Neurosurgeon - Dr B

A Report by the

Health and Disability Commissioner

(Case 03HDC05150)

Health and Disability Commissioner
Te Toihau Hauora, Hauātanga

Parties involved

Mrs A	Consumer / Complainant
Mr A	Consumer's husband
Dr B	Provider / Neurosurgeon
Dr C	Provider / General Practitioner
Dr D	Provider / Neurosurgeon
Dr E	Neurosurgeon
Dr F	Provider / Neurologist

Complaint

On 9 April 2003 the Commissioner received a complaint from Mrs A about services provided by Dr B. The complaint was summarised as follows:

From January 2002 until February 2003 neurosurgeon Dr B did not provide Mrs A with services of an appropriate standard in relation to her arachnoid cyst. In particular:

- *on 9 January 2002 Dr B inserted a programmable magnetic shunt to drain her cyst; the shunt did not function correctly owing to its length, and Mrs A experienced ongoing pain and required further corrective surgery*
- *Dr B did not consider that Mrs A's shunt was malfunctioning and continued to make a number of adjustments to it*
- *in February 2003 Dr B advised Mrs A that she did not need a CT scan, and subsequently incorrectly advised her that a CT scan did not show any change in her cyst.*

An investigation was commenced on 20 May 2003.

Information reviewed

- Complaint from Mrs A
- Information from:
  - Dr B
  - ACC
  - General practitioner Dr C
  - Neurosurgeon Dr D

Independent expert advice was obtained from Dr Sam Bishara, neurosurgeon.

Information gathered during investigation

Background
In February 1998 Mrs A consulted a neurosurgeon Dr E with a two-month history of frontal headaches. Dr E referred Mrs A for a CT scan, which was taken on 18 February 1998 and revealed an arachnoid cyst. MRI imaging on 25 February 1998 confirmed the presence of a 4cm arachnoid cyst at the tip of her temporal lobe. Dr E considered that insertion of a shunt would provide some decompression of the cyst and possibly alleviate her headache symptoms and in April 1998 he inserted a non-valved shunt. Following surgery, Mrs A's headaches improved and she remained asymptomatic until the middle of 2000, even though the shunt displaced itself and migrated into her peritoneal cavity within several months of the surgery. (The shunt was removed in August 1999 via a laparoscopic approach.)

Referral to neurosurgeon Dr B
Following referral by her general practitioner, Dr C, Mrs A consulted Dr B on 19 July 2000 for discussion of her ongoing headaches and their possible association with her arachnoid cyst. Dr B trialled various medications for Mrs A without significant long-term success (in tandem with prescribing by Dr C).

Due to the continuation of her headache symptoms, Dr B referred Mrs A to a neurologist for a second opinion. On 12 January 2001, he recommended continued conservative management. He advised Dr B:

> "I presume that the headaches are related to [an] arachnoid cyst, but it is difficult to be certain of this. The headaches do have some migrainous features to [them]. I suspect that the arachnoid cyst has unmasked migraine like symptoms."

The neurologist noted that Mrs A was taking amitriptyline 10mg at night, without side effects. He recommended increasing the amitriptyline to 20mg or 30mg per night, or trialling other anti-migraine prophylactic treatments if the amitriptyline was not effective. Mrs A's headache symptoms stabilised throughout 2001 with conservative management but became more distressing in November and Dr C referred her back to Dr B. Dr C's letter of referral, dated 7 November 2001, to Dr B states:

> "Frontal headaches are more regular despite anti-migraine measures trialled thus far. [Mrs A] can be aware of headaches in the night but describes these as 'pounding' on waking each day when she takes Brufen LA 800mg with partial help.
>
> …
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> In Feb, April, May and early Sept headaches were fairly well controlled with Amitriptyline regular."

On 28 November 2001 Dr B examined Mrs A and suggested either continuing with conservative management or implanting a further shunt drainage system. Dr B informed me that Mrs A requested the shunting procedure with some urgency, as the headaches were

interfering significantly with her quality of life. Dr B discussed the risks associated with the insertion of a shunt with Mrs A. His medical notes for 28 November 2001 record:

> "I had a good discussion with [Mrs A] about the risks and possible complications of the surgery, both major and minor and more so the possibility that the surgery may not relieve her symptoms."

Dr B informed me that most arachnoid cysts do not require treatment but some, as in Mrs A's case, are associated with headaches. Some patients benefit from procedures to either shunt the cerebrospinal fluid to the abdomen or open a cyst to the normal fluid compartments underlying the brain. However, there is controversy about the potential benefits of treatment as there is no investigation that can confirm the cysts are the source of headaches.

Insertion of cystoperitoneal shunt

Dr B advised that because of the Christmas period, surgery was delayed until 9 January 2002, when he inserted a programmable valved shunt into Mrs A's arachnoid cyst. Dr B inserted a cystoperitoneal shunt, which consisted of a ventricular catheter passing into the cyst with an externally programmable or resettable shunt valve (Strata) and a peritoneal catheter. The purpose of the shunting device is to drain fluid from a cyst where the pressure is elevated, either continuously or intermittently. The programmable valve meant the pressure setting could be adjusted to titrate the headaches against the pressure at which the system worked. Dr B explained:

> "Normal intracranial pressure is in the realms of 7-14mmHg. The shunt aimed to maintain the pressure within the cyst at these or slightly lower levels.
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> …
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> The shunt valve is a device that opens when the pressure of the fluid reaches a set point. … The range of the strata valve is stated as a performance level 0.5 equating to 3mmHg, level 1 equating to 5mmHg, level 1.5 to 7mmHg, level 2 to 10mmHg and level 2.5 to 13mmHg. … The pressure settings are altered with an external circular magnet – when placed over the valve and turned, the setting is changed. A template allows the exact precision level to be chosen. The setting is then usually checked with an X-ray.
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> …
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> The ideal pressure setting is very dependent on the individual. It is basically the setting at which the patient attains symptom improvement without developing overdrainage complications. Normally for an arachnoid cyst I aim for the lower end of the precision level, ie, 0.5 to 1 but have patients with good symptomatic relief throughout the range."

