

**Neurosurgeon, Dr C**  
**Otago District Health Board**

**A Report by the**  
**Health and Disability Commissioner**

**(Case 07HDC11036)**



Health and Disability Commissioner  
*Te Toihau Hauora, Hauātanga*



---

## Parties involved

Dr C	Provider/Neurosurgeon
Mrs D	Consumer
Ms E	Complainant/Consumer's daughter
Mrs F	Consumer's friend
Dr G	Consumer's general practitioner
Otago District Health Board	Provider

---

## Complaint

On 22 June 2007 the Health and Disability Commissioner (HDC) received a complaint from Ms E about the services provided to her late mother, Mrs D, by neurosurgeon Dr C. The following issues were identified for investigation:

*The appropriateness of the services provided by neurosurgeon Dr C to Mrs D on 1 August 2006.*

*The appropriateness of the services provided to Mrs D by the Otago District Health Board during August and September 2006.*

*The adequacy of the information provided to Mrs D by Otago District Health Board.*

An investigation was commenced on 17 September 2007.

---

## Information reviewed

Information was received from:

- Ms E
- Dr C
- Mrs F
- Dr G
- Otago District Health Board (ODHB).

Mrs D's clinical records and the documentation relating to ODHB's response to the Medical Radiation Technologists' strike were obtained and reviewed. Independent expert advice was obtained from neurosurgeon Dr Arnold Bok.

## Overview

In July 2006, Mrs D, aged 67 years, was diagnosed at Dunedin Hospital as having an intracavernous (cerebral) aneurysm. She was referred to neurosurgeon Dr C. Dr C informed Mrs D about her condition and her treatment options. She told her that the aneurysm was unlikely to rupture. Dr C ordered a semi-urgent CT cerebral angiogram.<sup>1</sup> The waiting time for ODHB semi-urgent radiology services at that time was 4 to 6 weeks. Mrs D was anxious to progress her treatment and telephoned a number of times to enquire about her appointment. On 8 September she was notified that her appointment for the CT angiogram was for 11 September, 41 days after the referral was made. However, later that day, Mrs D was contacted again and her appointment was postponed until 2 October because of the Medical Radiation Technologists' (MRT) strike commencing the next day (12 September 2006). Mrs D was found dead in her home a few days later. She is believed to have died two days earlier.

## Information gathered during investigation

### *Background*

Mrs D was seen in the Dunedin Hospital Ophthalmology Clinic on 12 July 2006 by Dr H, registrar for consultant ophthalmic surgeon Dr I, for assessment of her headaches and nausea accompanied by visual disturbance. Dr H considered that Mrs D was suffering from right fourth cranial nerve palsy. He organised for her to have urgent blood tests taken and to be reviewed two weeks later at the clinic by Dr I.

On 27 July Dr I saw Mrs D. He noted, "We feel reasonably confident that she has right fourth nerve palsy." He ordered a CT scan of her head and referred her to the Ear Nose & Throat Department, asking them to assess her to identify "any obvious cause for this headache which does not appear to be coming from the eye". However, later that day Mrs D presented at the hospital's Emergency Department with worsening symptoms.

An MRI scan of Mrs D's brain was performed the following day, 28 July. The report from the radiologist noted, "The patient's symptoms can be explained by a 9.1mm aneurysm in the cavernous portion of the right internal carotid artery (arising from the inferior and horizontal level)." As a result of this report Mrs D was referred to neurosurgeon Dr C.

Dr C reviewed the scan at the time of the referral and again on the morning of 1 August 2006, prior to seeing Mrs D, and discussed the findings with a neurosurgeon, a neuroradiologist and a vascular neurosurgeon.

---

<sup>1</sup> Computerised axial tomography and examination of the cerebral blood vessels by the injection of a contrast medium introduced via a specialised catheter.

*Consultation with Dr C*

Dr C recalled the consultation as follows:

“I saw [Mrs D] and examined her with the MRI scan with the MRA.<sup>2</sup> I explained in plain English to [Mrs D] and her friend that she had an aneurysm on the internal carotid artery in the cavernous sinus<sup>3</sup> which was causing a compression of the right fourth and sixth cranial nerves producing the double vision and paresis<sup>4</sup> of her right eye. It also explained the whooshing noise she could hear in her right ear. I told her that I thought that the new symptoms were because the aneurysm had grown a little inside the sinus and was able to cause pressure and irritation on the nerves. There was no clinical evidence nor radiological evidence that the aneurysm had ruptured. In terms of treatment options I explained to her that there was no operation which could be performed to treat the aneurysm unless it was to be physically trapped by tying off the internal carotid artery in her neck and clipping the internal carotid artery intracranially above where the aneurysm was situated. I informed her that there were better treatment options available. ... To be able to obtain an adequate opinion about this we needed to obtain a CT cerebral angiogram to which she was agreeable. I explained to her that there was a waiting list for these procedures but I thought that the kind of problems that she had warranted her being placed on the semi-urgent waiting list to have this done rather than the routine list which had quite a long waiting list at that time.”

