Blasts from the past

Jim Horne with what must surely be the goriest article in the history of The Psychologist

Much has been written in *The Psychologist* (eg. Macmillan, 2008) and elsewhere about Phineas Gage. Many of us know how, as a result of a railroad accident in 1848, Gage lost part of the frontal area of his brain, and lived a different but reasonable life until his death 12 years later, following a series of fits. However, few readers will be aware of many rather similar accounts of this era – even much earlier – of people (all men) surviving with little apparent ill effect, after losing significant portions of the same brain region. Many of the injured were soldiers who had been hit by musket balls, or who were victims of their own musket breech backfiring into the forehead after aiming and firing.

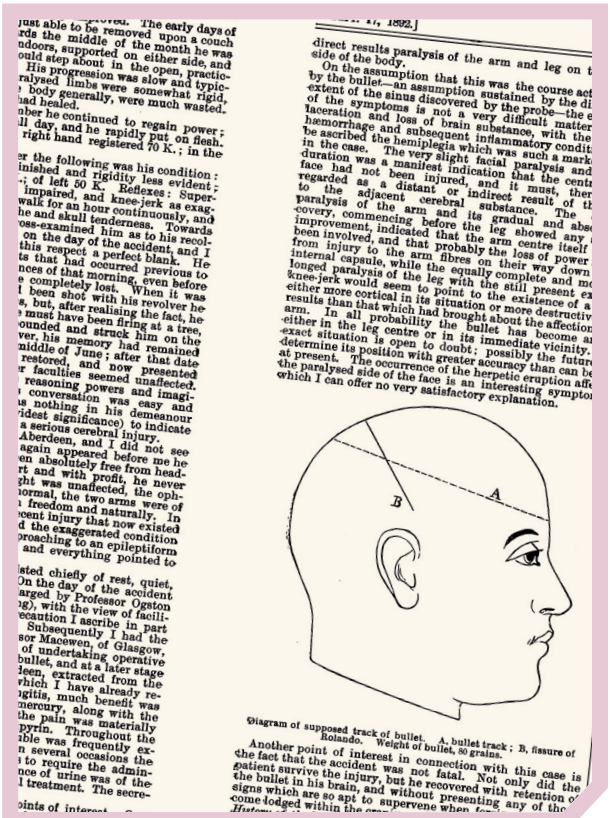
The *British Medical Journal* (BMJ) has quite a selection of these remarkable accounts. For example, in the 'Case of recovery after compound fracture of the frontal bone and loss of cerebral substance', George Mallet MD (BMJ, 15 July 1853, p.610), describes how Mr R. Booth, a 60-year-old stonemason, was struck on the head by the handle of a rapidly rotating windlass. After being knocked out, and then carried by his fellow labourers back to his house, his situation was considered hopeless by a passing 'medical gentleman'. Surprisingly, the next day he was still alive, and his GP (Dr Mallet), was called, to find that Booth was still 'insensible', having sustained a compound fracture of the entire breadth of frontal bone, with a large piece driven into the brain, 'a very considerable quantity of the cerebral matter was adherent to the adjoining parts… the quantity of the brain lost could not be accurately estimated, but it was not thought not be less than from one to two tablespoonfuls'.

Assisted by a medical friend, Dr Mallet proceeded to remove 12 bone fragments deeply embedded into the cortex, and, 'still the man remained quite insensible to our operations; but on the extraction of the thirteenth, the last, which was a larger piece and more deeply imbedded than the others, he started up in bed and uttered – no doubt from his accustomed habit, and quite unconscious of what had been going on – an oath'. Dressings were applied, and Booth was left until the next morning, when Dr Mallet found him 'quite sensible and exhibiting no unfavourable symptoms'. The only medication he subsequently received was castor oil, for his bowels.

Three months later Dr Mallet reported that Booth had walked three miles to the surgery, and that 'pulsations of the brain were seen immediately under the newly formed skin… his intellect, as far as I could judge, was unimpaired; and the muscular power not at all paralysed. I never saw him afterwards'.

An extraordinary report by P. Blaikie Smith MD, again in the BMJ (7 September 1892, p.627–629), entitled, 'Revolver wound of the brain; lodgment of the bullet; recovery', was of 'a young gentleman in the best of health and spirits [who] accidentally shot himself with his revolver'. '…Blood and cerebral matter issued slowly from a wound in his forehead…over the right eyebrow.' How he survived what happened next can only be a tribute to the seemingly pointless but extraordinary dexterity of Dr Smith, who 'inserted a director into the wound …the instrument was slowly and carefully passed onwards for its whole length into the brain… gradually assuming an upward direction… ending not far from the upper extremity of the fissure of Rolando'. Thankfully, 'no resistance to the progress of the director was experienced and no trace of the bullet could be discovered upon careful searching… towards the vault of the cranium'. His patient remained conscious but drowsy, could speak slowly in monosyllables, and had 'very slight paralysis of the left side of his face chiefly in the vicinity of the mouth… but the left arm and leg were completely paralysed'. For those interested, Dr Smith kindly provides a drawing of the track the bullet took through the brain (see picture below).

