Northland District Health Board
Orthopaedic Surgeon, Dr A

A Report by the
Deputy Health and Disability Commissioner

(Case 19HDC01077)

Health and Disability Commissioner
Te Toihau Hauora, Hauātanga

Contents

Executive summary

1. This report concerns the care provided to a toddler following surgery for DDH.[1] The report highlights the importance of clinicians interpreting X-rays correctly, reading radiologists' reports, and investigating concerning clinical features. It also highlights the importance of DHBs implementing systems that support clinicians to undertake appropriate CT scans and read radiologists' reports.

2. When the toddler was six months old, his general practitioner (GP) noted a possible discrepancy in the length of his legs. She examined his hips and was reassured that there was no discrepancy, but she did not make a follow-up plan to monitor the toddler.

3. Eighteen months later, the toddler started to walk with a limp and he was diagnosed with DDH. An orthopaedic surgeon subsequently performed corrective surgery and a cast was applied. Following surgery, the toddler attended the orthopaedic surgeon on multiple occasions to check his progress and change his cast. The surgeon checked the toddler's hip with an X-ray at each change of cast, but did not recognise that the toddler's hip had re-dislocated. The radiologists who reviewed the X-rays noted that there were changes to the toddler's hip and reported that orthopaedic review was required. The re-dislocation of the toddler's hip was not identified by the orthopaedic surgeon for several months.

Findings

4. The Deputy Health and Disability Commissioner, Kevin Allan, found that the orthopaedic surgeon breached Right 4(1) of the Code because he failed to perform a CT scan after surgery, failed to interpret several X-rays correctly, failed to review several radiologists' reports that identified a dislocated hip, and failed to place sufficient weight on parental concerns and clinical features of hip stiffness. The Deputy Commissioner stated that these factors should have prompted the surgeon to investigate the toddler's hip further.

5. The Deputy Commissioner found that the district health board breached Right 4(1) of the Code because there was no policy requiring a CT scan following surgery for DDH, and no reliable system to check that an orthopaedic surgeon had read and approved a radiologist's report.

6. The Deputy Commissioner was critical that the GP did not develop a robust follow-up plan to monitor the toddler.

Recommendations

7. The Deputy Commissioner was satisfied that the orthopaedic surgeon has taken appropriate steps to improve his practice.

8. The Deputy Commissioner noted the actions undertaken by the district health board as a result of this case. He recommended that the DHB undertake an audit of DDH surgery

[1] Developmental dysplasia of the hip — see para 15 below for description.

undertaken on children over the last 12 months, to ensure that all children have had a CT scan and have been seen in a consultant clinic until stability is confirmed.

9. The Deputy Commissioner noted that in response to his provisional opinion, the orthopaedic surgeon and the district health board provided a written apology to the toddler's family and that the family accepted the GP's expression of regret, as detailed in the report.

Complaint and investigation

10. The Health and Disability Commissioner (HDC) received a complaint from Ms B about the care provided to her son, Master B, at a public hospital. The following issues were identified for investigation:

- *Whether Dr A provided Master B with an appropriate standard of care from October 2017 to December 2018.*
- *Whether Northland DHB provided Master B with an appropriate standard of care from October 2017 to December 2018.*

11. This report is the opinion of Deputy Commissioner Kevin Allan, and is made in accordance with the power delegated to him by the Commissioner.

12. The parties directly involved in the investigation were:

Dr A	Orthopaedic surgeon
Ms B	Complainant/consumer's mother
Northland District Health Board (NDHB)	Provider

13. Further information was received from:

Dr C	General practitioner (GP)
DHB2	Provider
Dr D	Orthopaedic surgeon

14. Independent expert advice was obtained from an orthopaedic surgeon, Dr Denis Atkinson (Appendix A), and in-house clinical advice was obtained from GP Dr David Maplesden (Appendix B).

Information gathered during investigation

Introduction

15. This report relates to the diagnosis and treatment of Master B for developmental dysplasia of the hip (DDH). DDH is a condition in which the "ball and socket" joint of the hip does not form properly, and the ball at the top of the thighbone[2] is not stable within the socket.[3] DDH may develop around the time of birth or during a baby's first year of life.

16. Ms B told HDC that when Master B was aged six weeks he was examined by a Plunket nurse, who noted that the creases on Master B's legs did not align, and that there was a possible leg length discrepancy. The Plunket nurse recommended a review by a GP.

GP review

17. On 24 March 2016, Master B was seen by GP Dr C. Dr C conducted a "clicky hip check" to check for DDH, and was reassured by the results. Dr C measured Master B's legs but was unable to extend his legs fully. She documented that his left leg was 24cm long and his right leg was 22.5cm long. She noted that this was not consistent with the Plunket nurse's findings, in which the right leg looked longer than the left.

18. Dr C documented: "Hips NAD [no abnormality detected]. [L]ikely no true leg length discrepancy — to be monitored." However, no monitoring plan was documented.

19. Ms B stated that Dr C sent them home without suggesting or discussing options for further investigation.

20. Dr C told HDC that in 2016 she was in the beginning stages of her GP career, and that her follow-up plan was not adequate. She said that the findings were not highly suspicious of DDH, and the best follow-up plan would have been to arrange a repeat examination at three months of age.

21. Dr C stated:

> "Now with more experience behind me, I can say that I would have managed this situation quite differently. I do make a point to have very clear follow-up plans now and do arrange follow-up examinations at [three] months if there are soft signs of DDH. Of course, if there are features highly suspicious of DDH or any risk factors identified at the [six] week check I will arrange imaging in accordance with the … Regional Health Pathways … I greatly regret this lapse in judgement at the time by not making an adequate follow up plan and I do feel terrible for [Master B] and his family knowing that I potentially could have made this diagnosis earlier for him if he had been rechecked at three months."

[2] The femoral head.
[3] The acetabulum.

Dislocated hip diagnosed

22. Ms B stated that about 18 months later Master B began walking with a limp. She said that by that stage the family had moved to another town, and a different GP referred them to an orthopaedic surgeon at NDHB.

23. On 30 October 2017, Master B was seen by orthopaedic surgeon Dr A. Master B's right hip was normal, but he was diagnosed with a dislocated left hip. The reporting letter to Master B's GP practice stated: "We have had a lengthy discussion with [Master B's] parents and they understand that he will need surgical intervention."

24. Dr A saw Master B again on 14 November 2017 and discussed the surgery with the family.

25. Dr A told HDC that when he discusses such cases, he makes it clear that all hips with DDH are different, and there is a large variation in both the severity of the pathology and the required treatment. He said that some hips are inherently stable and require only one procedure, whereas others can be very unstable and require many procedures. He stated that he talks about the failure to relocate the hip and late dislocation of the hip, as well as the variable time required in a cast or brace.

