7.2 Dealing with blood loss

Learning outcomes

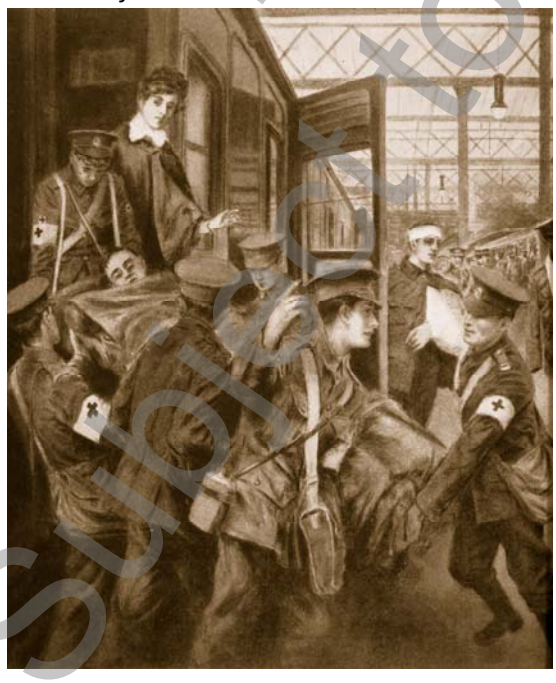
By the end of this topic you should be able to:

- understand the development of transfusion and blood storage techniques
- identify the key stages in dealing with the problem of blood loss
- evaluate the role played by war, science and technology in overcoming the problem of blood loss

Transfusion and the First World War

James Blundell, the surgeon who reintroduced blood transfusion in the nineteenth century, wrote that cases 'really requiring the infusion of blood into the veins are probably rare'. That was in 1828. The First World War (1914-1918) changed everything. The industrial scale of the war led to millions of casualties. Many soldiers were dying from blood loss even when the wound itself was not fatal. Their bodies lost too much blood to be able to function: they went into shock and died.

Source A: A newspaper illustration from between 1914 and 1919 showing soldiers wounded in the First World War coming back to London by train for treatment.



Although transfusions were much less risky now that compatible blood groups had been identified, the problem of blood clotting meant that the donor had to be connected to the recipient. This was impossible to organise on the scale it was needed in wartime.

Storing blood

Some way of storing blood was desperately required.

- In 1915 the American doctor, Richard Lewisohn, found that adding sodium citrate stopped blood from clotting. This meant that the donor did not have to be present and therefore more transfusions could be carried out. Although it was found that the blood cells would deteriorate if the blood was not used soon afterwards, this discovery still saved the lives of thousands of wounded soldiers.
- Richard Weil found that this blood could then be stored in refrigerated conditions.
- In 1916 Francis Rous and James Turner found that adding a citrate glucose solution allowed blood to be stored for longer. This meant that, when an attack was planned, the army could ask for donations of blood from the public, so that they were available for transfusion to treat the wounded.
- Geoffrey Keynes, a British surgeon, developed a portable machine that could store blood. This meant that transfusions could happen closer to the battlefield.
- The first blood depot was established in 1917 for the Battle of Cambrai, using blood group O, which can be safely given to all patients, whatever their blood type.

All these techniques were developed to get blood into wounded soldiers quickly and easily, so they would survive long enough to get to a field hospital where they could be patched up. There was no problem with donors for blood as soldiers were always ready to help wounded comrades.

Transfusion after the First World War

After the war finished, however, many British surgeons were not convinced that using stored blood for transfusions was as good a method as the old, direct method, with the donor connected directly to the recipient.

- Blood groups sometimes got confused: there were different classification systems and mix-ups produced unfortunate results.
- The bottles that blood was stored in and the transfusion tubes weren't always free of bacteria. This could cause infections after transfusions.
- Type O worked for everyone but that meant hospitals only targeted type O people for donations. As giving blood also involved a big cut into the vein, it quickly became difficult to find donors.
- Doctors and surgeons were simply reluctant to change – methods developed in haste to cope with the bloodbath of the First World War seemed risky.

Activities

1 Explain why it wasn't possible to use direct transfusion (connecting a donor to a recipient) to treat all the men needing blood transfusions in the First World War.

2 Explain which was more important in the development of blood transfusions – Landsteiner's identification of blood groups or Rous and Turner's discovery of ways to store blood.

3 Explain which factor had more effect on the development of blood transfusions – science and technology or war.

Fascinating fact

A Soviet scientist, Alexander Bogdanov, believed that regular transfusions of new blood could have major health benefits. He died after having a transfusion of blood from a student with malaria.

Build Better Answers

Why were there problems with using 19th century methods of blood transfusion in the First World War?

Explain your answer, using Source B on page 125 and your own knowledge. (10 marks)

Basic, Level 1

Answer uses simple statements from the source or own knowledge, e.g. 'There were too many soldiers needing transfusions.'

Good, Level 2

Answer is supported by information from the source or own knowledge, e.g. 'Source B shows that 19th century blood transfusions needed the donor to be connected to the patient. In the First World War, it was difficult to find the right donor at the right time and place.'

Excellent, Level 3

Answer uses the source and precise own knowledge. Answers cannot reach Level 3 unless they use own knowledge.

Summary

Overcoming the problem of blood loss was an important stage in the development of surgery. It depended on increased scientific knowledge but its development was also accelerated by the casualties of war – though, as we have seen in other developments, this increased focus diminished as the war ended and old methods reasserted themselves.