Scottish Parliament Region: South of Scotland

Case 200801946: Ayrshire and Arran NHS Board

Summary of Investigation

Category

Health: Hospital

Overview

The complainant (Mrs C) raised concerns regarding the orthopaedic treatment received by her husband (Mr A) at Crosshouse Hospital in the area of Ayrshire and Arran NHS Board (the Board). Mr A fractured his left ankle on 4 May 2007 and this was treated surgically on 8 May 2007. However, he had existing Peripheral Vascular Disease (a narrowing of the arteries) which contributed to his surgical wound failing to heal and he subsequently had to have his left leg amputated below the knee on 22 August 2008. Mrs C complained that Mr A's wound was managed inappropriately and that, as a result, his left leg was unnecessarily amputated. The specific complaints are listed below.

Specific complaints and conclusions

The complaints which have been investigated are that:

(a) there was a failure to recognise Mr A's existing vascular condition and the decision to operate was inappropriate (*upheld*); and

(b) Mr A's post-operative treatment was inappropriate *(upheld)*.

Redress and recommendations

The Ombudsman recommends that the Board:

(i) highlight this report to the relevant staff, particularly junior doctors, to ensure that they are aware of the deficiencies which have been identified; and

(ii) apologise to Mr A for their failure to identify and take into account his vascular condition when deciding to operate on his ankle fracture, and for the delay in referring him for vascular review when his surgical wound failed to heal.

The Board have accepted the recommendations and will act on them accordingly.

Main Investigation Report

Introduction

1. The complainant (Mrs C) raised concerns regarding the orthopaedic treatment received by her husband (Mr A) at Crosshouse Hospital (the Hospital). He was admitted on 6 May 2007 with a fractured distal fibula and on 7 May 2007 he was reviewed by a consultant orthopaedic surgeon (the Consultant) who performed surgery on the fracture the next day. Unfortunately, Mr A, who was 62 years old, had existing Peripheral Vascular Disease (PVD) which contributed to his surgical wound failing to heal. A subsequent attempt to address this via angioplasty in November 2007 was unsuccessful and Mr A's left leg was later amputated below the knee on 22 August 2008. Mr A was subsequently re-admitted to hospital on 23 September 2008 due to complications of advanced PVD of his right leg. Subsequent surgical attempts to address these complications were also unsuccessful and Mr A's right leg was amputated on 10 December 2008.

2. The complaints from Mrs C which have been investigated are that:

(a) there was a failure to recognise Mr A's existing vascular condition and the decision to operate was inappropriate; and

(b) Mr A's post-operative treatment was inappropriate.

Investigation

3. In writing this report my investigator has had access to Mr A's medical records and the complaints correspondence with Ayrshire and Arran NHS Board (the Board). In addition, my investigator obtained advice from two of the Ombudsman's advisers, one a consultant in orthopaedic and accident surgery (Adviser 1) and the other a consultant vascular surgeon (Adviser 2).

4. I have not included in this report every detail investigated but I am satisfied that no matter of significance has been overlooked. An explanation of the abbreviations used in this report is contained in Annex 1. A glossary of terms is at Annex 2 and the referenced articles are noted in Annex 3. Mrs C and the Board were given an opportunity to comment on a draft of this report.

Background

5. Mrs C raised her concerns with the Board, via an advocate, on 20 August 2008. She outlined details of the treatment Mr A had received and advised that, between breaking his left ankle and the decision being made to

amputate his left leg, he had suffered extreme pain (the complaint letter stated that the amputation was to be carried out that day, however, it was carried out two days later, on 22 August 2008). She expressed surprise that his leg could have deteriorated so quickly and requested that a full investigation be carried out. In particular, she complained that Mr A's ankle had merely been re-plastered when the wound was found to still have been open two weeks after the initial treatment. She noted that the wound was treated when Mr A was re-admitted via Accident and Emergency (A&E) a further two weeks later, on 5 June 2007, and she questioned why this action had not been taken sooner. She also questioned whether it would have been possible Mr A would not have required an amputation had the wound been dealt with earlier and she asked how an obvious physical problem, such as Mr A's ankle wound, could have deteriorated so badly whilst he was under hospital care.