26. Dr A said that he cannot recall the exact conversations he had with Master B's parents, but he does recall that they asked questions and spent a lot of time discussing all aspects of Master B's management and surgery. Dr A stated: "Late dislocation would almost certainly have been discussed."

27. Dr A recorded in his clinic note:

> "We have had a lengthy discussion with [Master B's] parents and that they understand that he will need surgical intervention beginning with [examination under anaesthesia] +/- further open procedures …"

Surgery

28. On 27 November 2017, Dr A performed surgery to re-position the hip bones.[4] A cast[5] was applied from Master B's waist to his ankles.

29. A CT scan[6] was not undertaken after the surgery.

30. Dr A told HDC that he mistakenly believed that he had viewed a CT scan of Master B's hip immediately following the surgery. Dr A stated:

> "It is my usual practice to obtain a post-operative CT scan. Due to similar cases being treated at the same time, I believed I had seen [Master B's] CT scan and it was well reduced. This incorrect belief combined with the visual reduction of the hip at the time

[4] An "open reduction".
[5] A hip spica — a type of cast that goes from the waist to the ankles, with a gap around the groin area for toileting. It is used to hold hips in position following surgery for DDH.
[6] A three-dimensional X-ray.

of surgery gave me a strong diagnostic bias that the hip was reduced. Follow-up X-rays were interpreted by me as 'unchanged' and therefore acceptable."

Postoperative care

31. Following the surgery, Master B attended Dr A on multiple occasions to check his progress and to change his cast as required. The details of the postoperative clinics are outlined below.

32. Dr A said that he checked Master B's hip with an X-ray[7] at each change of cast, and was satisfied that "the head had been in joint and remodelling well". As outlined above, Dr A stated that this conclusion was based on a CT scan that he thought he had seen but in fact did not exist.

33. In addition to Dr A's review of the X-rays, a radiologist also reviewed many of the X-rays and wrote a report on these. NDHB told HDC that the radiologist is not expected to report X-rays on the day they are performed, and the clinician does not expect to see a radiologist's report on the day on which an X-ray is performed — the X-ray can be reported weeks later. At the time of these events, no system was in place that allowed or required a report to be acknowledged and signed off by the requesting clinician. NDHB told HDC that a "radiology alerts" system was in place, but it is unsure whether Dr A was alerted to Master B's X-ray reports.

34. Dr A said that Master B's X-ray reports were not communicated to him. Dr A stated: "No I never saw these reports. No, I was not required to sign them off. No, obviously there was no action taken [on the reports]. These reports were not communicated to me."

Chronology of postoperative clinics

35. On 13 December 2017, and again on 22 January 2018, Master B's cast was changed and an X-ray was taken.[8]

36. Master B had a further X-ray taken on 14 February 2018 and was then seen by Dr A in clinic. Dr A documented that he patched the cast, and noted: "The X-ray looks good today with no problems or concerns, and we went over the intra-operative films today."

37. On 22 February 2018, a radiologist reported on the X-ray taken on 14 February 2018. The report stated: "[Ball] is projected below the level of the [socket]. For orthopaedic review."

38. The radiologist's report was not available to Dr A at the clinic and, as a result, no orthopaedic review was undertaken.

39. On 14 March 2018, Dr A removed Master B's cast and fitted a Rhino brace.[9] Dr A documented: "[Master B's] hips will be stiff and too much examination will be difficult for

[7] An arthrogram — an X-ray image of the inside of the joint after a contrast medium (a "dye") is injected into the joint.
[8] There were no reports for these X-rays.
[9] A removable brace used to position the hips correctly.

him today." No X-ray was taken, but Dr A documented that an X-ray was to be taken in four weeks' time.

40. Master B was seen again by Dr A on 11 April 2018, and X-rays were taken.

41. Dr A documented:

> "We attempted to get X-rays but he is still quite irritable when attempting to straighten his hips as his hips are stiff.
>
> Mum says when he is in the bath and is a bit more relaxed he does move his hips a bit more freely but he is certainly not choosing to put his hips into full extension at this stage.
>
> X-ray is out of alignment today and we couldn't get anything better. I cannot confirm that it is in perfect position but there are no red flags at this stage to suggest anything untoward but obviously I would like to see some better X-rays in the future when he is a bit more mobile and happy for us to facilitate things."

42. The radiologist's report stated: "Follow-up for hip dysplasia, fixation and orthopaedic review. Severe changes of hip dysplasia are again noted on the left."

43. This report was not dated, and Dr A said that he did not see it.

44. Master B was next seen by Dr A on 29 May 2018, and an X-ray was taken. Dr A documented:

> "[Master B] has increased in his range of motion from when I saw him previously … The X-ray today with minimal extended position shows that head is pointing towards the triradiate cartilage[10] which is what we are after."

45. The radiologist's report[11] stated:

> "Post-surgical change involving the left femoral head, neck and shaft are identified are again noted. Orthopaedic follow-up.
>
> **Impression**
>
> Orthopaedic review."

46. This report was not dated, and Dr A said that he did not see it.

47. Ms B told HDC that during this time she raised concerns about Master B not standing on his left leg, and taking over four months to start to walk. Ms B was also concerned that Master B walked with a pronounced limp, that he was standing on his toes on his left side, and that he was twisting his pelvis and swaying from side to side. She said that Dr A assured them

[10] The growth centre for the acetabulum and pelvis; the junction where the ischium, ilium, and pubis meet.
[11] For an X-ray taken on 28 May 2018.

that all these things were normal, and that Master B's toe standing was caused by his hamstring shortening and a lack of flexibility in his hip following the operation.

48. Ms B stated:

> "During this time we experienced frustration and stress relating to the X-ray process where the X-ray clinicians had little knowledge about the condition and when we would present to [Dr A] he told us that he cannot tell us anything definitive as the X-rays were of poor quality."

Dislocation diagnosed

49. On 18 September 2018, 10 months after Master B's surgery, Master B was seen by an orthopaedic registrar, who noted that Master B was walking independently, but that his left ankle had limited motion[12] and he lurched towards the right. The orthopaedic registrar recorded that he had reviewed the images and discussed Master B's case with Dr A, who asked the orthopaedic registrar to recommend Master B for surgery to remove the metalware from his leg. Dr A's plan was for an examination under anaesthetic and an X-ray to assess Master B's hip.

50. The radiologist's report for the X-ray taken on 18 September stated: "Comparison is made with previous films from May 10. Evidence of hip dysplasia is present in the left."

51. Dr A saw Master B on 24 October 2018 and recommended an examination under anaesthetic to assess the ball and socket and to remove the plate from the left thigh bone.

