Vasuhi d/o Ramasamypillai v Tan Tock Seng Hospital Pte Ltd
[2001] SGHC 30

Case Number : Suit 517/2000

Decision Date : 16 February 2001

Tribunal/Court : High Court

Coram : Tan Lee Meng J

Counsel Name(s) : Seenivasan Lalita (Virginia Quek Lalita & Partners) for the plaintiff; Christopher Chong and Sharmila Nair (Helen Yeo & Partners) for the defendants

Parties : Vasuhi d/o Ramasamypillai — Tan Tock Seng Hospital Pte Ltd

Tort – Negligence – Doctors – Deceased died of heart attack – Whether doctors negligent to discharge deceased before coronary angiogram – Whether coronoary angiogram elective or urgent – Whether death caused by delay of coronary angiogram

: The plaintiff, Madam Vasuhi d/o Ramasamypillai, whose husband died of a heart attack, sued the defendants (hereinafter referred to as `TTSH`) for negligence in the treatment of her husband`s heart condition. TTSH denied any negligence on the part of their doctors and maintained that they provided the deceased with proper treatment for his condition.

Background

Madam Vasuhi`s husband, Karunanithi s/o K Kalandavelu (hereinafter referred to as `the deceased`), a security guard, had a long history of heart trouble, asthma and systemic lupus erythematosus. He suffered a heart attack in 1984. He had a second heart attack on 1 August 1997 and was warded in the Tan Tock Seng Hospital.

The deceased took a number of tests while he was in the hospital. On 5 August 1997, a signal average ECG was done. This showed a high risk of ventricular tarchicardia and ventricular fibrillation. An echocardiogram was done on 7 August 1997. This revealed that the deceased`s left ventricular function was severely impaired and that the estimated ejection fraction was only 21%, a worrying result when compared to the ejection fraction of a healthy heart. Finally, a sub-maximal exercise stress test was done on 7 August 1997. During this test, the deceased achieved his predicted heart rate without complaining of chest pain and the test was discontinued because of fatigue. After evaluating these tests and the deceased`s overall condition, Dr Alfred Cheng, the head of TTSH`s Department of Cardiology and the Director of their Coronary Care Unit, discharged the deceased on 8 August 1997, pending a further evaluation of his condition. It was arranged that he return to the hospital one month later for a review of his condition and for a maximal exercise stress test to be conducted. In addition, a coronary angiogram was scheduled for late October 1997.

Upon his discharge, the deceased was given medicine for his condition. He was prescribed aspirin to inhibit platelet aggregation, sorbitrate to improve blood flow to his heart muscles and captopril to improve his heart function. He was also provided with GTN tablets, which were to be taken if he had chest pains. He was advised that if he had any chest pain, he was to take the GTN tablet and proceed immediately to the Accident and Emergency Department of the hospital. Unfortunately, the deceased suffered a fatal heart attack in the early morning of 16 August 1997.

The plaintiff`s case

Madam Vasuhi contended that the deceased died because he was not given proper and appropriate treatment expected of responsible and reasonably competent doctors. In her statement of claim, she made the following allegations:

(a) TTSH`s doctors failed to consider and administer thrombolytic therapy to the deceased.

(b) TTSH`s doctors failed to consider and omitted to note that the deceased had an earlier heart attack and thus failed to recognise that the deceased had an increased risk of another severe heart attack.

(c) TTSH`s doctors failed to consider the risk of an exercise stress test so soon after a heart attack and erroneously relied on the result of an incomplete exercise stress test.

(d) TTSH`s doctors failed to note that the deceased may have had some on-going ischaemia which required intervention to prevent another heart attack.

(e) TTSH`s doctors failed to arrange for a coronary angiogram prior to discharging the deceased to determine the appropriate measures to be taken, such as by-pass surgery.

(f) TTSH`s doctors failed to advise the deceased and/or his family of the urgency of a coronary angiography even though an echocardiography showed that the deceased`s condition was serious.

(g) TTSH`s doctors failed to arrange for the deceased to take other tests and investigations.