Dr C described to Mrs D the symptoms of aneurysm rupture and told her that if she experienced any increase in headache, eye pain or further deterioration in her vision, she should go to the Emergency Department. Dr C would admit her, and arrange any subsequent tests and treatment and an urgent referral to a Christchurch Hospital neuro/endovascular surgeon. Dr C reassured Mrs D that the risk of her aneurysm rupturing or causing her death was very small.

Dr C correctly diagnosed that the aneurysm was symptomatic and advised Mrs D and her friend accordingly. Dr C stated that she “did not at any time” tell Mrs D that the aneurysm was “incidental or asymptomatic”. The only time that she used the word “uncomplicated” was when she was quoting the published risk of bleeding of asymptomatic aneurysms.

Mrs D’s friend, Mrs F, accompanied her to the appointment with Dr C. She stated:

---

<sup>2</sup> Magnetic resonance angiography.

<sup>3</sup> Cavernous sinus: one of the paired cavities at the base of the skull behind the eye sockets into which blood drains from the brain, eye, nose and upper cheek before leaving the skull through connections with the internal jugular and facial veins.

<sup>4</sup> Paresis: muscular weakness.

“We were led to believe that it was an aneurysm, like a clot and was sitting in a pocket on the brain. If there was any sign of bleeding we were to take [Mrs D] straight back to the hospital because of the bleeding and possibility that the eyes could pop. ... The eye had to be covered because it was turning inwards and causing double vision and massive headaches.”

Ms E said that her mother telephoned her very frightened about her condition. She could hear a “whooshing” noise in her right ear and thought this was caused by growth of the aneurysm. Dr C told her mother that if the aneurysm burst it would “bleed out”. It was not life-threatening and would be cured by having an operation at Christchurch Hospital.

#### *Wait for CT angiogram*

Mrs D was placed on the semi-urgent waiting list for the angiogram. Dr C wrote to Dr I and Mrs D’s general practitioner, Dr G, to advise them of her findings.

Ms E believes that her mother was unaware that she was on the semi-urgent waiting list and would have to wait for six to eight weeks for a scan. She thought she would be sent an appointment immediately.

Over the next three weeks, Mrs D telephoned Dunedin Hospital radiology services a number of times to enquire about her appointment for the angiogram. Mrs F stated:

“When we returned from the trip to the West Coast and [Mrs D] rang to check on her CT scan she was told by the hospital that she had been lost in the system and that they had no record of her appointments and tests.”

Ms E stated that her mother was informed, by telephone about 12pm on 8 September 2006, that an appointment had been made for her to have a CT angiogram at 1.15pm on 11 September. However, at 1pm the same day (8 September), Mrs D received a further phone call cancelling the 11 September appointment because of the Medical Radiology Technologists’ strike due to start on 12 September.

ODHB stated that during the second call, Mrs D was given a new appointment for 2 October 2006. Ms E stated that her mother was sent an appointment letter, postmarked 12 September 2006, confirming the new date as 2 October.

#### *Death*

Mrs D was found dead in her home. It was thought that she had been dead for about two days. The Police notified Ms E of the death of her mother.

The death certificate completed by Dr G identified the cause of death as cerebral haemorrhage caused by a cerebral aneurysm. A post mortem was not conducted.

Ms E had a meeting with Dr G to discuss her mother’s death. Dr G said that she had no doubt that Mrs D died as a result of the aneurysm bursting, based on the bruising

and blood she saw on the right side of Mrs D's face when she was called to the house by the Police.

Dr C advised HDC that there was no clear evidence that Mrs D died as a result of the intracavernous internal carotid artery aneurysm. She said, "In fact it is exceedingly unlikely that this is the case." Dr C said that if she had been informed that the Coroner had decided against a post mortem she would have insisted on this being done, "from a medical perspective never mind a coronial perspective".

#### *Radiology waiting times at Otago DHB*

ODHB Chief Executive Officer (CEO) advised that Mrs D's "B" category referral had, in August/September 2006, an actual waiting time of 4 to 6 weeks, although the target was 3 weeks.

ODHB inpatients are categorised as "A" if they are acute inpatients or have a life-threatening condition. These include patients with newly diagnosed cancer who are waiting for staging CT scans to decide on treatment options. Many inpatient scans, particularly for patients from the Emergency Department, or ordered by neurosurgeons or general surgeons, are also classified as "A".

"B+" category patients are mainly oncology patients, or patients with pre-existing conditions who, clinically, are thought to be deteriorating or have had other clinical test results that suggest disease progression.

"B" category patients are patients who are of intermediate clinical concern from the referrer.

The DHB CEO stated that radiologists rely very heavily on the clinical information provided by the referrers. An appointment was booked for Mrs D for 11 September 2006, based on her "B" categorisation, but this appointment was postponed because of the industrial action that was to take place from 8am on 12 September to 8am on 15 September 2006. During the strike only those patients who were considered to require life-preserving services were able to have a CT scan. As part of the ODHB contingency planning for the strike, a decision was made that all radiology outpatient appointments, except those that were categorised as "A", were to be postponed so that acute inpatients could be done prior to the industrial action commencing.

#### *Mrs D's wait for CT scan*

Dr C believes that the waiting time she decided upon for Mrs D's CT cerebral angiogram was reasonable and was not inappropriately influenced by the MRT strike.