The patient occasionally complained of a headache, and after four days some slight improvement was noted, and the facial paralysis had disappeared, but he 'always lay as if he were asleep… and indeed did sleep a great deal – yet he could easily be roused, and when he spoke his articulation was faster and his replies more prompt than before'. He recognised the voices of others but kept his eyes mostly closed, 'and on several occasions inquired about the pursuits of


direct results paralysis of the arm and leg on t
side of the body.
On the assumption that this was the course act
by the bullet—an assumption sustained by the di
extent of the sinus discovered by the probe—the e
of the symptoms is not a very difficult matter
laceration and loss of brain substance, with the
haemorrhage and subsequent inflammatory condit
be ascribed the hemiplegia which was such a mark
in the case. The very slight facial paralysis and
duration was a manifest indication that the centr
face had not been injured, and it must, ther
regarded as a distant or indirect result of th
to the adjacent cerebral substance. The
paralysis of the arm and its gradual and abs
covery, commencing before the leg showed any
improvement, indicated that the arm centre itself
been involved, and that probably the loss of power
from injury to the arm fibres on their way down
internal capsule, while the equally complete and m
longed paralysis of the leg with the still present ex
knee-jerk would seem to point to the existence of
either more cortical in its situation or more destructiv
results than that which had brought about the affection
arm. In all probability the bullet has become a
either in the leg centre or in its immediate vicinity
-exact situation is open to doubt, possibly the futur
determine its position with greater accuracy than can be
at present. The occurrence of the herpetic eruption affe
the paralysed side of the face is an interesting symptom
which I can offer no very satisfactory explanation.
just able to be removed upon a couch
rds the middle of the month he was
ndoors, supported on either side, and
ould step about in the open, practic-
His progression was slow and typic-
ralysed limbs were somewhat rigid,
body generally, were much wasted.
had healed.
nber he continued to regain power;
ll day, and he rapidly put on flesh.
right hand registered 70 K.; in the
er the following was his condition:
inished and rigidity less evident;
-; of left 50 K. Reflexes: Super-
impaired, and knee-jerk as exag-
walk for an hour continuously, and
he and skull tenderness. Towards
oss-examined him as to his recol-
on the day of the accident, and I
this respect a perfect blank. He
ts that had occurred previous to
nces of that morning, even before
e completely lost. When it was
been shot with his revolver he
s, but, after realising the fact, he
must have been firing at a tree,
ounded and struck him on the
ver, his memory had remained
middle of June; after that date
restored, and now presented
r faculties seemed unaffected.
reasoning powers and imagi-
conversation was easy and
s nothing in his demeanour
idest significance) to indicate
a serious cerebral injury.
Aberdeen, and I did not see
again appeared before me he
en absolutely free from head-
rt and with profit, he never
ght was unaffected, the oph-
normal, the two arms were of
freedom and naturally. In
cent injury that now existed
d the exaggerated condition
proaching to an epileptiform
and everything pointed to
sted chiefly of rest, quiet,
On the day of the accident
arged by Professor Ogston
g), with the view of facili-
ecaution I ascribe in part
Subsequently I had the
sor Macewen, of Glasgow,
of undertaking operative
bullet, and at a later stage
leen, extracted from the
which I have already re-
gitis, much benefit was
mercury, along with the
the pain was materially
pyrin. Throughout the
ible was frequently ex-
n several occasions the
s to require the admin-
nce of urine was of the
l treatment. The secre-
oints of interest.
B
A
Diagram of supposed track of bullet. A, bullet track; B, fissure of Rolando. Weight of bullet, 80 grains.
Another point of interest in connection with this case is the fact that the accident was not fatal. Not only did the patient survive the injury, but he recovered with retention of the bullet in his brain, and without presenting any of the signs which are so apt to supervene when [illegible] come lodged within the

references

Harlow, J.M. (1868). Recovery from the passage of an iron bar through the head. *Publications of the Massachusetts Medical Society, 2*, 327–347.

Macmillan, M. (2008). Phineas Gage – unravelling the myth. *The Psychologist, 21*, 828–831. See www.bps.org.uk/gage

his brothers, and showed an interest in lawn tennis'. Over the next three weeks the left hemiplegia improved somewhat, and 'his progress continued to be most satisfactory', although there was a temporary relapse with high fever and headache, diagnosed as 'meningitis', treated by mercury and ice to the head, it subsided over another week. Steady recovery continued to be maintained over the next two months, with the hemiplegia 'greatly diminished… could walk for an hour and was quite free of headache'. Although having no recollection of the event itself, his memory by now was 'nothing abnormal'. Moreover, 'his other faculties seemed unaffected… reasoning and imagination unimpaired... conversation easy and natural… nothing to indicate that he had been the subject of a serious cerebral injury'. Six months later he was 'perfectly well… two arms of equal power… walked naturally… apart from the scar on his forehead and an exaggerated left knee jerk'. There was no epilepsy. Dr Smith ends by noting that treatment consisted chiefly of 'rest, quiet, good nursing and suitable diet', and directed the reader to another case 'wonderfully like that of my patient' of an American boy who, the year before, had also accidentally shot himself in the forehead, and after some extradural surgery had fully recovered with in a year, and had become 'expert in riding a bicycle'.

