

John Hunter's teachings on gunshot wounds

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John Hunter (1728–1793) was a brilliant observer, naturalist and thinker. His philosophy of surgery and his teachings were based on close observation of patients and he claimed to pay scant attention to the writings of his contemporaries or his predecessors. His concept of the correct management of gunshot wounds was one of conservatism; however, his teaching was largely ignored by military surgeons of the time and has come in for considerable criticism by later authorities. A study of Hunter's actual observations and writings on this subject casts light on the development of his attitude to war wounds.

Hunter was born in East Kilbride, some seven miles south of Glasgow. He was slow in learning to read and write, disliked school and preferred to wander through the countryside observing Nature. Hunter in after years remarked:

‘When I was a boy, I wanted to know all about the clouds and grasses, and why the leaves changed colour in Autumn; I watched the ants, birds, bees, tadpoles and caddis worms; I pestered people with questions about what nobody knew or cared anything about’¹.

At the age of 20, having failed to find any vocation, he joined his brother William, ten years his senior, in London, where he had already established a reputation as a ‘man-midwife’. John entered as surgeon pupil at the newly founded St George's Hospital and joined William first as anatomy prosector and then as teacher in his private anatomy school in Great Windmill Street, Soho. Here he at last found his metier as a skilled dissector and investigator.

After years spent in the confined and unhealthy atmosphere of the dissecting room, Hunter joined the Army as surgeon in 1760, at the age of 32. Sir Everard Home (1756–1832), surgeon at St George's and Hunter's brother-in-law and biographer, wrote:

‘His health was so much impaired by excessive attention to his pursuits that in the year 1760 he was advised to go abroad, having complaints in his breast, which threatened to be consumptive. In October of that year, Mr. Adair, inspector general of hospitals, appointed him a surgeon on the staff’².

OBSERVATIONS AT BELLE ISLE

The Seven Years War had been in progress already for five years, with England in support of Frederick the Great of Prussia. In 1761 Hunter was sent to accompany the British expedition to Belle Isle, off the Quiberon peninsula of Brittany. Between May and June of that year, Hunter experienced his main exposure to gunshot wounds, there being some 700 British killed and wounded during the campaign. The following year, Spain entered the war on the side of England's enemies. Hunter accompanied the troops sent to Portugal but there was little fighting in this campaign and little was added to his experience with war wounds.

Returning to London in May 1763, Hunter went back to teaching anatomy, but five years later, at the age of 40, he was appointed to the surgical staff at St George's and remained on its staff for the rest of his life.

In 1792, on the death of Robert Adair, Hunter was appointed Inspector General of Hospitals and Surgeon General to the Army in his place. At this stage he wrote up his lifetime's observations and experiments in his *Treatise on the Blood, Inflammation and Gun-shot Wounds*², which was published posthumously in 1794 with a biographical note by Everard Home. Much of the section on gunshot wounds was based on Hunter's observations recorded during the Belle Isle campaign over 30 years previously.

Hunter was singularly unimpressed by his fellow surgeons on Belle Isle; the military surgeons of that period were for the most part ignorant, poorly trained and certainly badly paid. The standard treatment of war wounds was deplorable. It comprised wholesale blood-letting together with wide opening or brutal dilatation of the wound, extensive probing to search for the missile, and liberal recourse to amputation. He wrote in a letter from Belle Isle, ‘My fellow creatures at the hospital are a damned disagreeable set’, and added, ‘My practice in gun-shot wounds has been in great measure different from all others, so that I have had the eyes of all the surgeons upon me.’

Hunter was greatly impressed by his close study of four French and one English soldiers wounded on the first day of the fighting and who had received no early surgical treatment. The French soldiers had hidden themselves in a farmhouse and had not had their wounds attended by a surgeon until they were discovered and taken prisoner on the fifth day, yet their bullet wounds of thigh, chest, knee and arm, respectively, all healed with superficial dressings

only. The Englishman was wounded by a musket ball through the upper arm. He was taken prisoner by the French, treated only with a superficial dressing, escaped after two weeks as a prisoner, and achieved a satisfactory outcome, again with minimal treatment. These clinical observations fitted in well with Hunter's generally conservative attitude; he regarded operative surgery as a mutilation of the patient and an admission of failure to cure by more physiological means.

MANAGEMENT OF DEAD TISSUE

Hunter clearly recognized that gunshot wounds differed from other open injuries because of their increased degree of tissue damage. He wrote:

'Gun-shot wounds are in general contused wounds from which contusion the solids surrounding the wound deaden. [The dead tissue] is thrown off in the form of a slough which prevents such wounds from healing by first intention...most of them must be allowed to suppurate.'