The DHB CEO advised that the appointment initially given to Mrs D was within the time frames appropriate to the category allocated to her by Dr C. The radiology department management became aware, at around the time of these events, that there was an urgent need to improve communication with patients and referrers regarding waiting times. The DHB CEO stated:

“The following communications have been established within Radiology.

1. Letters to patients and referrers regarding prioritisation and expected wait time. This is currently being reviewed to ensure that it is applied consistently.
  2. Follow up letters to patients regarding updated information on wait times.
  3. A monthly newsletter to referrers (both hospital and community) which provides wait time information and information regarding progress.
  4. Media releases to ensure there is general information to the public regarding the existing wait time issue in Radiology and our actions to address this issue.”
- 

## **Responses to Provisional Opinion**

*Dr C*

Dr C responded to the provisional opinion stating that the standards applied by my neurosurgical expert, Dr Bok, to the “clinical problem for provision of investigations and treatment are not those of the Neurosurgeons in the South Island of New Zealand involved in the management of [Mrs D] (deceased)”.

Dr C stated that she correctly diagnosed that the aneurysm was symptomatic and advised Mrs D and her friend accordingly. Dr C stated that she “did not at any time” tell Mrs D that the aneurysm was “incidental or asymptomatic”. The only time that she used the word “uncomplicated” was when she was quoting the published risk of bleeding of asymptomatic aneurysms. Dr C stated:

“I gave [Mrs D] a qualitative estimate of risk in that I thought it was very small (not extremely small as the report directly misquoted me) because there was no accurate figure other than to say it is more than 0.05% per year.”

Dr C refutes Dr Bok’s opinion that she should have seen and treated Mrs D with greater urgency. She said that “contrary to his assumption” that she waited five days to see Mrs D, she asked that Mrs D be booked into her clinic the day after she was informed about the result of the MRI scan by the Emergency Department registrar.

Dr C stated that after reviewing the scan, she discussed Mrs D’s case with a neurosurgeon, a neuroradiologist and a vascular neurosurgeon. Dr C commented:

“The treatment plan which I proposed to [Mrs D] was derived from these discussions and expert advice all of which were done ‘urgently’ in that it took place in less than 24 hours from when I was consulted about the result of the MRI.”



Dr C stated that it is the practice in Christchurch and Dunedin to investigate CT cerebral angiogram prior to formal referral to streamline the investigation/treatment process, to treat problems such as symptomatic cavernous aneurysm promptly even when there are symptoms and signs of cavernous sinus syndrome as there were in this case. She said:

“We do not think that a semi-urgent waiting time of 2–6 weeks is ‘unnecessarily delayed’ ... It appears that the consensus of opinion of 3 Neurosurgeons in Auckland is that, as I stated in my original statement, [Mrs D] did not die as a result of the cavernous sinus aneurysm.”

*Otago District Health Board*

The Otago DHB CEO, stated:

“... We recognise that our initial communication with [Mrs D] regarding her CT angiogram was suboptimal. ...

While the circumstances of her case may have highlighted some issues that the Otago DHB needs to address it is stated by your independent advisor that, on the balance of probabilities, [Mrs D’s] death appears to be unrelated to the aneurysm. This statement is an important one as it provided the context against which the case should be measured. ...

I would like to confirm that [the Canterbury DHB vascular surgeon] was in agreement with [Dr C’s] management plan for [Mrs D].”

---

## **Independent advice to Commissioner**

Expert advice was obtained from neurosurgeon Dr Arnold Bok and is attached as Appendix 1.

---

## **Code of Health and Disability Services Consumers' Rights**

The following Rights in the Code of Health and Disability Services Consumers' Rights are applicable to this complaint:

### *RIGHT 4*

#### *Right to Services of an Appropriate Standard*

- (1) *Every consumer has the right to have services provided with reasonable care and skill.*

### *RIGHT 6*

#### *Right to be Fully Informed*

- (1) *Every consumer has the right to the information that a reasonable consumer, in that consumer's circumstances, would expect to receive, including —*

...

- (c) *Advice of the estimated time within which services will be provided; and*

...

- (e) *Any other information required by legal, professional, ethical, and other relevant standards; ...*

---

## **Opinion: Breach — Dr C**

Dr C saw Mrs D on 1 August 2006 after an MRI scan, conducted three days earlier, reported the presence of an intracavernous aneurysm measuring 9.1mm. Dr C explained to Mrs D that she had an intracavernous aneurysm, and provided her with information about her treatment options and the actions to take if her condition worsened. Dr C discussed Mrs D's case with a neurologist, a neuroradiologist and a vascular neurosurgeon, and then booked her for a CT angiogram, placing her on the semi-urgent waiting list.

My independent expert, neurosurgeon Dr Arnold Bok, advised that the natural history of aneurysms has been studied extensively and the latest opinions from the literature suggest that incidental aneurysms under 10mm in diameter seldom rupture. The incidence of rupture is believed to be 0.05% per year. However, the rupture rate in symptomatic aneurysms is higher than in incidental asymptomatic aneurysms. When a totally intracavernous aneurysm ruptures, the bleeding does not extend into the

subarachnoid space,<sup>5</sup> but a fistula or connection develops. Blood passes at high pressure through the fistula into the veins that drain the area, which leads to back pressure on the eye, causing redness and swelling and threatening vision.

