The First Successful Acoustic Neuroma Removal the Importance of Historical Sources

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This paper is presented to correct what appears to be a historical inaccuracy and in doing so to warn against the evils of serial transgenerational misquotation. How easy it is to lift a reference, especially a historical reference, from the end of another writer’s paper rather than go back to source. May he who has never resorted to this misdemeanour lay his hand on his heart and proclaim his innocence. I too have, on occasion, been guilty as charged. But on this occasion I take a small step towards redemption.

The question to be addressed is “who performed the first successful acoustic neuroma removal?” – “successful” in this context implying “with survival of the patient”. For over a century the credit has gone to Sir Charles Ballance and he has been lauded in print by generations of intellectually and scientifically impeccable authorities. So who was Sir Charles Ballance? (Figure 1).

Ballance was born in 1856 and received his medical education at St Thomas’s Hospital in London. He was an outstanding student and went on to become an outstanding surgeon both at his alma mater and at the National Hospital for Nervous Diseases in Queen Square. He specialized both in otology and neurosurgery, working as he did with Sir Victor Horsley. He may well be regarded as the father of neuro-otology. He was founder and the first president of the Society of British Neurosurgeons. That said, he was also a skilled cardiac surgeon and during the Gallipoli campaign successfully removed a bullet from the heart of a wounded soldier. He is credited with performing the first mastoidectomy with ligation of the internal jugular vein, the first accessory-facial anastamosis and the first vestibular nerve section. Even towards the end of his life he was working with Duell in New York on facial nerve surgery. In his book “Some points in the surgery of the brain and its membranes” published in 1907 he describes an operation carried out in 1894 to remove a right-sided cerebellopontine angle tumour. It has found its way into the history books as an acoustic neuroma and serial writers ever since have taken the word of their predecessors at face value and perpetuated the diagnosis.

It was the great Harvey Cushing, however, who questioned the diagnosis in his 1917 monograph “Tumors of the Nervus Acusticus and the Syndrome of the Cerebellopontile (sic) Angle”. He thought that Ballance’s case was more likely to be a meningioma on the grounds that the tumour was broad-based and attached to the posterior surface of the petrous bone, and in his view, the accolade should go to the Edinburgh surgeon, Thomas Annandale, in 1895: “a brilliant surgical result the first recorded.” So who was Thomas Annandale? (Figure 2).

Annandale, from Newcastle-upon-Tyne, studied medicine in Edinburgh, where he eventually succeeded Joseph Lister as Regius Professor in 1877. Like all general surgeons of the day, he could turn his hand to anything, although most of his practice seems to have been orthopaedic. He was described as “Of medium height, sprightly in his walk, neat in his dress with his coloured necktie knotted in a loose bow after the fashion of his old master. He was a familiar figure in the streets of Edinburgh, saluted by the policemen on duty and by the “cabbies” on the rank for all of whom he had a cheery greeting. He was linked with the older school of surgery whose dexterity, rapidity of action, resourcefulness and courage were essentials of their craft, all of which qualities Annandale possessed” (Logan Turner 1937) [1].

Figure 1 Sir Charles Balance.
His famous case, described by Gibson (1896) [2] and by J Purvis Stewart (1895) [3] was a 25 year old pregnant lady from Dundee, who presented at Edinburgh Royal Infirmary with a 10 month history of frontal headache, giddiness and difficulty walking. She was unable to hear the ticking of a watch in her right ear or a tuning fork placed on the vertex. Examination of the eyes revealed optic neuritis (papilloedema) and both horizontal and vertical nystagmus. There was dilation of the left (ie contralateral) pupil, palatal weakness with regurgitation of fluids through the nose and changes in her voice. She had exaggerated tendon reflexes on both sides and ankle clonus. Her gait was broad based and she had a tendency to fall to the right side especially when standing with the feet together and the eyes closed. “There was therefore strong clinical evidence of a large posterior fossa lesion”. The differential diagnosis was tumour, gumma or tuberculoma.