Experts` views on whether a coronary angiogram should have been performed before the deceased was discharged

Madam Vasuhi contended that the deceased was such a critically ill patient that he should not have been discharged on 8 August 1997 without the benefit of a coronary angiogram. Her case was summed up by her counsel, Ms Seenivasan Lalita, in paras 65 and 66 of her written submissions in the following terms:

> *It is therefore submitted that the deceased would not have died if Dr Alfred Cheng had done a coronary angiography prior to discharge where he would have seen how bad the condition of the deceased`s heart was. The coronary angiography would have shown that the deceased was not fit for discharge. He would have to be kept on Heparin and scheduled for by-pass surgery.*
>
> *As the deceased would have been in the care and under close observation of the hospital he would not have suffered the fatal heart attack.*

Madam Vasuhi`s expert witness, Dr Leo Mahar, the Director of Cardiology at the Royal Adelaide Hospital, said that there was a strong possibility that the deceased had on-going ischaemia and that he required an urgent coronary angiogram. Dr Mahar added that he would have scheduled such an angiogram within a week after the deceased`s admission to the hospital. In para 15 of his affidavit of evidence-in-chief, he opined as follows:

> *My view is that someone of his age should be given the maximum opportunity and that would include early investigation and intervention therapy if indicated. There was a need to conduct a fairly urgent angiography as the deceased had at least two vessel coronary artery disease and was known to have poor left*

ventricular function.

TTSH`s expert witnesses, Professor Lim Yean Leng (hereinafter referred to as `Professor Lim`), the Director of the National Heart Centre, and Associate Professor Lim Yean Teng (hereinafter referred to as `Assoc Prof Lim`), the Chief and Senior Consultant Cardiologist at the National University Hospital, did not agree with Dr Mahar that there was a strong possibility that the deceased had on-going ischaemia or that an urgent coronary angiogram was called for.

Like Dr Cheng, both Professor Lim and Assoc Prof Lim took the view that what the deceased required was an elective coronary angiogram and not an urgent coronary angiogram. The difference between an urgent coronary angiogram and an elective coronary angiogram was explained by Professor Lim in the following terms:

> *In cardiology, we talk of immediate or urgent (as soon as possible or a matter of days). If not, we talk of elective or delayed. The length of the delay depends on the category of patients.*

Dr Cheng, who said that the deceased did not have signs of on-going ischaemia, explained that he contemplated an urgent coronary angiogram for the deceased on 14 August 1997. However, after evaluating the deceased`s case, he thought that an elective angiogram was more appropriate than an urgent angiogram. In para 16 of his affidavit of evidence-in chief, he explained:

> *In view of the results of the negative submaximal exercise stress test and the lack of any other clinical indications or symptoms such as continuing chest pain, there was no clinical indication for early coronary angiography for the deceased. Hence, I scheduled the deceased for elective coronary angiography at the Singapore General Hospital, which was then fixed for 23 October 1997, which was the next available date.*

Professor Lim, who endorsed Dr Cheng`s view that the deceased required an elective coronary angiogram, made it clear that he would not have required an urgent angiogram to be performed if the deceased had been his patient. When cross-examined, he said as follows:

> *Q: ... [W]ould you have considered this patient a candidate for an urgent angiogram?*
>
> *A: If the emphasis is on the word `urgent`, the answer is `no` but on the possibility of helping the patient further, an angiogram will help. With the record presented with the patient having no subjective symptoms of ischaemia, usually pain, and no clear cut evidence of ischaemia, there is no urgency to proceed with an angiogram. The decision made in this case was for an elective angiogram.* ***This was appropriate*** *.*
>
> *Q: For this patient, you would not have arranged for an urgent angiogram?*
>
> *A: In this case, the patient is post-infarct, a specific group. He was kept seven days in the hospital. This is the usual practice for uncomplicated cases, ie those with no further chest pain, no failure or dangerous electrical arrythmia. Then,*

we investigate the further management strategy. ***The deceased was a patient for an elective angiogram. I would not have arranged for an immediate angiogram*** *. [Emphasis added.]*

Professor Lim stood his ground when it was pointed out to him that the deceased had an ejection fraction of only 21%. When cross-examined, he answered as follows:

Q: This patient had two heart attacks, congestive failure on the third day, electrical instability, an ejection fraction of 21% and an inconclusive sub-maximal test. Based on these, I put it to you that the patient should have been given an earliest angiogram.