Dr B advised that the procedure was straightforward and without complication. A good flow of cerebrospinal fluid (CSF) was evident down the shunt. Dr B stated:

> "[Mrs A] recovered in rapid fashion after surgery and was discharged home. She was reviewed in clinic on 20 February 2002 and remarked how well she was feeling and I encouraged her to return to her usual activities. She described mild burning sensations across her forehead on prolonged standing, which I thought may be related to shunt overdrainage. These were not particularly troubling to her at this stage."

Development of postoperative symptoms

Mrs A stated that the programmable shunt that Dr B inserted on 9 January 2002 did not function correctly and caused severe pain. She complained that, as a result, further surgery was required in April. Mrs A stated:

> "In the first few weeks the shunt caused burning in my head. [Dr B] said it would pass, but it never did. After the six-week check-up, [Dr B] said I could do anything, no restrictions. 'Get a life' he said. All the time it was burning right across my forehead day and night, it just never went away. I couldn't think or concentrate. It hurt so much I would cry in pain. The pain has made it hard for me to work and has affected my family. I just couldn't cope with the pain."

There is a discrepancy between the parties concerning how many adjustments were made to the pressure of the shunt in an attempt to alleviate Mrs A's postoperative symptoms. Dr B informed me that he adjusted the pressure after the January surgery on only two occasions and that he was relatively conservative in the pressure changes he made, to avoid complications. He commented that the valve is an encased system and it is very difficult to see how changing the mechanism would cause any discomfort. Dr B advised that X-rays were taken after each change, except one:

> "I believe the shunt was set at precision setting of 1.5 at the time of the surgery. [Dr B's operation note confirms this.] On development of the burning forehead sensation, this was elevated to a Performance setting of 2, [6 March 2002] on the basis that overdrainage is the most problematic condition and then reset at Performance level 1 after the CT scan [taken on 14 March 2002] showed no complicating factors ie subdural haematomas."

In contrast, Mrs A stated:

> "A lot more than two adjustments were made to the valve's pressure after it was installed. I can recall a total of at least five visits. These were usually made outside of his [Dr B's] normal practice hours or squeezed in between other patients … He appeared to be just guessing, adjusting the pressure up and down."

Conflicting references to adjustments of pressure are found in emails between Mr A and Dr B, and Dr B's medical records. On 14 February 2002, Mr A wrote the following email to Dr B:

> "[Mrs A] is still experiencing burning across her forehead, the odd mild headache and nausea all day and night. … The burning, however, is a little better after the last adjustment, but is not as good as when she first left hospital … On the two occasions

> the pressure was increased, the burning and nausea also increased. Is it possible that the current pressure setting of the valve is too high?"

Dr B reviewed Mrs A on 20 February 2002. His medical notes record:

> "She does develop some burning sensation in her forehead after prolonged standing I would suggest that this is a slight degree of intracranial hypotension, however I am hesitant to change the valve pressure, seeing that this is tolerable and that we have got good control of her headaches."

Dr B reviewed Mrs A again on 6 March 2002 and noted the development of distressing symptoms of increasing burning sensations across her left forehead which had become prominent after a visit to an amusement park. Dr B stated that the burning symptoms were different from Mrs A's preoperative symptoms and were "difficult to explain on the basis of the arachnoid cyst or the shunt". Mrs A had no symptoms of shunt infection and her wounds had healed. Dr B adjusted the valve pressure to try and provide relief from the burning sensations. His medical notes of 6 March 2002 state:

> "I suspect that she has suffered a bit of shunt over drainage and I have adjusted her strata valve up to a setting of 2 today, I have also given her a form for a CT scan of head and if the burning sensations persist over the next few days then we need to repeat the scan to make sure there is no evidence of subdural collection."

Mrs A received a CT scan at a private hospital on 14 March 2002. Dr B advised me:

> "The CT scan was satisfactory with the shunt tubing placed within the cyst at its anterior wall such that the holes in the catheter were well within the cyst. [Mrs A] and her husband reviewed the CT scan and considered that the cyst catheter was too long and presumed that this was the cause of her symptoms, despite a period of significant symptom improvement, and they also concluded that I had made an error at surgery."

Dr B commented that his relationship with Mrs A deteriorated, because of her suspicion that he was concealing an error on his part. They met to discuss Mrs A's concerns and Dr B explained his opinion that the shunt was not misplaced and appeared to be functioning well. Dr B stated:

> "This was a fairly confrontational meeting with [Mr and Mrs A] accusing me of malpractice. I explained the situation that the shunt was not in my opinion misplaced and appeared to be functioning well and that there was not strong evidence on the scan that we should make any immediate alternations to it. Cyst catheters are made of silastic tubing, are soft and very pliable. Such catheters are a frequently used tool in neurosurgery and are often placed as part of shunts and can be placed in many intracranial locations. They often abut upon dura, the coverings of the brain, and do not induce any symptoms from being there."