6. The Board responded to Mrs C on 18 September 2008 and, in respect of Mr A's wound being re-plastered whilst an open wound was present, they noted that he had a past medical history of coronary artery bypass grafting along with a heart valve replacement for which he was on Warfarin. They advised that, at his fracture clinic on 21 May 2007, the Consultant had noted that Mr A's wound was leaking slightly but he felt that this was due to him being on Warfarin. They advised that it was not unusual for surgical wounds to leak a little when patients are on anti-coagulant therapy and, in the absence of any other adverse appearances such as infection, the Consultant was of the opinion that it was reasonable to have removed the stitches and placed Mr A in plaster to both immobilise his ankle, and to enhance wound and fracture healing.

7. In response to Mrs C's concerns that action was not taken until Mr A was admitted to A&E two weeks after attending the fracture clinic on 21 May 2007, the Board advised that the action taken at the clinic was the most appropriate action to have taken at that time. They advised that the Consultant did not feel that dealing with the wound differently at that time could have prevented the subsequent events.

8. With regards to Mrs C's questions relating to the deterioration of Mr A's ankle wound and eventual amputation, the Board summarised the treatment Mr A received following his re-admission to the Hospital on 5 June 2007 and at the fracture clinic on 18 June 2007. They also advised that Mr A re-attended on 20 June 2007 to have a vacuum dressing applied to his wound to remove the excess leakage and they stated that he was observed to have had symptoms of

PVD and he was advised that, if he continued to smoke, he ran the risk of continued problems with wound healing.

9. The Board explained that Mr A was reviewed regularly at the fracture clinic, arrangements had been made for him to be seen by a consultant vascular surgeon and consideration was given to the possibility of asking for an opinion from a plastic surgeon. They confirmed that, following a CT angiogram, requested by the vascular surgeons, an angioplasty was performed in November 2007.

10. The Board advised that, as the wound had appeared to have been improving, the option of consulting a plastic surgeon had not been explored. However, they noted that the wound had subsequently deteriorated and an amputation was discussed. They indicated that this was initially rejected by Mr A and the referral to plastic surgery was made, but the Consultant had advised that the wound was unlikely to heal and the plastic surgeons may not have been able to offer Mr A anything. The Board then noted subsequent input by the Consultant as well as a consultant vascular surgeon and an experienced orthopaedic doctor, however, they stated that it was clear that Mr A's foot and ankle had deteriorated significantly over late July and early August 2008. They indicated that these changes were typical of an ischemic limb (lack of efficient blood supply to the leg) and they suggested that the sudden deterioration may have been precipitated by Mr A's low haemoglobin, resulting in diminished oxygen delivery to already ischemic tissues.

11. Mrs C complained to the Ombudsman office on 17 October 2008 and she reiterated her version of events relating to Mr A's injury and subsequent treatment. She advised that, despite having had an active social life prior to his injury, Mr A was now housebound and in need of assistance around the house. She indicated that she 'would like the hospital and doctors to admit they made mistakes – to prevent this type of thing from happening to anyone else'.

(a) There was a failure to recognise Mr A's existing vascular condition and the decision to operate was inappropriate

12. My investigator asked Adviser 1 to comment on the standard of Mr A's pre-operative assessment and he noted his belief that there were deficiencies during this part of Mr A's care which affected the decision-making. He advised that there were two records dated 6 May 2007 which stated that there was 'no neurovascular deficit - normal sensation and circulation'. He stated that this

meant that, in the examining doctors' opinions, there was no evidence that Mr A's injured left ankle was the site of any major nerve or vessel damage. He observed that there was certainly no major nerve or vessel damage due to the accident, and the external appearance of the skin would have led the doctors to have believed that the blood supply was adequate and not likely to have given cause for concern in the immediate future. However, he advised that, although important, this was a fairly superficial assessment of the blood supply and subsequent special vascular investigations later revealed severe PVD.

13. Adviser 1 informed me that these 'normal' observations were made by junior medical staff whose ability to examine properly would have been restricted by the presence of the plaster. He stated that the assessment of sensation and movement was also limited in these circumstances and only externally detectable serious deficiencies could have been sought. He said that, unfortunately, the main clue to Mr A's poor lower limb blood supply was in the history, rather than in the clinical examination, and there was no indication in the medical records that anyone asked about any pre-injury symptoms or elicited the fact that Mr A was awaiting an appointment to attend a vascular unit because of a prior GP referral letter dated 7 February 2007.

