CORONERS ACT, 2003

SOUTH *AUSTRALIA*

FINDING OF INQUEST

An Inquest taken on behalf of our Sovereign Lady the Queen at Adelaide in the State of South Australia, on the 1st, 2nd, 3rd and 7th days of March 2016 and the 29th day of September 2016, by the Coroner's Court of the said State, constituted of Mark Frederick Johns, State Coroner, into the death of Robert Ian McShane.

The said Court finds that Robert Ian McShane aged 66 years, late of 4/689 Burbridge Road, West Beach, South Australia died at the Calvary Hospital, 89 Strangways Terrace, North Adelaide, South Australia on the 8th day of January 2013 as a result of multi-system failure and ischaemic gut after left nephrectomy complicated by massive haemorrhage and vascular grafting. The said Court finds that the circumstances of his death were as follows:

1. Introduction and cause of death

1.1. Robert Ian McShane died on 8 January 2013 at the Calvary North Adelaide Hospital. The previous afternoon he had undergone surgery for laparoscopic left nephrectomy. The medical report of death to the Coroner was completed by the surgeon, Mr Denby Steele, who is a consultant urologist. Mr Steele gave his opinion as to the cause of Mr McShane's death as multi-system failure and ischaemic gut after left nephrectomy complicated by massive haemorrhage and vascular grafting, and I so find[1].

2. Background and the events leading to Mr McShane's death

2.1. In late 2012 Mr McShane had seen his general practitioner for a general check-up. His general practitioner directed certain investigations as a result of which haematuria was

[1] Exhibit C4, page 2

noted. Further investigations including renal ultrasound were then ordered and these revealed a left renal mass with possible adrenal pathology. Mr McShane's general practitioner referred Mr McShane to Mr Steele on 29 November 2012. Mr Steele arranged for further investigation by flexible cystoscopy and a left renal biopsy. This revealed features of capillary renal carcinoma in the left kidney and Mr Steele recommended that Mr McShane have a laparoscopic left nephrectomy. This surgery was, as I mentioned before, scheduled for 7 January 2013.

2.2. Mr Steele's handwritten operation record contains the following note:

> 'Urology - laparoscopic left nephrectomy complicated by catastrophic bleeding from second renal artery and aortic stapling in attempt to control life-threatening bleeding.' [2]

The same record reveals that Mr Steele was initially assisted by Mr Mohan Rao who is a retired general surgeon. Mr Rao was a urologist in India and when he came to Australia he performed transplant surgery and related urological work until 2011 when he retired.

2.3. The operation record also records that the anaesthetist was Dr Semenov and mentions two other surgeons, Drs Subramaniam and Hamilton. They are vascular surgeons who were called in to deal with the situation once Mr Steele had appreciated that Mr McShane's abdominal aorta had been transected at the level of the superior mesenteric artery[3]. Mr Hamilton was called in to assist Mr Subramaniam.

2.4. Mr Steele also prepared a typewritten operation note on 7 January 2013. It is useful to set out in full the relevant part:

> 'Open insertion of a 12 mm port above and lateral to the umbilicus. Pneumoperitoneum and insertion of two 12 mm ports caudal to this. The peritoneum was incised lateral to the colon to mobilise the colon medially and the spleen superiorly. The lower pole of the kidney was mobilised, the gonadal vein and the ureter mobilised laterally and followed to the pedicle. The hilum was dissected and the renal artery then vein were stapled using the Ethicon stapler. The kidney was mobilised until finding a residual branch of the renal artery. Attempts to ligate this led to bleeding, extension of the most caudal port site and insertion of a hand port. Good vision was initially achieved, haemostasis secured, the remaining artery divided and the kidney removed but brisk arterial bleeding started. Attempts to stop life threatening haemorrhage with the stapler while preparing for conversion to an open procedure, led to aortic stapling distal to the bleeding. On emergency opening by extending the hand port site medially and supero-laterally, the aorta

[2] Exhibit C4, page 70
[3] Exhibit C7, tab C

was clamped proximally but produced further bleeding controlled only by pressure. Vascular surgical help was summoned and while waiting, the left adrenal was removed to enable better access up the aorta. Peter Subramaniam and Mark Hamilton inserted an 18 mm aortic graft and reanastomosed the right renal artery using a graft to bring the anastomosis anteriorly. Despite a coagulopathy from a large blood loss and IV heparin, haemostasis was good. A small pleural opening was closed after forced inspiration and the wound was closed with looped 1 PDS in 2 layers, 3-0 Vicryl and 3-0 V-Loc over a naropin infusion catheter. The superior port site was closed with 0 Vicryl and skin on both port sites was closed with 3-0 V-Loc after infiltration with 0.75% Naropin and all wounds were dressed with Duoderm.' [4]

2.5. Following the operation Mr McShane was admitted to the Intensive Care Unit. He continued to deteriorate and a laparotomy performed the following afternoon revealed widespread patchy ischaemic small and large bowel that was not survivable. Following that Mr McShane was for palliative measures and, as I have noted, he died the same afternoon.

2.6. Mr Steele gave evidence at the Inquest. He is a consultant urologist having obtained his Fellowship at the Royal Australian College of Surgeons in 1991. Mr Steele also made a statement which was admitted into evidence[5]. He described his experience as follows:

'Whilst I am an experienced Urologist, my training was with open nephrectomy and laparoscopic developments occurred during the course of my specialist practice. I subsequently trained as a Laparoscopic Surgeon under Associate Professor Nick Brook at the Royal Adelaide Hospital. Following my training I felt confident in my ability to undertake laparoscopic urological surgery. Associate Professor Brook informed me that he regarded me as proficient in this procedure and I was performing this procedure confidently with just a general practitioner assisting.' [6]

2.7. Mr Steele said that his usual assistant who is a general practitioner was not available on 7 January 2013 and as a result of this he requested the assistance of Mr Rao who agreed to act in that role. Mr Steele stated as follows in his statement:

'Surgery was straightforward initially until difficulty was experienced dividing what was thought to be a second and previously unrecognised renal artery when the kidney was mostly mobilised. Sudden precipitous bleeding occurred. I attempted to stop the bleeding by use of a hand port and then stapler but was unsuccessful. I converted to an open procedure and identified that damage had been done to the abdominal aorta. I called for assistance from a Vascular Surgeon and Dr Subramaniam attended. With vascular surgical