There is no reference in Dr B's medical notes to any further change in pressure following the adjustment on 6 March 2002 (or to the meeting referred to above).

Dr B explained that an X-ray report of 27 March 2002 confirmed that the pressure setting had been changed, following the CT scan of 14 March 2002. The X-ray report stated: "Today's examination shows a totally different pressure setting."

Dr B emailed Mr A on 4 April 2002 and advised that the settings should not be changed again until a "true picture" of Mrs A's headaches had emerged. An email response from Mr A to Dr B on 7 April 2002 stated:

> "…We wish to clarify a couple of things. The headaches [Mrs A] is experiencing [are] not the same as the ones preop. They are more like a general headache the average person would experience. The burning is constant and located right across the forehead. Currently she finds this almost unbearable and she gets no relief from the pain relievers. It is this that gives her the most discomfort. This too was not present preop. After the last adjustment, she did not have an X-ray due to other commitments she had on that day. Should she have one in the next few weeks."

Further surgery

Dr B informed me that after further discussion with Mr and Mrs A about her symptoms and consideration of her case at a public hospital neuroradiologists' meeting, it was decided to perform further surgery to shorten the catheter and, if necessary, revise the shunt. Dr B stated:

> "The consensus opinion [at the neuroradiologists' meeting] was that the catheter was adequately placed and that moving it was unlikely to make any change to her symptoms, but that if her symptoms were intolerable, then the cyst catheter could be shortened or the shunt removed. However, [Mr and Mrs A] were insistent that the catheter was the cause of the burning pain and on the [basis of the] rare possibility of dural-irritation and to exclude any chronic low-grade infection, I agreed to shorten the catheter and if necessary, revise the shunt."

On 17 April 2002, at a private hospital, Dr B undertook exploratory surgery of Mrs A's shunt. Dr B shortened the ventricular catheter, and tested all the shunt components. He informed me that the correct functioning of the shunt was confirmed at this time. He stated:

> "Under a general anaesthetic, the shunt valve was exposed by reopening the previous incision and each component of the system individually tested. The ventricular catheter was then shortened with the plan for it to be well away from any dura and on the edge of the cyst. The catheter showed good flow of CFS [cerebrospinal fluid] throughout and was reconnected to the valve. The shunt testing chamber depressed and filled appropriately indicating appropriate passage of CFS. CFS was tested and did not show any indication of shunt infection."

Dr B stated that when he reviewed Mrs A on 5 June 2002, her forehead pain had improved but she had developed a burning pain along the track of the valve and catheter. His medical notes state:

> "I reviewed [Mrs A] today. Her symptoms have significantly improved since shortening of the ventricular catheter. She does occasionally get some burning pains around the wound … I am not really able to explain these symptoms other than there may be some altered sensation around the wound from the scalp scar and would expect them to settle over the next year. She has no recurrence of her preoperative headaches.
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> …
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> The initial ventricular catheter was really of almost perfect length sitting well within the cyst and draining the cyst appropriately. Exactly why she developed a burning pain I do not know for sure. The only suspicion I have is that the tip of the catheter may have moved after her time at [the amusement park] and had touched the dura of the middle cranial fossa."

Dr B did not arrange any formal follow-up and Mrs A continued with conservative management of her pain, under the guidance of her general practitioner, Dr C. However, Mrs A has continued to suffer significant pain:

> "The area around the valve and down the side of my face, has become very tender to touch. I have nausea constantly. I can't wash my hair properly or lie on that side of my head. I can't put my head under water or bend over, it hurts to run. I mostly can't do anything with my head. I am in so much pain all the time. It wakes me in the night. It makes me very irritable.
>
> …
>
> Over the course of two operations I have gone from the original constant headache I was being treated for, to burning across my forehead, to severe, debilitating, burning pain down my face, neck and around the valve. On a scale on 1-10, I rate the burning from 8-10+.
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> The nausea has been present throughout."

Dr F, neurologist

Following referral by Dr C, Mrs A consulted neurologist Dr F for a second opinion of her condition. He formed the view that she may be suffering from a type of migraine. Dr F's report dated 11 December 2002 recorded:

> "I think the shunt to the arachnoid cyst is functioning satisfactorily. I think the arachnoid cyst has triggered migraine but she also has other precipitating factors for the migraine, particularly the feelings of resentment and frustration largely engendered by her symptoms. There is a contribution [towards her symptoms] from her resentment towards her parents' lack of help. As well as the migraine, there is a mild tendency to habitual hyperventilation, as hyperventilation exacerbated her symptoms of light-headedness within 15 seconds although there was no overt alteration of her breathing. I do not consider any further investigation to be indicated at this stage."

Final consultation with Dr B
Dr B saw Mrs A on 22 January 2003, after a further referral by Dr C. Mrs A stated that she asked Dr B to refer her for a further CT scan, but he refused her request. Mrs A said Dr B could not explain the reason for her distressing symptoms of burning and tenderness.

Dr B did not document, and does not recall, any such request for a CT scan, although he advised me that it is possible the matter was discussed. However, in Dr B's view, a further CT scan was not appropriate at that time:

> "At that stage her symptoms were mainly tenderness along the shunt track and a CT [scan] would not have been the investigation of my choice. I [do not] arrange for indiscriminate CT scanning of my patients and required a clinical indication for doing so. In this circumstance, I did not have one."