DHB2

52. The examination under anaesthetic was undertaken on 12 November 2018. An X-ray was performed and the plate was removed. A dislocation of the hip was confirmed, and Master B was referred to a paediatric orthopaedic surgeon at another hospital (DHB2) for further management.

53. Master B underwent surgery on 4 February 2019 and remained in a cast for four months. Subsequently, he progressed well.

Ms B — further comment

54. Ms B stated that Dr A should slow down his consultations, listen to caregivers' concerns, learn not to provide empty reassurances that everything will be "okay" without clear evidence, and discuss further treatment options with parents if they raise concerns about their child's lack of progress or the monitoring process.

[12] Master B's ankle was in equinus — a condition in which the ankle joint lacks flexibility, and upward toes-to-shin movement of the foot is limited.

Dr A — further comment

55. Dr A said that Master B's surgery was uncomplicated but that he made a technical error. He stated:

> "The technical over-retroversion[13] of the femoral osteotomy[14] can occur. I do not believe this is due to negligence or incompetence on the part of the surgeon. However, this would have been obvious and correctable if a 3D image was performed post operation — as stated this 3D imaging was not performed — therefore this technical error was not appreciated and not corrected."

56. Dr A said that at some point after the surgery Master B's hip dislocated, and this was not recognised until September the following year. Dr A stated that the nature of DDH is such that a late dislocation can occur, but that "[t]his failure to diagnose the complication meant a significant delay in corrective treatment".

57. Dr A told HDC that his management plan and investigations were not adequate, and the correct management would have been to undertake three-dimensional imaging (either CT or MRI scans) in April 2018.

58. Dr A stated that Master B would always have required further treatment. However, Dr A acknowledged that the delay in treatment was a result of his failure to investigate adequately, and that he reassured Master B's mother incorrectly when she expressed concerns at the time.

59. Dr A stated:

> "I would like to express my sincere apologies to [Master B] and his family. Not only for failing to make the diagnosis in a timely manner, but also for the way I interacted with [Master B's] parents. I was deeply upset with the result of young [Master B's] care and I will carry that with me. I hope that despite his protracted treatment, [Master B] still has a good outcome for his future."

Opinion — Dr D

60. NDHB arranged for orthopaedic surgeon Dr D to undertake an independent assessment of the care provided to Master B.

61. In his report,[15] Dr D stated that the X-ray taken on 22 January 2018 appeared to show that Master B's hip was dislocated. Dr D said that the X-rays taken on 14 February 2018 and 11 April 2018 more clearly show that Master B's hip was dislocated.

[13] Backward rotation of the hip.
[14] A surgical procedure that includes cutting and realigning the femur.
[15] Dated 26 July 2019.

62. Dr D stated:

> "No CT scan or MRI scan[16] was performed while [Master B] was in [a brace]. This is the routine practice of most surgeons carrying out hip reduction surgery and is the most reliable way of checking that the hip is in the joint. Performing a CT scan or MRI scan during the period of time when [Master B] was in a [brace] would have been able to confirm that the hip was either enlocated or dislocated."

63. Dr D noted that there was a technical error[17] in the original surgery that may have contributed to the dislocation of the hip.

Responses to provisional opinion

Ms B

64. Ms B was given an opportunity to comment on the "information gathered" section of the provisional opinion. Ms B reiterated that Dr A minimised the family's concerns about Master B's lack of progress after the surgery and the extent to which full recovery would be possible. She also stated:

> "It was only once I talked to [Master B's] GP and asked her to speak directly to [Dr A] that our concerns appear to have been taken seriously."

Dr A

65. Dr A was given an opportunity to comment on the provisional opinion, as it related to him. He advised HDC that he accepts the provisional opinion and recommendations.

NDHB

66. NDHB was given an opportunity to comment on the provisional opinion, as it relates to NDHB. NDHB advised HDC that it accepts the provisional opinion and recommendations.

Dr C

67. Dr C was given an opportunity to comment on the provisional opinion, as it relates to her. She advised HDC that she does not wish to make any further comment, and that she accepts the recommendations.

[16] Magnetic resonance imaging (MRI) is a medical imaging technique used in radiology to form pictures of the anatomy and the physiological processes of the body.
[17] As outlined above.

Opinion: Dr A — breach

68. On 30 October 2017, Dr A diagnosed Master B with DDH, and on 27 November 2017 Dr A performed corrective surgery.

Surgery

69. Dr A acknowledged that he made an error in the initial surgery, which resulted in an over-retroversion of the hip. Dr A was not aware of the error at the time.

70. Expert advice was obtained from Dr Denis Atkinson, an orthopaedic surgeon. Dr Atkinson advised that Dr A's diagnosis and preoperative plan were appropriate, but that excessive retroversion of Master B's hip occurred at the time of the surgery, and this likely contributed to Master B's hip instability.

71. Dr Atkinson said that although undesirable, the technical error did not constitute a departure from the accepted standard of care. I accept this advice.

X-ray review

72. The X-ray undertaken on 14 February 2018 was interpreted by Dr A as showing no concerns. Subsequent X-rays were also interpreted as showing no concerns.

73. Dr Atkinson reviewed the images and advised that the X-ray taken on 14 February 2018 confirmed that the left hip was dislocated. He also stated that the X-rays taken on 11 April 2018, 26 May 2018, and 18 September 2018 also confirmed a dislocation. Dr Atkinson advised that the failure to recognise the hip dislocation in the X-rays was a departure from the accepted standard of care.

74. I agree. Dr A interpreted the X-rays taken on 14 February, 11 April, and 26 May 2018 incorrectly, and he failed to recognise the dislocation of the left hip.

X-ray reports

75. Radiologists provided reports on the X-rays outlined above. All reports noted that the ball and socket were not aligned and recommended orthopaedic review.

76. Dr A said that he did not see any of the radiologists' reports.

77. I note that the system in place at the time of these events did not require the clinician to acknowledge or sign off radiologists' reports. However, it is the responsibility of the clinician who ordered the X-rays to follow up and read the X-ray reports, including any recommendations in the report. This ensures that patients receive well-coordinated and timely care. I am concerned that Dr A did not follow up on any of the radiologists' reports and investigate whether Master B's hip was dislocated.

Clinical findings

78. At the clinic on 11 April 2018, Dr A noted that Master B's hips were stiff, and on 29 May Dr A noted that the degree of flexion was not as good on Master B's left-hand side as it was on his right.

79. Dr Atkinson advised that hip stiffness, along with other clinical features, is a sign of a possible late dislocation of the hip joint. He said that hip stiffness, together with the X-rays, meant that early paediatric review and 3D (CT or MRI) imaging was required. He stated that Dr A's failure to do so was a departure from the accepted standard of care.