A: If this patient is stable with no symptomatic angina or ischaemia and his heart failure has been treated, he is managed as a stable patient to be discharged for further management. ***I agree with the management of his case*** *. [Emphasis added.]*

Assoc Prof Lim, who also took the view that the deceased showed no signs of on-going ischaemia that warranted an urgent angiogram, said as follows during cross-examination:

Q: The reasons why an angiogram should have been done include two heart attacks complicated by heart failure on the third day, uninterpretable stress test results ...

A: These are reasons why an angiogram needs to be done but do not qualify for an urgent angiogram ie before the patient can be sent home. Urgency depends on whether the patient has spontaneous or inducible ischaemia. There was no such evidence in this case.

Assoc Prof Lim also rejected the contention that the results of the echocardiography performed on 7 August 1997 should have alerted Dr Cheng that an urgent coronary angiogram was required. When cross-examined, he said as follows:

Q: After the echocardiograph report, he should not have been discharged?

A: The timing of the angiogram is not determined by the result of the echocardiograph. It identifies a high risk patient and we want to study further. But the timing of the angiogram becomes more urgent if the patient has evidence of inducible or spontaneous myocardial ischaemia. In this case, there was no such evidence. ***Notwithstanding the echocardiograph report, I would have discharged the patient*** *. [Emphasis is added.]*

Experts` views on whether there were sufficient grounds for the deceased to be discharged

on 8 August 1997

As both Professor Lim and Assoc Prof Lim thought that the deceased did not require an urgent angiogram, their view that TTSH had sufficient grounds for discharging the deceased on 8 August 1997 report, will next be considered.

Dr Cheng, who discharged the deceased from hospital, explained that while the deceased was ill, his condition was not such as to warrant his continued hospitalisation pending the taking of further tests. He pointed out that by 8 August 1997, the deceased did not have any chest pain and his blood pressure was satisfactory. His lungs were also clear. There were no ECG changes during the sub-maximal stress test and the deceased achieved 75% of his predicted heart rate without any chest pain during the said stress test. In his considered opinion, there was no indication of on-going myocardial ischaemia. As such, the patient was clinically stable and could be discharged from hospital.

Dr Cheng`s decision to discharge the deceased on 8 August 1997 was endorsed by Professor Lim, who accepted that there was a possibility that the deceased had on-going ischaemia but stressed that this did not mean that the patient could not be discharged. During cross-examination, he explained:

> *Q: Was it acceptable practice to discharge him?*
>
> *A: With no subjective evidence of ischaemia, it is acceptable practice to discharge him. This may be regarded as conservative management ...*
>
> *Q: You said there was a possibility that the deceased had ischaemia?*
>
> *A: Everyone can have this. A person with a heart attack has a higher possibility of ischaemia.*

Admittedly, Professor Lim would not have placed much reliance on the sub-maximal stress test results. However, his evidence should be read in its proper context as he made it absolutely clear that he would have discharged the deceased without putting him through a sub-maximal exercise stress test on 7 August 1997.

As for Dr Mahar`s view that the sub-maximal exercise stress test results could not be interpreted and should not have been relied upon for the purpose of deciding whether or not it was safe to discharge the deceased, Assoc Prof Lim endorsed Dr Cheng`s view that the results could be interpreted. In paras 5 and 6 of his affidavit of evidence-in-chief, Assoc Prof Lim said as follows:

> *5 It is recommended practice for a cardiac patient to undergo a sub-maximal stress test for risk stratification purposes and the test is designed to continue until the patient achieves 75% of his expected maximum heart rate or until the onset of symptoms. This was done for the deceased on 7 August 1997.*
>
> *6 The results of the sub-maximal exercise stress test show that there was no inducible ischaemia and this would indicate that the deceased was safe for discharge. It is wrong to suggest that there was anything significant in the raised ST segments of the ECG. This is not unexpected for patients who have*

had a Q-wave heart attack. In these patients, it is only when the ST segments are depressed during the exercise stress test or there are onset of ischaemia symptoms would it indicate that there is inducible ischaemia.