---

[4] Exhibit C4, page 88
[5] Exhibit C10
[6] Exhibit C10, page 3

> expertise from Dr Subramaniam an aortic graft was placed and he was transferred to ICU reasonably stable although after a massive transfusion and some period of aortic clamping.' [7]

2.8. Mr Steele said that it is not uncommon in laparoscopic urological surgery to have to deal with unexpected bleeding in the area of the operative field. He said that the nature and extent of the response to such bleeding will depend to a considerable extent upon its magnitude, persistence and origin if known. He said that if it cannot be controlled and its origin determined, the appropriate response is to convert to an open procedure[8]. He noted that the options available short of converting to an open procedure can be performed via the laparoscopic method. Thus the appearance of bleeding would not of itself require an immediate conversion to an open procedure. He noted that he would do his best to try to avoid converting to an open procedure because the 'recovery time is so much longer'[9]. He added that if the patient is at risk because the bleeding cannot be controlled or persists, then it is axiomatic that conversion to an open procedure take place.

2.9. Mr Steele said that during the operation he altered his usual practice in relation to the placement of the laparoscopic ports. This followed a discussion with Mr Rao who referred to the alternative placement. Mr Steele said that because of the different port positions the operative view was different to that to which he was accustomed, and that this was not a problem in a bloodless field, but when the bleeding occurred, 'the anatomical perspective was less familiar'[10]. He said that he discussed strategy with Mr Rao and believing that the bleeding was not severe enough to warrant an immediate open procedure, he followed Mr Rao's suggestion of trying a hand port to help control the bleeding. Mr Steele said:

> 'The hand port did not prove helpful and despite poor visibility I felt I might be able to control the bleeding by firing a linear stapler. This again failed to control the bleeding and his abdomen was opened.' [11]

[7] Exhibit C10, page 4
[8] Exhibit C10, page 4
[9] Exhibit C10, page 5
[10] Exhibit C10, page 5
[11] Exhibit C10, page 5

2.10. Mr Steele said in his statement that he now accepts that his decision to use the stapler to try and stop the bleeding was an error of judgment and he should have proceeded to open the abdomen at that time[12]. He added that:

> 'In retrospect I was misguided to use the stapler in the face of poor vision and unfamiliar angles to try and stop the bleeding.' [13]

He explained that his efforts to stop the bleeding were to increase the peritoneal CO_2 pressure, the use of careful suction, tamponade swabs, the hand port to manually control bleeding and finally the use of the stapler[14].

2.11. In his oral evidence Mr Steele described the use of three ports, one of which is used to introduce a camera for vision and the other two of which are working ports[15]. The initial port for vision was inserted near the umbilicus and two further ports were inserted caudal to this[16]. He said that it is commonly the case that the vasculature of the kidney consists of one artery and one vein supplying and draining the kidney, but that it is not uncommon to have variations and this may include extra arteries, or veins, or both[17]. Mr Steele in his oral evidence said that his memory was hazy[18].

2.12. In the typed operation note[19] Mr Steele referred to 'finding a residual branch of the renal artery'. He continued 'attempts to ligate this led to bleeding'. In his oral evidence he was asked what he meant by 'ligate' in that context and he said that usually he uses the word ligate to mean to tie off with sutures, but said that he was using the term loosely because there were no sutures involved at this stage. He said that he could not remember exactly, but thought he was referring to a combination of the use of clipper pliers and the harmonic scalpel[20]. He said that the harmonic scalpel is a device that will seal and cut-off tissue.

2.13. It will be remembered that in his statement he had described this part of the process by saying that the surgery was straightforward initially until difficulty 'was experienced dividing what was thought to be a second and previously unrecognised renal artery

---

[12] Exhibit C10, page 6
[13] Exhibit C10, page 6
[14] Exhibit C10, page 6
[15] Transcript, page 19
[16] Transcript, page 21
[17] Transcript, page 22
[18] Transcript, page 23 and Transcript, pages 60-61
[19] Exhibit C4, page 88
[20] Transcript, page 25

when the kidney was mostly mobilised'[21]. The reference in his statement to dividing what was thought to be a second and previously unrecognised renal artery and his explanation that ligate referred to the use of the harmonic scalpel, suggests that the bleeding was in fact started as a result of some action taken by Mr Steele in relation to 'what was thought to be a second and previously unrecognised renal artery'[22].

2.14. Mr Steele was asked whether he still remained of the view that what he had described as an accessory renal artery was indeed an accessory renal artery. His response was:

> '… that's the best explanation I could come up with at the time and I haven't come up with a better one since, but, you know, it was unclear at the time and it is no clearer now three years later.' [23]

2.15. In any event Mr Steele went on to explain that at that point the bleeding seemed to have stopped by some means[24]. Mr Steele went on to describe the next event which was the removal of the kidney. The kidney was removed via the hand port which had been made by extending the most caudal port site. Mr Steele's report stated that good vision was initially achieved, haemostasis secured, the remaining artery divided and the kidney removed. By the reference to the remaining artery I take him to be referring to what he had previously described as a residual branch of the renal artery.

2.16. It was at this point that what Mr Steele described as brisk arterial bleeding in his typewritten operation report and as catastrophic bleeding in his handwritten report occurred. Mr Steele thought that the new bleeding, which was worse than the earlier bleeding, was coming from the same source as the earlier bleeding[25]. The bleeding had been described by him in his typewritten report as 'life threatening haemorrhage'[26] and that it was necessary to attempt to stop it. This attempt was made using the stapler. Mr Steele described the stapler as a device that will fit through the laparoscopic ports with a jaw at the end such that when the jaws are brought together it will produce four lines of staples and then cut between them with the effect that it will seal the vessel, the vessel being divided on both sides of the cut[27]. In his statement[28] Mr Steele said 'I now

---

[21] Exhibit C10, page 4
[22] Exhibit C10, page 4
[23] Transcript, page 49
[24] Transcript, page 25
[25] Transcript, page 29
[26] Exhibit C4
[27] Transcript, page C28
[28] Exhibit C10

accept my decision to use a stapler to try and stop the bleeding was an error of judgment and I should have proceeded to open the abdomen at that time'.