Mrs D's aneurysm was confidently diagnosed on MRI as being situated in a large venous structure at the base of the brain — the cavernous sinus. She presented with headache and double vision due to pressure, signs that the aneurysm could be expanding. Therefore Mrs D had a symptomatic aneurysm with a higher risk of rupture, and she should have been treated with greater urgency.

Dr Bok advised that an intracavernous aneurysm may cause a stroke, but is rarely a cause of death. It may cause significant morbidity in the form of visual deterioration and ischaemic stroke. Dr Bok agreed with Dr C that Mrs D's aneurysm probably did not cause her death.

Dr Bok advised that a patient with a symptomatic aneurysm should be admitted to hospital and investigated urgently. It is necessary to obtain as much information about these lesions as possible so that management can be planned and treatment performed, if indicated, before the aneurysm ruptures. Dr Bok considered that the CT angiogram should have been performed within days of Mrs D's clinic visit.

Dr C stated that it is the practice in Christchurch and Dunedin to investigate CT cerebral angiogram prior to formal referral to streamline the investigation/treatment process, to treat problems such as symptomatic cavernous aneurysm promptly even when there are symptoms and signs of cavernous sinus syndrome as there were in this case. It is accepted practice in Christchurch and Dunedin to investigate with CT cerebral angiogram prior to formal referral to "streamline" the investigation/ treatment process, to save time. Dr C said, "We do not think that a semi-urgent waiting time of 2–6 weeks is 'unnecessarily delayed'." Dr C submitted that the standards Dr Bok applied when reviewing this case "are not those of the Neurosurgeons in the South Island of New Zealand involved in the management of [Mrs D]".

Dr Bok responded: "I think most Neurosurgeons would consider a symptomatic aneurysm an urgent problem. ... These patients should be investigated and treated without delay whether they reside in the North or South Island of New Zealand."

Dr Bok advised that Dr C's management of Mrs D was suboptimal and her peers would view her departure from the standard with mild disapproval:

"I think that there were unnecessary delays in obtaining special investigations and treatment for [Mrs D]. After a diagnosis of an unstable enlarging aneurysm had been made, there was a significant delay in obtaining a CT angiogram, partly because it was booked as semi-urgent and partly because of industrial

---

<sup>5</sup> Subarachnoid space: the space between the meninges of the brain and the spinal cord containing circulating cerebrospinal fluid and large blood vessels.

action. She should have been investigated and referred for treatment urgently. This omission did not cause her death though in my opinion.”

I accept that Dr C recognised that Mrs D’s aneurysm was symptomatic and consulted specialist colleagues appropriately. Dr C believed the risk of rupture was very small and therefore Mrs D did not require urgent treatment. In this respect, I consider that Dr C erred and did not respond with sufficient urgency to a serious problem. As noted by Dr Bok, patients with Mrs D’s condition “should be investigated and treated without delay whether they reside in the North or South Island”. Unfortunately, Dr C set the scene for the distressing delays that followed.

I conclude that Dr C did not act with reasonable care and skill, and accordingly breached Right 4(1) of the Code of Health and Disability Services Consumers’ Rights (the Code).

---

## **Opinion: Breach — Otago District Health Board**

### *Information for patients on waiting list*

Mrs D was first seen in Dunedin Hospital for assessment of her headache, nausea, and visual disturbance on 12 July 2006. She was reviewed on 27 July and a CT scan was ordered. However, she presented at the Emergency Department later that day complaining of worsening symptoms. An MRI conducted the following day identified an intracavernous aneurysm. Mrs D was referred to neurosurgeon Dr C, who saw her on 1 August 2006.

Mrs D was given an alarming diagnosis on 1 August. Although reassured by Dr C that there was minimal risk of the aneurysm rupturing with fatal consequences, she remained understandably anxious. Dr C says that she told Mrs D that she needed to have a CT angiogram and that she was being placed on the semi-urgent waiting list. However, according to Ms E, her mother thought she would be sent an appointment immediately.

Mrs D had to make numerous telephone calls to Dunedin Hospital before she was finally advised of her appointment for a CT angiogram on 11 September. She faced delays and uncertainty when attempting to follow up her referral and get an appointment. As Dr Bok noted, “uncertainty regarding the timing of special investigations always causes concern and unhappiness”.

Mrs D should have received a prompt acknowledgement and information about her appointment (certainly within 10 working days of the referral, not 38 days later). She should not have had to telephone repeatedly before receiving her appointment. Otago DHB has indicated that it was around this time that it became aware of the urgent need

to improve its communication with patients and referrers about waiting times, and changes have been made.

The communication with Mrs D about her appointment was clearly substandard. In failing to provide Mrs D with adequate, timely information about her awaited CT angiogram, Otago DHB breached Rights 6(1)(c) and (e) of the Code.

