

Spinal surgery unintentionally performed on incorrect part of spine

1. On 16 July 2022, the Health and Disability Commissioner (HDC) received a complaint from Mr A regarding the care he received from Dr B at Health New Zealand | Te Whatu Ora Waikato (Health NZ Waikato). Mr A's complaint concerns the management of spina bifida,¹ specifically, that spinal cord detethering surgery² on 18 November 2016 was performed at the wrong level of his back, that he was not fully informed pre- and postoperatively, and that he has concerns about his subsequent care. Mr A was aged 46 years at the time of the 2016 surgery. Mr A is now unable to walk and uses a wheelchair for mobility. I acknowledge the significant impact these events have had and continue to have on Mr A.

Information gathered

2. Mr A was born with spina bifida, but he told HDC that his condition did not greatly affect him until he reached his forties. Around this time, Mr A began to experience symptoms of tingling and pain in his feet and subsequent lower limb weakness. Mr A's general practitioner (GP) referred him to a neurologist, who arranged further investigation by way of magnetic resonance imaging (MRI)³ scans on 22 April 2016. The MRI scans confirmed that Mr A's spinal cord was tethered up to L5⁴ with associated myelomeningocele.⁵
3. Mr A's GP referred him to the neurosurgery team at Waikato Hospital. On 3 August 2016, he was seen by neurosurgeons Dr B and his registrar, Dr C, to discuss his symptoms, MRI results, and management options. Mr A's symptoms of lower limb weakness, recent progressive weakness in the right lower limb, and reduced sensation in both feet were noted.
4. Mr A was offered surgery for lumbar laminectomy⁶ and detethering of the spinal cord. In his clinic letter dated 3 August 2016, Dr C recorded that there had been a 'lengthy discussion' regarding treatment options and that he had 'emphasised to Mr A that the main purpose of the surgery is to prevent further deterioration of his symptoms, but it will not help with improving his pre-existing symptoms.' Mr A was told that his right lower limb weakness may improve to a small extent after surgery. Dr C recorded that Mr A had been told that there was a 5% risk of nerve root damage, resulting in loss of bowel function and complete paraplegia. Dr C noted that Mr A appeared to have understood the potential benefits and

¹ A condition in which the spine and spinal cord do not form properly during early pregnancy.

² A tethered spinal cord is abnormally attached to the spinal canal. In this surgical procedure, the tethered spinal cord is cut away from the surrounding tissue.

³ An imaging technique that generates detailed images of the internal organs, tissues, and bones.

⁴ One of the lumbar vertebrae located in the lower back above the sacrum.

⁵ A severe form of spina bifida in which the spine and spinal canal do not close so the spinal cord and nerves in the affected area develop outside of the spinal canal.

⁶ Removal of bone from part of the vertebra in the lower back to relieve pressure and create more space in the spinal canal.

risks of the procedure and that he had agreed to proceed. Mr A was subsequently placed on the urgent elective list for surgery.

5. Mr A's case was reviewed at the Waikato Neurosurgical multidisciplinary team meeting (MDTM) on 11 August 2016. It was agreed that the lumbar laminectomy and detethering surgery should go ahead as Dr B and Dr C had discussed with Mr A during their appointment.
6. On 17 November 2016, Mr A was admitted to Waikato Hospital for lumbar laminectomy and detethering surgery. He signed a written surgical consent form⁷ that day, which listed the following risks: 'Bleeding, infection, damage to nerves – continence, sexual function, numbness, wound leak, blood clots, risk to life.' The consent form does not list paralysis as a potential risk. However, the typed operation note dated 18 November 2016 states under the section 'Indications' that '[Mr A] was adamant that he wanted surgery despite the risks of more weakness and paralysis, complete loss of bowel/bladder function. Consent was taken.' Dr B also told HDC that he spoke to Mr A on the day of the surgery to again reiterate that 'the risks of the surgery were high and that he might suffer from worsening neurological deficit in his legs ...'. According to Dr B, Mr A acknowledged that his legs were already deteriorating and that he would like to proceed with the operation.
7. Mr A told HDC that he was reassured by Dr B on three separate occasions before the operation that his ability to walk would not be affected and that Dr B was confident with performing the surgery. Mr A also stated that he was told 'there is a 5% chance that things may go wrong'.
8. On 18 November 2016, Dr B carried out the laminectomy and detethering procedure. The typed operation note says that an L5 laminectomy and detethering of the spinal cord was completed. It was noted that there was a lipoma⁸ and tethering of the spinal cord in the sacrum area.⁹ Dr B told HDC that he did not explore the lipoma to search for tethered cord in the sacrum area because 'it would be easy to get lost and damage neural tissue.' Dr B said that the decision to avoid the lipoma and release the cord higher was discussed with his colleagues at the MDTM on 11 August 2016. However, the MDTM note does not record this discussion.
9. Dr B said that the surgery went smoothly and that there was no drop in Mr A's blood pressure to indicate damage to the spinal cord. However, Dr B told HDC that he unknowingly operated one level above where he intended to do the operation (L4 rather than L5). This was not discovered until an MRI scan was performed on 13 January 2017.
10. Following the procedure, Mr A experienced severe weakness in his lower limbs (paraplegia). Dr B told HDC that some deterioration was expected because of the detethering of the spinal cord, but he expected symptoms to improve quickly. Dr B also said he considered that the risk of postoperative compressive haematoma¹⁰ was very low, so he did not consider it

⁷ The form was completed by another of Dr B's registrars, Dr D.