The usual traditional nostrums were attempted—the antisyphilitic potassium iodide and inunction of the head with blue ointment over the right cerebellar hemisphere and the left frontal region. When they failed to improve things, Annandale operated on 3rd May 1895 and carried out a total piecemeal removal of a cerebellopontine angle tumour “the size of pigeons egg” The bird’s egg metric was loved by earlier physicians. Reference to authoritative ornithological sources suggests that Annandale’s tumour was around 3 x 2.5 cm. Furthermore it was associated with a cyst of around a drachm of clear serous fluid. The histological diagnosis was the commonly used but inaccurate term “fibrosarcoma” which seems to describe the appearance of an Antoni A acoustic neuroma.

Not only did the patient survive but subsequent correspondence from her general practitioner to Gibson states that she was neurologically intact apart from a hint of residual nystagmus. She went on to deliver a healthy baby.

Interestingly Dr Purvis-Stewart who was the house the surgeon at Edinburgh Royal Infirmary later moved to London where he collaborated with Ballance on peripheral nerve injuries and acquired both a hyphen and a knighthood.

The only way to resolve the question was to go to source and unearth Ballance’s original clinical and operation notes. A visit to the Royal Society of Medicine Library provided a copy of “Some points in the surgery of the brain and its membranes” delivered to me under the close scrutiny of the kid-glove clad librarian.

Ballance describes the presentation of his patient. She was a 49 year old woman with a 12 month history of vertigo, frontal headache, failing vision, right sided deafness and tinnitus. On examination she had “optic neuritis” (papilloedema), vertical and lateral nystagmus more to the left than to the right and a degree of right sided deafness (as assessed using a watch). There is no mention of facial weakness or numbness. There was some weakness of grasp with the right hand. Before the camera was in common use for the recording of anatomical and surgical specimens it was up to the graphic skills of the surgeon to illustrate his findings for posterity (Charles Bell springs immediately to mind). Fortunately Charles Ballance was a meticulous and skilled artist. His beautifully drawn and labelled surgical illustration shows quite clearly that his tumour was, as Cushing had suspected, a petrous ridge meningioma (Figure 3). The tumour has a broad base along the petrous ridge and there is no tumour in the internal meatus which itself is undilated. Here is Ballance’s own description of the surgery and post-operative course. The surgery was performed in two stages.

“Operation November 19 1894 Scalp thrown down towards right occipital region and bone removed. Towards the external occipital protuberance an exostosis was discovered and removed. The exostosis presented towards the dura and as well as externally. The inward projection had occluded the lateral sinus. When therefore the exostosis was removed the sinus filled up, causing considerable alteration in the venous circulation. The result was the patient collapsed and respiration ceased. Patient was revived with much difficulty”

The presence of the exostosis is itself suggestive of a diagnosis of an underlying meningioma.
“Operation November 26 1894. Flap thrown down and then
dural flap thrown down. Solid tumour found attached to dura
over inner part of posterior surface of petrous. Somewhat firmly
fixed and the finger had to be insinuated between the pons and
tumour to get it away” (Figure 4).

His patient recovered but her convalescence was prolonged.
The fifth and seventh nerves were injured at the operation and
the right eye ulcerated and had to be removed. The papilloedema
cleared up with good recovery of her vision (in the left eye). Some
tropic ulceration occurred at the angle of the mouth and at the
right ala nasi but this ultimately healed.

An annotation dated September 1906 (12 years after the
operation) indicated that she was alive and well but had a right
sided facial palsy and trigeminal anaesthesia.

So there you have it - Annandale was the first. But let’s be clear.
We are talking about two great surgeons who were working at
a time when diagnosis was entirely clinical - after all it was not
until 6 months after Annandale’s operation that Rontgen took
his famous first X-ray of his wife’s hand. Surgical anatomy and
physiology were poorly understood. Perhaps in paying tribute
to their achievements it should be borne in mind that Krause in
1906 reported an 86.6% mortality in his series (Cushing 1917)
[4].

Figures 5 and 6 are taken from the author’s own skull base
series and show quite clearly the differences between an acoustic
neuroma and a petrous ridge meningioma.

My final advice to those writing an article for a scientific
journal. Try to find the time to check the original source. You will
avoid misquotation and you will have a lot of fun exploring some
of history’s more fascinating backwaters.

I am grateful to the librarians at the Royal College of Surgeons
of Edinburgh and at the Royal Society of Medicine, London, for
their help in compiling the historical details.

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