Dr B did not believe Mrs A's symptoms were related to intercranial pressure, the cyst or the shunt, and concluded that there was a more complex pain problem. The return of her symptoms after the shunt catheter was shortened confirmed his belief that the cyst tubing was not responsible for the symptoms. Dr B's medical notes for 22 January record:

> "At the current stage I do not think there is anything from a surgical point of view that could be offered. [Mrs A] has difficulties with the tolerance and the appreciation of pain which makes management of her situation very difficult. I have not arranged any formal follow-up."

Mrs A was subsequently referred for CT scan by Dr C. This was reported on 20 February 2003 to Dr C (with a copy to Dr B and Dr E) as showing a possible increase in the size of the cyst:

> "[There is an] arachnoid cyst in the left middle cranial fossa, similar to that on a previous scan although possibly slightly larger."

Dr B and Dr F discussed Mrs A's CT scan result on 21 February 2003 and Dr B agreed to review the films. Following receipt of the CT films, Dr B advised Dr F (on 3 March 2003) that, when taking into account the difference in angle of the slices obtained, there was very little difference between the two scans of 14 March 2002 and 20 February 2003. He also considered that the shunt was positioned adequately. He stated:

> "The ventricular catheter tip was sitting on the posterior wall of the cyst. This could have been placed more centrally within the cyst but there was no evidence that it was not draining adequately."

Dr D
Dr C referred Mrs A to neurosurgeon Dr D for another opinion. Dr D was provided with a complete copy of Mrs A's medical records and saw Mrs A on 25 March 2003. He advised Dr C:

> "I have reviewed the imaging, this included the initial MRI scan of the brain which showed a moderately large left temporal arachnoid cyst and mild ventricular enlargement. Further CT studies again show an arachnoid cyst as expected, the most recent study, from February of this year suggesting it may be slightly larger. I was not able to be certain that the tube of the shunt system actually enters the cyst."

Dr D considered Mrs A was presenting with two different problems. First, the headaches that may have been due to raised intercranial pressure. Secondly, dysaesthetic pain [pain caused by partially damaged nerve fibres] around the forehead and temporal region. Dr D was suspicious of cerebral pathology and requested an MRI scan, which was performed on 17 April 2003. It confirmed no abnormalities and revealed that the cyst was the same size as it had been when the previous MRI scan was taken in 1998. Dr D consulted with Dr B and formed the view that further surgery was not indicated.

Mrs A commented:

> "It was not until I was seen by [Dr D] that I was told that it is **nerve damage** and that I would probably have to live with it for the rest of my life, 24 hours a day, 7 days a week. The chances of relief were very remote. When I heard this I [had] mixed emotions. Firstly it came as a huge shock. I had previously been told it would improve over time. Secondly, one of relief, I had finally a more definite answer as to the actual cause.
>
> All the medication I have tried so far as only aggravated it and I am reluctant to try any more."

ACC

Mrs A submitted a claim to the ACC Misadventure Unit, which was accepted on the grounds of medical mishap. ACC found that Dr B provided an appropriate standard of care and that the subsequent development of a dysaesthetic pain syndrome was an unusual and unintended consequence of the insertion of the shunt system. The ACC expert advisor, a neurosurgeon, commented:

> "The current symptoms that the patient complains of appear to be significantly different in character to the headaches or pain which she had prior to the re-implantation of the shunt and appear to have more the character of a local dysaesthetic or hyperpathic [an excessive response to pain] pain syndrome related to the shunt itself, or to some effect that the tubing is having.
>
> One possibility is that the patient has developed a painful neuroma or neuralgia [pain which follows the course of one or more nerves]. This can occur after virtually any incision into the body, appears to be somewhat more common after implantations, and would certainly lead to a constellation of symptoms extremely similar to what the patient is suffering from: the only unusual feature is that these pains are almost invariably associated with quite marked tenderness or hypersensitivity around the scar and the solitary report we have relevant to local inspection and palpation around the wound scar from Dr E suggests this is not the case."

The ACC expert advisor advised that other explanations for Mrs A's pain included the slow seepage of cerebrospinal fluid around the shunt tubing or some form of atypical immune response to the shunt tubing. Alternatively, the pain may be due to the upper end of the tubing irritating the dura and the cyst wall membranes, or the shunt dragging on nerve filaments around the base of the middle fossa. He considered it generally unlikely that Mrs A's pain was generated by a blocked or non-functioning shunt:

> "[H]owever it appears that the symptoms were present between the original implantation of the shunt and the exploration of the shunt some three months later and, as [Mr B] documented, the shunt appeared to be functioning when it was re-explored, so the symptoms are unlikely to be caused by a non-functioning shunt: were this to be the case I would also expect the symptoms to be similar or identical to the symptoms she suffered prior to the implantation of the shunt, rather than the significant change in the nature of her symptoms."

Independent advice to Commissioner

The following independent expert advice was obtained from Dr Sam Bishara, neurosurgeon:

> "Medical Report
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> Complaint: [Mrs A]
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> Your Ref: 03/05150/AM
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> Thank you for your letter of 11th February and for the extensive enclosed information you have sent me. I sincerely apologise for the delay in replying.
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> I read the guidelines for independent advisors you supplied and agree to follow them.
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> During our telephone conversation, I stated that the provider under investigation worked during 1994 in the Neurosurgical Unit, at a [public hospital] as a neurosurgical registrar when I was the Director of the Unit. Later in 1997 he was appointed to a consultant position and I was by then an Honorary Neurosurgeon at [the hospital], a position I still hold. We discussed whether this would raise the question of a potential conflict of interest and it was agreed that it did not.
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> The opinion I am giving is based on the information available in the documents and the films of the investigations you have supplied, my own experience as a Consultant Neurosurgeon since December 1966 and a review of the relevant medical literature.
>
> • *Was it appropriate for [Dr B] to provide [Mrs A] with a shunt?*
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> Intracranial arachnoid cysts are benign developmental (congenital) cysts. With the universal use of computer tomography (CT) and magnetic resonance imaging (MRI) as

non-invasive neuro-diagnostic tests, increasing numbers of these cysts are recognised and treated.