He was also well aware that the amount of dead tissue produced was proportional to the velocity of the missile. He decried the practice of dilating or enlarging the skin wound in searching for the missile, which, more often than not, could not be found and, even if found, was frequently irremovable. The bullet itself, indeed, seldom caused harm when left at rest, unless in a vital part.

So Hunter preached conservatism—let the wound suppurate; leave it to the victim's body to throw off the dead material in the form of a slough. However, he was quite clear of his indications for active surgical intervention. These were:

- 1 If the foreign body is superficial and easily removable through the wound opening
- 2 If an artery is wounded and requires ligation
- 3 If a fracture of the skull indicates the need for trephination
- 4 If, in an abdominal wound, gut or omentum protrudes and requires reposition
- 5 If a vital part is pressed upon, 'such as will often happen with fractures of the skull, ribs, sternum, etc.'

Hunter deprecated early amputation unless the limb were to be hanging all but detached or if there was major vascular injury. We now realize that Hunter's surgical contemporaries, when exploring and enlarging these wounds, were introducing further contamination from their filthy fingers and instruments, as well as opening tissue planes for further spread of infection. Moreover, without

the benefit of anaesthesia, it was often impossible to locate, let alone remove, the offending missile.

GUTHRIE AND AMPUTATION

1792, the year before Hunter died, saw the beginning of the series of wars that followed the French Revolution, which were to engulf Europe for the next 23 years and which were only to end on the battlefield of Waterloo in 1815. British military surgeons, who were to gain immense battle experience, largely ignored Hunter's teachings and the reason can be found in the pages of *A Treatise on Gun-shot Wounds* by George James Guthrie (1785–1856)³. Guthrie served as surgeon in Canada, then saw several years of extensive war surgery as Wellington's principal surgeon in the Peninsula campaign; returning home in 1814, he was recalled for the Waterloo campaign, where once again he served with distinction. He was then appointed to the staff of Westminster Hospital. Guthrie was a firm advocate of immediate amputation for compound fractures and joint injuries resulting from missile wounds. He wrote that, if amputation be not performed, 'Pain, heat, redness, tumefaction of neighbouring parts constituting inflammation comes on, which speedily runs into suppuration or gangrene...fever become more violent and frequently ends in death in the course of a few days.'

Guthrie was well aware of the difference between most injuries produced by musket balls, which even at fairly close range result in what we now term low-velocity missile wounds with little tissue destruction, and the formidable tissue destruction produced by cannon balls. Guthrie writes, 'There is an incalculable difference on many occasions between the effects of injury by cannon and of musket shot in the same part'. He stresses that most of the observations in his treatise on the importance of early amputation apply to serious wounds from cannon shot or shells.

There is no doubt, from reading Hunter's work, that his observations were based, primarily, on musket or pistol wounds and, as stressed by Guthrie, on limited experience. Guthrie states: 'Hunter wrote from his knowledge of principles unbiased by a particular theory and from having some *opportunities of practice*'.

Guthrie admits the only way to prove the wisdom of his advice would be by what today we would call a prospective randomized clinical trial, in which comparable wounds would be treated either by early amputation or by delay with secondary amputation performed as and when indicated, but he comments, 'I do not myself feel authorized to commit murder for the sake of experiment.'

On the French side, Dominique Jean Larrey (1766–1842), chief surgeon to Napoleon's Imperial Guard and perhaps the greatest military surgeon of all time, was a firm

proponent of immediate amputation for all major limb trauma on the battlefield. Indeed, he performed no fewer than 200 amputations in 24 hours at the battle of Borodino in the Russian campaign. Perhaps the greatest compliment paid to Guthrie was that he was referred to as the 'English Larrey'.

HIGH-VELOCITY INJURY

All this was to change. Half a century after Waterloo, the knowledge of the bacterial nature of wound infection resulting from the work of Louis Pasteur and Joseph Lister led to the introduction of the antiseptic technique⁴. This, together with radical improvements in hospital hygiene, was followed by a dramatic fall in wound sepsis in elective surgery and trauma surgery of civilian practice, with its less extensive tissue destruction. The dreadful wounds of the First World War in 1914, with high-velocity missiles resulting in massive tissue destruction, led to a return to Hunter's fundamental concept of the malign effect of devitalized tissues in wounds, now recognized as a superb pabulum for the growth of anaerobic bacteria: 'When the

life of a part has been destroyed by the accident it must necessarily suppurate'².

A combination of antiseptic surgery with complete excision of all devitalized tissue and delayed primary suture practised by the frontline surgeons from 1915 onwards, reinforced in the Second World War by the introduction of antibiotics, has today largely overcome the fearful mortality and morbidity of high-velocity missile wounds. How delighted John Hunter would have been to see the validation of his concept of the importance of ridding the wound of its sloughs.

REFERENCES

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