⁸ Benign lump of fat cells that forms under the skin.

⁹ Triangular-shaped bone at the rear of the pelvis and the base of the spine.

¹⁰ Collection of blood that puts pressure on surrounding tissues.

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necessary to order an MRI scan at that time. However, he accepted that completing an MRI scan at that time would have shown that he had operated at the wrong level, and he would have been able to inform Mr A of this sooner.

11. On 30 November 2016, Mr A was transferred to a public hospital for rehabilitation. Dr B noted that, at the time of discharge from Waikato Hospital, Mr A's strength in both legs had improved such that it was similar to what was documented before the surgery.
12. On 13 January 2017, because Mr A's recovery had been slow, an MRI of the lumbar spine was completed. The MRI showed that the operation had been completed one level higher than Dr B intended and that Mr A's spinal cord had been transected (cut across) at L4.
13. Dr B told HDC that '[he has] never hidden the fact that [he] was at the wrong level and informed Mr A once the MRI scan confirmed this postoperatively and apologised.' I am unable to find any record of such a conversation in the clinical documentation.
14. Mr A told HDC that Mr B 'Never [came] clean on what really happened in surgery.'
15. Mr A continued to experience weakness and pain in his legs, as well as headaches. Further neurosurgical procedures were completed under the care of Dr B with the aim of addressing Mr A's ongoing symptoms, including:
 - a) further spinal cord detethering surgery on 14 May 2019;
 - b) insertion of a lumbar drain¹¹ on 5 February 2020 to relieve cerebrospinal fluid¹² pressure on the pseudomeningocele;¹³
 - c) insertion of a ventriculoperitoneal shunt¹⁴ on 29 July 2020; and
 - d) insertion of a baclofen pump¹⁵ on 28 June 2021.
16. On 30 March 2023, further surgery (laminectomy, detethering of the spinal cord in the sacral region, reduction of subcutaneous lipoma, and removal of the baclofen pump) was completed by Dr E at a private hospital. Dr E stated that the surgery was indicated because of Mr A's ongoing pain and discomfort, particularly at the site of the lipoma. Dr E also noted that Mr A had previously undergone two detethering operations, during one of which his spinal cord had been transected.
17. Mr A, Dr B, and Health NZ Waikato were provided with the provisional report for comment. Mr A said he would like Dr B to be held accountable, for him to learn from his errors, and for him to not repeat his mistakes on others. Mr A said he would also like Health NZ Waikato

¹¹ A temporary tube used to drain cerebrospinal fluid.

¹² Fluid that surrounds and protects the brain and spinal cord.

¹³ An abnormal build-up of cerebrospinal fluid.

¹⁴ An implanted device that drains excess cerebrospinal fluid.

¹⁵ A device that delivers baclofen (medication used to relax muscles) to the spinal canal.

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to take this incident seriously and ensure it is not repeated. Dr B said he accepted the report, and Health NZ Waikato said it had nothing further to add.

ACC information

18. On 22 November 2016, Waikato Hospital staff completed an ACC treatment injury claim on Mr A's behalf. The claim stated that Mr A had experienced weakness in his legs following detethering of the spinal cord on 18 November 2016. The claim was made before the MRI on 13 January 2017 showed that the laminectomy had occurred at L4 instead of L5 – although this information was later provided to ACC.
19. ACC sought independent advice from an orthopaedic surgeon, and Dr Reuben Johnson, neurosurgeon.¹⁶
20. ACC's independent advisor considered that transection of the spinal cord at L4 was an unexpected outcome of surgery and should be considered a treatment injury.
21. Dr Johnson agreed that transection of the spinal cord should be considered a treatment injury. In addition, he noted that transection of the spinal cord was not a necessary part of the laminectomy and detethering procedure that was performed. Dr Johnson stated that the failure to investigate Mr A's severe and unexpected postoperative neurological deficit was below the expected standard of care. He also noted that Dr B appeared to have operated at the wrong level, which, if correct, was also outside the expected standard of care.
22. ACC concluded that transection of the spinal cord at L4 occurred during a L5 laminectomy and detethering procedure. This physical injury resulted in weakness in the lower legs and bilateral paralysis of the feet. Accordingly, ACC accepted that a treatment injury had occurred due to the transection.

Independent clinical advice

23. As part of this investigation, HDC sought independent clinical advice from Dr Johnson, neurosurgeon (**Appendix A**). He identified two departures from accepted standards in the care Dr B provided to Mr A.
24. While Dr Johnson considered that the overall consenting process was appropriate, he was critical that 'paralysis' and/or 'paraplegia' were not listed on Mr A's written consent form for the 18 November 2016 operation. Dr Johnson considered that the risk of paralysis should be noted on the surgical consent form for any neurosurgical procedure on the spine. Dr Johnson considered the absence of this wording a moderate departure from accepted standards.
25. Dr Johnson considered that the decision to recommend detethering surgery for Mr A on 18 November 2016 was appropriate. However, he was critical that Mr B performed the operation at L4 rather than L5, indicating a failure to identify the correct level during the

¹⁶ ACC's clinical advisor and Dr Johnson provided their final reports to ACC on 22 March 2017 and 21 June 2017, respectively.