14. In Adviser 1's opinion, whilst it could reasonably be argued that the examining doctors might not have been expected to ask specifically about intermittent claudication or the out-patient appointment, the notes led him to believe that the assessment of Mr A's pre-accident level of function was incomplete. He stated that a number of health care professionals would have seen, and talked to, Mr A between his attendance in A&E and the day of his operation and that there was ample time and opportunity to discover that his leg circulation was not as good as it appeared to have been superficially.

15. Adviser 1 confirmed that the decision to operate was made by the Consultant on his pre-operative ward round of 7 May 2007, when he had indicated that he felt internal fixation was appropriate. The Consultant had also recommended that it could take place at that time since the soft tissues appeared externally in good condition (ie there was no swelling). Adviser 1 confirmed that this would correspond to the standard practice to internally fix this sort of fracture and that it was also good practice to operate when the soft tissues are in optimum condition. However, it appeared that the Consultant did not know (or ask) about the intermittent claudication and that he had made his decision in the absence of this important piece of information. In Adviser 1's

view, had this information been discovered, an urgent vascular opinion could have been obtained and the possibility of doing vascular surgery before operating on the ankle could have been considered. In addition, he indicated that the ankle fracture could have been treated by means other than an operative procedure.

16. Notwithstanding this, Adviser 1 informed me that, having viewed the x-rays of the injury prior to treatment, in principle, Mr A's fracture was best treated by internal fixation. Indeed, he advised that the use of a plate and screws was entirely appropriate and the immediate post-operative x-rays revealed that a technically satisfactory procedure was performed. He said that the fracture would have been difficult to hold in a good position by a plaster cast alone and that, if the fracture had healed in this original, poor position, he would not have expected very good function to have resulted. He pointed out, however, that all of these statements apply to an otherwise fit, healthy patient, irrespective of age and he advised that, in practice, the decision whether or not to operate in an individual case depends upon the individual patient's overall condition - not just the x-rays.

17. Adviser 1 spoke of the reasoning behind ('indications for') operating on a displaced fracture of the ankle, such as the one sustained by Mr A. He advised that, realistically speaking, the choices available for treating this were either non-operative (manipulation under anaesthetic and plaster cast) or operative (open reduction and internal fixation). He stated that, in practice, non-operative treatment was not generally favoured because of the high likelihood of the fracture slipping out of position and leading to poor function and arthritis. However, he advised that operative treatment required a surgical wound to be made, thus leading to the potential for complications such as infection.

18. Adviser 1 informed me that it was well established that, if surgery was to be carried out, careful pre-operative assessment, especially of the soft tissues, was essential. He referenced an article regarding 'Principles of Fracture Management' (see Annex 3) and stated that it made a number of points, two of which were particularly relevant to Mr A's situation. He advised that, firstly, it stated it was important to find out the patient's pre-accident level of mobility, which in Mr A's case was that he was unable to walk more than 50 to 100 yards without experiencing pain (intermittent claudication). Secondly, it stated that a more general check of risk factors such as vascular disease and smoking should result in consideration of the likely complications of surgery. Finally, it

was rightly recommended that surgery was performed within about ten days, subject to the patient's general state and the state of the local tissues. However, in Adviser 1's opinion there was no urgency to operate if the fracture/ankle joint was manipulated into reasonable position and held there temporarily with a plaster whilst further investigations took place and any correctible problems were addressed. Thus, he advised, if the poor blood supply of Mr A's leg had been recognised before surgery, the fracture could have been manipulated and held temporarily (with a pin or pins inserted through the skin, for example, the heel) in reasonable position pending a vascular opinion, investigations (for example, an angiogram) and possibly reconstructive vascular surgery. He indicated that internal fixation could then have been reconsidered at a later date if necessary, according to progress.

19. In general, Adviser 1 stated that he believed open reduction and internal fixation of displaced ankle fractures to be good practice and he advised that it was correctly thought about in Mr A's case. However, it was not universally applicable and careful consideration should have been given to avoiding, or at least delaying it, when the patient was less mobile and had an important medical condition such as PVD. In Adviser 1's opinion, it is important to think carefully about each individual patient since some may present with increased risk factors (for example, for wound breakdown/infection) thus being the 'exception to the rule' about operative treatment.