Assoc Prof Lim agreed that it was safe for the deceased to be discharged on 8 August 1997. Indeed, after reviewing the position taken by Dr Cheng in the treatment and discharge of the deceased, Assoc Prof Lim concluded that the management of the deceased was well within accepted practice.

Experts` views on when the elective angiogram should have been performed

If what the deceased required was an elective coronary angiogram and not an urgent coronary angiogram, a question arises as to whether the elective coronary angiogram should have been performed before the deceased died on 16 August 1997, eight days after he was discharged from the hospital.

The deceased`s elective coronary angiogram was scheduled for 23 October 1997. Dr Cheng explained that while the waiting time for an elective coronary angiogram is presently very much shorter than in 1997 because TTSH now have their own angiography facilities, it ought to be noted that in 1997, TTSH did not have in-house facilities for angiography and their patients had to be sent to the Singapore General Hospital for a coronary angiogram to be performed. He testified that while an urgent coronary angiogram could have been performed immediately in 1997, the waiting list in that year for an elective angiogram was about two months. Hence, the deceased`s coronary angiogram was scheduled for 23 October 1997, which was the next available date for such an angiogram.

All three expert witnesses thought that the date given to the deceased for his coronary angiogram was rather late although Professor Lim and Assoc Prof Lim conceded that they had no knowledge of the logistics involved in arranging for such an angiogram for TTSH`s patients in 1997.

Professor Lim said that he would not have scheduled a coronary angiogram for the deceased too soon after his heart attack on 1 August 1997. This is because the benefits of such an angiogram must be balanced against the risks of an early coronary angiogram. He said that unless an urgent angiogram was required, it would be preferable to give the deceased`s heart some time to repair itself after the heart attack of 1 August 1997. During cross-examination, he explained as follows:

Q: When would you have done the elective angiogram?

A: There is a small additional risk of complications following a mild heart attack in this group of patients versus someone who has not had a heart attack. This risk arises because of recently damaged areas of the heart. The damaged areas can rupture, clot and are electrically more irritable. In the past, unless you had good reasons, you try not to do an angiogram during this period. Nowadays, we are prepared for an angiogram even during a heart attack. By the 1980s, we can do an angiogram and angioplasty during the said period where the benefits outweigh the risks. ***However, all things being equal, you try not to give a patient an additional risk****. [Emphasis is added.]*

Professor Lim said that if the deceased had been his patient, he would have scheduled the elective coronary angiogram some two to three weeks after the deceased`s second heart attack on 1 August 1997. He added that if there had been a waiting list, the coronary angiogram would have been performed in three weeks.

Dr Mahar opined that the view that one should allow two to three weeks for a damaged heart to heal before performing a coronary angiogram is no longer held in Australia and the United States. However, Professor Lim maintained that in the absence of conditions warranting an urgent coronary angiogram, he would prefer to let a patient`s heart have two to three weeks to heal after a heart attack before having a coronary angiogram performed.

Assoc Prof Lim also agreed that an acceptable date for the elective coronary angiogram to be performed in this case would have been two to three weeks after the heart attack on 1 August 1997.

The Bolam test

A discussion of the duty of a doctor to a patient ought to begin with a consideration of the ***Bolam*** test, which was stated by McNair J in **Bolam v Friern Hospital Management Committee** [1957] 2 All ER 118[1957] 1 WLR 582, in the following terms:

> *I myself would prefer to put it this way: A doctor is not guilty of negligence if he has acted in accordance with a practice accepted as proper by a responsible body of medical men skilled in that particular art ... Putting it the other way round, a doctor is not negligent, if he is acting in accordance with such a practice, merely because there is a body of opinion that takes a contrary view.*

The ***Bolam*** test has been subject to much scrutiny, and especially so, in recent times. (See, for instance, **Hucks v Cole** [1993] 4 Med LR 393, a decision of the English Court of Appeal, **Edward Wong Finance Co v Johnson Stokes & Master** [1984] AC 1296, a decision of the Privy Council, and **Rogers v Whitaker** [1992] 175 CLR 479, a decision of the High Court of Australia.) All the same, in **Bolitho v City and Hackney Health Authority** [1998] AC 232[1997] 4 All ER 771, the ***Bolam*** test was accepted by the House of Lords as `[t]he locus classicus of the test for the standard of care required of a doctor or any other person professing some skill or competence`.