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procedure. The operation being performed at the wrong level resulted in the severing of Mr A's spinal cord above the level of tethering, and Dr Johnson considered that this was a severe departure from accepted standards of care. He also noted a failure to explore the lipoma in the sacral region during the operation.

26. Dr Johnson said that, for complex cases such as Mr A's, it would be common, albeit not mandatory, practice to use intraoperative neurophysiology monitoring¹⁷ to assist with identifying neural structures and reducing the risk of spinal cord transection.
27. Dr Johnson also stated that it would have been appropriate for Dr B to request a postoperative MRI scan when Mr A showed neurological decline after the procedure on 18 November 2016. Dr Johnson considered that Mr A's post-surgical decline was a rare and unexpected event. Investigative imaging would be used in such cases to establish the cause and rule out any reversible conditions, such as a compressive haematoma (although Dr Johnson acknowledges that this would be a highly unlikely occurrence). Dr Johnson also noted that a postoperative MRI scan would have identified the injury to Mr A's spinal cord, leading to earlier communication to him regarding this error. Dr Johnson considered that Dr B's failure to perform a postoperative MRI scan was a moderate departure.
28. Dr Johnson did not identify any departures from accepted practice in relation to Dr B's immediate and subsequent postoperative care of Mr A after the surgery on 18 November 2016. This included the insertion of a ventriculoperitoneal shunt on 29 July 2020 and of a baclofen pump on 28 June 2021.

Opinion: Dr B

Operation and management of neurological decline – breach

29. Right 4(1) of the Code of Health and Disability Consumers' Rights (the Code) states that every consumer has the right to have services provided with reasonable care and skill. Based on the available evidence, including the advice provided by Dr Johnson, it is evident that several aspects of Dr B's care of Mr A did not meet accepted standards.
30. Dr Johnson was critical that the surgery of 18 November 2016 was performed at the wrong level, leading to the transection of Mr A's spinal cord above the level that it was tethered. The fact that this error occurred indicates that Dr B did not correctly identify the level at which he was operating during the surgery, which was a departure from accepted standards of care. Dr B has accepted that he unknowingly operated at the wrong level. Accordingly, I accept Dr Johnson's advice that Dr B operated at the wrong level, which was a severe departure from accepted standards.
31. Immediately following the detethering surgery, Mr A experienced neurological decline, with severe weakness in his legs. Dr Johnson considered that Mr A's symptoms were an unexpected post-surgical outcome, that an MRI scan was indicated to investigate the cause and rule out a haematoma, and that failure to do so was a departure from expected standards of care. Dr B stated in his response to HDC that some neurological decline was

¹⁷ Continuous observation of neural pathways during neurosurgery to help clinicians preserve the integrity of neural structures.

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expected post-surgery and that a haematoma was unlikely. However, Dr B acknowledged that an MRI scan would have identified that surgery had been completed at the wrong level, allowing Mr A to be informed of this error sooner. Noting Mr A's significant neurological decline and the chance, albeit slight, of a haematoma, I consider it would have been appropriate for Dr B to have requested further investigation through a postoperative MRI scan. I accept Dr Johnson's opinion that failure to request a postoperative MRI in such circumstances was a moderate departure from accepted standards.

32. Noting these two criticisms – operating at the wrong level of the spine and failing to request a postoperative MRI scan in the context of neurological decline – I consider that Dr B breached Right 4(1) of the Code.

Documentation – adverse comment

33. I note that the consent form Mr A signed before surgery did not list 'paraplegia' or 'paralysis' as a risk of the surgery. I accept Dr Johnson's advice that consent forms for spinal procedures should list this risk. I acknowledge that Dr B's registrar, Dr D, completed the consent form, but I consider that, as the lead clinician, Dr B held the overall responsibility for ensuring the adequacy of the consenting documentation. Accordingly, I am critical that Dr B did not ensure that 'paraplegia' or 'paralysis' were listed as risks on the consent form. This criticism is mitigated by the fact that, overall, the consenting process appears to have been reasonable. I note that there is clear documentation of a thorough consenting discussion being completed during the clinic before the operation. This included discussion of the significant risk of nerve damage resulting in paraplegia. It was noted that Mr A appeared to have understood the risks of the procedure. Further evidence to support the occurrence of in-depth discussions regarding risks of the operation, including paralysis, was recorded in the typed operation note. Although I acknowledge Mr A's recollection that he was not aware of such risk, given the passage of time I have relied upon and prefer what has been documented contemporaneously or closer in time to the procedure. I note also that Mr A has acknowledged that he was aware 'there [was] a 5% chance that things may go wrong.'
34. Dr Johnson was critical of Dr B for his decision not to explore the lipoma in the sacral region. Dr B told HDC that he was concerned about potential damage to neural tissue if he explored that area. He also stated that this decision was discussed with his colleagues at the pre-surgical MDTM meeting on 11 August 2016. I accept that Dr B and his colleagues decided against exploration of this area because of the perceived risk of potentially causing damage to neural tissue. However, I would expect that discussions on the direction of treatment would be recorded in detail to ensure that the rationale for such decisions is clearly documented and readily accessible.
35. Regarding Mr A's concern that Dr B did not disclose the error that he made during surgery, I note that Dr B was unaware that he had operated at the wrong level until an MRI scan was completed in the months after the operation. Dr B told HDC that he informed Mr A of the error and apologised once he became aware of what had happened. Unfortunately, I have not received clinical records detailing any such discussion. In the absence of this information, I am critical that Dr B did not appropriately document what was discussed with Mr A regarding this error but otherwise am unable to make further findings on this matter.

