

History, Medicine through time

Lesson 28 of 30

Worksheet:

**How far did war on the Western Front
give rise to new techniques in medical
treatment?**

Miss Holland



Development of X-rays

X-rays had been discovered in 1895 by **William Roentgen** and by 1896 there were x-ray machines in hospitals. This meant x-ray units were being used from the start of the war to identify bullets and shrapnel in injured soldiers. This was important because if shrapnel was not removed it would lead to infection, so it allowed surgeons to locate where it was embedded.

There were **528** x-ray units being used on the Western Front by the British and **6** of these were mobile. However there were a number of issues with the x-ray units used on the Western Front:

- X-rays couldn't detect clothing which could be taken into the body along with shrapnel and would still cause infection even if all the shrapnel was removed.
- It took several minutes to take an x-ray and the soldier would have to remain very still which would be difficult if they were badly injured.
- The tubes used within the x-ray machines would overheat so they would have to be left to cool down. This made it difficult when there were so many injured soldiers.
- The quality of images from mobile units wasn't as good as static units.



Developments in blood transfusions

Human blood transfusions were being carried out from as early as the 1800s by the likes of **James Blundell**, but many of the transfusions were unsuccessful. The success rate improved after **1901** when blood groups were discovered by **Karl Landsteiner** which meant the correct blood type could be used, reducing the chance of rejection.

However by 1914, there were no effective ways of storing blood and preventing it from clotting. During the First World War, there were several developments in this area:

- The **syringe-cannula** technique was developed where a syringe was used to transfer blood from the donor to the patients (however, blood could still clot in the syringe).
- In 1915, it was discovered that adding **sodium citrate** to the blood would prevent it from clotting and allow it to be stored for up to 2 days (if also refrigerated).
- In 1916, it was discovered that adding **citrate glucose solution** would allow blood to be stored for up to 4 weeks.

These developments were important because it meant that the direct transfusion from the donor to the patient was no longer necessary and it meant that blood banks could be set up where blood would be stored in preparation for battles. E.g. the **first blood bank at Cambrai**.



Dealing with leg injuries

Wounds to the leg (shrapnel, bullet wounds) were very serious, especially in the **femur** which could lead to major blood loss. At the start of the war, **80%** of men who suffered this sort of injury in the trenches died.

A surgeon named **Robert Jones** began to treat this injury using the **Thomas Splint** and it was being used on the Western Front from 1916. The Thomas Splint was strapped around the broken leg before the casualty was moved. This stopped the leg from moving, so that further damage was prevented. This was an improvement on the splints used at the start of the war as they didn't stop the leg from moving completely so there was more chance of blood loss and infection.

The use of the Thomas Splint meant that the **survival rate increased to 82%.**

Robert Jones also released a book that instructed doctors in Britain how to treat complicated shoulder, leg, arm, spinal and pelvic fractures.



Dealing with infection

Before the war, there had already been some developments in dealing with infection. For example, carbolic acid was used in surgery and by the 1900s **aseptic surgery** was also in use e.g. steam sterilisation.

However, infection was still very serious for soldiers on the Western Front; if it wasn't dealt with quickly, it would spread and kill them. There were several methods to deal with infected wounds:

- **Carbolic acid** was still used e.g. bandages were soaked in it and carbolic lotion applied to the wound. But it wasn't effective on all infections e.g. gas gangrene.
- **Debridement** - the infected flesh would be cut away during surgery to try and prevent the infection from spreading further. But if any amount of infected tissue remained it would continue to spread.
- The **Carrel-Dakin method**. This was a technique used from 1915, tubes with small holes in the end would be put inside the infected wound and a saline (salt) solution would be flushed through the tubes and into the wound for 6 hours. The wound would be bandaged over whilst this happened and a patient may need several rounds of this treatment. This method was more effective at treating gas gangrene.
- **Amputations** were a last resort, if attempts at treating the infection failed. Amputations were necessary or the soldier would die. This also led to the development of **prosthetic limbs**, of which there were 26,000 fitted at Queen Mary's Hospital alone.



Developments in plastic surgery

Despite **Brodie helmets** being introduced in 1915, there were still lots of serious facial injuries. This meant many soldiers were left **disfigured** and this led to advancements in plastic surgery and facial reconstruction.

The key individual who pioneered new techniques in plastic surgery was a surgeon named **Harold Gillies**. He was interested in how to reconstruct soldier's faces.

He developed the '**tube-pedicle**', where a skin-graft would be taken and formed into a tube shape to prevent infection. Months later, once healed, this tube could then be moved to reconstruct the face, e.g. form a new nose or mouth.

It could take years and many surgeries for the process of facial reconstruction to be completed and for the patient to recover. This meant this type of surgery happened back in Britain e.g. the **Queen's hospital in Kent**.



Developments in brain surgery

Head injuries were common on the Western Front and there was a lack of doctors who had experience in **neurosurgery** at the start of the war.

However, one key individual named **Harvey Cushing** helped to develop new techniques in brain surgery which led to progress in the treatment of head injuries.

- He stressed the importance of using a **local anaesthetic** rather than a **general anesthetic** when performing brain surgery as this would prevent the brain from swelling.
- He used **magnets** to carefully removed shrapnel from the brain.
- He stressed the importance of operating quickly on soldiers with head injuries.
- In 1917, the survival rate of Cushing's patients increased from **50% to 71%** using these techniques.



Glossary

- **Amputation** - The removal of part of the body e.g. a leg
- **Debridement** - The removal of damaged tissue from a wound
- **Disfigured** - When someone's appearance is harmed
- **Femur** - The thigh bone
- **General anesthetic** - When the patient is put to sleep.
- **Local anesthetic** - When the patient is awake during an operation but the area is numbed so the patient can't feel pain.
- **Neurosurgery** - Surgery to do with the brain, spinal cord or nervous system
- **Prosthetic limbs** - Fake (artificial) limbs



Comprehension Questions

1. Read source A. Explain 2 things you can learn about how wounded soldiers were treated on the Western Front and support with quotes.
2. Why is source A **useful** for finding out about the development of medical treatment on the Western Front? **HINT:** Remember the questions we ask when analysing the utility of sources.
 - **What does Source A tell you about treatment on the Western Front?**
 - **How can you support source A with your own knowledge?**
 - **Where does the source come from and how does this affect the usefulness of the source?**
3. Describe two new techniques developed as a result of war on the Western Front.
4. Which area of medical treatment do you think saw the most development and why?
5. Challenge question: How far did medical treatment advance as a result of war on the Western Front?
 - **Use the sentence starters below to help you:**
 - **To some extent war on the Western Front did help medical treatment to advance because...**
 - **However, it could be argued that advances in medical treatment were limited because...**