2.17. At that point Mr Steele proceeded to open Mr McShane's abdomen. It was at this stage that he determined that the stapling had itself caused damage to the abdominal aorta and that he needed to obtain assistance from a vascular surgeon[29]. He could not recall how much time elapsed in that process[30]. This was the first time he had ever had to call for assistance from a vascular surgeon[31]. While he was awaiting the arrival of vascular surgical assistance he removed the left adrenal in order to enable better access up the aorta for the vascular surgeon when they arrived[32].

2.18. Mr Steele's attention was drawn to the anaesthetic chart in the hospital notes[33]. He acknowledged that there was a blood pressure drop at approximately 11:45am consistent with a bleed[34]. His attention was also drawn to a Clinpath report of a blood sample collected at 11:44am[35]. The report under clinical history refers to a nephrectomy being underway and bleeding occurring[36]. Mr Steele acknowledged that this is an indication that bleeding was underway at 11:44am[37].

3. Visualisation of the stapler jaws

3.1. Mr Steele was asked when he cut the vessel whether he could see the vessel in the body of the stapler jaws. He acceded to this proposition[38], but the effect of this answer was qualified in the passage of evidence that followed[39]. In that passage Mr Steele was asked whether he could see the tips of the stapler clear from the surrounding material when he cut the vessel and he replied:

> 'Well you can virtually never see the tips of the stapler because they're pointing away from you. So you need to sort of know where they are but you can never see them.' [40]

[29] Transcript, page 32
[30] Transcript, page 32
[31] Transcript, page 32
[32] Transcript, page 33
[33] Exhibit C4, page 62
[34] Transcript, page 38
[35] Exhibit C3, page 59
[36] Transcript, page 41
[37] Transcript, page 42
[38] Transcript, pages 46-47
[39] Transcript, pages 47-48
[40] Transcript, page 47

He also said:

> 'I can say you never know where the - you have to know where the tips are but you can never see where the tips are because they're pointing away from you and you just can't. They're sort of underneath the kidney so you - I'd go so far as to say you never see the tips of the stapler.' [41]

3.2. Mr Steele was asked how far the cutting edge goes in relation to the end of the stapler and he said that although he had never measured it, he thought the distance was 8mm[42]. He was asked if he had ever been shown the technique of holding the vessel within the jaws of the stapler and then rotating the jaws of the stapler so that you can see all of what it is that is in contact with the jaws and he responded that:

> 'Well usually the tips of the stapler are behind the kidney so no matter of rotation would usually allow you to see the tips, no.' [43]

Mr Steele said that in his experience he cannot necessarily see all of what it is that is within the cutting tips of the stapler[44]. He acknowledged that the accidental cutting of a blood vessel which took place in this case was attributable to that lack of vision[45].

3.3. Mr Steele was asked whether he asked his assistant, Mr Rao, for any change of field of vision or focus via the camera before he operated the stapler on each occasion and he replied that he did not recall[46]. He was asked whether he had enquired of his assistant whether he should operate the stapler and replied that he had no recollection[47]. It was put to him that the firing of the stapler was his decision made without consultation and he responded ‘that would usually be the case, yes’[48]. The stapler was not fired after conversion to the open procedure[49].

3.4. Mr Steele was informed that Mr Rao videotaped all of his laparoscopic procedures and was asked whether he did so. He replied in the negative[50]. Mr Steele was asked why not and he responded that he did not do so because of a combination of time, facilities and necessity. He added that there were some occasions when he had videotaped his own procedures, but then had never actually had a chance to look back at them[51].

---

[41] Transcript, page 47
[42] Transcript, page 47
[43] Transcript, page 48
[44] Transcript, page 48
[45] Transcript, page 48
[46] Transcript, page 49
[47] Transcript, page 49
[48] Transcript, page 49
[49] Transcript, page 50
[50] Transcript, page 51
[51] Transcript, page 51

4. The Prolene sutures

4.1. Mr Steele said that when the abdomen was opened and bleeding sites were seen, they were oversewn with sutures to stop the bleeding. He said that this was what might be described as a gross repair to stop bleeding before a detailed repair commenced[52]. He said that he used Prolene sutures in order to stop the bleeding in the abdominal aorta[53]. Mr Steele did not accept that he had lost control of the surgery, instead describing the situation as 'a bad call'[54].

5. The evidence of Mr Rao

5.1. Mr Rao was as I said Mr Steele's assistant on this occasion. I have already described his qualifications and the fact that he practised as a renal transplant surgeon for many years. In his statement[55] Mr Rao commented that the donor nephrectomies of the kind he carried out in his practice differ from radical nephrectomies performed in cases of kidney cancer 'in that a donor kidney must be removed in a condition that it can be transplanted into a recipient' and that 'it is therefore necessary to establish precisely what vascular structures are associated with the kidney before the nephrectomy is performed'. It is for this reason that there is a preoperative angiogram in the case of donor nephrectomy, but that this is not necessary for radical nephrectomies for cancer[56]. Mr Rao's overall recollection of the progress of the surgery accorded with that of Mr Steele. He said that after the laparoscopic ports had been inserted Mr Steele mobilised the large bowel and the spleen to expose the left kidney. Mr Steele identified the ureter and followed it to the kidney. The left renal vein and the renal artery were cleared and the left renal artery was divided with a stapler and the left renal vein was then divided with a stapler. Mr Rao stated in his statement that when Mr Steele divided the left renal artery and left renal vein 'I was unable to see that the tips of the stapler were clear'[57]. He then said that Mr Steele proceeded to mobilise the kidney and divided the ureter. Mr Rao said to this point there was no apparent bleeding, but that Mr Steele then identified a vessel which Mr Steele described as a residual branch of the renal artery and that 'when he tried to secure this vessel it started bleeding'[58]. Mr Rao said

[52] Transcript, page 51
[53] Transcript, page 71
[54] Transcript, page 72
[55] Exhibit C11
[56] Exhibit C11
[57] Exhibit C11, paragraph 17
[58] Exhibit C11, paragraph 19

that this initial bleeding was not significant. He referred to the introduction of a hand port to help to control the bleeding and described what then followed in that the residual renal artery was divided using the stapler and the kidney was removed. Mr Rao said it was then that 'profuse bleeding immediately followed the removal of the kidney'[59].