In the face of widely differing views from medical experts, it would be appropriate to bear in mind the following words of Lord Scarman in **Maynard v West Midlands Regional Health Authority** [1985] 1 All ER 635[1984] 1 WLR 634:

> *I do not think that the words of the Lord President (Clyde) in **Hunter v Hanley** 1955 SLT 213 at 217 can be bettered:*
>
> *`In the realm of diagnosis and treatment there is ample scope for genuine difference of opinion and one man clearly is not negligent merely because his conclusion differs from that of other professional men ... The true test for establishing negligence in diagnosis or treatment on the part of a doctor is whether he has been proved to be guilty of such failure as no doctor of ordinary skill would be guilty of if acting with ordinary care ...`*
>
> *... Differences of opinion and practice exist, and will always exist, in the medical as in other professions. There is seldom any one answer exclusive of all others*

> *to problems of professional judgment. A court may prefer one body of opinion to the other, but that is no basis for a conclusion of negligence.*

It does not follow that a defendant doctor or hospital will avoid liability for negligent treatment merely because there is evidence from a number of medical experts to the effect that the treatment accorded to a patient accords with what other doctors might have done. In ***Bolitho*** (supra), Lord Browne-Wilkinson put the matter in its proper perspective when he said as follows (at [1998] AC 232, 241-242; [1997] 4 All ER 771, 778):

> *In the **Bolam** case itself, McNair J [1957] 1 WLR 583, 587 stated that the defendant had to have acted in accordance with the practice accepted as proper by a `responsible body of medical men` ... [T]he court has to be satisfied that the exponents of the body of opinion relied upon can demonstrate that such opinion has a logical basis. In particular, in cases involving, as they so often do, the weighing of risks against benefits, the judge before accepting a body of opinion as being responsible, reasonable or respectable, will need to be satisfied that, in forming their views, the experts have directed their minds to the question of comparative risks and benefits and have reached a defensible conclusion on the matter.*

In **Hucks v Cole** [1993] 4 Med LR 393, the Court of Appeal accepted that a defendant doctor was negligent in failing to treat with penicillin a patient who was suffering from septic places on her skin though he knew them to contain organisms capable of leading to puerperal fever despite the fact that a number of distinguished doctors gave evidence that they would not, in the circumstances, have treated the patient with penicillin. In that case, Sachs LJ pointed out at p 397 that where the evidence shows that a lacuna in professional practice exists by which risks of grave danger are knowingly taken, then, however small the risk, the court must anxiously examine that lacuna, and particularly so if the risk can be easily and inexpensively avoided. His Lordship added that if the court finds, on an analysis of the reasons given for not taking those precautions that, in the light of current professional knowledge, there is no proper basis for the lacuna, and that it is definitely not reasonable that those risks should have been taken, its function is to state that fact and where necessary to state that it constitutes negligence. His Lordship had no doubt that in such a case, the practice will be altered for the benefit of patients.

It ought to be noted that a judge should not be too quick to substitute his opinion for that of medical experts. In ***Bolitho*** (supra), Lord Browne-Wilkinson cautioned against such speed when he said as follows (at [1998] AC 232, 243; [1997] 4 All ER 771, 779):

> *I emphasise that in my view it will very seldom be right for a judge to reach the conclusion that views genuinely held by a competent medical expert are unreasonable. The assessment of medical risks and benefits is a matter of clinical judgment which a judge would not normally be able to make without expert evidence ... [I]t would be wrong to allow such assessment to deteriorate into seeking to persuade the judge to prefer one of two views both of which are capable of being logically supported. It is only where a judge can be satisfied that the body of expert opinion cannot be logically supported at all that such opinion will not provide the benchmark by reference to which the defendant`s conduct falls to be assessed.*

My findings

When closely examined, Madam Vasuhi`s case rests mainly on the assertion that TTSH`s doctors failed to realise that the deceased was a high risk patient for whom conservative treatment was inappropriate and that TTSH`s doctors were negligent when they failed to perform a coronary angiogram before discharging the deceased on 8 August 1997.