80. While it would not be unusual for a hip to be stiff following hip surgery, I accept my expert's advice and find that these clinical features warranted further investigation by Dr A.

Family concerns

81. I note that Ms B raised her concerns about Master B's progress with Dr A, and was reassured by Dr A that it was normal. She expressed frustration that she was not listened to, and I note that Dr A has accepted these concerns.

82. In my view, it is important for clinicians to listen to the information provided by parents, and to recognise that often parents are familiar with their child's symptoms and aware of changes in their child's condition.

Conclusion

83. The surgery performed by Dr A to correct DDH did not constitute a departure from the accepted standard of care. However, following the surgery, Master B's hip dislocated. There were numerous opportunities for Dr A to recognise this, but he failed to do so. In particular, Dr A:

- Failed to perform a CT scan to identify whether the hip was enlocated correctly;
- Interpreted several X-rays incorrectly;
- Failed to review several radiologists' reports that identified a dislocated hip and recommended orthopaedic review; and
- Placed insufficient weight on parental concerns and clinical features of hip stiffness.

84. These factors should have prompted Dr A to investigate Master B's hip further. Instead, there was a delay of several months in diagnosis of the dislocation and commencement of treatment. Accordingly, I consider that Dr A failed to provide services to Master B with reasonable care and skill, and breached Right 4(1) of the Code of Health and Disability Services Consumers' Rights (the Code).[18]

85. I welcome the actions Dr A has taken to improve his practice in light of the experiences of Master B and his family.

[18] Right 4(1) states: "Every consumer has the right to have services provided with reasonable care and skill."

Opinion: NDHB — breach

86. As a healthcare provider, NDHB is responsible for providing services in accordance with the Code. Master B had a right to have services provided to him with reasonable care and skill.

CT scan

87. A CT scan was not performed immediately postoperatively or at any other point after the surgery.

88. Dr Atkinson advised that a failure to perform a CT scan postoperatively was a departure from the accepted standard of care. He stated: "[Master B's] delay in diagnosis could have been avoided had 3D imaging been performed at the time of the initial concern."

89. It appears that at the time of these events there was no policy at NDHB regarding appropriate timing for CT scans or any other 3D imaging. NDHB has since addressed this issue by introducing a new protocol that all children who undergo surgery for DDH will have a CT scan immediately postoperatively,[19] and a second scan between two to four weeks later.

90. Dr Atkinson advised: "This protocol change meets the current standard and would ensure that further delay in diagnosis is avoided."

91. A CT scan is the most reliable method of establishing whether a dislocation of the hip has occurred. I am concerned that there was no protocol requiring a CT scan immediately postoperatively or at any later stage. I accept my expert's advice that the new protocol is appropriate.

Radiologist reports

92. Master B's X-ray reports were not seen by Dr A. At the time of these events, NDHB had no system in place for checking that a clinician had reviewed and signed off a radiologist's reports.

93. Dr Atkinson advised:

> "There was a systems failure in the [Northland] DHB that did not ensure [Dr A] was made aware of the radiologists report [dated 22 February 2018]."

94. The radiologists' reports clearly identified a hip dislocation, but there was no reliable system in place at NDHB to ensure that Dr A saw the reports.

95. I note that NDHB now has a protocol that all X-ray reports must be accepted and signed off personally by the consultant.

96. At the time of events, the systems at NDHB did not support the early diagnosis of a hip dislocation, and there was no policy in place requiring a CT scan following surgery for DDH. Dr D advised that CT scans are a reliable method of identifying hip dislocation, and Dr A

[19] Within 24 hours.

stated that his usual practice is to perform a CT scan following surgery for DDH. In addition, there was no reliable system to check that an orthopaedic surgeon had read and signed off a radiologist's report. As a result, I find that NDHB failed to provide Master B with services with reasonable care and skill, and breached Right 4(1) of the Code.

Opinion: Dr C — adverse comment

97. DDH is a known condition that can affect babies and young children. When Master B was six weeks old, a Plunket nurse noticed that his left leg was shorter than his right leg, and recommended a review by a GP. The GP noted that Master B's right leg appeared to be shorter than his left leg, but after she examined his hips she was reassured that there was no discrepancy. No follow-up plan was made for Master B, and it was not until he was 18 months old, and had started to walk with a limp, that he was referred to an orthopaedic surgeon at NDHB.

98. My expert clinical advisor, Dr Maplesden, stated that there are limitations to the screening procedures for DDH, and that the early diagnosis of DDH can be difficult. In relation to Dr C's failure to document a follow-up plan, Dr Maplesden advised:

> "I do not feel an unstructured or unspecified monitoring plan was clinically appropriate and I am mildly to moderately critical that this approach appears to have been taken."

99. I accept Dr Maplesden's advice. Given that the early diagnosis of DDH can be difficult, and that Master B showed some signs of DDH, I am concerned that Dr C did not develop a robust follow-up plan to monitor Master B. I note that Dr C acknowledges that her follow-up plan was not adequate, and that she now arranges for follow-up examinations at three months of age for children with signs of DDH.

Changes made since these events

NDHB

100. NDHB stated that Master B's case was discussed in the Orthopaedic Department Mortality and Morbidity meeting. As a result, all children who have undergone surgery[20] for DDH will now have a CT scan immediately after the surgery, and another scan between two and four weeks later. The CT scan will be performed even if the X-ray and inter-operative findings are satisfactory. Patients will continue to be seen in a consultant clinic until stability is confirmed.[21]

[20] Closed or open hip reduction surgery.
[21] Typically, stability is confirmed at one year following surgery.

101. NDHB now has a system in place where all X-ray reports must be "accepted" and "signed off" by the consultant. This ensures that any X-ray, even if reported on eight days later, is seen and signed off by the consultant personally.

Dr A

102. Dr A stated that he has made the following changes:

- All patients who undergo a closed or open reduction now receive a CT scan prior to leaving hospital, which he interprets himself.
- All patients receive a CT scan at the two- to three-week follow-up appointment.
- All X-ray reports from any source are signed off by him personally.
- Busy mixed clinics are now split into separate clinics, allowing more time to be spent with complex follow-up/postoperative patients as required.

103. Dr A also stated that he will undertake a sabbatical to work with, and operate with, other paediatric specialists. He said that Dr D will attend some of his paediatric clinics to advise on factors that could be improved.

104. Dr Atkinson advised that Dr A has demonstrated insight into the cause of the delayed diagnosis and has helped to institute policies to minimise the risk of this situation occurring in the future.