*Strike planning and impact on “semi-urgent” patients*

Otago DHB advised that because of the pending strike there was a contingency plan to reschedule radiology appointments, to ensure that all patients categorised as urgent had their planned examinations. Mrs D had been categorised as semi-urgent based on the referral of Dr C. Although a six-week wait for a semi-urgent appointment for CT angiogram *may* be reasonable, Mrs D had already waited the maximum time for her semi-urgent appointment, and the strike meant further delay (nine weeks in total, had the appointment on 2 October occurred).

I appreciate that urgent patients must always be given priority, particularly when there is a strike. I also understand that time on the waiting list is not a criterion for automatic reprioritisation. However, there is merit in Dr Bok’s suggestion that the time semi-urgent patients have been waiting should be considered when making contingency plans for a strike. I intend to draw this to the attention of all district health boards.

This case is further evidence of the potential harm to which patients are inevitably exposed during strikes by health professionals.

---

## Recommendations

I recommend that Dr C:

- provide a letter of apology to Ms E.

I recommend that the Otago District Health Board:

- provide a letter of apology to Ms E
- update HDC by **30 September 2008** on the changes made to improve communication with patients and referrers about waiting times for elective services
- review the way radiology patients are notified of their appointments to ensure information is provided in a timely way, and advise HDC of any changes made, by **30 September 2008**.

## **Follow-up actions**

- A copy of this report will be sent to the Medical Council of New Zealand.
- A copy of this report, with details identifying the parties removed (except Otago DHB and Dunedin Hospital), will be sent to the Minister of Health, the National Ethics Advisory Committee, the Director-General of Health, DHBNZ, the Association of Professional and Executive Employees, the Association of Salaried Medical Specialists, the New Zealand Medical Association, and the Royal Australasian College of Surgeons, and placed on the Health and Disability Commissioner website, [www.hdc.org.nz](http://www.hdc.org.nz), for educational purposes.

## Appendix 1

### Independent advice to Commissioner

The following expert advice was obtained from Dr Arnold Bok:

“Thanks for asking me to provide expert advice to the Commissioner on case number 07/11036.

I have read the ‘Guidelines for Independent Advisors’ and agree to follow these guidelines.

I am a Specialist Neurosurgeon and have been employed as a consultant Neurosurgeon at Auckland City Hospital since 1993. My professional qualifications are MBChB, MMed (Neurosurgery), FCS (SA), FRACS. I trained in Neurosurgery in South Africa and Scotland and was a consultant Neurosurgeon at Wentworth Hospital in Durban, South Africa for 2 years and a consultant Neurosurgeon at Groote Schuur Hospital in Cape Town, South Africa for 5 years, before relocating to New Zealand. I am a member of the Neurosurgical Society of Australia and New Zealand and an International member of the Congress of Neurological Surgeons in the USA.

I have a special interest and expertise in Cerebro-Vascular problems and have personally treated a large number of patients with cerebro-vascular lesions, including aneurysms, arterio-venous malformations and carotico-cavernous fistula. I am an examiner in neurosurgery for the Royal Australasian College of Surgeons.

I believe there are no personal or professional conflicts in me advising on this case. I know [Dr C], as she spent two years as a registrar in the Department of Neurosurgery at Auckland Hospital during her training. I know most of the Neurosurgeons in Australia and all the Neurosurgeons in New Zealand, as this is a small region Neurosurgically speaking, and as we provide training positions for two Australasian Neurosurgeons every year, for a maximum of two years each.

I note that I am instructed to:

1. Comment generally on the standard of care provided to [Mrs D] on 1 August 2006.
2. Provide my professional opinion on whether the services provided to [Mrs D] by [Dr C] and/or the Otago District Health Board were appropriate.
3. State my opinion on whether [Dr C’s] management plan for [Mrs D] was reasonable.
4. Comment on the timing of [Mrs D’s] radiological appointment.

I have reviewed the notes that you provided:

- [Ms E's] complaint document received 22 June 2007, marked with an 'A'. (Pages 1 to 11)
- Response from Otago District Health Board, including [Mrs D's] clinical records and a statement from [Dr C], received 10 August 2007, marked with a 'B'. (Pages 12 to 31).
- Additional response from Otago District Health Board on 19 October 2007, marked with a 'C'. (Pages 32 to 100).
- [Mrs D's] clinical Records received from her general practitioner [Dr G], marked with a 'D'. (Pages 101 to 110).
- Statement provided by [Mrs D's] friend, [Mrs F], provided 4 December 2006, marked with an 'E'. (Pages 111 and 112).

### **Background**

[Mrs D], 67 years, was seen at Dunedin Hospital Eye Clinic on 12 and 27 July 2006 for assessment of blurred vision and headaches and was referred for a CT scan with contrast to identify the cause of her symptoms. On 28 July she had a MRI head, and orbits and MRA head examination. The report noted, 'The patient's symptoms can be explained by 9.1mm aneurysm in the cavernous portion of the right internal carotid artery arising from the inferior and horizontal level'.

[Mrs D] was referred to neurosurgeon [Dr C], who saw her on 1 August. [Dr C] informed [Mrs D] that the aneurysm was causing compression on the right fourth and sixth cranial nerves producing the double vision and paresis of her right eye. [Dr C] explained that there was no operation that could be performed to treat the aneurysm except occluding her carotid artery, and described other treatment options such as inserting a stent, which would improve the function of her right eye. [Dr C] told [Mrs D] that to obtain an adequate picture of the problem she would need to have a CT cerebral angiogram.