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36. Dr Johnson did not identify any departures regarding the care Dr B provided following the surgery (and immediate postoperative care) of 18 November 2016, and I accept his opinion.

Changes made since events

37. Dr B advised that he has made the following changes to his practice since these events:
- a) He now performs pre-incision and post-incision X-rays for all spinal surgeries to ensure he is operating at the correct level.
 - b) Intraoperative neuro-monitoring has become more widely available since 2017, and Dr B uses it for all intradural spinal operations and some extradural spinal operations (excluding emergency cases). This is a further check that he is operating at the correct level.
 - c) All complex intradural spinal cases are discussed preoperatively in a neurosurgical MDTM.
 - d) Dr B works on difficult intraspinal cases with the assistance of a colleague. For paediatric spinal detethering cases, he works with a paediatric surgery consultant.
 - e) Dr B now requests postoperative MRIs for nearly all intradural spinal pathologies, regardless of whether the patient has deteriorated.

Recommendations and follow-up actions

38. I recommend that Dr B provide a formal written apology to Mr A for the deficiencies identified in this report. The apology is to be sent to HDC within three weeks of the date of this report, for forwarding to Mr A.
39. I recommend that Dr B and Health NZ Waikato reflect on the wording used on surgical consent forms for spinal procedures and, if required, provide further training to the neurosurgical team in relation to the completion of consent documentation. In particular, clinicians should ensure that the terms 'paralysis' and/or 'paraplegia' are stated as risks for any neurosurgical operation on the spine. Following any further training as required, Health NZ Waikato is to complete an audit of the last 10 neurosurgical consent forms for spinal procedures to ensure that risks are being appropriately recorded. A copy of the audit findings (and any corrective actions) is to be provided to HDC within three months of the date of this report.
40. I recommend that Dr B and Health NZ Waikato reflect on the detail of decisions and the rationale recorded in neurosurgical MDTMs. If required, further guidance should be given to clinicians regarding the expected detail of documentation. Following any further training that may be identified, Health NZ Waikato is to complete an audit of the last 10 neurosurgical MDTMs to ensure that discussions are being appropriately recorded. A copy of the audit findings (and any corrective actions taken) are to be provided to HDC within three months of the date of this report.

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41. I trust that Dr B will reflect on his documentation to ensure that any conversations with patients regarding perioperative complications are appropriately recorded in that patient's clinical records.
42. Noting the remedial changes that Dr B has made to his clinical practice since these events, which I consider address the key issues identified with the care he provided Mr A, and given the time that has elapsed since the provision of care, I do not propose to make any further recommendations relating to the care he provided.
43. A copy of this report with details identifying the parties removed, except the clinical advisor on this case and Health NZ Waikato, will be sent to the Medical Council of New Zealand, and it will be advised of Dr B's name.
44. A copy of this report with details identifying the parties removed, except Health NZ Waikato and the clinical advisor on this case, will be sent to the Royal Australasian College of Surgeons and placed on the Health and Disability Commissioner website (www.hdc.org.nz) for educational purposes.

Morag McDowell
Health and Disability Commissioner

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Appendix A: Independent clinical advice to Commissioner

The following independent advice was obtained from neurosurgeon, Dr Reuben Johnson:

'I am Reuben David Johnson, [...]. I am a vocationally registered neurosurgeon in New Zealand. I hold the degrees of Bachelor of Medicine and Bachelor of Chirurgery from the University of Glasgow. I also hold the degrees of Bachelor of Laws from the University of London, the degree of Bachelor of Science from the University of Glasgow, and the degree of Doctor of Philosophy from the University of Oxford. I am a Fellow of the Royal College of Surgeons of England and Wales (Neurosurgery), a Fellow of the Royal Australasian College of Surgeons, an Associate Fellow of the Royal College of Medical Administrators, and a Fellow of the Australasian College of Legal Medicine.

I have been in medical practice since 1999 and in neurosurgical practice since 2003. I have been a consultant neurosurgeon since 2012. I am the clinical lead for neurosurgery at Wellington Hospital, Capital, Coast and Hutt Valley, New Zealand. I am currently a member of the training board for neurosurgery for the Neurosurgical Society of Australasia. I am a clinical lecturer in neurosurgery at the University of Otago.