Some of Madam Vasuhi`s allegations of negligence can be dismissed at the outset. To begin with, the complaint that TTSH`s doctors failed to administer thrombolytic therapy to the deceased is without cause. Such therapy, which involves the intravenous injection of a drug into a patient`s blood stream to dissolve blood clots that may be occluding the coronary arteries, may not help a patient such as the deceased, who was admitted to the hospital more than 11 hours after the onset of chest pain. Heart muscle which has been deprived of blood supply for more than 11 hours would probably be necrotic and the restoration of blood flow would not be beneficial. Besides, the blood clots, if any, would be much more difficult to dissolve. The potentially serious and even life-threatening effects of such therapy, including the risk of stroke and haemorrhage, must be balanced against the minimal benefits to such a patient. It is for the doctor managing the case to decide whether or not to administer thrombolytic therapy and in the circumstances of this case, TTSH cannot be faulted for not administering the said therapy to the deceased.

Madam Vasuhi`s second assertion, namely, that TTSH`s doctors failed to note that the deceased had an earlier heart attack in 1984, is baseless as it was evident that TTSH`s doctors knew that they were treating a patient who has had a previous heart attack. The previous heart attack had been recorded at the time of admission and in the medical case-notes after the deceased was hospitalised.

Madam Vasuhi`s next assertion that TTSH`s doctors failed to consider the risk of an exercise stress test so soon after his heart attack must also be rejected. It was not alleged that the stress test in question caused or was a contributory cause of the deceased`s death. In any case, Dr Mahar did not say that it was wrong for the sub-maximal exercise stress test to have been carried out on 7 August 1997. He merely said that the results of this test were uninterpretable.

Madam Vasuhi`s assertion that an electrophysiology study and a nuclear scan should have been done is also groundless. Dr Mahar accepted that an electrophysiology study would not have shed much light on whether or not the deceased had on-going ischaemia. As for a nuclear scan, it appears that, as a general rule, the next stage of inquiry for a patient such as the deceased is a coronary angiogram and not a nuclear scan.

As for the suggestion that the use of an implantable defibrillator could have been considered, it was not the practice to use implantable defibrillators in 1997.

If the unsubstantiated allegations of negligence referred to above are left aside, whether or not TTSH are liable to Madam Vasuhi for the death of her husband depends on the answers to the following questions:

(a) Was it proper for the deceased to be discharged on 8 August 1997?

(b) If it was proper, was the deceased`s death caused by any unjustifiable delay on the part of TTSH`s doctors to arrange an elective coronary angiogram for him?

On the evidence, I am satisfied that it has not been established that Dr Cheng was negligent in

deciding on an elective coronary angiogram for the deceased. While Dr Mahar would have arranged for an urgent coronary angiogram for the deceased, Prof Lim, Assoc Prof Lim and Dr Cheng furnished sound and very acceptable reasons for adopting the view that an elective coronary angiogram was what the deceased required.

As Dr Cheng was entitled to take the view that the deceased did not require an urgent coronary angiogram, Madam Vasuhi`s complaint that he failed to inform the deceased or his family members that the deceased required an urgent coronary angiogram or that an urgent coronary angiogram could have been performed at an earlier date at another medical establishment must be dismissed.

I am also satisfied that Dr Cheng was not negligent in relying on the available test results and on his own assessment of the deceased`s condition for the purpose of deciding whether or not to discharge the deceased from the hospital on 8 August 1997. It was alleged that Dr Cheng did not have all the facts before him when he discharged the deceased from the hospital. In particular, she alleged that Dr Cheng did not review the echocardiogram report of 7 August 1997 before discharging the deceased. She pointed out that Dr Cheng had wrongly stated the date of the echocardiogram as 11 August 1997 in, inter alia, his affidavit of evidence-in-chief. Dr Cheng explained that the error was a typographical error. He said that he must have seen the echocardiogram report because its findings were mentioned in the Inpatient Discharge Summary dated 8 August 1997. I believe Dr Cheng and hence, this matter need not be considered any further.

