hadn't used it. It was actually in the intensive care unit, not in the OR. So we called for it to come to the operating room, in the meantime we were doing chest compressions, and Dr. Odim managed to get the pacemaker in and we didn't ultimately require the external pacer.

*Q* Okay. So the external pacer was the first one that you tried?

*A* We tried it, but we hadn't hooked it up properly.

*Q* And whose job was it to hook it up?

*A* I will say my job.

*Q* Okay.

*A* So, you know, I wasn't familiar with that pacemaker, so we hadn't put the leads on properly, so we didn't—we ultimately didn't use it and we did get, Dr. Odim did get the pacemaker in and we were able to hook up to that pacer. (Evidence, pages 16,442–16,443)

Eventually, Odim connected a different type of external pacemaker and was able to go on and implant the internal pacemaker. He testified that he was surprised that no one knew how to use the equipment.

The manuals came out. Ms. Youngson, the head nurse, didn't know how to get the machine working, neither did Dr. Swartz, I believe, who was the anaesthetist and also intensive care unit specialist.

So there was a lot of confusion, and no one really knew how to turn the machine on or to get it to function. (Evidence, pages 25,687–25,688)

Once the pacemaker was implanted, Swartz felt that the patient was properly paced from then on and that the operation was a success.

Odim testified that he had not used the machine in Winnipeg before that event.

All I know is at the pre-operative meeting, I asked whether there was a machine in existence, because many a times we will use this as backup sometimes if we are able to get it to capture. And I was told that there was a machine in existence. And I said, well, we better have that on hand for this patient, and I wanted the pads placed; and so that was done. But, what surprised me was that none of the senior personnel, or junior personnel, when we needed it, really knew how to work it. (Evidence, pages 25,688–25,689)

ER was discharged on October 25, 1994. However, she died from a cardiac arrest on July 8, 1995.

While Swartz testified that the level of communications was very good during this procedure, it is apparent that it was not very good in the period leading up to the procedure. If Odim's account was correct, it would appear that Swartz should have indicated that she was not familiar with the pacing equipment he wanted to use as a backup. In addition, if Swartz was not familiar with the equipment, she should have reviewed the use of the pacemaker before the procedure.

The situation concerning the failure to be able to use the new pacing equipment certainly speaks to the inability of the team members to address matters of communications directly at this time in the year. While there was an attempt at briefing the team involved in intra- and post-operative care, there was no follow-through in preparation for the procedure.

## **THE WISEMAN COMMITTEE**

### **MEETING OF OCTOBER 17**

At the committee's October 17 meeting, considerable discussion was devoted to the issue of transferring the care of post-operative neonates from the NICU to the PICU. While the neonatologists had given their agreement in principle to the idea of all open cases going to the PICU, neonatal nurses were resistant to the idea. They believed that the move represented a lack of confidence in the care they provided.

Seshia informed the committee that several nurses in the unit had developed a post-operative care package, which was to become a guideline for managing such patients in the NICU. She indicated that there were negative feelings about the lack of input from the cardiac surgeon in that process (Exhibit 20, Document 278K).

In discussing the issue, Kesselman said he believed that two bedside nurses were required for these cases, one of whom ought to come from the NICU. It was pointed out that the PICU nurses had some anxieties about providing care to post-operative neonates.

Giddins reported that two high-risk surgical cases had been successfully carried out. The minutes show no reference to the death of Erica Bichel on October 4. Wiseman testified that he could not recall the case being discussed or reported. Odim testified that he could not recall any discussion by the committee about whether or not the team should be performing Norwoods. Odim did say he was aware that Wiseman did not approve of the Norwood procedure being conducted under any circumstances, a view that Wiseman confirmed in his testimony.

The next committee meeting was to be scheduled after a series of meetings between team members and various HSC staff, to deal with the issue of post-operative care. As a result, it did not meet again until December 7.

At some point in the autumn, Blanchard had informally sounded out a number of people about Odim's surgical skills. Hancock told him that Odim's skills were comparable to Duncan's. Dr. Peter Duke, an adult anaesthetist, told him that Odim was comparable to an average adult surgeon, while Hamilton assured him that Odim was fine.

During the autumn of 1994 Isobel Boyle, after discussions with the operating-room nurses, once more spoke with Wiseman and asked him to observe Odim in surgery. She testified that Wiseman indicated that he was not prepared to do so at that time.

Susan VanDeVelde-Coke, the vice-president in charge of both the Department of Surgery and the Department of Anaesthesia, had heard informally from Boyle in the autumn that the nurses were having concerns about the Pediatric Cardiac Surgery Program, as were the anaesthetists. She testified that she had heard that there were concerns about Odim's surgical technique. According to her, Blanchard had passed on Hancock's positive assessment of Odim. In her testimony, VanDeVelde-Coke said she had not known about the May withdrawal of services until February 1995.