This report is written on the basis of information provided to me. Where a file-based case review has been requested, I have not made arrangements to review the patient in person. I am able to review patients face to face on request.

1. Brief summary of clinical events

- 1.1 Mr [A] was born with spina bifida and a congenital sacral lipomyelomeningocele, which was managed conservatively.
- 1.2 He was seen by [Dr F], neurosurgeon, in January 2014 at the age of 43 years when he was experiencing sensory changes in the feet. At that time, he had clawing of the toes and pes cavus. There was a background of a clam ileocystoplasty with artificial urinary sphincter in 2012 and an anastomotic urethroplasty in 2011. Nerve conduction studies were undertaken by way of assessment by Dr [G], and the possibility of release of the lumbar and sacral nerves around the lipomyelomeningocele was considered. He was seen by [...] Mr [F]'s registrar, on 14 May 2014, where the complex nature of this surgery and the risk of nerve damage and a CSF [cerebrospinal fluid] fistula was outlined. Further investigations by way of EMG [electromyography] were requested. Dr [F] saw Mr [A] for review on 8 October 2014 following EMGs by [Dr G] on 26 August 2014, which revealed a severe longstanding bilateral lower limb axonal motor neuropathy. Dr [F] did not feel that the current problems were due to the spina bifida or spinal dysraphism.
- 1.3 By the age of 45, Mr [A] was experiencing progressive sensory changes in his feet and then subsequent weakness.
- 1.4 Mr [A] was referred by his GP to neurology, and he was seen by Dr [...], visiting neurologist, at the hospital on 17 May 2017. He was 45 years old at the time, and he was found to have distal lower limb weakness and at the ankles and some sensory disturbance in his feet. He had a background of a neurogenic bladder with artificial

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sphincter and intermittent self-catheterisation. Investigation by way of MRIs on 8 January 2014 and 22 April 2016 revealed a tethering of the spinal cord up to L5 and an associated myelomeningocele.

- 1.5 Repeat electrophysiology was consistent with his symptoms being attributable to his spina bifida rather than a neuropathy.
- 1.6 Mr [A] was referred to [Dr B], neurosurgeon, at Waikato Hospital by his GP [...] on 3 August 2016.
- 1.7 Mr [A] was seen by [Dr B]'s registrar, [Dr C], on 3 August 2016. It was reported that there was a history of long-standing left lower limb weakness and more recent progressive weakness of the right lower limb over a 12-month period. Neurologically, he was found to have moderate weakness in the distal lower limbs at the ankles and some sensory disturbance in the feet. Offered surgery by way of lumbar laminectomy and cord detethering. The aim of surgery was said to be to prevent further neurological deterioration and a possible expected improvement in right leg power. A 5% risk of nerve root damage was quoted, with resultant complete paraplegia and loss of bowel function.
- 1.8 Mr [A] case was reviewed at the Waikato Neurosurgical MDM on 11 August 2016. It was noted that there was tethered cord in the sacral canal. In view of the clinical and electrophysiological findings, cord detethering was recommended.
- 1.9 Mr [A] was admitted to Waikato Hospital on 17 November 2016, and a written consent form was signed prior to surgery with the following risks being written on the consent form: "Bleeding, infection, damage to nerves – continence, sexual function, numbness, wound leak, blood clots, risk to life". The consent form was signed by Mr [A] and by Dr [D], Registrar. There is no mention of paralysis.
- 1.10 Mr [A] underwent surgery under [Dr B] on 18 November 2016 by way of L4/L5 laminectomy and detethering of the spinal cord. At the time of surgery, a lipoma was reported to be seen deep to the nerve roots and there was epidural bleeding. There is no mention of intraoperative electrophysiology being used for the case in the written note. There is no patient label on the written record, but the record correlates with the typed operation note. The typed note states there was an L5 laminectomy and untethering of the cord. There is no mention of the use of intraoperative electrophysiology. The operative record states:

"Linear incision was made of the L5 lamina. The lamina was removed. Epidural bleeding was stopped with surgical and Floseal. Dura opened in the midline and held open with 4/0 silk. The nerves were separated from the thick lipomatous filum/spinal cord. This was divided after coagulation of the midline. Careful haemostasis made with bipolar."
- 1.11 In the immediate postoperative period, Mr [A] experienced severe neurological deficits, particularly motor deficits in the lower limbs, such that he was paraplegic. Mr [A] was subsequently transferred to another hospital for rehabilitation.

