Sir Charles Bell: surgeon, anatomist, teacher and artist

This year is the 175th anniversary of the death, in 1842, of Sir Charles Bell. Bell, who distinguished himself as a surgeon, made important observations on the central and peripheral nervous system, was a popular teacher and illustrated his publications with his own exceptional art work. To this day he is eponymously remembered in the terms Bell's palsy (paralysis of the facial nerve) and the Bell–Magendie law (the anterior roots of the spinal cord convey motor nerve fibres, while sensation is transmitted in the posterior spinal roots).

Charles Bell was born in Edinburgh in 1774, the fourth son and seventh child of a clergyman. Bell's father died when he was only 5 years old, and the child was educated in his early years by his mother, herself the daughter of a clergyman and from whom Charles no doubt acquired his considerable artistic skills.

Determining on a career in medicine and no doubt encouraged by his elder brother John, 11 years his senior, who was already practising as a surgeon, young Bell attended courses in anatomy, botany, chemistry and practice of medicine, as well as following clinical lectures at the Royal Infirmary. While still a student, Charles joined his brother John, who was teaching surgery and anatomy in the Edinburgh extramural school, and took over the anatomy teaching. He became adept at making wax models of anatomical and pathological specimens to use in his classes.

In 1798, while still a student, Charles published his first book 'A System of Dissection', illustrated by his own splendid figures, which proved to be a popular work. The following year, Bell was admitted as Fellow of the Royal College of Surgeons of Edinburgh and commenced surgical practice. In 1802, Charles published 'The Anatomy of the Brain explained in a Series of Engravings'. This was followed in 1803 by 'A series of engravings explaining the courses of the nerves' – again, brilliantly illustrated by Charles. He then went on, with his brother John, to publish an 'Anatomy of the Human Body' in 1811.

Bell showed that division of the posterior roots of the spinal cord could be performed in the experimental animal without producing muscle contractions, whereas touching the anterior roots with a knife did so. It was the experimental work of the French physiologist François Magendie in 1822 that established clearly that the anterior spinal roots subserve motor activity and that the posterior roots convey sensation (the Bell–Magendie law).

In his lectures, Bell stressed the anatomy and functions of the different parts of the brain, which did not constitute a common sensorium, as was generally thought, but in which different anatomical structures had different functions. In 1804, Bell decided to move to London and in 1806 published his beautiful book 'The Anatomy of Facial Expression', with dissections of the facial musculature, correlating these individual muscles with facial movements.

His early years in the metropolis were a struggle, but in 1811 he married and used all of his dowry money to buy a share in the School of Medicine in Great Windmill Street, Leicester Square, which had originally been established by John Hunter. Here, Bell taught postgraduate anatomy and surgery. This was followed, in 1814, by his appointment as a surgeon to the Middlesex Hospital. His position in London was now soundly established. In 1824 came the appointment of Professor of Anatomy and Surgery at the Royal College of Surgeons. Subsequently he became a member of its Council and he was knighted by King William IV in 1831.

Bell had two short, but extremely rewarding, exposures to military surgery. In January 1809, large numbers of casualties from the British evacuation of Corunna in the Peninsular war arrived at the south coast ports. The shortage of military surgeons was met by volunteers from London, among them Charles Bell, who travelled to Portsmouth with his surgical instruments. Bell not only helped deal with the wounded, but made sketches of his cases, and later completed his studies life sized and in oils. This important collection is now in the keeping of the Royal College of Surgeons of Edinburgh. They give a vivid picture of the effects of missile injuries in the days before antisepsis. I advise readers to look at them in 'A Surgical Artist at War: The Paintings and Sketches of Sir Charles Bell 1809–1815' (Crumplin and Starling, 2005). Bell later wrote up his experiences in his 'Dissertation on gun-shot wounds', published in 1814.

In 1815, hearing of the Battle of Waterloo on 18 June, Bell and his assistants travelled to Brussels, where he operated for 12 hours a day. Once again, he recorded his patients in sketches, which he worked up into watercolours when he got back to London for use in his teaching.

In 1836, Bell accepted the invitation to fill the vacancy of Professor of Surgery at the University of Edinburgh and here he spent his remaining years. Sadly, this period was marred by his suffering from angina pectoris, which restricted his activities and his earning capacity. He died in April 1842 from a heart attack while on a visit to friends at Haller Park near Worcester and was buried in the church yard there, leaving his poor widow in difficult financial circumstances. Fortunately, she was awarded a civilian pension by Sir Robert Peel's government.

I have to confess that Charles Bell is one of my surgical heroes. I use slides of his paintings to illustrate my lecture on missile injuries. A particular favourite is that of a soldier with tetanus exhibiting opisthotonic spasm – arms clenched and spine arched so that he is balanced on the back of his head and his heels. I saw a child dying of tetanus when I was a young surgical registrar in 1954, but, thanks to barbiturates, his spasms never reached this level of severity. **BJHM**

Conflict of interest: none.

Crumplin KH, Starling P, eds (2005) *A Surgical Artist at War: The Paintings and Sketches of Sir Charles Bell 1809–1815.* Royal College of Surgeons, London

Professor Harold Ellis is Emeritus Professor of Surgery, Guy's, King's and St Thomas' School of Biomedical Sciences, London SE1 1UL