The middle fossa is the most common site for intracranial arachnoid cysts. A middle fossa cyst may remain asymptomatic throughout life only to be diagnosed incidentally by a neuro-imaging study or at autopsy. When it is symptomatic headache is the most common complaint.

There is a consensus that adults with asymptomatic middle fossa cysts should be treated conservatively. Arachnoid cysts that cause a mass effect or neurological symptoms should be treated surgically. If headache is the only complaint, surgical treatment is a valid option.

When [Mrs A] presented to [Dr E] on 20.2.98 with headache of two months duration and the CT and MRI showed an arachnoid cyst in the left middle fossa, [Dr E] said 'whether or not the cyst is causing the headache remains a moot point'. Still he went on to insert a cystoperitoneal shunt without a valve two months later. When [Dr E] saw [Mrs A] 25 days after the operation, he reported that the headache was much improved. In a letter by [Dr E], dated 24th July 1998, that is, three months after the insertion of the shunt, he stated that when [Mrs A] was investigated with plain X-rays of the abdomen because of abdominal pains, two days before seeing him, the cystoperitoneal catheter was found to have migrated into the peritoneal cavity and was lying in the pelvis. Still [Mrs A] was free from headache. The catheter was removed through laparoscopy on 12th August 1999 and the abdominal pain settled down.

[Dr B] first saw [Mrs A] on 19th July 2000 with recurrence of the headache for one month. He elected to treat her conservatively. When the treatment failed, he referred her to [a neurologist] on 11th November 2000 for a second opinion. This neurologist saw her on 12th January 2001 and wrote, 'I presume that the headaches are related to the arachnoid cyst, but it is difficult to be certain of this. The headaches do have some migrainous features to [them]. I suspect that the arachnoid cyst has unmasked migraine-like symptoms'. [Dr B] saw [Mrs A] again on 28th November 2001, that is, 16 months after seeing her first in July 2000. She was still having ongoing problems with headache and headache control despite conservative management. He offered her the operation of cystoperitoneal shunt pointing out that her previous shunt had given her at least a year's symptom resolution. She accepted the offer and the operation was carried out on 9th January 2002.

I would like to point out that it was 16 months after seeing [Mrs A] for the first time that [Dr B] decided to offer her a shunt. During this period, he obtained a second opinion from [the neurologist] and treated her conservatively without success.

It is my opinion that [Dr B] had good reasons to believe that the headache was related to the cyst; these are the resolution of the headache for over two years following the previous shunt, and the failure of conservative treatment for over one year after

consultation with [the neurologist]. I find that given [Mrs A's] symptoms and her relevant history, [Dr B] was justified in providing [Mrs A] with a shunt.

- *Was it appropriate for [Dr B] to use a programmable valve?*

Two valve types are currently available. The older type is the differential pressure valve which provides a constant resistance and allows cerebro-spinal fluid flow when the proximal hydrostatic pressure exceeds the valve's preset closing pressure. Low pressure valves have a closing pressure of 20-40 mm H20, medium pressure 40-70 mm H20 and high pressure 80-100 mm H20. The newer valves are variable resistance valves which allow changing the closing pressure dependent on the symptoms. If the symptoms are suspected to be due to over-shunting (over drainage) the closing pressure is increased and if under-shunting (under drainage) is suspected, the closing pressure is reduced. This is a distinct advantage over differential pressure valves making it possible to avoid valve replacement with a higher pressure valve if there is over-shunting or with a lower pressure valve if there is under-shunting. This would create real problems especially if it has to be done more than once. However, it is fair to say that careful long term follow up is necessary to determine whether these new valve types will fulfil their promise.

I find it appropriate for [Dr B] to have used a valve noting that the previous shunt inserted by [Dr E], which did not have a valve, migrated into the abdominal cavity. A valve would anchor the shunt and would greatly minimise the risk of its migration. I also find it appropriate for [Dr B] to have used a programmable valve. This enabled him to change the valve setting upwards on 6th March 2002 when he suspected [Mrs A's] symptoms to be due to over-shunting and [possibly] on other occasions as stated in [Mrs A's] letter to the Commissioner.

- *Was [Mrs A's] shunt correctly positioned by [Dr B] in January 2002?*

The operation in January 2002, as described by [Dr B] in reasonable detail, was done, in my opinion, according to the accepted standards without incident. A 5cm catheter was inserted into the cyst in [a] single pass with good flow of cerebrospinal fluid.

The doctor who read the CT head scan done on 14th March 2002, five weeks after the operation, reported that the tip of the shunt catheter traversed the posterior margin of the arachnoid cyst to have its tip at the inferomedial aspect of the left middle fossa. I have reviewed the CT scan films and agree with this interpretation. I believe that the tip of the shunt catheter is within the cyst.

During the second operation on 17th April 2002, which started by exploration of the shunt, [Dr B] reported that when the catheter was disconnected there was a free flow of cerebrospinal fluid. The valve and the distal catheter were checked also showing free flow of cerebrospinal fluid.

Taking the above mentioned three paragraphs into consideration, I believe that [Mrs A's] shunt was correctly positioned by [Dr B] in January 2002.