[Mrs D] agreed to this procedure and was placed on the semi-urgent waiting list for the angiogram. [Dr C] explained to [Mrs D] what was likely to happen if the aneurysm ruptured, that it could create a fistula between the internal carotid artery and the cavernous sinus. The signs indicating a rupture would be dependent on the size of the fistula and the amount of blood flowing through it. The most likely symptom would be that the eye would swell and for [Mrs D's] vision to deteriorate. [Mrs D] was told that if she developed these symptoms she was to present at the ED and that [Dr C] would admit her for tests and treatment.

Over the next three weeks, [Mrs D] telephoned Dunedin Hospital radiology a number of times to enquire about her appointment for the angiogram. On 8 September she was informed that she had an appointment scheduled for 11



September. However she was contacted again the same day to be told that the appointment was cancelled because of the radiology technician's strike which was starting the next day, 12 September.

On [date] [Mrs D] was found dead in her home. The death certificate identified the cause of death as cerebral haemorrhage caused by a cerebral aneurysm. A post-mortem was not conducted.

### **Literature review**

The natural history of unruptured aneurysms has been studied extensively, and the latest opinions from the literature suggest that incidental aneurysms under 10mm in diameter seldom rupture. Aneurysms may affect up to 5% of the population (1) and the incidence of subarachnoid haemorrhage is low, approximately one case per 10 000 persons per year (2). According to the International Study of Unruptured Intracranial Aneurysms (ISUIA) which was first published in 1998, the incidence of rupture in incidental intracranial aneurysms less than 10mm in diameter was 0.05% per year (1). This figure is considerably lower than the figure of between 1.4% and 2% per year quoted in older literature (3)(4). Factors such as genetic predisposition, smoking, and polycystic kidney disease increase the risk of aneurysm rupture, and should be factored in. A population based study by Juvela et al in 2000 documented a risk of haemorrhage of 1.3% per year in 142 unselected patients from a defined geographic area observed for 20 years (5). The continuation of the prospective arm of the ISUIA Study which was published in 2003, demonstrated a higher rupture rate for patients with incidental aneurysms than in the retrospective arm, 0% for aneurysms smaller than 7mm and 2.6% for aneurysms 7 to 12mm. It is important to note that there were no ruptures in cavernous aneurysms under 12mm in size (6). The American Heart Association Guidelines recommend that incidental aneurysms smaller than 10mm in patients without a previous subarachnoid haemorrhage should be observed rather than treated (7). In the ISUIA study there were no ruptures in incidental cavernous ICA aneurysms measuring 12mm in diameter or less. The rupture rate in symptomatic aneurysms is higher than in incidental asymptomatic aneurysms (8).

When a totally intra-cavernous aneurysm ruptures, the bleeding does not extend into the sub-arachnoid space, but a fistula or connection is established with the cavernous sinus, a so called carotico-cavernous fistula. Blood will therefore shunt from the high-pressure carotid arterial system where the aneurysm arises to the venous system that drains the cavernous sinus. This leads to backpressure on the orbit and eye that causes swelling and redness of the eye, and can threaten vision. It may also cause decreased blood supply to the brain that may cause a stroke. It is however rarely a cause of death.

## **Expert Advice:**

### **1. Standard of care provided to [Mrs D]:**

[Mrs D] was seen in the Ophthalmology clinic at Dunedin Hospital on 12 July 2006. A history of nausea and one episode of vomiting three days previously followed by a mild right frontal headache for about ten minutes which had resolved, and vertical diplopia from the next day is documented in a clinic letter from [Dr H], Registrar for [Dr I]. He found a full range of extraocular movements and considered a fourth cranial nerve palsy, but decided to order urgent blood tests to rule out Giant Cell Arteritis, and advised review in two weeks.

[Dr I], Consultant Ophthalmic surgeon and Paediatric Ophthalmologist on 27 July 2006, saw [Mrs D] in clinic. Her C-reactive protein level was noted to be normal and she had no symptoms other than headache to suggest Giant Cell Arteritis. She was referred to the ENT Department at Dunedin Hospital by letter dictated 27 July 2006 and typed the same day. The letter states that she had presented to the Eye Department in early July with nausea, vomiting and a right sided headache and double vision when looking downwards. A diagnosis of a right fourth nerve palsy was made, which was thought to be most likely due to a vascular infarction of the fourth nerve. In view of her significant headache, as well as a noise in her ears, a CT of her head was ordered.

[Mrs D] attended the Emergency Department at Dunedin Hospital later on the evening of 27 July 2006 with an increase in her symptoms. A MRI scan of the brain was performed the next day. She was referred to [Dr C] with the result.

The MRI report from [the] Radiologist, dated 28 July 2006, states that a 9.1mm aneurysm of the right internal carotid artery in its cavernous portion, just as the internal carotid artery ascends into the cavernous sinus, was demonstrated. The internal carotid artery measured 3.8mm on either side of the aneurysm. The neck of the aneurysm was difficult to visualise and may have measured up to 5mm. No other significant intracranial abnormality was demonstrated.

