

Joseph Lister: father of modern surgery

This year marks the centenary of the death, in 1912, of Joseph Lister, in my opinion the greatest contributor to the science of surgery in this country, if not in the world. Indeed, 12 August 1865, the date of Lister's first operation under antiseptic surgical conditions, represents the watershed between long centuries of almost inevitable sepsis and risk of death following the most minor surgical procedures and the 'modern' era of surgery.

Joseph Lister was born in 1827 in Upton, then a village in Essex, now swallowed up as a suburb of outer East London. His father, Joseph Jackson Lister, was a devout Quaker and a successful (teetotal) wine merchant. He was also a distinguished microscopist, who ground his own lenses and devised and built the achromatic microscope, the principle of the microscopes that we use today.

Joseph entered University College London as a medical student at the age of 17 years, passed his MRCS in 1852 and obtained his MB (London) the following year. With a letter of introduction from William Sharpey, his Professor of Physiology, Lister obtained the post of house surgeon to James Syme at the Royal Infirmary, Edinburgh. A warm relationship developed between the two – Lister became Syme's assistant, and married his daughter, Agnes. At the age of 33 years, in 1860, Lister was appointed Regius Professor of Surgery at the Glasgow Royal Infirmary.

Lister was interested in inflammation and wound healing and had carried out studies of the microscopic vascular changes in the web of the frog's foot in this process. Surgeons, of course, were only too familiar with the sepsis that occurred even in the most trivial wounds. The standard belief was that this was caused by air entering the wound. In 1865, John Anderson, the Professor of Chemistry at Glasgow, told Lister of the work of Louis Pasteur, who showed that wine, milk and urine would go mouldy when exposed to air, not

because of the air itself but because of the microscopic organisms present in the air. Immediately, Lister put the two together – it was the presence of these 'minute organisms' introduced into wounds that produced the septic process. It was obvious that heat could not be used – as in Pasteur's experiments on boiling the wine – to kill these microbes, and Lister experimented with various chemicals without success. Anderson then told him that carbolic acid was successfully used to treat stinking sewage – a smell similar to the surgical wards at the Glasgow Royal Infirmary.

In 1865, Lister treated a boy of 11 years with a compound fracture of the tibia by cleaning out the wound carefully with crude carbolic acid, covering the wound with a carbolic soaked dressing and then splinting the fracture. Six weeks later, the boy walked out of hospital healed. Lister delayed publishing results until ten more fracture patients had been treated by the antiseptic technique. There was one case of infection requiring amputation, and one death from secondary haemorrhage in spite of ligation of the femoral artery (reading the notes, the patient would have been saved if blood transfusion had been available in those days). The remaining nine patients all healed and survived.

Up to that time, Lister's collected figures showed that compound fractures at the Royal Infirmary had a 50% mortality and 90% amputation rate. Lister's first publication of his dramatic results appeared in *The Lancet*, in five successive issues in 1867.

By 1870, Lister was confident enough in his technique to venture into new fields of surgery. Up to that time, surgeons feared to make a wound through intact skin because of the extreme risk of wound infection – even something as simple as removing a sebaceous cyst might be followed by fulminating sepsis. Now new vistas of surgery lay open – Lister performed open reduction of a fractured patella, wiring the ends of the bone together, he wired a closed and displaced fracture of the olecranon, excised tuberculous wrist joints and drained large tuberculous

abscesses. The external iliac artery was successfully ligated in a woman with a large femoral aneurysm. He carried out a mastectomy for cancer with clearance of the axilla. Miraculously, it seemed, the wounds healed without suppuration or spreading gangrene.

Lister's technique was very simple – frequently he did not even take off his coat. The surgeon's hands and those of his assistants and the skin of the patient were washed with carbolic. Carbolic-soaked towels were placed around the operative area; the instruments, sponges and suture material were soaked in carbolic. The operating table was a plain padded wooden board, while gas or candles supplied the necessary illumination.

One would imagine that Lister's results would have spoken for themselves. Visitors to his theatre and wards were impressed and took his ideas into their practice, and this applied especially to overseas, particularly German, surgeons, who gradually modified his methods into modern 'aseptic surgery', with its steam sterilising machines, gowns, gloves and so on. Many surgeons, however, especially in this country, simply regarded carbolic as just another of the dozens of salves and ointments that had been tried over the centuries. It took a remarkable two decades of lectures, articles and patient demonstrations before surgeons world-wide were finally won over to Lister's principles.

In 1869 Lister returned to Edinburgh as Professor of Clinical Surgery. Then, in 1877, he accepted the invitation to the Chair of Surgery at King's College, London, in order to spread his teachings to the metropolis. In 1883 he was created a baronet – the first surgeon to be elevated to the peerage – and in 1902 he was awarded the newly created Order of Merit by King Edward VII. In 1907 his health began to fade, he became almost blind and he died of pneumonia on 10 February 1912. Lister refused to be buried in Westminster Abbey and lies beside Agnes in West Hampstead cemetery after a crowded public funeral service at the Abbey. **BJHM**

Conflict of interest: none.

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