Recommendations

105. In my provisional opinion I recommended that NDHB and Dr A provide formal written apologies to Master B's family for the deficiencies identified in the report. They have both done so.

106. In my provisional opinion I recommended that Dr C provide a formal written apology to Master B's family for the deficiencies identified in the report. I note that Master B's family acknowledge and appreciate Dr C's expression of regret, as noted earlier in this report.

107. Noting the actions NDHB has undertaken as a result of this complaint, I recommend that NDHB undertake an audit of DDH surgery undertaken on children over the last 12 months, to ensure that all children have had a CT scan and have been seen in a consultant clinic until stability is confirmed. NDHB should report back to HDC on the outcome of the audit, including any actions planned as a result of findings from the audit, within six months of the date of this report.

108. I am satisfied that Dr A has taken appropriate steps to improve his practice in light of the experiences of Master B and his family.

Follow-up actions

109. A copy of this report with details identifying the parties removed, except NDHB and the experts who advised on this case, will be sent to the Medical Council of New Zealand and the Royal Australasian College of Surgeons, and they will be advised of Dr A's name.

110. A copy of this report with details identifying the parties removed, except NDHB and the expert who advised on this case, will be sent to the Health Quality & Safety Commission and the New Zealand Orthopaedic Association, and placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.

Appendix A: Independent clinical advice to the Commissioner

The following expert advice was obtained from orthopaedic surgeon Dr Denis Atkinson:

"**Documents provided**

1. Letter of complaint dated 13 June 2019
2. Northland DHB Orthopaedic department's response received 5 August 2019
3. [Dr A's] response received 5 August 2019
4. Clinical records from Northland DHB covering the period 30 October 2017 to 12 November 2018
5. Disc containing X-rays dated 14 February 2018, 11 April 2018, 29 May 2018 and 18 September 2018
6. Disc containing arthrograms dated 30 October 2017 through 12 November 2018
7. Imaging reports dated 30 October 2017 through 12 November 2018

HISTORY:

1.0 [Master B] was first reviewed by [Dr A] at [the public hospital] 30.10.2017. [Master B] was a twenty month old boy who presented with signs and symptoms of developmental dysplasia of the left hip. Radiographs confirmed dislocation of the left hip. [Dr A] recommended early surgical intervention. He proposed examination under anaesthesia with open reduction, adductor release, and possible proximal femoral osteotomy. Post-operative hip spica mobilisation.

1.1 Surgery was performed at [the public hospital] 27.11.2017. The operative record confirms a left hip reconstruction with adductor longus release, EUA arthrogram, anterior open relocation of the hip, a derotation varus osteotomy and hip spica application. The operative confirms no intra-operative complication. By open reduction, [Dr A] achieved a concentric reduction of the hip joint. He recorded it required 65° of internal rotation to keep the femoral head in a safe position. He elected to proceed with a proximal femoral osteotomy.

1.2 Post operatively a hip spica was applied. [Dr A] recorded the hip position was satisfactory when confirmed by image intensifier.

1.3 [Master B] was readmitted for an elective left hip arthrogram and change of spica 22.1.2018. [Dr A] records the arthrogram confirmed a stable hip with good rounding of the femoral head and early development of the acetabulum. He noted no dye pooling medially. Hips were noted to be stiff.

1.4 There was further clinical review 14.2.2018. The hip spica was repaired. [Dr A] noted an X-ray of the hip showed no problems or concerns.

1.5 The consultant Radiologist's report of the X-ray performed 14.2.2018 noted the frog lateral view confirmed the left femoral head to be projected below the level of the acetabulum. The Radiologist recommended Orthopaedic review.

1.6 Clinical review 14.3.2018, the hip spica was removed. [Dr A] reported both hips were stiff and difficult to examine. [Master B] was placed in an abduction brace with planned review in four weeks.

1.7 Clinical review 29.5.2018 noted some improvement in range of movement in the hip though fixed flexion was noted. [Dr A] reported the X-ray showed the femoral head was pointing to the triradiate cartilage.

1.8 The ten month post-operative review was performed 18.9.2018 by an Orthopaedic Registrar. The Registrar noted [Master B] was walking with a limp, shortening of the left femur was noted, fixed flexion was noted. The Registrar noted the femoral neck was pointed to triradiate cartilage but noted the X-ray was difficult to interpret as the patient was rotated.

1.9 The Radiologist's report of the radiograph performed 18.9.2018 notes there was lateral displacement of the capital femoral epiphysis relative to the acetabulum. The femoral epiphysis appeared inferiorly displaced on the frog leg views, the position unchanged compared to the films of April.

1.10 The Orthopaedic Registrar records he discussed [Master B's] clinical and X-ray findings with [Dr A] on the afternoon of 18.9.2018. [Dr A] instructed him to arrange for [Master B's] admission for removal of metalware. An examination under anaesthesia and arthrogram would be necessary at that time to confirm congruency of the reduction. [Dr A] requested to see the family in one month's time.

1.11 At clinical review of 24.10.2018 [Dr A] records his concern regards the limited movement of the left hip and the X-ray appearances. He was concerned that the femoral head was subluxing which was leading to delay and development of the acetabulum. He notes a revision procedure was necessary however he planned to remove the metalware from the left femur and further assess the stability of the left hip under anaesthesia with the addition of an arthrogram.

1.12 There was elective admission 12.11.2018 for examination under anaesthesia, arthrogram and removal of metalware to the left hip. Examination under anaesthesia confirmed instability with some luxation of the joint detectable. The arthrogram confirmed acentric joint reduction. The plate and screws to the proximal femur were removed.

1.13 Following this procedure it was recorded that [Master B] was referred to the care of [a] Paediatric Orthopaedic surgeon at [DHB2]. CT scanning confirmed dislocation of the hip. Further revision and reconstructive surgery has been performed.

ARTHOGRAM AND X-RAYS:

2.0 I have reviewed the PACS images provided.

The X-ray 30.10.2107 confirms developmental dysplasia of the left hip, the left hip is dislocated.

2.1 The intra-operative image intensifier film 27.11.2017 confirms fixation to the proximal femur to be well positioned. The AP image appears to confirm the hip is reduced. The quality of the lateral view precludes comment regards positioning of the femoral head.

2.2 Arthrogram 13.12.2017 suggests congruent reduction of the AP view however in the lateral view the femoral head appears to project inferior to the floor of the acetabulum.

2.3 The arthrogram 22.1.2018, the images are of poor quality. I am unable to make a comment regards of the femoral head in relation to the acetabulum.

2.4 The X-ray 14.2.2018 shows the femoral head to lie in a dislocated position relative to the acetabular floor. The femoral head lies in an inferior position on the single X-ray.