20. Adviser 1 observed that the vascular surgery performed later (November 2007) was unsuccessful and he advised that it was, therefore, a matter of speculation as to what would actually have happened had the PVD been recognised. Given that the subsequent vascular surgery to the left leg did not improve Mr A's circulation significantly, and given the fact that his right uninjured leg also had to be amputated as a result of the natural progression of the PVD, Adviser 1 stated that there was always likely to have been a poor outcome. Notwithstanding this, he doubted whether the ankle fracture would have been operated upon initially if the vascular surgery had been carried out in advance. He acknowledged that the fracture would still have required treatment and amputation might still have become necessary due to the PVD. However, any decision to treat the fracture operatively would at least have been based upon more information and the increased risks would have been much clearer.

21. Adviser 1 also indicated that there were two smaller issues that could have been addressed if the poor leg blood supply had been recognised before

definitive treatment of the ankle: specifically that the use of a tourniquet during the operation, and the high elevation of the foot before and after surgery, could have been avoided. He confirmed that the tourniquet time during Mr A's surgery was 69 minutes and this was about the length of time he would have expected the ankle operation to have taken. He indicated that the use of a tourniquet in such operations was routine but not essential and, in his opinion, there was a good case for not having used one when there was PVD. Similarly, he advised that high elevation was the normal position in which to reduce swelling and pain but he indicated that it could be counter-productive where PVD exists.

22. Adviser 1 concluded that, based upon his interpretation of the evidence which he has seen, the Consultant did not appear to have considered general factors sufficiently when recommending internal fixation within a few days of injury. He acknowledged that this was partly due to the GP letter of referral to the vascular unit not having been brought to the Consultant's attention, however, in Adviser 1's experience, such detail was not usually available in emergency situations. He stated that, had A&E staff and, more particularly, the Orthopaedic Team, seen the referral letter from the GP (written two months before the fall) they would have seen that Mr A had PVD. However, he advised that medical records are seldom complete or readily available to those treating emergencies, such as in Mr A's situation. He said that the records ought to 'follow the patient' but he knew of no practical way of achieving this. Hence, he stated, there was a need for clinicians to remain alert to ask questions about, and 'be suspicious' of, hidden problems.

23. In investigating this matter, I considered whether Mr A had a responsibility to highlight his existing vascular condition to medical staff. However, whilst that may have been the case, I concluded that, ultimately, the onus was on the medical staff, as professionals, to take a full history from Mr A and to identify any existing conditions.

24. My investigator asked Adviser 2 for a further opinion on this matter and he noted that Mr A had been referred by his GP to the vascular services, for investigation of his bilateral intermittent claudication, three months prior to his presentation with a fractured fibula. He stated that, even if this information had not been verified by Mr A, a basic assessment of his previous functional ability should have brought to light the fact that he could only walk fifty yards before stopping with pain in his calves. Adviser 2 stated that the assessment of Mr A's

peripheral vascular status, including his pulses, appeared to have been inadequate or inaccurate. He noted that Mr A was seen in the vascular clinic on 22 May 2007, two weeks after his fracture, but there was no record that this was communicated to the orthopaedic team looking after him, although it should have been available in his hospital records.

25. Adviser 2 advised that, if the presence of PVD had been detected prior to Mr A's surgery, the use of a thigh tourniquet could have been avoided. He stated that, in the presence of disease of the superficial femoral artery, the use of a thigh tourniquet for a duration of 69 minutes was not completely innocuous and could lead to thrombosis of the vessel. Indeed the use of a thigh tourniquet was not recommended in the presence of a history of intermittent claudication or poor quality pulses (Zahrani/Cuschieri and Langkamer – see Annex 3).

26. Adviser 2 pointed out that, at the time surgery on Mr A's ankle was being considered, there was evidence of chronic (longstanding) PVD but there was no evidence of an acute impairment in blood supply as a result of the fracture. As such, there was no indication for preliminary vascular surgery. He advised that it was appropriate to have proceeded with surgery to fix the fracture, however, once the wound broke down and failed to heal, the circulatory problems should have been aggressively investigated and treated (which I have addressed under complaint (b)).