The criticism that Dr Cheng relied primarily on the sub-maximal exercise stress test for the purpose of deciding whether or not to discharge the deceased has not been overlooked. Dr Cheng denied that he based his decision to discharge the deceased primarily on the results of the sub-maximal exercise stress test. When cross-examined, he said as follows:

> *Q: You relied primarily on the sub-maximal stress test when discharging him.*
>
> *A: No. I made an assessment of the patient`s suitability for discharge from hospital on the basis of his clinical condition, his symptoms or lack of them, clinical examination, supported by investigations such as the exercise stress test. Other tests would be taken into consideration such as the echocardiogram and the signal averaged ECG. Based on all these, I decided to discharge him.*

As for the assertion that the sub-maximal exercise stress test results should not have been relied on because the test was incomplete, Dr Cheng explained that this was not true. In para 14 of his affidavit of evidence-in-chief, he stated as follows:

> *[I]t is not correct to suggest that the stress test was incomplete. The sub-maximal exercise stress test is meant to be terminated at 70-75 per cent of the predicted maximal heart rate or the onset of symptoms. Based on the ECG readings, the deceased achieved a total exercise time of 9 minutes and 33 seconds and reached a heart rate of about 76% of his age predicted heart rate.*
>
> *During the exercise stress test, the deceased did not develop any chest pain and there was no significant ST segment depression which would have indicated evidence of significant myocardial ischaemia.*

As it has not been established that Dr Cheng was negligent in discharging the deceased on 8 August 1997 or in deciding that the deceased did not require an urgent angiogram, the only remaining question is whether the deceased`s death was caused by any delay on the part of TTSH in arranging for the elective coronary angiogram.

As has been mentioned, Dr Cheng scheduled the deceased`s coronary angiogram for 23 October 1997. Whether or not TTSH should have arranged for the deceased`s elective coronary angiogram to be performed at an earlier date, it should be borne in mind that in ***Bolitho*** (supra), the House of Lords reiterated that where a breach of a duty of care is proved or admitted, the burden still lies on the plaintiff to prove that such breach caused the injury suffered.

In ***Bolitho*** `s case, a child who had respiratory trouble was admitted to hospital. On the following day, his breathing deteriorated at 12.40pm and a nurse summoned the doctor in charge of his case by telephone. The doctor did not turn up but the child recovered. However, at 2pm, he suffered another bout of acute respiratory difficulty. The nurse reported this to the doctor by telephone. The doctor again did not turn up. The child apparently recovered and looked much better after a while. At 2.30pm, the child collapsed due to a failure of his respiratory system, as a result of which he had a cardiac arrest. By the time, his respiratory and cardiac functions were restored, the child had sustained severe brain damage. Eventually, the child died and his parents sued the health authority for damages for negligence. The trial judge held that the doctor had been in breach of duty in failing to attend to the child when summoned by the nurse. Negligence having been established, the question of causation had to be determined. The issue before the court was whether the cardiac arrest would have been avoided if the doctor in charge or any suitable deputy had attended to the child at an earlier stage. It was common ground that intubation so as to provide an airway in any event would have ensured that the respiratory failure which occurred did not lead to cardiac arrest and that such intubation would have had to be carried out before the final episode of respiratory failure. Five experts gave evidence that after the second episode of respiratory failure, any competent doctor would have intubated. On the other hand, the defendants` experts took a different view. One of them testified that the child`s symptoms did not show a progressive respiratory collapse and there was only a small risk of total respiratory failure, a small risk which had to be balanced against submitting the child to the invasive procedure of intubation, which was not a routine risk-free process. In the face of such conflicting expert evidence with respect to whether intubation should have been done, the trial judge accepted that it had not been established that the defendants` admitted breach of duty had caused the catastrophe to the child. His decision was affirmed by the Court of Appeal [1994] 1 Med LR 381. The plaintiff`s appeal to the House of Lords was dismissed. Lord Browne-Wikinson said that it could not be suggested that it was illogical for the defendants` expert witness to favour running a small risk of total respiratory collapse rather than to submit the child to the invasive procedure of intubation.