- *What if any, indications are there that the shunt was not operating correctly after being inserted?*

The only indication that may suggest that the shunt was not operating correctly, would be the persistence of the preoperative headache. However, I would like to point out that [Mrs A] in her letter to the Commissioner did not complain of headache after the insertion of the shunt but of 'burning right across my forehead day and night'. I failed to find this symptom mentioned in any of the references before the operation.

I do not think that this symptom is an indication that the shunt was not operating correctly. In my opinion, the most probable explanation of this symptom is that [Mrs A] developed neuropathic pain.

- *What are the possible sources of [Mrs A's] pain which she developed after the operation of 9 January 2002?*

[Mrs A] described her pain in the forehead following [Dr B's] operation on 9th January 2002 as burning in character and present day and night, never going away. Following [Dr B's] second operation on 17th April 2002, she found that the area around the valve and down the side of the face was very tender to touch all the time such that she could not wash her hair properly, lie on that side of the head or put her head under water or bend over or run.

I believe that the pain after both operations has the characteristics of neuropathic pain.

- *Was it appropriate to perform the second operation on 17th April 2002?*

I find from the consent form [Mrs A] signed on 13th April 2002 that she consented to the procedure of exploration of cystoperitoneal shunt. I think exploration of the shunt is justified in view of [Mrs A's] persistent and severe pain despite changing the valve's pressure setting. I also note that [Mrs A's] case was discussed with the neurosurgeons and the neuro-radiologists at the Neuro-radiological Meeting at a public hospital. The consensus of opinion was that the catheter was adequately placed but if [Mrs A's] symptoms were intolerable, the catheter could be shortened on the assumption that the tip of the catheter was causing dural irritation.

I find the decision to perform the second operation on 17th April 2002 reasonable and appropriate.

- *[Dr B] formed the view that the shunt mechanism was working properly when he tested the mechanism during the second operation. Please comment on whether you agree this was a reasonable conclusion.*

In the operation of exploration of the cystoperitoneal shunt carried out by [Dr B] on 17th April 2002, he reported that when he disconnected the cyst catheter there was a free flow of cerebrospinal fluid. The valve and distal catheter were then checked also

showing free flow of cerebrospinal fluid. I think that [Dr B's] view that the shunt mechanism was working properly is a reasonable conclusion.

- *What effect do you consider the second operation may have had in relation to [Mrs A's] pain?*

It appears to me that [Mrs A's] neuropathic pain took a different form after the second operation. In her letter to the Commissioner, [Mrs A] reported that following this operation, the area around the valve and down the side of the face became very tender to touch. When [Dr B] reviewed [Mrs A] on 5th June 2002, he stated that the burning forehead pain had improved but she was complaining of burning pain along the track of the valve and catheter.

- *What do you consider may be the source(s) of the pain [Mrs A] continued to experience following the second operation?*

I am of the opinion that [Mrs A] continued to suffer from neuropathic pain following the second operation. Neuropathic pain arises from a lesion or dysfunction within the nervous system. The specific mechanisms that elicit neuropathic pain symptoms are the subject of ongoing research. It is generally acknowledged that neuropathic pain is extremely difficult to treat. Surgical intervention in any form does not relieve this type of pain.

- *In your view, was the shunt operating normally and was it correctly placed following the second operation?*

At the second operation on 17th April 2002, [Dr B] checked the shunt components and found them to be functioning properly. He then shortened the cyst catheter by 1cm and reconnected it to the valve. I have no good reason to suspect that the shunt was not operating normally and was not correctly placed following this operation.

- *Following the CT scan taken in February 2003, [Dr D] formed the view that the cyst may have increased in size and that the tube of the shunt system may be too short. [Dr B] was not convinced that the cyst had enlarged or that the positioning of the catheter was problematic. What is your opinion concerning the CT scan?*

I have carefully reviewed the films of the CT scan reported on 20th February 2003 and compared them to the films of the previous CT scans done on 18th February 1998 and 14th March 2002. In these two scans the cyst measures 3 x 4 x 2 cm. In the scan of 20th February 2003, which was reviewed by [Dr D], the cyst measures 3.2 x 4 x 2 cm. I think this minimal difference is within the margin of error of measurement and does not signify a definite increase in the size of the cyst.

Comparing the position of the cyst catheter in the scans dated 14th March 2002 and 20th February 2003, the catheter in the latter scan appears to have been shortened such that it cannot be seen any more in the lowest part of the cyst but its tip can be seen just within the cyst in the axial cut immediately above.

- *What is your opinion concerning the MRI scan taken on 17th April 2003?*

The arachnoid cyst in the left middle fossa is of the same size as in the previous MRI scan taken on 25th February 1998. In both scans the cyst measures 4 x 4 x 2 cm. The cyst catheter cannot be visualised. There is an artifact obscuring the left temporal lobe posterior to the cyst. Apart from this area which cannot be visualised, all the regions of the brain appear normal.

- *What are the relevant standards relating to this complaint and did Dr B comply with those? If you consider that relevant standards were not met, was the departure minor, moderate or major?*

I consider that [Dr B] provided an appropriate standard of care over the time he was engaged in [Mrs A's] care.