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- 1.12 Dr [...], physician, requested an MRI of the lumbar spine in January 2017 because of delayed recovery, and this was reported as showing transection of the spinal cord at the L4 level.
- 1.13 Mr [A] went on to have a re-do detethering of his cord on 14 May 2019. There is a handwritten record of this procedure in the Waikato notes signed by the registrar (name not legible). The record appears to state that there was a “Redo laminectomy + detethering at L4/5 then S2.” There was said to be a L3 laminectomy and an S2 laminectomy with division of the filum at the S2 level. There is no mention of intraoperative neurophysiology.
- 1.14 Mr [A] subsequently had insertion of a VP [ventriculoperitoneal] shunt on 29 July 2020 under [Dr B] in Waikato for symptoms of raised intracranial pressure.
- 1.15 Mr [A] has had the following other surgical procedures:
1. Multiple plastics procedures for necrotising fasciitis of the thigh 2018 and formation of loop colostomy
 2. Baclofen pump insertion 2021.
- 1.16 Mr [A] underwent further surgery in 2023 under [Dr E], neurosurgeon, in Auckland. The procedure was stated to be: “Lumbo sacral laminectomy, detethering of spinal cord in the distal sacral region, detethering of adherent spinal cord at L3/4 (site of previous surgery) and debulking of subcutaneous lipoma + removal of baclofen pump.” [Dr E] states the indications for surgery as follows:
- “This man had previously undergone two operations for a tethered spinal cord. Unfortunately, these had involved sectioning his spinal cord in two places and not freeing the cord up at the distal site of attachment into his lipoma. He had ongoing discomfort and pain at the site of the lipoma and requested that this be addressed directly.”*
- 1.17 [Dr E]’s operation note states that in the sacral area:
- “1. Spinal cord tethered in the distal canal by a fibrous band extending through into a subcutaneous lipoma.
 2. Dense adhesions between the spinal cord and surrounding dura at the site of previous laminectomy at L3/4”.
 3. “Findings were of a transected distal spinal cord with what appeared to be some nerve roots coming down ventrally from outside the dura and exiting the canal below the point of transection.”

2. Brief summary of complaint and response to complaint

- 2.1 Mr [A]’s complaint has numerous components to it, and I refer you to that for full details. I note, however, that Mr [A] maintains that:

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1. He was told by a member of the neurosurgical team following the first operation in 2016 that he had coughed during the procedure and that there may be some ongoing nerve damage as a result.
2. He was not aware that his spinal cord had been severed until an MRI in 2017 revealed the cord was severed.
3. That renal stones were missed on some of his earlier imaging.
4. That the insertion of a baclofen pump further weakened his legs.
5. He feels that [Dr B] has been dishonest in his communications with Mr [A].

2.2 [Dr B] has responded to the complaint in detail, and I refer you to his response for full details. However, I note that [Dr B] maintains that:

1. He saw Mr [A] preoperatively in clinic and on the ward and explained the risks of the proposed procedures.
2. He does not recall any coughing during the procedure and indicates that if there had been a cough he would have stopped operating.
3. That at the operation in 2016 he went a level higher than he thought he had.
4. That the postoperative weakness following the surgery in 2016 was expected and improved to the point that it was not much different to that when seen in clinics prior to surgery.

3. Radiology review

3.1 I have reviewed radiological images myself from 2016 through to 2023. I have discussed this imaging with Dr [...], neuroradiologist. These images include MRIs of the L-spine 8 January 2014, 22 April 2016, 13 January 2017, 12 December 2019, and 27 July 2023. The MRI of 13 January 2017 clearly shows cord transection at the L3/4 level.



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4. Opinion

- 4.1 You have asked me some specific questions, and I will answer them as posed (your words in ***bold italic*** below)

1. Was it consistent with accepted practice to recommend L5 laminectomy and untethering of the spinal cord? List any sources of information reviewed other than the documents provided by HDC:

- 4.2 Please see Appendix 1.

Advisor's opinion: What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.

- 4.3 Tethered cord syndrome is a neurological disorder caused by tissue attachments that limit this movement of the spinal cord within the spinal column, resulting in abnormal stretching of the spinal cord. This syndrome is closely associated with spina bifida. In the case of a spina bifida with a myelomeningocele, the spinal cord fails to separate from the skin of the back during development, preventing the normal ascent of the spinal cord. As a result, the spinal cord lies low within the spinal column and is tethered. In spina bifida with lipomyelomeningocele, the spinal cord will also have fat (lipoma) at the lower tip, and this may connect to the thecal sac, resulting in tethering. The condition is also associated with scoliosis (curvature of the spine). In Mr [A]'s case, he has spina bifida with lipomyelomeningocele and scoliosis. I have discussed the imaging with a neuroradiologist, Dr [...], who agrees this is by definition a lipomyelomeningocele, and radiologically it appears that the filum and nerve roots terminate at the placode without separate discernible filum lipoma or intradural lipoma, and there is a caudal regression syndrome of the sacrum. It is difficult to discern where the cord actually terminates from the 2016 images, and although it appears that the cord may terminate at L3/4, on later images it is more clear that the cord most likely terminates at L5 or below.
- 4.4 It has long been accepted practice to consider surgical intervention for symptomatic spina bifida with tethered cord, particularly in the presence of progressive neurological deterioration. This was the case in 2016. The type of surgery that is recommended depends on the nature of the individual anatomy. In some cases, only the filum terminale (a thin fibrous band attaching the cord to the sacrum) needs to be divided. In more complex cases, such as the presence of a lipomyelomeningocele, more complex dissection is required to detether the cord.
- 4.5 There is no written guideline regarding the management of tethered cord syndrome that I am aware of. However, detethering for symptomatic progression and neurological deterioration is accepted practice, and this is widely reflected in the literature.