(a) Conclusion

27. The advice which I have received, and fully accept, indicates that the medical staff failed to recognise that Mr A had significant PVD before the decision was taken to operate on his ankle fracture. I am advised that, had this been recognised, the decision-making process would have been different. In addition, factors such as the use of a tourniquet, and the elevation of Mr A's foot, might have been altered by the prior knowledge of Mr A's vascular condition. Whilst surgical treatment may have been appropriate for the type of fracture Mr A sustained, and whilst a poor outcome may always have been likely due to the severity of his PVD, the pre-operative assessment was clearly deficient and the decision to operate was not fully informed. I, therefore, uphold this complaint.

(b) Mr A's post-operative treatment was inappropriate

28. Adviser 1 explained that the vast majority of surgical wounds heal entirely satisfactorily within two weeks as a result of the body's natural response to injury. Similarly, he advised that even when there is partial or complete breakdown, with or without infection, relatively simple measures such as antibiotics, rest (in plaster where appropriate), dressings and removal of dead tissue would be followed by wound healing, even if this takes many weeks. Indeed, he confirmed that these actions were all taken in Mr A's case without success. However, Adviser 1 informed me that there are many factors which contribute to wound breakdown and delayed healing in a small proportion of cases.

29. Firstly, he advised that local factors could have contributed to the wound breakdown, such as rough handling of the soft tissues during surgery. He confirmed that the blood supply to skin around the ankle is poorer than in many areas of the body, even in fit and healthy patients. However, he stated that there was no evidence that the quality of the surgery on 8 May 2007 was anything other than normal. He advised that another contributory local factor could have been the use of a tourniquet, as discussed under complaint (a) (see paragraph 21).

30. Another local factor which Adviser 1 indicated could have contributed to the wound breakdown was the presence of a foreign body such as a plate and/or screws. He advised that the metalwork used for internal fixation of the fracture was at the base of the wound and contributed to the delayed healing in Mr A's case. However, he stated that it did not cause it. He said that, in theory, removal of the metalwork may have alleviated the situation but it could not realistically have been done until the fracture had healed - many months after the injury. He advised that, when all else is well, such a procedure, possibly associated with plastic surgery, can lead to wound healing. Adviser 1 confirmed that this was considered by the Consultant and the plastic surgeon but he agreed with them that the chances of success, either simply by removing the plate, or by major plastic surgery, were inestimably low.

31. Adviser 1 informed me that general factors, especially the blood supply, were more important than local factors in contributing to the wound breakdown. He confirmed that PVD was a major factor and he advised that this was severe in both Mr A's legs. He believed it to have been the single most important factor responsible for Mr A's wound problems and his subsequent amputation.

32. Other general factors mentioned by Adviser 1 were Diabetes Mellitus (which he advised was considered but excluded in Mr A's case); smoking (which Mr A was advised to stop); a suppressed immunological system (which did not appear to have been apparent in Mr A's case); and severe or prolonged anaemia (low haemoglobin).

33. In Adviser 1's opinion, low haemoglobin was not a significant factor for most of the time as it was regularly checked and corrected fairly quickly. He confirmed that Mr A was on Warfarin (prescribed during 2006 for coronary artery disease) and that he was, therefore, always at risk of 'hidden' bleeding leading to anaemia. He indicated that Mr A's haemoglobin was at the lower end of the normal range for the most part but was not, in his opinion, at dangerously low levels. Indeed, he advised that it was being monitored carefully throughout his illness and, on each occasion that it was found to be very low, Mr A had a blood transfusion within a few days, thus quickly restoring the haemoglobin to acceptable levels. Adviser 1 stated that, most importantly, Mr A's haemoglobin level was at its highest when the ankle fracture occurred, when it was operated upon and when the wound broke down. Adviser 1 said that, whilst a very low haemoglobin may have added to wound healing problems at times, he did not believe it to have been responsible for the wound breakdown initially and he, therefore, concluded that any effect upon wound healing due to anaemia was minimal and very short lived.