It is clear from ***Bolitho*** `s case that even if it is accepted that in the present case, the deceased should have been given an earlier date for an elective coronary angiogram, it must be established that the deceased`s death was caused by the delay. As has been mentioned, both Prof Lim and Assoc Prof Lim testified that if the deceased had been their patient, they would have arranged for his elective coronary angiogram to be performed some two to three weeks after his heart attack on 1 August 1997, which is sometime between the middle of August 1997 and one week thereafter.

It must be stressed that what is crucial is not what Professor Lim or Assoc Prof Lim might themselves have done but whether or not they furnished sound and acceptable reasons for their suggested timing for the deceased`s elective coronary angiogram to be performed. In this regard, both of them provided cogent reasons as to why it was preferable for the elective coronary angiogram to be performed some two to three weeks after the deceased`s heart attack on 1 August 1997. I thus

accept that TTSH cannot be faulted even if the elective coronary angiogram for the deceased had been scheduled for the third week of August 1997.

Regrettably, the deceased passed away during the early morning of 16 August 1997, only eight days after his discharge from the hospital. As such, even if the logistics of arranging an elective angiogram for TTSH`s patients in 1997 are not taken into account, the fact remains that the deceased died well before the acceptable deadline for TTSH to send him for an elective coronary angiogram. Professor Lim summed up the position as follows in his letter dated 19 December 2000 to the Chairman of the Medical Board of the defendant hospital:

> *The patient suffered a cardiac arrest eight days after he was discharged. With the results of the investigations prior to discharge,* ***I personally would not have arranged for a diagnostic coronary angiogram to be performed within these eight days****. [Emphasis is added.]*

As the deceased died before the expiry of the period within which TTSH may be expected to have arranged for him to have an elective coronary angiogram, it cannot be said that TTSH`s delay in arranging the angiogram in question was a cause of the deceased`s death. In fact, Professor Lim went so far as to say that even if the elective coronary angiogram had been performed on 14 August 1997, he would, on the basis of the findings in the autopsy report, not have kept the deceased in hospital after the angiogram. Neither would he, without more, have, as Dr Mahar suggested, prescribed heparin for the deceased while further investigations were being conducted. During cross-examination, he said as follows:

> *Q: If an angiogram had been done on 14 August 1997, you would have admitted him to hospital?*
>
> *A: No. A person reading it will say that this person may benefit from surgery. There will be a long consultative process. No heparin will be prescribed unless his condition is unstable. Whether this patient is unstable depends on chest pains and objective symptoms of angina. This patient is a post-infarct 14-day patient.*
>
> *Q: If an angiogram had been done on 14 August 1997, it would have shown the condition of the heart as in the autopsy report?*
>
> *A: Yes but he could still have died on the 16th from ruptured haemorrhagic plaque ... This would be so even with heparin.*

In view of my finding that the deceased`s death was not caused by any delay on the part of TTSH in arranging an elective coronary angiogram for him, it is unnecessary for me to consider the lengthy arguments raised by both parties as to whether a heart by-pass operation would have benefited the deceased. All the same, it ought to be noted that on this issue, the experts were sharply divided. While Dr Mahar was more optimistic about the benefits of such an operation for the deceased, both Professor Lim and Assoc Prof Lim said that the additional tests required before a decision on such an operation can be made could not have been completed before the deceased died on 16 August 1997. Assoc Prof Lim added that revascularisation surgery for the deceased would have been highly risky because of his poor left ventricular systolic function and the fact that he had systemic lupus

erythematosus.

In the final analysis, whether or not the approach of TTSH`s doctors to the treatment of the deceased is acceptable depends on whether or not a conservative approach to the treatment of the deceased was justified. Given the circumstances of the case, it has not been established that the approach adopted by TTSH`s doctors was wrong. Madam Vasuhi`s claim against TTSH is thus dismissed with costs.

Outcome:

Claim dismissed.