2.5 Multiple X-ray views of 11.4.2018 confirm the left femoral head to be dislocated inferiorly and probably posteriorly in relation to the acetabular floor.

2.6 Single X-ray 26.5.2018 confirms the femoral epiphysis lies lateral to the acetabular floor.

2.7 X-rays of 18.9.2018 confirm in the supine view that the femoral head lies lateral to the acetabulum. In the lateral view the femoral head appears dislocated inferiorly.

OPINION:

3.0 I consider the surgery conducted by [Dr A] on 27.11.2017 was appropriate and met an acceptable standard of care. His diagnosis and pre-operative plan was appropriate. His records of the procedure are well documented. The surgical steps conducted to achieve concentric reduction of the hip are an acceptable standard of care. His decision to perform a derotation osteotomy was appropriate. He records he positioned the hips in a safe position in the hip spica and performed an intra-operative check X-ray by image intensification.

3.1 It is unclear from the documentation provided as to whether [Dr A] warned the parents of the possibility of late or post-operative dislocation following the proposed operative procedure. It would be standard practice to warn the parents of this possibility.

3.2 No record of the plaster change in EUA and arthrogram of 13.12.2017 are provided in the documents.

3.3 Later [Dr A] records examination under anaesthesia confirmed a congruent reduction. The supine view of the arthrogram confirms this although the lateral view is suggestive the femoral head lies inferior. [Dr A] further confirmed examination under anaesthesia confirmed the congruent reduction of the hip 22.1.2018. The imaging of the hip at the time is difficult to interpret.

3.4 The X-ray of the left hip performed 14.2.2018 confirms the left hip to be dislocated inferiorly. This finding was confirmed and reported to the consultation Radiologist. No action was taken on this finding.

3.5 The failure to act on the report of the Radiologist and the failure to recognise dislocation of the left hip is a moderate departure from the standard of care.

3.6 At that stage it would have been appropriate for [Dr A] to have reviewed the Radiographs in consultation with a Radiologist or a Paediatric Orthopaedic colleague. Any doubt regards the status of the reduction of the hip would necessitate three dimensional imaging.

3.7 The clinical features of persistent hip stiffness, deteriorating gait and leg length discrepancy are features of possible late subluxation or dislocation of the hip joint. Radiographs performed between May and September of 2018; at times of poor quality demonstrate a nonconcentric reduction of the hip joint. These clinical and X-ray features necessitated early review with further three dimensional imaging and if in doubt, a referral to a tertiary Paediatric hip surgeon. [Dr A's] failure to follow this course is a moderate departure from an accepted standard of care.

3.8 [Dr A] recognised there was some instability of the left hip following the Registrar review of 18.9.2018. Further confirm this on review of 24.10.2018. It is recorded he discussed his concerns with [Master B's] family.

3.9 It was appropriate for him to proceed to further examination under anaesthesia, arthrography and removal of internal fixation.

3.10 Following the EUA [Dr A] appropriately referred [Master B] for further review by Paediatric Orthopaedic hip surgeons.

3.11 [Master B's] delay in diagnosis could have been avoided had 3-D imaging been performed at the time of the initial concern regards nonconcentric reduction of the hip on 14.2.2018.

3.12 The Northland District Health Board Orthopaedic Department have now recommended all children with closed or open reduction for DDH will have a 'CT scan immediately post op' within twenty four hours and also have a secondary repeat scan between two to four weeks. 'This will occur even if the arthrogram and intra-operative findings are satisfactory'.

3.13 This protocol change meets the current standard and would ensure that further delay in diagnosis is avoided.

3.14 On reflection [Dr A] concedes he failed in diagnosing [Master B's] post-operative dislocation of the hip. He concedes imaging was not adequate. He agrees that three dimensional imaging in the post-operative period would have avoided [Master B's] complications.

3.15 It is recorded that [Dr A] will undergo a sabbatical attachment to a paediatric unit in 2020. I would endorse this proposal."

The following further advice was obtained from Dr Atkinson:

"**Advice Request:**

Comment on [Dr D's] opinion and [Dr A's] response and whether it causes you to amend your advice in any respect. Comment on any other matter you consider to be relevant.

Documents Reviewed:

Report [Dr D]. 26 July 2019
Report [Dr A]. 19 June 2020

[Dr D's] report

[Dr D] records the operation note clearly outlines the surgery performed 27.11.2017. He notes xrays of the osteotomy taken at the time of surgery look good.

[Dr D's] notes on the views of the arthrogram 22.1.18 suggest the hip to be dislocated posterior and inferior.

[Dr D] considered the hip to be dislocated on views performed 14.2.18, 11.4.18, 18.9.18.

Hip dislocation was not diagnosed until 12.11.18 when an arthrogram and metal ware was removed. [Dr D] considered poor imaging contributed to this occurring.

[Dr D] noted no CT or MRI scan was performed whilst patient was in a hip spica. He considered such scans were routine practice for surgeons performing hip reduction surgery.

[Dr D] records the CT scan at [the second hospital] and revision surgery confirmed excessive retroversion of the osteotomy had been performed at surgery 27.11.17. He comments it can be difficult to exactly work out the angle of correction intra-operatively and the correction can be variable.

[Dr D] records post revision imaging confirms a reduced hip with no complication.

[Dr D] states that [Dr A] has extensive training in paediatric orthopaedic surgery. He considered that treatment of a toddler with a dislocated hip is completely within [Dr A's] realm of practice.

[Dr D] concludes the hip dislocated in a hip spica on or before 14.2.18. The dislocation was not diagnosed until 12.11.18. He considered there was contribution to the dislocation from an intra-operative technical error. There was oversight of the redislocation in the absence of CT or MRI imaging.

[Dr D] recommended that [Dr A] address technical issues of performing hip surgery. He proposes [Dr A] [undertake a sabbatical to work with, and operate with, other paediatric specialists] and receive visits from surgical colleagues to review surgical skills. He also proposed a review of outpatient clinic management again with reciprocal visits.

[Dr A's] response:

[Dr A] records at the time of surgery the hip was visualised to reduce to the acetabulum.

He notes that it is his normal practice to obtain a post operative CT scan. He believed in this case he had seen the CT and the hip was well reduced. He confirms CT was not performed noting that he interpreted the follow up Xrays as being acceptable.

[Dr A] confirms at some stage in the post operative management that there was late dislocation of the hip. This went unrecognised until September/October 2018.

[Dr A] acknowledges an acceptable standard of care should have included a post operative CT scan. The failure to perform this procedure allowed excessive retroversion of the osteotomy and late dislocation to be identified. This led to a significant delay in treatment.