5.2. Mr Rao in oral evidence acknowledged that in these forms of surgery it is not uncommon to encounter unexpected bleeding and that there are strategies available to deal with these events laparoscopically[60].

5.3. Mr Rao described the staplers used in laparoscopic surgery as having three rows of staples on either side of the blade that moves in and out[61]. It will be recalled that Mr Steele's description involved four rows of staples which I took to be two each side of the blade. By contrast with Mr Steele's estimate of the distance between the tip of the jaws of the stapler and the extent of the blade which was 8mm, Mr Rao gave an estimate of 'a couple of millimetres short of the tip'[62]. Mr Rao said that it is important in manipulating the stapler to make sure that the surgeon has not inadvertently picked up a structure that he or she does not want to cut and staple:

> 'Yes, I think that's the most crucial part of the operation. You've got to define, clear the vessel, make sure there is nothing else is attached to it and - stapler is like scissors, you won't cut unless you see the full extent of the scissors and a similar thing with the stapler. Even if they say that there is half a centimetre of blunt plastic but what happens to the rest. So my practice is always put the stapler, lock it then I would move it sideways to see whether any other tissue that I haven't cleared is caught in the jaws and then only I'll pull the trigger.' [63]

He was expressly asked whether his practice was to visualise the tip of the stapler and he said yes[64]. At this point an objection was raised by counsel for Mr Steele who pointed out that Mr Rao's experience is as a renal transplant surgeon and it should be made plain that he was speaking to that sort of procedure and not the radical nephrectomy procedure. However, Mr Rao agreed with the proposition that in all forms of surgery it is important not to cut tissue that you do not intend to cut, and added:

> 'I would say, you won't cut anything unless you know what you are cutting.' [65]

---

[59] Exhibit C11, paragraph 23
[60] Transcript, page 85
[61] Transcript, page 87
[62] Transcript, page 88
[63] Transcript, page 88
[64] Transcript, page 88
[65] Transcript, page 89

He added that while he can only speak about what he has done in his transplant work:

> 'Yes, I'm only looking at it from the common sense, you wouldn't cut anything unless you know what you are cutting.' [66]

On the same topic Mr Rao said:

> 'When I use the stapler I like to see where the stapler is, and what is inside the jaws of the stapler, and it could be another organ there, it could be another vessel there. But what I normally do is locking it, I just put the lid to see whether it is still covered, and make sure my tip is all right, and then only will that ... prepare to cut it.' [67]

5.4. Mr Rao said that the surgery was going smoothly and 'even though I was concerned that I couldn't see the tips', 'I was relieved that there was no bleeding, so probably there is no damage'[68]. He then said that at this point Mr Steele said that there was an extra vessel going to the kidney. Mr Rao said he used the word 'residual branch' or something similar[69]. Mr Rao said he himself could not make out where it was going, but Mr Steele decided to staple it. Mr Rao described that Mr Steele 'put the stapler on it and pulled the trigger and shortly after that we got into trouble'[70]. Mr Rao said that in his opinion 'maybe we should have spent a little bit of time to see – trace it up and down, see exactly where it is coming from and where it is heading, before we dealt with it'[71]. From this it can be seen that Mr Rao was doubtful as to the identity of the vessel in question and that further investigation was required before it was dealt with. It will also be recalled that Mr Steele's evidence was that at the time, and even at the time that he gave his evidence, the identity of the vessel was unclear[72].

5.5. I am not able to make any finding as to the exact identity of the vessel on the evidence I have heard. Perhaps it was a residual or accessory renal artery as supposed by Mr Steele. Despite his comment when giving evidence that it was not clear to him at the time, that was certainly what he wrote in his contemporaneous notes. Whether he was correct or not cannot now be known.

5.6. Mr Rao confirmed that if he himself was unable to see the tips of the stapler it followed that no-one else, including Mr Steele, could see them either[73]. That is because of course

---

[66] Transcript, page 90
[67] Transcript, pages 97-98
[68] Transcript, page 99
[69] Transcript, page 99
[70] Transcript, page 99
[71] Transcript, page 99
[72] Transcript, page 49
[73] Transcript, page 99

the vision being used to guide the operation was on a screen that could be observed by both Mr Steele and Mr Rao. This is perhaps obvious, but important to bear in mind because it demonstrates that Mr Rao's vision of the operative site was as good as Mr Steele's and that Mr Steele had no better perspective as the operator than Mr Rao did as the assistant.

5.7. In this connection I would also add that there is a difference between the evidence of Mr Rao and Mr Steele as to gaining vision of the tips of the stapler prior to activating the cutting blade of the stapler. Mr Rao referred to his practice of locking the stapler over the vessel and then manipulating the vessel in order to ensure that no other tissues had been trapped in the stapler's jaws. In this I take him to be referring to the ability of the operator of the stapler to clamp the jaws of the stapler together without actually activating the stapling and cutting function.

5.8. Returning to the narrative, Mr Rao described the initial bleeding as 'quite brisk'[74]. Mr Rao explained that the hand port was created after the residual artery was stapled[75].

5.9. Mr Rao's recollection was that the kidney was extracted via the hand port[76] and that the initial bleeding followed that removal[77]. Mr Rao said that he could not see what caused the initial bleeding[78].

5.10. I note that counsel for Mr Steele did not ask Mr Rao any questions about visualisation of the stapler as a pre-condition to its deployment.

6. <u>The evidence of Mr Subramaniam</u>

6.1. I have already noted that Mr Subramaniam was the vascular surgeon who was called in after Mr Steele had identified the aortic transection. There was some evidence about the timing of the decision to call a vascular surgeon. I do not propose to traverse that evidence. The only thing I would say in relation to timing is that once Mr Subramaniam received a message that his assistance was required, he attended in a most timely fashion. He correctly assessed the situation as a transected abdominal aorta and noted that it was at the level of the superior mesenteric artery. He also noted that the right renal artery had been transected as well. Mr Subramaniam provided two very helpful