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- 4.6 In Mr [A]’s case, there was a complex lipomyelomeningocele, and surgery to detether the cord would require complex dissection of the abnormality below the level of the cord including the lipoma.

Was there a departure from the standard of care or accepted practice?

- ***No departure;***
 - ***Mild departure;***
 - ***Moderate departure; or***
 - ***Severe departure.***
- 4.7 No departure. The recommendation to detether the cord is not a departure from the standard of care or accepted practice.

How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.

- 4.8 In my opinion, the decision to offer surgical detethering was correct and would be looked upon favourably by my peers. I have discussed this case previously in 2017 with [Dr H], neurosurgeon, in Wellington, and with [Dr E], neurosurgeon, in Auckland. I have discussed the radiology with [the neuroradiologist] more recently in 2024.

Please outline any factors that may limit your assessment of the events.

- 4.9 Not applicable.

Recommendations for improvement that may help to prevent a similar occurrence in future.

- 4.10 Not applicable

2. As far as can be determined, were the risks and benefits of such surgery presented accurately and in a manner consistent with accepted practice? List any sources of information reviewed other than the documents provided by HDC.

- 4.11 Please see Appendix 1.

Advisor’s opinion: What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.

- 4.12 The standard of care was to obtain informed consent for the proposed procedure. It is evident from the records that the risk of neurological damage as a result of surgery was explained and consent obtained. A 5% risk was quoted in clinic, and this included a risk of paraplegia.
- 4.13 A written consent form was signed prior to surgery. Although the written consent specifically stated nerve damage, it did not include the words paralysis or paraplegia.

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4.14 I have reviewed the Waikato District Health Board Informed Consent Policy.

Was there a departure from the standard of care or accepted practice?

- ***No departure;***
- ***Mild departure;***
- ***Moderate departure; or***
- ***Severe departure.***

4.13 There is no departure from the standard of care or accepted practice in the consent process. I would, however, say that the words paralysis and/or paraplegia should have been included on the written consent form by Dr [D] on 17 November 2016. However, this omission represents a moderate departure from the standard of care and is not sufficient to invalidate the overall consent process.

How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.

4.14 My peers would view the consent process favourably but would share my view that the failure to use the specific wording of paralysis and/or paraplegia on the written consent form is an omission.

Please outline any factors that may limit your assessment of the events.

4.15 Not applicable.

Recommendations for improvement that may help to prevent a similar occurrence in future.

4.16 The neurosurgical registrars undertaking written consents should be reminded that it is their duty to accurately document serious risks on the consent form. For neurosurgical procedures on the spine, this should always include the risk of paralysis.

3. Was the surgery of 18 November 2016 undertaken to a standard consistent with accepted practice? List any sources of information reviewed other than the documents provided by HDC.

4.17 Please see Appendix 1.

Advisor's opinion: What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.

4.18 Release of a tethered cord usually requires severing the filum terminale but may also require dissection of fibrous bands around the nerve roots or conus or even the resection/partial resection of a lipoma at or within the conus. In order to carry this out safely, intraoperative neurophysiology is widely used to help identify neural structures (Kothbauer and Novak, 2004). Whilst it is not mandatory to use intraoperative

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neurophysiology, in the case of a complex lipomyelomeningocele, as was the case here, would have been common practice in New Zealand.

- 4.19 The standard of care would also have included exposure of the lipoma below the level of the conus and dissection of the tethering below the conus. In this case, this was lower down towards the lower lumbar spine/sacrum, not in the mid-lumbar spine.

Was there a departure from the standard of care or accepted practice?

- ***No departure;***
- ***Mild departure;***
- ***Moderate departure; or***
- ***Severe departure.***

- 4.20 Severe departure.

- 4.21 The operation was performed at the wrong level and resulted in severing of the spinal cord above the level of the tethering.

How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.

- 4.22 My peers would agree that the operation was performed at the wrong level. There was a failure to identify the correct level at the time of surgery, and there was no exploration of the lipoma in the sacral region.

- 4.23 I have discussed this case previously in 2017 with [Dr H], neurosurgeon in Wellington. At the time of discussion, we both agreed that there had been transection of the distal end of the cord and that further surgery to untether the cord below this was unlikely to have any beneficial effect. I have also discussed this case with [Dr E], neurosurgeon in Auckland, who undertook further surgery on Mr [A] in 2023. [Dr E] found that the cord had been transected at the previous surgery, and he undertook detethering in the sacral region, which had not previously been explored.

Please outline any factors that may limit your assessment of the events.

- 4.24 I am basing my opinion on the medical records and the documentation enclosed. I was not present at the time of surgery.

Recommendations for improvement that may help to prevent a similar occurrence in future.

- 4.25 It would be my recommendation that the complex lipomyelomeningocele surgery should be undertaken with intraoperative neurophysiology. This would reduce the risk of intraoperative spinal cord transection.

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4. Was the acute deterioration in Mr [A's] lower limb neurological status post-surgery investigated and managed in a manner consistent with accepted practice? List any sources of information reviewed other than the documents provided by HDC.

4.26 Please see Appendix 1.

Advisor's opinion: What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.