34. Adviser 1 summarised that a number of factors contributed to the wound breakdown in Mr A's left ankle. He observed that they were recognised and dealt with adequately and that the most important problem was the poor blood supply which was not recognised by the Orthopaedic Team until after the operation to fix Mr A's ankle and after his wound had broken down. He observed that, even when Mr A re-attended with wound problems during the first few weeks following his operation, the poor blood supply to his leg was not appreciated. He advised that the records show this as not having been noted by the Consultant until 20 June 2007 and that it was not fully investigated until 31 July 2007. Adviser 1 did note that Mr A had attended the vascular clinic on 22 May 2007, however, this was coincidental and was as a result of the GP referral of 7 February 2007 (around three months prior to the injury).

35. In Adviser 1's opinion, the decisions made from, and the actions taken after, the recognition of Mr A's vascular problems were entirely appropriate. He

stated that, once the wound breakdown had occurred and after the PVD had been recognised, there was co-ordinated and satisfactory treatment by the Consultant's team, the vascular unit, the nursing staff and the plastic surgeons (as well as physicians). Adviser 1 noted that this treatment was not successful and the wound did not heal and that Mr A had remained immobile and in severe pain. He stated that amputation, therefore, became necessary and he did not think that any other decisions or actions would have changed the outcome.

36. With regards to Mrs C's specific concerns that Mr A's ankle was re-plastered whilst there was an open wound, Adviser 1 explained that, once the wound had broken down, there was little prospect of healing unless the blood supply could have been improved substantially - which in the event it could not. He stated that, if the plaster had been removed, Mr A would have had to avoid bearing weight on that leg for many weeks and there would have been an ever present risk of the plate (and, therefore, the fracture) slipping out of position and adding to the surgical problems. It is also Adviser 1's view that wound healing is better when the area is immobilised by a plaster, as movement of the soft tissues is inevitable when the ankle is allowed to move, thus delaying wound healing even when there is a normal blood supply.

37. Adviser 1 concluded that there was no realistic alternative to amputation of Mr A's left leg. He observed that vascular surgery had not resulted in any wound healing. He indicated that plastic surgery would have caused more suffering with minimal chance of success and he acknowledged the Consultant's view that the ankle joint was in such a poor state that function (mobility/walking) would also have been poor. He informed me that the fitting of a prosthesis (artificial leg) could be expected to lead to better function and less pain than Mr A's leg as it was and as it could have been. With the benefit of hindsight and in the knowledge of the entire two year history, Adviser 1 said that it appeared to him that the PVD made amputation almost inevitable.

38. My investigator asked Adviser 2 to comment on Mr A's post-operative treatment and he also noted that Mr A was seen in the vascular out-patient clinic two weeks after his fracture. He observed that the referral for this consultation was made by Mr A's GP and predated his fracture. At the clinic it was noted that Mr A had a history of bilateral intermittent claudication, with the right leg being more severely affected than the left. It was also noted at the clinic that Mr A had symptoms of rest pain in the right foot. The clinic examination revealed that Mr A had femoral pulses on both sides but it was not

possible to feel any other pulses in either leg and a full examination of the left leg was restricted by the below knee plaster cast.

39. Adviser 2 noted that a plan was made to review Mr A in four months, in the hope that his fracture would have healed and he would be ambulant by then. In his view, this was a reasonable course of action but for the mention of rest pain. He stated that the occurrence of rest pain was indicative of critical limb ischemia and was considered to be an indication for further investigations and treatment. He said that it would, therefore, have been appropriate to have arranged for a Duplex (ultrasound) scan or a CT angiogram to evaluate the circulation. Adviser 2 explained that, whilst the noted rest pain applied to Mr A's right leg, a CT angiogram would have furnished information on the circulation of both legs.

40. At Mr A's next review in the vascular clinic, on 31 July 2007, Adviser 2 noted that a CT angiogram was arranged and this revealed the presence of disease in the left external iliac artery and extensive disease of the superficial femoral artery with a short blockage. Mr A underwent an external iliac angioplasty in November 2007, with insertion of a stent in the narrowed artery. The procedure appeared to improve the healing of his left ankle wound initially but by December 2007, there was a recurrence of infection and in February 2008, there were changes of severe destruction of the ankle joint noted on the x-ray. Over the next few months, the wound remained open and, in Adviser 2's opinion, it was very likely that chronic anaemia contributed to poor healing as there were two admissions during this period with a very low haemoglobin (from a gastrointestinal bleed probably caused by his Warfarin therapy). Eventually Mr A underwent a left below knee amputation on 22 August 2008. There is no record of any further vascular investigations at this stage such as a Duplex scan or a CT scan to ascertain the state of the vasculature prior to the amputation, however, Adviser 2 stated that this may have been because the amputation was thought to be inevitable for orthopaedic reasons.