[74] Transcript, page 99
[75] Transcript, page 100
[76] Transcript, page 101
[77] Transcript, page 101
[78] Transcript, page 101

diagrams which formed tabs D and E to his statement[79]. I include as an appendix to this finding copies of tabs D and E. Tab E shows the aortic graft and the right renal artery graft that were implanted by Mr Subramaniam. In order to understand the two diagrams it is necessary to appreciate, as explained by Mr Subramaniam in his evidence, that once the artery was transected the two ends of the artery withdrew in what is a natural physiological response to such an insult. Rather than attempt to stretch the aorta back to its original position, it is the practice of a vascular surgeon instead to insert a graft. This may assist the reader in better understanding the diagrams in tabs D and E[80]. It is useful to include the whole of Mr Subramaniam's operative note dated 7 January 2013:

> 'Patient was in lateral position on the operating table with retroperitoneal exposure following conversion of laparoscopic nephrectomy to an open nephrectomy and exploration due to bleeding.
>
> On initial review, the abdominal aorta was noted to be transected with a complete stapled suture line distally. Proximally the aorta was completely transected at the level of the superior mesenteric artery. Proximal control was noted to have been achieved at the level of the superior mesenteric artery by a side biting clamp. Multiple Prolene sutures were noted in the line of the transected proximal abdominal aorta. At the time of vascular involvement, the left kidney had been resected as well as the left adrenal gland. The right renal artery was noted to be divided. (On review under drapes, the patient's feet were noted to be ischaemic).
>
> Proximal control of the abdominal aorta was achieved at the level of the diaphragm by division of the right crus of the diaphragm, above the level of the coeliac trunk. 5000 international units of heparin was administered in two boluses of 2500IU.
>
> A Dacron graft was sourced from another hospital with minimal delay and an 18 mm diameter tube Dacron reconstruction of the aorta completed, incorporating the superior mesenteric artery origin in the proximal anastomosis. Following release of the clamp, proximal pulsatile was noted in the superior mesenteric artery. The distal anastomosis was completed, as with the proximal anastomosis, using a continuous 3, 0 Prolene suture.
>
> After being isolated and dissected, with heparinised saline irrigation and control, the right renal artery was reimplanted into the body of aortic graft using a 6 mm PTFE graft. This was completed using a 5, 0 Prolene continuous suture. Following release of clamps, pulsatile flow was confirmed by palpation in the renal artery, the superior mesenteric artery and the distal iliac vessels.
>
> Haemostasis was achieved and the patient's feet were noted to be viable with moderately brisk capillary return.
>
> The patient was noted at this stage to be acidotic and anuric, requiring inotropic support for maintenance of blood pressure.' [81] [82]

---

[79] Exhibit C7
[80] Transcript, page 124
[81] Exhibit C7, Tab C
[82] For the lay reader it is helpful to note that the reference in the operation report to 'proximal' refers to the cardiac side of the point of dissection, while 'distal' is the side further away from the heart or closest to the peripheries (transcript page 129)

6.2. In the course of the operation, including before and after the arrival of Mr Subramaniam, Mr McShane was administered 20 units of blood, six units of cryoprecipitate[83], five of fresh frozen plasma and two of platelets.

6.3. Mr Subramaniam confirmed that the superior mesenteric artery had not been transected before his arrival or after. However, at the time that he arrived there was no flow into the superior mesenteric aorta because the aorta had been clamped above the superior mesenteric artery and transected at the level of the superior mesenteric artery[84]. He then explained:

> 'So when I put the top end of the graft in and I brought the clamp down, there was flow back in the SMA (superior mesenteric artery) and I guess what I've used that term[85] to imply is that I brought the SMA back into circuit. That's probably the source of confusion, I guess. I make a note if you look at my operative note that the origin of the SMA, the way it comes off was incorporated in the proximal anastomosis, so I didn't have to take it off and plug it back in but by putting my graft at the level of the SMA or just below, I brought the SMA back into circuit.' [86]

6.4. This point assumed some small significance in the Inquest because the expert witness, Professor Costello, had deduced from the wording of Mr Subramaniam's operative report that the superior mesenteric artery had been transected and required reimplantation. In fact it would appear that the superior mesenteric artery had never actually been cut, but was still intact and connected to the aorta when Mr Subramaniam arrived. However, Mr Subramaniam made it plain that the transection of the aorta was at the level of the superior mesenteric artery, from which it would seem to be likely that even if the superior mesenteric artery remained connected to the aorta immediately proximal to that transection, the open aorta would mean that the blood flow would likely pour out of the opening and the flow into the superior mesenteric artery would either be non-existent or significantly compromised. This is clear from Mr Subramaniam's remark that as a result of his efforts he 'brought the superior mesenteric artery back into circuit'[87].

---

[83] An agent used to encourage clotting
[84] Transcript, page 141
[85] Here he is referring to the term 'reimplantation of superior mesenteric artery' in his operative note (Exhibit C7, Tab C)
[86] Transcript, page 141
[87] Transcript, page 141

7. Professor Costello, urological surgeon and expert witness

7.1. Professor Costello is Director of Urology at the Royal Melbourne Hospital and a Professorial Fellow in the Melbourne University Department of Surgery. He was the Head of the Urology Department at St Vincent's Hospital for nine years between 1990 and 1999. His training in urologic surgery after completion of his fellowship in Australia was at the University of Texas in Houston where he completed a fellowship specialising in urological cancer surgery. After that he was employed as a senior lecturer in the Department of Urology at the University of London and the Royal London Hospital. He completed the urologic fellowship in London specialising in the areas of reconstructive surgery, general urology, urological cancer and transplant. He is qualified in the areas of laser surgery, ultrasound in application to urology and laparoscopic and robotic urological surgery. He has published more than 175 scientific manuscripts and 15 book chapters. He runs a post graduate international urology fellowship teaching program at the Royal Melbourne Hospital. Professor Costello has assisted his colleagues with laparoscopic radical nephrectomy. He said that laparoscopic surgery requires dexterity, but is also a counter intuitive operation because hand movements are reversed. He considers that laparoscopic surgery is highly technical and complex and needs to be done by specialists who do a lot of it. When he started as Head of the Department at the Royal Melbourne Hospital in 2000, he put in place a requirement that only trained laparoscopic nephrectomists are permitted to do the operation at the Royal Melbourne Hospital. He said that at the Royal Melbourne Hospital there are three such specialist kidney laparoscopic surgeons at present. He noted that any surgeon who trained in a fellowship for urology surgery prior to around the late 1990s would not have been trained in the technique of laparoscopy or laparoscopic nephrectomy and would have required further training to undertake such surgery[88]. In short, he said that the Royal Melbourne Hospital insists that surgeons undergo a year of laparoscopic training before performing laparoscopic nephrectomy[89]. He expressed the view that at least 40 cases should be performed before a person could be considered to be satisfactorily trained in this particular operation which in his opinion is one of the more complicated operations in urology[90].