4.27 In the event of a new neurological deficit in the immediate or early postoperative period following spinal surgery, it is the standard of care/accepted practice to undertake investigative imaging to establish the cause and rule out any reversible conditions. There are occasional exceptions to this where the neurological deficits are expected.

Was there a departure from the standard of care or accepted practice?

- **No departure;**
- **Mild departure;**
- **Moderate departure; or**
- **Severe departure.**

How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.

4.28 Moderate departure.

4.29 The new weakness in Mr [A]'s legs following the surgery in 2016 could have been explained by either direct neurological damage or a compressive haematoma. A postoperative MRI was indicated to look for a compressive haematoma.

4.30 It appears from the records available and [Dr B]'s comments on this case that he felt the postoperative deficits were expected. I have previously discussed this with my colleagues [Dr H] and [Dr E] and referenced this discussion in my report for ACC in 2017. A decline in postoperative neurology following spinal cord detethering is a rare event and not expected. Whilst in retrospect it is highly unlikely there was a compressive haematoma, it would have been prudent to exclude this with an MRI scan. Furthermore, the injury to the spinal cord would have been identified at that time, and this would have led to early communication with Mr [A] regarding this complication.

Please outline any factors that may limit your assessment of the events.

4.31 I am basing my opinion on the medical records and the documentation enclosed. I was not present at the time of surgery.

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Recommendations for improvement that may help to prevent a similar occurrence in future.

- 4.32 The indications for postoperative imaging in the presence of a new neurological deficit should be reviewed.

5. As a general comment, were the strategies undertaken or facilitated by Dr [B] between 2017 and 2022 to improve Mr [A]'s neurological symptoms and function consistent with accepted practice. List any sources of information reviewed other than the documents provided by HDC.

- 4.33 Please see Appendix 1.

Advisor's opinion: What was the standard of care/accepted practice at the time of events? Please refer to relevant standards/material.

- 4.34 Please see my answers to the questions above regarding the surgery in November 2016.

- 4.35 The decision to undertake a re-do detethering of the spinal cord in May 2019 was not unreasonable. However, as the spinal cord had already been transected, this was highly unlikely to result in any significant neurological improvement. Unfortunately, the surgery in May 2019 did not appear to address the cause of tethering at the level of the lipoma. Radiologically it appears that there has been a second injury to the cord at L5. [Dr E] subsequently undertook surgery in 2023 to address the tethering at the levels below.

- 4.36 The use of baclofen pumps to control lower limb spasms, and the use of a ventriculoperitoneal shunt to treat symptoms or raised intracranial pressure, are part of accepted neurosurgical practice.

Was there a departure from the standard of care or accepted practice?

- ***No departure;***
- ***Mild departure;***
- ***Moderate departure; or***
- ***Severe departure.***

- 4.37 There was no departure from the standard of care or accepted practice in the use of a baclofen pump or a ventriculoperitoneal shunt.

How would the care provided be viewed by your peers? Please reference the views of any peers who were consulted.

- 4.38 My peers would agree that the use of a baclofen pump and a ventriculoperitoneal shunt in this case were part of accepted practice and do not represent a departure from the standard of care.

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Please outline any factors that may limit your assessment of the events.

4.39 Not applicable.

Recommendations for improvement that may help to prevent a similar occurrence in future.

4.40 Not applicable.

Any additional comments

4.41 As outlined in my letter above, there are outpatient records that do not appear to have been included in the information provided. I doubt these would substantially change my opinion as they have been referred to by [Dr B] in his response. However, it would be useful going forward to have the outpatient letters consolidated into a file. Furthermore, as [Dr E] has seen Mr [A] and undertaken further surgery, it would be useful for the HDC to incorporate a copy of those records also as they include key findings relevant to this case.

4.42 Surgery for spinal dysraphism is becoming less common. The majority of such cases are undertaken in the paediatric population and as such are usually undertaken in centres where paediatric neurosurgery is undertaken. Of course, there will be centres where there are neurosurgeons who have the knowledge and experience to deal with this condition. However, as the number of cases reduces, consideration should be given to consolidating these cases into the hands of fewer neurosurgeons in New Zealand.

5. References

5.1 Kothbauer KF, Novak K. Intraoperative monitoring for tethered cord surgery: an update. *Neurosurg Focus* 2004; 16(2): E8. doi: 10.3171/foc.2004.16.2.1



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Appendix 1. File Review

A1.1 I have reviewed the following documentation that you included in relation to this claim:

- C22DHC01751 – Letter of complaint – PDF of six pages
- C22DHC01751 – Health New Zealand | Te Whatu Ora Waikato S14 Response – PDF of five pages
- C22DHC01751 – Clinical records (Waikato DHB) – PDF of 1071 pages
- C22DHC01751 – Health New Zealand | Te Whatu Ora Waikato Informed Consent Policy – PDF of 30 pages

A1.2 I have also reviewed the following records:

- My external clinical advice report of 21 June 2017 to ACC with regard to spinal cord injury at L5.
- My previous clinical letter of 8 October 2021 when I reviewed Mr [A] for a second opinion. I referred Mr [A] to [Dr E] at that time.

The operation note of [Dr E] of 30 March 2023.'

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