There are many earlier cases of battle injuries, and a comprehensive account can be found in a lengthy editorial the *British Medical Journal* of 1853 (29 April, pp.375–376), entitled, 'Cases of recovery after loss of portions of the brain'. The earliest reference was to a 'small work' written by Dr James Younge, entitled 'Wounds of the Brain Proved Curable' published in 1682, where the latter had amassed opinions of 60 other authors covering over 100 observations, even including those of Galen. More specific accounts, in this editorial, of frontal trauma, begin with one from the Battle of Waterloo (1815) when a ball entered a soldier's left frontal bone and lodged within his brain. He developed left side hemiplegia and 'loss of memory of proper names, and of some names of objects'. However, he fully recovered from these symptoms, rejoined the army and lived for another 12 years, eventually dying of TB.

The next case, a few years later, was based on a report by Dr John Edmonson, in the *Edinburgh Medical and Surgical Journal* of April 1822 (p.199), of a 15-year-old soldier who was wounded by the bursting breech of an overloaded small cannon. Shrapnel blew through his forehead, resulting in the loss of a piece of frontal bone measuring 2½ x 1¼ inches together with 32 other pieces of bone and metal that were removed from the frontal part of his brain, together with, 'more than a tablespoon of cerebral substance… portions of brain were also discharged at three dressings'. The account went on to say, 'at no period were there any symptoms referable to this injury… during the time that the brain was discharged he is reported as giving correct answers to questions put to him, and as being perfectly rational'. By three months the wound had closed, and 'he was reported in perfect health, and having suffered no derangement of his mental capacities'.

> "pulsations of the brain were seen immediately under the newly formed skin"

In 1827 came a report by a Dr Rogers in the *Medico-Chirurgical Transactions*, where a young man received a frontal impact, again from a breech explosion. It was not until another three weeks, when the soldier, 'discovered a piece of iron lodged within the head in the bottom of the wound from which a considerable quantity of bone had come away… it proved to be the breech pin of the gun three inches in length and three ounces in weight'. Four months later he was 'perfectly cured'. Another case, here, was of an exploding breech pin penetrating 1½ inches into the brain, making a hole ¾ inch in diameter, resulting in an 'escape of cerebral substance'. But 'no severe symptoms occurred, and recovery took place in less than 24 days'.

A Dr De Barbe reported in an 1853 issue of the *Gazette des Hôspitaux Chaumes* on a soldier hit by pieces of the breech that penetrated 'above the centre of the left eyebrow'. Nevertheless, for whatever reason, 'he was able to search for the fragments of the gun and walk some distance to the hospital. When the piece of the gun was removed, a spoonful of cerebral matter escaped'. Moreover, 'there was no disturbance of intellect, nor of the senses, nor of speech throughout the progress of the case. On the twelfth day the patient was discharged, cured.' In the next issue of the same *Gazette*, more cases were described whereby 'injuries to the brain are not only less fatal than commonly supposed, but less frequently followed by severe symptoms'.

One advantage of gunpowder is that it is also a strong antiseptic, which soldiers would sprinkle on battle wounds. As the foreheads of these victims were probably fortuitously coated with gunpowder dust, before penetration by what would have been a sterile piece of breech, the risk of infection was reduced. Fortunately, with the introduction of the rifle and all-metal cartridges, around 1860, most of these injuries disappeared, as did the musket.

The apparently benign outcomes of these cases seems to contrast with that of Phineas Gage, whose personality apparently markedly changed, his behaviour becoming risqué, bawdy and uninhibited, which might well be due to his having a more extensive (orbito) frontal trauma. Of course, as Macmillan (2008) noted, this might not have been as great as is thought: much of what we know about Gage comes from his physician Dr John Martyn Harlow, who enjoyed much fame and fortune as a result of Gage's accident, culminating in a 20-page paper, eight years after Gage's death (Harlow, 1868). On the other hand, maybe the physicians treating these other cases I've mentioned might not have been familiar enough with their patients to spot more subtle changes in behaviour, given the usual deference and respect that would usually have been paid to their doctors.

The horrifying thought of a piece of metal being violently projected into the frontal cortex of these hapless individuals needs to be tempered with the scene, of around a hundred years later, set by Dr Walter Freeman. In 1946 Freeman invented the 'ice pick lobotomy'; a procedure requiring only a kitchen 'ice pick' and a rubber mallet. Often only using a mild tranquilliser on his patients, Freeman would niftily hammer the ice pick through the thin area of skull, just above the tear duct, and then sweep the pick back and forth to sever connections in his 'trans-orbital procedure'. With no apparent scars, his technique was seen as a great neurosurgical advance, able to be performed in mental hospitals lacking surgical facilities. Such was Freeman's zeal that he traversed the USA in his own van, which he called his 'lobotomobile', demonstrating the procedure at numerous medical centres, even in hotel rooms. Thankfully, he eventually lost his licence to practise having previously incapacitated President Kennedy' sister, Rosemary, and killing a patient who was seeing him for her third transorbital procedure.

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