[Dr C] saw [Mrs D] in clinic on 1 August 2006. She noted the history of a painful right trochlear palsy developing two weeks ago. There was also pain in the right ear associated with a pulsatile bruit. The double vision was originally only on looking down, but became more constant a few days before the clinic visit. Fourth and sixth cranial nerve palsies were documented. The absence of chemosis and proptosis was noted.

A diagnosis of subacute right cavernous sinus syndrome related to formation and growth of a right intracavernous internal carotid artery aneurysm was made. A carotico-cavernous fistula was discounted on the available clinic and

MRI data. A CT angiogram was requested to provide more information. [Mrs D] was advised to present to the emergency department if she developed increased headache, eye pain or worsening vision in the right eye. Semi-urgent referral to Christchurch Hospital for endovascular treatment was planned after the CTA. Urgent referral was planned if a carotico-cavernous fistula developed.

[Mrs D's] daughter states that [Mrs D] did not receive an appointment for the CTA and had to make several phone calls to the hospital to find out what was happening. She eventually got an appointment for 11 September 2006, forty one days after the Neurosurgery clinic visit. Her appointment was deferred on 8 September to 2 October 2006.

[Mrs D] was found dead in her house on [date]. Her GP discussed the problem with the coroner who advised that a death certificate could be issued and that a post mortem was not necessary.

The complainant refers to communication problems and difficulty in obtaining the CTA booking. This obviously needs to be addressed, as uncertainty regarding the timing of special investigations always causes concern and unhappiness.

[Mrs D's] aneurysm was confidently diagnosed on MRI as being situated in the cavernous sinus, a large venous structure at the base of the brain. She presented with headache and double vision due to fourth and sixth cranial nerve palsies. These signs were probably due to expansion of her aneurysm, and this was also [Dr C's] opinion. [Mrs D] therefore had a symptomatic aneurysm, with a higher risk of rupture than the 0.05% quoted by [Dr C] from the ISUIA figures. The exact risk of rupture of her aneurysm is however difficult to define, as no figures are available for this unusual clinical situation.

The timeline of medical treatment in this case prior to the MRI diagnosis of the problem is reasonable in my opinion.

[Mrs D] developed symptoms in early July and was seen in a specialist clinic a few days later. Blood tests were requested and she was seen in a second specialist clinic 15 days later when a CT scan was requested.

The timeline of medical management after obtaining a diagnosis was suboptimal.

Her symptoms worsened and she was seen acutely and a MRI performed the next day. With the diagnosis of a cavernous sinus carotid aneurysm she was referred to the Neurosurgical service and seen five days later. In my opinion a patient with a symptomatic aneurysm should be seen urgently by a Neurosurgeon.

[Dr C] advised a CT angiogram after seeing the patient. This investigation adds some information regarding the aneurysm shape, position and size, but was not essential in my opinion. The patient still needed a cerebral angiogram for treatment of her symptomatic aneurysm, and the CT angiogram request caused a delay in obtaining treatment.

The CT angiogram was booked semi-urgently, which meant a delay of about six weeks. According to the complainant there was difficulty confirming this appointment. Due to industrial action by Radiation Technologists, the CT angiogram was then postponed at the last moment for a further three weeks.

A request for urgent review by angiogram for treatment of the cavernous sinus aneurysm by the endovascular therapist would have been a better option and would have prevented the delay in performing the CT angiogram and thereby the complaint.

*I have to state that it is extremely unlikely that rupture of a totally intra-cavernous aneurysm will cause a patient's death, unless it causes a massive epistaxis (bleeding from the nose), which was not the situation in the case under discussion. I have discussed this point with two of my Cerebro-Vascular Neurosurgical colleagues, Dr Edward Mee and Dr A Robert Aspoas, and none of us have ever had a patient die from rupture of a cavernous sinus aneurysm or from a carotico-cavernous fistula.*

*On the balance of probabilities, [Mrs D's] death was therefore not caused by her aneurysm.*

**2. My professional opinion on whether the services provided to [Mrs D] by [Dr C] and/or Otago District Health Board was reasonable:**

I think that there were unnecessary delays in obtaining special investigations and treatment for [Mrs D]. After a diagnosis of an unstable enlarging aneurysm had been made, there was a significant delay in obtaining a CT angiogram, partly because it was booked as semi-urgent and partly because of industrial action. She should have been investigated and referred for treatment urgently. This omission did not cause her death though in my opinion.

**3. My opinion on whether [Dr C's] management plan for [Mrs D] was reasonable:**

There was an unnecessary delay in obtaining treatment for [Mrs D]. According to [Dr C's] report she explained the problem in great and accurate detail to [Mrs D]. She made an error however in assessing the aneurysm as incidental and therefore extremely unlikely to rupture.

As stated a symptomatic aneurysm has a higher, but unquantified risk of rupture, and should be treated urgently. She should have requested an urgent

CT angiogram, and if she knew that there would be a delay in obtaining the investigation, could have referred [Mrs D] for interventional treatment without the CT angiogram, which adds information that is not essential for treatment of an aneurysm.