- *Are there any other matters which you believe to be relevant to this complaint?*

The relationship between headache and an arachnoid cyst in the middle fossa, in the absence of mass effect in the MRI or CT scan, is always difficult to establish. To add to the difficulty, there is no known and reliable preoperative investigation or test to confirm that the headache is due to increased intracranial pressure due to increased pressure within the cyst. It is possible that in [Mrs A's] case the headache benefited from the shunt as when [Dr B] discussed the possibility of removal of the shunt when he saw her on 5th June 2002, she told him that she did not wish to return to the state she was in prior to the shunt insertion. It is equally possible that the headache was not related to the cyst and any improvement after operative intervention was co-incidental or a placebo effect. The fact that the size of the cyst in the MRI of 17.4.03 is the same as that in the first MRI of 25.2.98 does not mean that the shunt was not functioning, as it is not always that there is significant change in the size of arachnoid cysts after successful shunting.

I believe that [Mrs A's] burning pain in the forehead and the pain and tenderness in the area around the valve on the left side of the head and down the left side of the face is neuropathic. The specific mechanisms that elicit neuropathic pain remain undetermined. [Mrs A] underwent three operations in the same area with what I think resulted in inevitable damage to the cutaneous nerves by the incisions used in these operations. There is scientific/experimental evidence that the genetic factor controls heritability of development of this type of pain following nerve lesions. Also the presence of co-morbidities such as poor sleep, depressed mood and anxiety may help to perpetuate the pain. I strongly recommend referring [Mrs A] to the Pain Clinic.

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Additional advice

Dr Bishara provided additional verbal advice to the Commissioner concerning the exact size of [Mrs A's] arachnoid cyst. As noted above, both of Mrs A's MRI scans (taken 25 February 1998 and 17 April 2003) measured the cyst as being 4 x 4 x 2 cm. In contrast CT scans of 18 February 1998 and 14 March 2003 measured 3 x 4 x 2 cm. In the CT scan of 20th February 2003, the cyst measured 3.2 x 4 x 2 cm (within the margin of error). Dr Bishara commented that the measurements obtained from the MRI imaging were more likely to be correct, as it is a more detailed investigation.

Dr Bishara also commented that there was no way of knowing from the investigations performed exactly how far the catheter tube entered into the cyst. However, the exact position of the tube in relation to the cyst was not significant in terms of its functioning. The important matter is that the catheter tube was positioned within the cyst. Dr Bishara noted that the catheter remained in the cyst after the catheter was shortened by 1cm during the second operation.

Code of Health and Disability Services Consumers' Rights

The following Right in the Code of Health and Disability Services Consumers' Rights is 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.

Opinion: No breach – Dr B

Standard of care
Right 4(1) of the Code of Health and Disability Services Consumers' Rights (the Code) gives every patient the right to have services provided with reasonable care and skill. Following the insertion of a programmable valved shunt by neurosurgeon Dr B on 9 January 2002, Mrs A developed distressing burning sensations around her forehead region and shunt pathway. Mrs A describes the pain she now suffers as severe and has been advised that the probability of improvement is remote. Mrs A is understandably aggrieved that her quality of life has been so drastically altered, following a surgical procedure designed to alleviate headache symptoms. However, there is no evidence that this situation is the result of a failure by Dr B to observe the standard of care and skill expected in the circumstances. I consider that Dr B provided treatment of an appropriate standard and did not breach Right 4 (1) of the Code. The basis for my decision is set out below.

Insertion, functioning and position of shunt
Mrs A complained that Dr B should not have performed the surgery and that the magnetic valve system is not recommended. She is concerned that the positioning and the functioning of the shunt by Dr B may have caused the development of her post-operative pain.

My independent expert advisor, neurosurgeon Dr Sam Bishara, considered that the insertion of a shunt, after a period of conservative management, was a reasonable treatment option in the circumstances, and that the January 2002 surgery was performed according to accepted standards. He advised:

> "It is my opinion that [Dr B] had good reasons to believe that the headache was related to the cyst; these are the resolution of the headache for over two years following the previous shunt and the failure of conservative treatment for over one year after consultation with [the neurologist]. I find that given [Mrs A's] symptoms and her relevant history, [Dr B] was justified in providing [Mrs A] with a shunt."

My advisor also considered that it was appropriate for Dr B to use a programmable valve, which allowed for the adjustment of pressure settings and minimised the risk of the valve migrating.

Dr Bishara agreed with Dr B's conclusion that Mrs A's shunt was correctly positioned (after both operations) because the available CT imaging indicated that the catheter tip was within the cyst. Dr Bishara noted that the consensus of opinion at the neuro-radiological meeting at a public hospital was that the catheter was adequately placed but may be causing dural irritation. The decision to perform further surgery in April to test and reposition the shunt was justified due to the persistence of Mrs A's symptoms. The precise position of the catheter tip in relation to the cyst was difficult to establish but the most important factor in terms of its functioning was that it was actually within the cyst.

Dr Bishara commented that the resolution of Mrs A's preoperative headache symptoms indicated that the shunt was functioning as intended. He agreed with Dr B that the free flow of cerebrospinal fluid observed during surgery in April 2002 indicated that the valve mechanism was working properly. The development of the distressing burning symptoms Mrs A experienced after the January surgery appears unrelated to the operation of the shunt. Dr Bishara stated:

> "I do not think that this symptom is an indication that the shunt was not operating correctly. In my opinion, the most probable explanation of this symptom is that [Mrs A] developed neuropathic pain.
>
> …
>
> Neuropathic pain arises from a lesion or dysfunction within the nervous system. The specific mechanisms that elicit neuropathic pain symptoms are the subject of ongoing research. It is generally acknowledged that neuropathic pain is extremely difficult to treat. Surgical intervention in any form does not relieve this type of pain."