---

[88] Transcript, pages 153-154, Exhibit C12
[89] Transcript, page 155
[90] Transcript, page 155

7.2. Professor Costello provided a useful summary of the circumstances leading up to Mr McShane's surgery which I have previously mentioned, but it is worth repeating here. Imaging was performed because Mr McShane had microscopic haematuria, that is a finding of blood in his urine on testing. The blood was not obviously discolouring the urine however. During the course of the investigation a small mass was found in the left kidney which was assessed as around 2.5cm in size. A biopsy was arranged by Mr Steele and the biopsy showed a papillary renal cell carcinoma Fuhrman grade 3 cancer. As a result of that it was decided that a laparoscopic left nephrectomy would be performed. Professor Costello noted that Mr McShane, apart from being a smoker, appeared to be in good health on admission to the Calvary Hospital[91].

7.3. Professor Costello summarised the events as he understood them in his report. Obviously his report was prepared in advance of the Inquest and before he had been made aware of the detailed evidence provided by Messrs Steele, Rao and Subramaniam. His summary was as follows:

> 'I have read the notes of Mr Steele's operation carefully. It is difficult to determine where the cause of the impending catastrophic bleeding was. The kidney was mobilised uneventfully it would seem until what apparently was misidentified as another branch of the renal artery was found. Attempts to control this artery lead to extensive bleeding. A hand port was inserted for better vascular control with some haemostasis being secured but more bleeding occurred and then a stapler was inserted prior to formally opening the abdomen. The stapler somehow or other was fired to divide the aorta distally completely. The right renal artery was also divided as was the superior mesenteric artery which was supplying the small bowel with blood supply. In summary in an attempt to control a haemorrhage the aorta was divided and subsequently found to be proximally oversewn when vascular surgery explored the retroperitoneum. The superior mesenteric artery was also divided. Thus in an attempt to control bleeding at this operation the aorta was divided with a stapler distally and oversewn proximally, the superior mesenteric artery was divided, as was the right renal artery.' [92]

7.4. Professor Costello was challenged by counsel for Mr Steele firstly in relation to his apparent description of the initial bleeding as 'catastrophic' in the passage where Professor Costello said it was difficult to determine where the cause of the bleeding was. In fairness to Professor Costello he may have been referring to the overall bleeding event because there is no doubt that even if the initial bleed was not 'catastrophic', it ultimately became so. In the end the matter was effectively resolved by Professor

[91] Exhibit C12
[92] Exhibit C12, page 3

Costello acknowledging the sequence of events, that is, an initial bleed apparently controlled followed by a catastrophic bleeding event.

7.5. A second challenge to Professor Costello's summary as referred to above was his mistaken assertion that the superior mesenteric artery was divided during the surgery. As I have attempted to explain above, this was not the case although it was undoubtedly the case that the blood supply to the superior mesenteric artery was probably significantly affected once the aorta was completely divided. Professor Costello's misunderstanding arose from the way in which Mr Subramaniam had described his actions in relation to the superior mesenteric artery by using the expression 'reimplantation'. I certainly am in no way critical of Mr Subramaniam for his use of that language, nor for any other action he took in relation to Mr McShane because, clearly, Mr Subramaniam entered a very grim situation and went about saving that situation as best he could in what might be reasonably described as a heroic manner. Unfortunately his efforts were not sufficient to save Mr McShane's life.

7.6. In any event there was a reason why Professor Costello assumed that the superior mesenteric artery had also been divided and when Professor Costello was provided with the true picture, he accepted that he had misunderstood this aspect of the matter. In effect, this was a side issue that in no way affected the weight or validity of Professor Costello's conclusions.

7.7. Professor Costello used the expression 'misidentified' or 'misidentification' in relation to the blood vessel which was variously described as a residual branch of the renal artery or an accessory branch of the renal artery, but which as I have previously noted Mr Steele said he could not identify at the time of the surgery, nor to this day. Mr Rao was not certain of its identity either. In fact, it is possible that it was an accessory/residual renal artery, but as Mr Steele noted that will never be known. There was no autopsy in this case. In any event, Professor Costello may or may not be correct in describing the vessel as having been 'misidentified'. It really is beside the point. Whatever its provenance, there was some unknown vessel from which the original bleeding appeared to have started. Presumably the catastrophic bleeding which followed originated from the same source, although having regard to Mr Steele's evidence that he could not see the tips of the stapler when firing the stapler, it is possible that damage was done to some other vessel.

7.8. Professor Costello said in his report[93] that 'the major misadventure in this situation was the firing of stapler which completely transected the aorta distally … The right renal artery was also divided during this'. I agree. Professor Costello went on to say that he had never heard of this complication at nephrectomy previously[94].

7.9. Professor Costello expressed the view in his report that Mr Steele seemed to have lost control of the operation and was quite critical in his report.

7.10. In cross-examination by counsel for Mr Steele, Professor Costello acknowledged that if Mr Steele believed that the bleeding was at some point controlled, it was reasonable for him not to convert immediately to an open procedure[95]. Professor Costello agreed with counsel for Mr Steele's proposition that Mr Steele's early belief of having controlled the initial bleed was probably misplaced and that it seemed that there was a material difference in the magnitude of the initial bleeding compared to the bleeding that followed the removal of the kidney[96]. Counsel for Mr Steele put to Professor Costello that Mr Steele had in his evidence acceded to the proposition that in operating the stapler it was necessary to visualise the vessel in the jaws of the stapler before doing what you needed to do with the stapler itself, and that the surgeon wants to know what is in the jaws of the stapler before pulling the trigger and Professor Costello accepted counsel's suggestion. That was literally an acceptance of counsel's suggestion as to something Mr Steele was asserted to have said in his evidence and it was that which Professor Costello accepted[97].