[Dr A] records that Outpatient Xrays (including 14.2.18) were viewed and interpreted by the surgeon on the day. At the time no system was in place for subsequent radiologist reports to be reviewed. He did not see the report of 22.8.18.

[Dr A] states such an oversight is no longer possible. Radiologist reports require individual sign off.

[Dr A] confirms that in this case he preoperatively discussed with the parents the diagnosis, surgery course of treatment and complications. The risk of re-operation and late dislocation were discussed.

Opinion:

I consider [Dr A] did adequately inform the parents of the diagnosis, surgery, probable outcome and complications of the procedure.

The surgery conducted by [Dr A] on 27.11.17 was appropriate and met an acceptable standard of care.

Subsequent imaging and surgery has demonstrated excessive retroversion of the hip occurred at the time of osteotomy. As [Dr D] has stated this is a judgement call at the time of surgery and the correction can be variable. The surgical record confirms the hip was located with the leg in a safe zone post osteotomy. It is likely the retroversion contributed to the late instability. The technical error would have been evident on CT scanning in the early post operative period. Although undesirable the technical error does not constitute a departure from an accepted standard of care.

The failure to perform a CT scan postoperatively, the failure to recognise the hip dislocation on Xrays on 14.2.18 and subsequently is a moderate departure from an accepted standard of care. The failure to perform adequate post operative imaging resulted in oversight and delay in diagnosis of the re-dislocation of the hip.

There was a systems failure in the NDHB that did not ensure [Dr A] was made aware of the radiologist's report 22.2.18.

[Dr A's] proposed changes to practice outlined in the response to the Commissioner well address the issues raised in [Dr D's] report.

I wish to commend [Dr A's] honesty, empathy and reflection in dealing with this difficult situation. He clearly appreciates the hurt and anxiety the delay in treatment has caused the patient and his family. He has demonstrated insight into the cause of the delayed diagnosis. He with the help of peers and colleagues have instituted policies and procedures which will minimise the risk of repeat of this complication in the future."

Appendix B: In-house clinical advice to the Commissioner

The following expert advice was obtained from GP Dr David Maplesden:

> "1. Thank you for the request that I provide clinical advice in relation to the complaint from [Ms B] about the care provided to her infant son, [Master B] ([DOB]), by [Dr C] of [the medical centre]. In preparing the advice on this case to the best of my knowledge I have no personal or professional conflict of interest. I agree to follow the Commissioner's Guidelines for Independent Advisors. I have reviewed the information on file: complaint from [Ms B]; response from [Dr C] with comment from Clinical Director [the medical centre], [medical centre] GP notes.
>
> 2. [Ms B] states that Plunket nurses examined her son, [Master B], at the age of six weeks and recommended GP review because *the creases on his legs did not align* and possible leg length discrepancy was suspected. [Master B] was seen by [Dr C] 24 March 2016 and *she did a 'clicky hip check' which she found negative and sent us home without suggesting or discussing options for further investigation.* About 18 months later [Master B] was noted to be walking with a limp and was referred for orthopedic review by his GP at the time. This led to a diagnosis of developmental dysplasia of the hip (DDH) which has required operative treatment.
>
> 3. The earlier a dislocated hip is detected, the simpler and more effective is the treatment. However, screening for DDH is a controversial subject. Screening may be by universal neonatal clinical examination (Ortolani or Barlow manoeuvres as recommended in New Zealand[1] with follow-up as per Appendices) with the addition of sonographic imaging of the hip (selective 'at risk' hips or universal screening in the neonate in some countries). A 2017 review of DDH screening processes[2] concluded: *Hip screening in DDH does not meet most of the World Health Organisation's criteria for an effective screening programme and should only be considered as surveillance due to its low sensitivity and positive predictive value (PPV). There is a significant risk of over diagnosis and over treatment. There is no International consensus on screening in DDH. Pathological DDH is mainly a female condition and 'at risk'/General Practitioner screening identifies few pathological cases in male subjects. The General Practitioner 6–8 week 'hip check' has a very low PPV for pathological DDH and is of doubtful value in screening and diagnosis. Unilateral limitation of hip abduction is a time dependent and useful clinical sign in the diagnosis of pathological DDH. The majority of the previously considered 'at risk' factors are not true risk factors with little or no association with pathological DDH.* As noted in [the medical centre's] responses, the decision to further investigate suspected DDH must include weighing up: the likelihood of the condition (which is relatively rare in the general population, particularly males, in the absence of specific risk factors, none of which were exhibited by [Master B]); relevant clinical findings which, as noted above, are not particularly sensitive in diagnosis of the

[1] Well Child Tamaraki Ora Health assessments — see Pg 64 of Health Book: https://www.healthed.govt.nz/resource/well-childtamariki-ora-health-book

[2] Paton R. Screening in Developmental Dysplasia of the Hip (DDH). Surgeon. 2017;15(5):290–96

condition; the risks and resource issues regarding over-investigation (X-ray exposure in an infant, stretched ultrasound resource); the potentially severe implications of a delayed diagnosis (requirement for surgery rather than splinting, potential for lifelong mobility issues).

4. [Master B's] six-week check performed by [Dr C] on 24 March 2016 is well documented and notes a query by the Plunket nurse regarding possible leg length discrepancy (a Plunket referral was filed on 22 March 2016 (inbox document) but has not been provided with the clinical notes). [Dr C] has documented measuring [Master B's] legs from ASIS to medial malleolus (right 22.5cm, left 24 cm) but this was somewhat unreliable as she could not fully extend [Master B's] legs. There was no apparent discrepancy in knee to ankle length. There is no comment on symmetry of thigh/buttock creases — asymmetry being a 'soft' sign for DDH, but a relatively common and insensitive sign. [Dr C] has noted the possible leg length discrepancy was the opposite to that found by Plunket (who found right leg longer than left), casting some doubt on the reliability and significance of the observations. [Dr C] has documented *hips NAD* and I presume from this note, and the comment made in the complaint, that [Dr C] performed a standard assessment for dislocatable hip (Ortolani's and/or Barlow tests) and these were negative. Without having viewed the examination I am unable to comment on [Dr C's] technique but it is quite conceivable the tests were negative, noting their limited sensitivity for DDH screening. The remainder of the six-week check was consistent with accepted practice. [Dr C] documented her diagnosis and management plan as: *well, likely no true leg length discrepancy — to be monitored.* The monitoring plan is not otherwise specified and there is no reference in the notes (prior to transfer to another practice in July 2017) of [Master B's] hips being reassessed.