Dr Bishara considered that Mrs A continued to suffer neuropathic pain after the second operation in April, although of a different nature. The ACC advisor also noted that the burning symptoms were of quite discrete character to the headaches Mrs A had before surgery and considered that the pain, although caused by the shunt, was not due to the shunt malfunctioning.

I accept Dr Bishara's advice that the decision to insert a programmable valve was an appropriate treatment option. The correct functioning of the shunt was confirmed by the free flow of spinal fluid. While the position of the catheter tip was altered in April to alleviate the possibility of dural irritation, there was no indication that the catheter tip was not correctly positioned.

Number of adjustments

There is a difference of opinion between Dr B and Mrs A about how many adjustments were made to the pressure of the shunt. Mrs A recalled that Dr B adjusted her shunt at least five times. In his email of 14 February 2002, Mr A refers to two increases in pressure being

made, prior to what Dr B referred to as the initial adjustment increasing pressure to performance level 2 on 6 March 2002. In contrast, Dr B explained that he was conservative in the number of adjustments he made and performed adjustments on two occasions. (Dr B's medical records are incomplete and make no reference to any further pressure change after 6 March 2002 – see *Other comment.*) Dr B explained that the X-ray taken on 27 March 2002 confirmed that the pressure setting had been changed again.

In light of the discrepancy between Mrs A's recollection, her husband's emails, and the failure of Dr B to document all the adjustments he made, I am unable to ascertain exactly how many adjustments were made. I conclude that Dr B made at least two, possibly more, adjustments to Mrs A's shunt.

Appropriateness of adjustments
Mrs A complained that Dr B continued to adjust her shunt, and did not consider that it might not be functioning properly.

Dr B informed me that the purpose of inserting a programmable valve was to allow for minor adjustments to the shunt. My advisor commented that the advantage of using a programmable valve is that there is no need for valve replacement with the occurrence of under-shunting or over-shunting.

Clearly, it is preferable to perform external adjustments to pressure settings without resorting to further invasive surgery. I accept that adjusting the pressure of the valve was appropriate and in keeping with the purpose of a programmable shunt. I also note that my advisor did not express concern about the number and type of adjustments made by Dr B. Although Dr B's medical records are incomplete, the adjustments he made appear to have been an appropriate response to the development of Mrs A's post-operative symptoms. Furthermore, I consider that Dr B was justifiably reluctant to proceed to further surgery immediately, and wanted to allow an opportunity for Mrs A's symptoms to settle. Exploratory surgery was undertaken in April after the failure of at least two adjustments to alleviate the burning symptoms, and the shunt was tested satisfactorily. It is clear that Dr B did turn his mind to whether the shunt was working properly and decided (correctly) that it was. I therefore conclude that Dr B provided an appropriate standard of care in this regard.

Matters relating to CT scan
Mrs A complained that on 22 January 2003 Dr B refused to refer her for a CT scan and that when a scan was subsequently provided to her by Dr C, Dr B interpreted it incorrectly. Dr B cannot recall such a request and I am unable to determine whether any such discussion occurred. However, I note that Dr B considered that there were no clinical indicators for a CT scan, when he saw Mrs A in January 2003.

Mrs A was subsequently referred for a CT scan by Dr C, which she received on 20 February 2003. The scan was reported as showing a possible increase in the size of her arachnoid cyst. Dr B was asked to review this CT scan by Dr F. Dr B informed Dr F (and Dr C) that he did not consider there was any significant change in the size of the cyst; if the difference

of angle of the "slice" obtained was taken into consideration, there was very little difference in comparison with the previous CT scan of 13 March 2002.

My advisor was provided with the relevant films and carefully compared and assessed them. He agreed with Dr B that the CT scan taken on 20 February 2003 did not indicate a definite increase in the size of the cyst. I accept Dr Bishara's advice and conclude that Dr B did not provide Dr F and Dr C with an incorrect opinion about Mrs A's CT scan.

Furthermore, I note that while Dr D initially considered the 20 February CT scan may have indicated an increase in the size of Mrs A's cyst, a subsequent MRI scan dated 17 April also confirmed that the cyst had not increased in size. I note that the MRI measurement was consistently 1cm larger than the CT scan measurement. Dr Bishara explained that the measurements obtained from the MRI imaging are more likely to be correct.

Conclusion
I accept my expert advice and conclude that the treatment provided by Dr B was of an appropriate standard. The painful symptoms Mrs A developed following the surgery have resulted from a combination of factors that occurred unexpectedly following the surgery. The precise cause of the pain has been difficult to determine. Although there appears to be a causal relationship between the surgery and the development of pain, there is no evidence that it is attributable to a lack of appropriate care on the part of Dr B.

Accordingly, in my opinion, Dr B did not breach Right 4(1) of the Code.

Other comment

Standard of medical records
As noted above, I have been unable to confirm how many adjustments Dr B made to Mrs A's valve from Dr B's written records.

While the medical records confirm that Dr B elevated the pressure to performance setting 2 on 6 March 2002, they make no reference to another pressure change that Dr B stated occurred after the CT scan on 14 March 2002. An X-ray taken on 27 March 2002 confirmed that the pressure setting had been changed. However, the X-ray does not clarify when the pressure setting occurred, and to what level it was adjusted.

Clearly, good medical practice requires the accurate documentation of every consultation, as well as any other clinically relevant discussions. I recommend that Dr B improve the standard of his medical records.

Follow-up actions

- A copy of my final report will be sent to the Medical Council of New Zealand and the Royal Australasian College of Surgeons.

- A copy of my final report, with details identifying the parties removed, will be placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.