7.11. Thereupon counsel for Mr Steele asked Professor Costello about his knowledge of the variability of staplers employed for radical laparoscopic nephrectomy and whether or not they have cutting edges all the way to their tips. Professor Costello said he did not know the answer to that question. It was suggested by counsel for Mr Steele that that lack of knowledge by Professor Costello may have been because 'this is not a procedure that you'd do'[98]. Professor Costello responded by saying:

> 'I use staplers but I don't use them in nephrectomy. Clearly I don't do it, but there are variations - there are a number of different stapler companies, they have different products,

93 Exhibit C12
94 Exhibit C12, page 4
95 Transcript, pages 193-194
96 Transcript, page 197
97 In fact Mr Steele never conceded that 'it was necessary to visualise the vessel in the jaws of the stapler'. His actual evidence was 'Well you can virtually never see the tips of the stapler because they're pointing away from you. So you need to sort of know where they are but you can never see them' Transcript, page, 47
98 Transcript, page 200

> I do use staplers. But I haven't the expertise to answer that question as to the variation in the type of stapler.' [99]

In providing that answer I take Professor Costello to be saying that he is not an expert in the characteristics of all laparoscopic staplers that might be on the market. I do not take it to be an acknowledgment by Professor Costello that he is not familiar with the technique of using staplers generally, and the precautions that should be followed in their use. Certainly it was never put by counsel for Mr Steele to Professor Costello that he did not understand those things.

7.12. Finally, in closing submissions, counsel for Mr Steele said that ‘it is not irrelevant that he (Professor Costello) does not perform laparoscopic radical nephrectomies’[100]. Counsel for Mr Steele submitted that acknowledging Professor Costello’s extensive curriculum vitae ‘what you can see of the instruments and where the instruments and what might be obscuring a field of view will differ from procedure to procedure’[101].

7.13. Counsel for Mr Steele then submitted that Mr Rao’s experience lies in the field of live donor nephrectomy. This seemed to be the beginning of a submission directed at suggesting that Mr Rao’s evidence as to surgical technique may not be applicable to laparoscopic radical nephrectomy as undertaken by Mr Steele in this case. However, counsel for Mr Steele did not go on to develop that submission and never directly submitted that Mr Rao’s expertise about technique was not relevant to laparoscopic radical nephrectomy.

7.14. Counsel for Mr Steele submitted that Mr Steele gave some evidence about anatomy and what is seen when he does laparoscopic radical nephrectomy[102]. I take this from the context of the submission to be a reference to Mr Steele’s evidence about his inability to see the tips of the stapler ‘because they are pointing away from you and you just can’t. They are sort of underneath the kidney so you – I’d go so far as to say you never see the tips of the stapler’[103]. It will be recalled that in that passage of evidence he was further examined about a technique whereby the stapler is rotated holding the vessel until the tips of the stapler became clear, a technique he said he had not heard of and

---

[99] Transcript, page 200
[100] Transcript, page 245
[101] Transcript, page 245
[102] Transcript, page 248
[103] Transcript, page 47

rejected on the basis that he did not think he could ever see the tips of the stapler 'by definition of the way it's done'[104].

7.15. Counsel for Mr Steele noted that Professor Costello when he was asked about that matter responded, to use counsel's words, 'I don't understand that'. Counsel went on to say that was a response from someone who does not do laparoscopic radical nephrectomies. Professor Costello's actual evidence on that point was as follows:

> 'I found that difficult to comprehend because it's important. So when the staple's applied you don't fire the staple to cut, you lift the vessel up in the stapler and make sure that the surrounding tissue is clear, that you haven't got anything else in the stapler. So, you want to be able to see the tips of the stapler.' [105]

He was asked about Mr Steele's suggestion that the stapler would be behind the kidney and Professor Costello said he could not see why the stapler would be behind the kidney and so unable to be seen[106].

7.16. Counsel for Mr Steele also made reference to Mr Steele's evidence that the cutting edge of the stapler does not extend all the way to the tips of the jaws. However, that issue was never raised by counsel for Mr Steele or anyone else with Professor Costello. In short, these matters were raised by counsel for Mr Steele as a basis for rejecting Professor Costello's view that the tips of the stapler should be visualised before the stapler is deployed. Counsel for Mr Steele said that Mr Steele had acceded to the proposition that the vessel that 'you are going to deal with in the stapler, you need to visualise in the jaws of the stapler and he said that you need to know where the stapler is and the tips are, but he said from his perspective in doing this procedure because the tips are away from you, you don't see them'. As I have noted, Mr Steele's evidence was that he does not use the technique of rotating the vessel in the stapler in order to visualise that the tips of the stapler were clear. His evidence was quite clear that he rarely or never visualises the tips of the stapler.

7.17. Counsel for Mr Steele did not address the evidence given by Mr Rao as to his view that it is crucial to visualise the tips of the stapler. It will be recalled that Mr Rao gave evidence that he was concerned that he could not see the tips of the stapler when Mr Steele dealt with the accessory/residual renal artery and was relieved when no

[104] Transcript, page 47
[105] Transcript, page 164
[106] Transcript, page 164

bleeding followed. Clearly Mr Rao was of the view that before the stapler is deployed, the operator must be absolutely clear about what is within the jaws of the stapler and what is liable to be cut or not cut. That would appear also to be Professor Costello's view. No submission was made by counsel for Mr Steele that Mr Rao did not have the expertise to express the view he did.

7.18. In short, the implication of counsel for Mr Steele's submissions was that Professor Costello does not do laparoscopic nephrectomies and this casts some doubt on his ability to opine in this matter. He also frankly suggested that Mr Rao's expertise is only in donor nephrectomy and although the submission was never really developed, the implication was that this cast some doubt on Mr Rao's expertise about visualising the jaws of the stapler in the context of laparoscopic radical nephrectomy.

8. <u>Observations</u>

8.1. Without drawing any conclusions about the matter one way or the other, I can certainly make the following observations. I find it difficult to see how the principle of fully visualising the contents of the jaws of the stapler is any different whether one is performing a donor nephrectomy or a radical nephrectomy. It is difficult to imagine that the field of view is different in either case or that there is any other relevant distinction. The only obvious distinction is that in the case of a donor nephrectomy it is important that no damage be done to the kidney that is being removed so that it remains suitable for transplant. Apart from that one might question whether there are any other significant differences.