41. Adviser 2 stated that the overall standard of vascular care was acceptable inasmuch as treatment was initiated for the left leg as soon as the second vascular review was sought. He did observe that Mr A had atherosclerosis of his left superficial femoral artery which could have been addressed by angioplasty and stenting, however, he noted that Mr A's angiograms were discussed at a multi-disciplinary meeting between the vascular surgeons and the interventional radiologist and there may, therefore, have been features that

made this difficult. He indicated that he would largely concur with the vascular surgeon's viewpoint that surgical bypass (use of a natural or artificial conduit to bypass the blocked arteries) would have been rendered challenging by the presence of an infected non-healing wound with exposed metal plates.

42. Adviser 2 commented that the natural history of patients with PVD is affected by many factors and it is extremely difficult to speculate on the likelihood of progression to amputation in an individual case. He advised that the standard first line of treatment in such patients is to address patient risk factors such as smoking, use of agents to thin the blood and statins (medication to reduce cholesterol). He said that approximately 50 percent of patients improve on such treatment and either become free of symptoms or remain 'stable claudicants'. A smaller proportion progress to critical limb ischemia and, in this situation, Adviser 2 indicated that amputation becomes inevitable, unless measures are taken to improve the circulation, either by balloon angioplasty or bypass operations. He informed me that the risk of this occurring is between one and three percent but this can increase by a factor of 11 in patients who continue to smoke (Dormandy/Heeck – see Annex 3).

43. In Mr A's case, Adviser 2 noted that he sustained a fracture of the fibula in his left leg, which was already compromised in terms of arterial blood supply, and this was not detected, either from the history or physical examination. He observed that the obvious connection between the breakdown of the surgical wound and failure to heal with vascular insufficiency was not made and a further vascular review was not sought until 30 July 2007 (and carried out the following day). He advised that wound breakdown can occur as a result of infection but, once this was treated, the persistence of non-healing beyond two or three weeks should have triggered an urgent vascular review with a full assessment of the circulation. He said it was possible that earlier attempts to improve the circulation by angioplasty might have enabled the wound to heal sooner and might have prevented some of the degenerative changes in the ankle joint that eventually rendered it incapable of function.

44. Adviser 2 stated that the sequence of events in Mr A's left leg was intimately related to the traumatic fracture of his fibula, and the treatment thereof, and the lack of healing of the operative wound was a reflection of the poor blood supply, which was also thought to be responsible for the arthritic changes in the ankle joint. He said that, ultimately, it was the fact that there was no hope of having a functional weight bearing joint that eventually led to the

decision to amputate and it was extremely difficult to speculate as to whether Mr A would have had an amputation of the left leg had he not broken his ankle. It could be argued that the right leg progressed to gangrene and eventual amputation but, in Adviser 2's opinion, it would be dangerous to extrapolate the outcome on one side to the other, as there was some evidence that Mr A's left leg was in fact the better of the two as far as the circulation was concerned.

45. Adviser 2 summarised that, in his view, the fracture of Mr A's fibula, and the operative treatment of the fracture, triggered a train of events that eventually resulted in his left leg being amputated. Mr A's underlying PVD contributed significantly to poor healing, infection and degenerative arthritis in the left ankle joint and the eventual outcome of a left below knee amputation.