4. [Dr C] has apologised for failing to detect [Master B's] DDH and stated: *In hindsight I should have arranged imaging to investigate the suspected leg length discrepancy at the time.* I agree with this statement in part given the concerns noted by another health care provider (Plunket) and the fact the examination was not completely normal (possible asymmetry in femur length noting apparent leg length discrepancy but equal knee to ankle measurements). I think reasonable management strategies at this time might have included: formal pre-scheduled review at three months of age to reassess leg length and more reliably assess symmetry of hip abduction (see Appendix 2); referral for X-ray at four to six months of age (as per ADHB guidance — see Appendix 1); consideration of referral for hip ultrasound on 24 March 2016. I think the most appropriate of these strategies, given [Master B's] presentation on 24 March 2016 when there was doubt over the reliability of the leg length measurements, otherwise normal hip examination and him being male with no additional risk factors for DDH, was to schedule a formal hip review at three months of age. I am unable to predict whether findings at this point would have led to referral for imaging, but if there was continued suspicion of leg length discrepancy or limited hip abduction noted (particularly if asymmetrical), then imaging was indicated. I do not feel an unstructured or unspecified monitoring plan was clinically appropriate and I am mildly to moderately critical that this approach appears to have been taken. However, I am aware how difficult early diagnosis of DDH can be and the limitations of the currently accepted screening

procedures in New Zealand. I recommend [Dr C] review the information referred to in the Appendices."

Appendix 1.

Auckland DHB clinical guideline 'Developmental Dysplasia of the Hips — (DDH)'[3]

(i) Approximately 1 in 100 babies will have hip instability immediately after birth. However, for the majority of babies this hip instability will resolve in the first few weeks of life, leaving an incidence of DDH of 1–2 per 1000. Detection of DDH is not always easy and all screening programmes have an incidence of late presentations of DDH. Screening is thought to reduce the incidence of 'late' DDH by about 50%.

(ii) All babies should be examined in the neonatal unit for hip instability and action taken as below.

A. Babies with definite DDH i.e. a dislocated hip that is either reducible or irreducible:

If a baby has a dislocated hip confirmed on repeat examination by a medical examiner, then this should be discussed with the paediatric orthopaedic registrar and a written referral made to the Orthopaedic Department with the name of the GP. The consultant on call will decide whether they wish to see the baby in the unit or at an early time in their clinic.

B. Babies with 'soft signs' of DDH i.e. clicky hips or asymmetric skin creases:

Many babies have clicky hips at birth or in the first few months. The great majority have normal hip X-rays at 4 months of age. Therefore, babies with clicky hips or asymmetric thigh creases should be discharged back to the GP with a request that the GP re-checks the hips at the regular baby checks AND arranges an AP pelvis X-ray at 4–6 months of age with a copy of the report to the Starship Hospital Orthopaedic Department. These X-rays can be arranged either through the public or private sector.

C. Babies with risk factors for DDH but no clinical signs of instability:

Risk factors are defined as below:

- Breech position/delivery
- Family history of DDH in close relative
- Babies with other orthopaedic problems (eg. metatarsus adductus or calcaneovalgus foot deformity) or neuromuscular problems

Action required:

Discharge child back to GP with a request that the GP re-checks the hips at the regular baby checks AND arranges an AP pelvis X-ray at 4–6 months of age with a copy of the report to the Starship Hospital Orthopaedic Department. These X-rays can be ordered through Starship radiology or via the private sector.

[3] http://www.adhb.govt.nz/newborn/Guidelines/Developmental/DDH.htm Accessed 5 August 2019

Appendix 2. Northland Health Pathways[4] 'Developmental Dysplasia of the Hip (DDH)'

Background

About developmental dysplasia of the hip (DDH)

About developmental dysplasia of the hip

- For about 1 to 2 babies in 1000, their hips will develop in a dislocated or dysplastic position and will need treatment.
- About 15 to 20 in 1000 will have minor dysplastic changes. Most will improve spontaneously with observation only but some will benefit from treatment.
- Developmental dysplasia of the hip (DDH) cannot always be detected at birth but may progress over the first few months.
- DDH is more prevalent in females with a female:male ratio of 5:1.
- The clinical features of DDH depend upon the age of the child and the severity of the abnormality.
- The earlier DDH is detected, the simpler and more effective the treatment and the better the long-term outcome.

Assessment

1. Consider risk factors for developmental dysplasia of the hip (DDH).

Risk factors for DDH

- Breech presentation in the 3rd trimester
- Strong family history of DDH, especially if in a parent or sibling
- Intrauterine problems e.g., oligohydramnios

2. Careful clinical examination for age-specific findings can detect most DDH, although some may be difficult to detect and imaging is required.
   - Children aged < 3 months

Children aged < 3 months – DDH

1. Perform in a relaxed infant. If the infant is unsettled, arrange a further appointment to recheck the hips.
2. Test for instability first while the infant is more relaxed:
   - Check with Barlow and Ortolani tests.
   - If a distinct hip 'clunk' reduction, refer as below.
   - Clicky hips are very common. Clicks heard during nappy changes are benign and are usually caused by the snapping of tendons or ligaments in and around the hip or knee. These are not suggestive of DDH. These clicks are very different to the "clunk" of a dislocation.
3. Look for any asymmetry which may indicate a unilateral dislocation. Findings of limited hip abduction or limb length discrepancy are inconsistent at this age and difficult to assess reliably.
4. General inspection – look for other relevant conditions presenting at this age e.g., plagiocephaly, torticollis, scoliosis, foot abnormalities.

[4] https://northland.healthpathways.org.nz/index.htm By subscription. Accessed 5 August 2019.

- Children aged ≥ 3 months

Children aged ≥ 3 months – DDH

1. Look for limited abduction:
   - If asymmetrical, this is the most sensitive sign associated with DDH in the older infant.
   - Normal range is 80 to 90 degrees
   - Place the infant in supine position, on a firm, flat surface.
   - With the pelvis stabilised, and hips and knees at 90°, gently abduct and adduct the hips to check for restricted range of motion.
   - To be accurate, the pelvis must be perfectly level. Ensure that the pelvis is not tipping by checking that the natal cleft is vertical throughout the manoeuvre.
   - Perform this manoeuvre gradually. It may need to be repeated a number of times to ensure an accurate result.
2. Assess leg length differences – In supine position with both hips and knees at 90 degrees, compare the femur lengths to see if the knee heights are equal.
3. Asymmetrical buttock creases:
   - A "soft sign" for DDH
   - Common in about 25% of all infants but rarely indicates hip dysplasia
4. Ortolani or Barlow tests may be positive but are increasingly difficult to perform reliably for babies aged > 2 months. If the baby is relaxed, the sensitiviy of these tests improves.
5. For more information on examination, see Examination after age 3 months.

Developmental Dysplasia of the Hip Flowchart