8.2. My second observation is that regardless of the qualifications and experience necessary to opine on the subject of whether it is or is not essential to visualise all of the contents of the jaws of the stapler when deploying the stapler in the course of a laparoscopic radical nephrectomy, it is quite clear that the reason why the aorta and the right renal artery were transected in Mr McShane's case was that the stapler was deployed while those vessels were within the jaws of the stapler when the cutting edge was deployed. Clearly it was not Mr Steele's intention to cut the aorta, nor the right renal artery: it was an accident. The only explanation is that it happened because Mr Steele could not see what was within the cutting field of the jaws of the stapler when it was deployed.

9. Recommendations

9.1. Pursuant to Section 25(2) of the Coroners Act 2003 the Court is empowered to make recommendations that in the opinion of the Court might prevent, or reduce the likelihood of, a recurrence of an event similar to the event that was the subject of the Inquest.

9.2. It would have been extremely helpful in determining what precisely occurred in Mr McShane's surgery if there had been what was referred to in evidence as a 'video' recording of the procedure. Indeed, Mr Rao said that it was his invariable practice to make such recordings and Mr Steele said that he made such recordings on occasions, although he had not viewed them subsequently. Professor Costello was not asked about the subject.

9.3. In my opinion it would be a useful exercise and one that could be achieved at little cost if this were done on every occasion. I therefore recommend that all hospitals at which laparoscopic procedures are carried out be required to make and keep a visual recording of the vision that the operator was able to see through the camera via the monitor during the surgery, and I direct this recommendation to the Minister for Health[107].

Key Words: Laparoscopic Surgery; Haemorrhage; Hospital Treatment

In witness whereof the said Coroner has hereunto set and subscribed his hand and

Seal the 29th day of September, 2016.

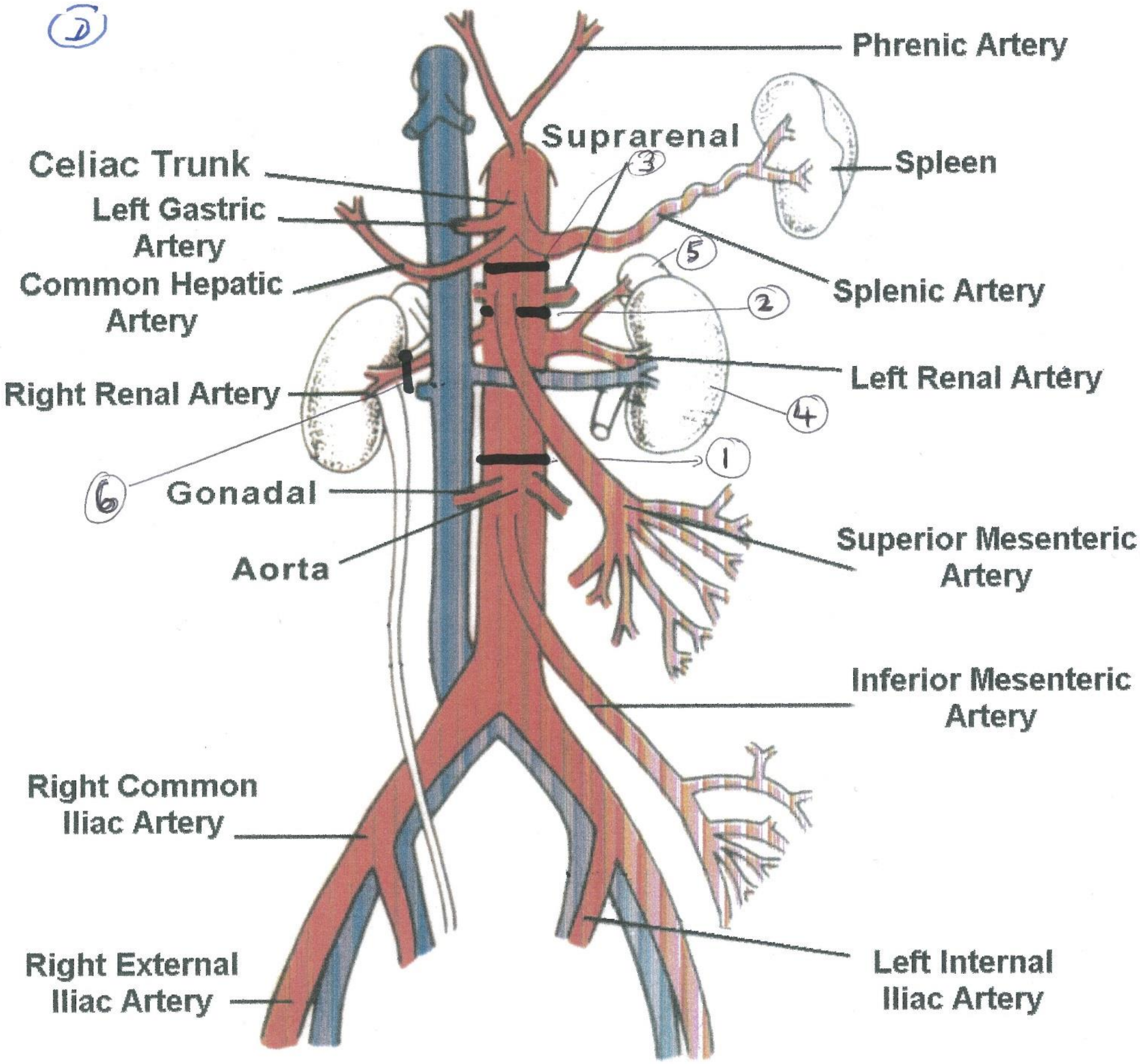
____

State Coroner

Inquest Number 39/2015 (0055/2013)

[107] It might be suggested that the making of such videos would not, in and of itself, prevent or reduce the likelihood of a recurrence of an event similar to Mr McShane's death: cf. Saraf v Johns [2008] SASC166. To this one might respond that the ability of the Court to review a surgical misadventure by aid of a visual record would aid in future prevention. However that may be, I am prepared to risk making the recommendation. A recommendation is not legally binding on anyone. The possibility that it might be quashed for want of jurisdiction does not alter the value of its content: if necessary, let it be seen in the benevolent light of a coronial suggestion, if only to avoid the need for barren debate about jurisdiction.

Statement of Mr Peter Subramaniam - Exhibit C7 Attachment D



Statement of Mr Peter Subramaniam - Exhibit C7 Attachment E