(b) Conclusion

46. The advice I have received indicates that Mr A received appropriate treatment following the identification of his vascular condition, however, this condition was not quickly recognised by the orthopaedic team, following the surgery. Despite Mr A encountering wound problems within the first few weeks following his operation, his circulation problems were not commented on by the orthopaedic team until 20 June 2007 and not acted upon until 30 July 2007, some 12 weeks after surgery. Mr A did attend the vascular clinic two weeks after his surgery (following a coincidental referral from his GP around three months prior to sustaining his fracture), however, the orthopaedic team showed no signs of having been made aware of this until they referred him back to the clinic on 30 July 2007. I have been advised that the failure of Mr A's wound to heal, two or three weeks after surgery, should have prompted an urgent vascular review and investigation of his circulation. In addition, Adviser 2 was critical of the vascular clinic's failure to carry out further investigations following their review on 22 May 2007, when they identified symptoms of rest pain. Whilst it has not been possible to definitely state whether Mr A would have required an amputation of his left leg had he not sustained the fracture and underwent surgical treatment for this, I conclude that there was a delay in investigating and treating his vascular condition and I, therefore, uphold this complaint.

47. This has been a difficult case to consider, particularly due to the difficulty in establishing whether Mr A's amputation would have been required had surgery not been carried out on his fracture. In commenting on the proposed report, the Board accepted that the wound breakdown resulting from Mr A's

surgery may have contributed to the eventual amputation, however, they highlighted that there were other strongly contributing factors. They, therefore, pointed out that there was not a straight cause and effect relationship between the orthopaedic surgery and Mr A's later amputation and I acknowledge this view.

General recommendations

48. I recommend that the Board:

(i) highlight this report to the relevant staff, particularly junior doctors, to ensure that they are aware of the deficiencies which have been identified; and

(ii) apologise to Mr A for their failure to identify and take into account his vascular condition when deciding to operate on his ankle fracture, and for the delay in referring him for vascular review when his surgical wound failed to heal.

49. The Board have accepted the recommendations and will act on them accordingly. The Ombudsman asks that the Board notify him when the recommendations have been implemented.

Annex 1

Explanation of abbreviations used

Mrs C	The complainant
Mr A	The aggrieved, Mrs C's husband
The Hospital	Crosshouse Hospital
The Consultant	The consultant orthopaedic surgeon who treated Mr A
PVD	Peripheral Vascular Disease
The Board	Ayrshire and Arran NHS Board
Adviser 1	One of the Ombudsman's orthopaedic advisers
Adviser 2	One of the Ombudsman's vascular advisers
A&E	Accident and Emergency

Annex 2

Glossary of terms

Anaemia	A lack of red blood cells or low haemoglobin in the blood
Angioplasty	Widening of narrowed arteries by gentle inflation of a balloon within the artery
Artery	Any blood vessel which carries blood away from the heart
Atherosclerosis	A narrowing of arteries due to a build up of fat, cholesterol and other substances in artery walls
Coronary artery bypass grafting	Type of surgery used to improve blood flow to the heart in patients with severe coronary artery disease
Critical limb ischemia	Severe obstruction of blood flow resulting in rest pain or tissue breakdown (leading to ulcers or gangrene)
CT angiogram	Procedure used to look inside coronary arteries
Diabetes Mellitus	A condition where the body does not produce enough insulin
Displaced fracture	A fracture where the two ends of the broken bone are separated from one another
Distal fibula	The prominent bone on the outside of the ankle
External iliac artery	A large artery in the pelvic region which provides the main blood supply to the legs
Femoral artery	A large artery in the muscles of the thigh (a continuation of the external iliac artery)

Femoral pulses	Pulses of the femoral artery (felt in the groin area)
Gangrene	The death of body tissue caused by a loss of blood supply
Haemoglobin	The coloured pigment inside red blood cells that carries oxygen round the body
Intermittent Claudication	Pain on walking caused by lack of circulation
Internal Fixation	Fixation of reset fractures using metalwork
Open reduction	Surgical procedure to reset fractured bones
Peripheral Vascular Disease (PVD)	Narrowing of the arteries, mainly occurring in arteries that supply blood to the legs
Rest pain	compromise to the circulation to the point that the tissues do not receive sufficient blood, even at rest
Stent	A small tube used to prop open an artery, blood vessel or other duct
Thrombosis	The clotting of blood within a blood vessel
Tourniquet	A device for compressing a blood vessel to stop bleeding or control the circulation of blood to an extremity
Vasculature	the arrangement of blood vessels in an organ or body part
Warfarin	Blood thinning anti-coagulant medication (prevents blood from clotting)

Annex 3

List of references

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