I do agree with [Dr C's] statement that rupture of an intracavernous aneurysm is very unlikely to cause death. This is also the opinion of two of my senior Neurosurgical colleagues. On the balance of probabilities, this error therefore did not contribute to [Mrs D's] death.

I consider that [Dr C's] peers would view her departure from an appropriate standard with mild disapproval.

#### **4. Comment on [Mrs D's] radiological appointment:**

As stated there was an unnecessary delay in obtaining the radiological investigation. A six-week wait for a semi-urgent appointment is reasonable, but her problem should have been assessed as urgent. The industrial action further delayed her appointment.

As she had already waited the maximum time for her semi-urgent appointment, she should have been upgraded to urgent when contingency plans were made prior to the industrial action, and the CT angiogram performed before the commencement of industrial action.

Please do not hesitate to contact me if you require more information.

Arnold Bok  
MbChB, MMed, FCS(SA), FRACS

#### **References:**

1. International Study of Unruptured Intracranial Aneurysms Investigators  
Unruptured intracranial aneurysms — risk of rupture and risks of surgical intervention.  
N Engl J Med 1998; 339: p 172–1733.
2. Ingall TJ, Whisnant JP, Wiebers DO et al.  
Has there been a decline in subarachnoid haemorrhage?  
Stroke 1998; 20: p718–724.
3. Jane JA, Kassell NF, Torner JC et al.  
The natural history of aneurysms and arteriovenous malformations.  
J Neurosurg 1985; 62: p 321–323.
4. Juvela S, Porras M, Heiskanen O

- Natural history of unruptured intracranial aneurysms: A long term follow-up study.  
J Neurosurg 1993; 79: p 174–182.
5. Juvela S, Porras M, Poussa K.  
Natural history of unruptured aneurysms: Probability of and risk factors for aneurysms rupture.  
J Neurosurg 2000; 93: P379–387.
  6. Wiebers DO, Whisnant JP, Huston J et al.  
Unruptured intracranial aneurysms: natural history, clinical outcome and risks of surgical and endovascular treatment.  
Lancet 2003; 362: p103–110.
  7. Bederson JB, Awad IA, Wiebers DO, et al.  
Recommendations for the management of patients with unruptured intracranial aneurysms: A statement for healthcare professionals from the Stroke Council of the American Heart Association.  
Stroke 2000; 31: p2742–2750.
  8. Tsutsumi K, Ueki K, Morita A et al.  
Risk of rupture from incidental aneurysms.  
J Neurosurg 2000; 93: p550–553.”

*Further advice*

Dr Bok provided the following additional neurosurgical advice:

“I have reviewed the response from [Dr C], Neurosurgeon from Dunedin, dated 29 February 2008, to my initial report.

I note that she disputes my opinion that [Mrs D] should have been investigated further more urgently and offered treatment if available, after the diagnosis of a symptomatic intracavernous aneurysm was made.

[Dr C] agrees that the aneurysm was symptomatic, as indicated by the patient’s headache and fourth and sixth cranial nerve dysfunction. This indicates an expanding aneurysm which is more likely to rupture than an incidental aneurysm, but absolute figures to define the risk of rupture are not available.

She states that she saw the patient a day after being informed about the MRI result and after reviewing the scan with a Neurosurgical colleague and a Neuroradiologist. The delay between the initial presentation to the Ophthalmology clinic on 12 July and the MR scan on 28 July was obviously beyond her control. She states that she was only told of the MRI result on 31 July and saw the patient in clinic on 1 August.

She therefore felt that an urgent consultation with [Mrs D] was indicated, and we are in agreement up until this point. She then arranged a CT angiogram,

which may not have added a lot of useful information, although it is not the investigation that concerns me, but the time taken to obtain this investigation.

After seeing [Mrs D] urgently, [Dr C] felt that it was reasonable to wait two to six weeks for the CT angiogram by scheduling her investigation as a B priority. In reality the waiting time became nearly 9 weeks as an appointment for the CT angiogram on 11 September 42 days later was postponed to an appointment on 2 October, 62 days after the clinic appointment.

In my opinion, a patient with a symptomatic aneurysm should be admitted to hospital and investigated urgently. The CT angiogram should have been performed within days of the clinic visit so that treatment could have been considered and offered if available. I accept that not all cavernous sinus aneurysms can be treated safely but it is necessary to obtain as much information about these lesions as possible, so that management can be planned and treatment performed, if indicated, before the aneurysm ruptures.

[Dr C] states that before seeing [Mrs D], she discussed the situation with [the] Vascular Neurosurgeon in Christchurch. She does not say whether he agreed with her management timeline and whether she followed his advice.

[Dr C] is of the opinion that the standards I applied to the management of a symptomatic intracavernous aneurysm are incorrect, and are not those of the Neurosurgeons of the South Island. I have obviously not canvassed the opinions of the Neurosurgeons of the South Island, but I think that most Neurosurgeons would consider a symptomatic aneurysm an urgent problem.

Although I agree that rupture of an intracavernous aneurysm is unlikely to cause death, it may cause significant morbidity in the form of visual deterioration and ischaemic stroke. These patients should be investigated and treated without delay whether they reside in the North or South Island of New Zealand.”