

The best stone man north of the border

BY KAMRAN RAZA AND JONATHAN CHARLES GODDARD

In this series of articles I am going to show you some of the exhibits contained in the Museum of Urology, hosted on the BAUS website (www.baus.org.uk). In 1860, Sir Henry Thompson (1820–1904), the famous 19th century English surgeon and urologist, travelled to Scotland for a fishing holiday. Not one to waste an opportunity to learn, he arranged to meet with William Keith of Aberdeen, the best stone surgeon in the north of Scotland (Figure 1). I hadn't heard of William Keith, so I tasked our very own Scot, Kamran Raza (before he returns to his homeland to start his specialist registrar rotation) to find out more!

William Keith (1802–1871) was a notable Scottish surgeon who was born in Aberdeen on 3 November 1802 to John Keith and Mary Donald. William spent most of his life in that city choosing to work in Aberdeen Royal Infirmary, where he was appointed as surgeon in 1838. His first marriage was to Mary Groom with whom he had one son. Unfortunately, the child only survived for one year and to add further tragedy, four years after the death of his son his wife passed away aged only 29. Keith married again, this time to Burnette Silver in 1835. The couple went on to have four children, however Keith would again outlive his wife after she passed away in 1853, aged 44. Keith married a third and final time in 1862, when he was around 60 years old. He and Isabella Fiskén (who would have been approximately 30 years younger), had one daughter before William passed away on 5 February 1871, aged 68. The cause of his death is not entirely certain, however records from the time state that he had suffered from "paralysis with effusion of blood upon the brain", suggesting that he had suffered from a haemorrhagic stroke. It appears that William Keith may have suffered from a number of strokes towards the end of his life, as it was noted in his obituary that he took a trip to America "with a renewed sense of vigour" following either a stroke or transient ischaemic attack around one year before his death.

Bladder stones were a common and terrible affliction in the past, more common than now and caused, most probably, by diet rather than by outflow obstruction; urate stones were the most usual type. For centuries, the only way to rid the sufferers of their pains was surgical excision, usually via the perineum. In these pre-anaesthetic ages it was fast, but brutal. In the early 19th

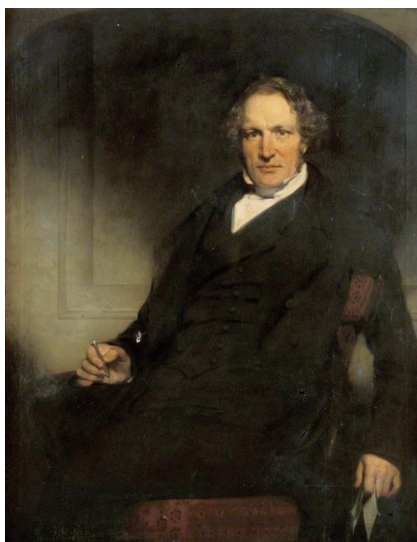


Figure 1: Dr William Keith, Oil on canvas, attributed to either James Giles (1801–1870) or John Moir (c.1776–1857). University of Aberdeen, ABDUA 30671. Image used under the terms of the Creative Commons Attribution licence (CC BY). Image credit: University of Aberdeen.

century, a new method of stone extraction appeared, mainly from France, lithotripsy. Here, the stones were crushed and extracted urethrally. It was a revolution in urology.

William Keith was the first surgeon to carry out this new lithotripsy in Scotland. The patient, the 72-year-old Reverend Robert Forbes, although otherwise healthy, had suffered for a year with frequency of an hour and a half, day and night, sometimes half hourly. His urine scalded him as he tried to void and this was followed by a cutting pain at the tip of the penis. On 19 April 1833, Keith examined the long-suffering minister by sounding; he felt a 1.5 inch stone, but in a small, contracted 2 by 3 inch bladder into which a maximum of 3 fluid ounces (85ml) could be injected before a painful detrusor contraction expelled it.

On 23 April 1833, Keith passed a lithotrite. It was a Heurteloupe percussor and the patient was on the specially designed Heurteloupe bed to which the percussor was fixed to a vice and then hit with a hammer, thus breaking the stone within the bladder (Figure 2). A fragment of the shattered stone was then grasped and hammered but at a third attempt, Keith felt a fold of bladder in his instrument, so stopped. The whole operation took 15 minutes. Keith tried again on 1 May, but the Reverend's bladder couldn't hold enough water. The procedure was carried out several more times, each

operation lasting eight to ten minutes, Keith crushing from two to five stone fragments. The last procedure was on 20 July and the patient was stone free. When Keith reported his case to the *Edinburgh Medical and Surgical Journal* in September of that year, the patient was still asymptomatic, joking to Keith that he felt, "A whole stone lighter". Keith operated on his second lithotripsy patient on 30 July the same year.

After his appointment to the Aberdeen Royal Infirmary, Keith carefully recorded and then published all his surgical stone cases, from 20 March 1838 to 20 March 1843. He recorded every case "whatever the age, or the state of health, or of constitution might be" so his data would be "strictly impartial". Of the 2352 patients admitted to his 56 beds, 42 (1.78%, or as Keith put it, 1 in 54 $\frac{3}{4}$) were stone cases, only one of these was female. Twenty-three underwent open lithotomy and 16 lithotripsy. Three patients requested lithotripsy but were not suitable and declined lithotomy and one was not fit for either operation. Of the 39 operated on, only three died (7.69%), two who had lithotomy (8.69%) and one lithotripsy patient (6.25%). The mortality rate for stone surgery in England at that time was 1 in 7 $\frac{1}{5}$ or 13.89% whilst in France, according to Dupuytren, it was 23.5%. Of patients over the age of 50 years, 20% died in England and one third across France. Of the 19 cases between the ages of 50 and 78 operated on by Keith only one (5.26%) died. Keith continued to publish his series of Aberdeen stone patients.

Although Keith had performed his first lithotripsy in 1833, by 1838 when he took up post at the Royal Infirmary he had never carried out a lithotomy. He was careful to start doing these before publishing his lithotripsy results, so he would have experience of the traditional technique as well. He performed his first lithotomy in December 1838. Lithotripsy was chosen in cases who were fit, had small stones and a non-irritable bladder, open lithotomy was chosen for the rest, although Keith states that 15 of the 16 lithotripsy cases could have been carried out as lithotomies with, he felt, no worse results. Thus, he notes that lithotripsy was not a substitute for lithotomy in all cases, but only for select and suitable ones.

As for Keith's technique for lithotomy, he studied as many methods as possible and, it appears, settled essentially with William Cheselden's from more than a century

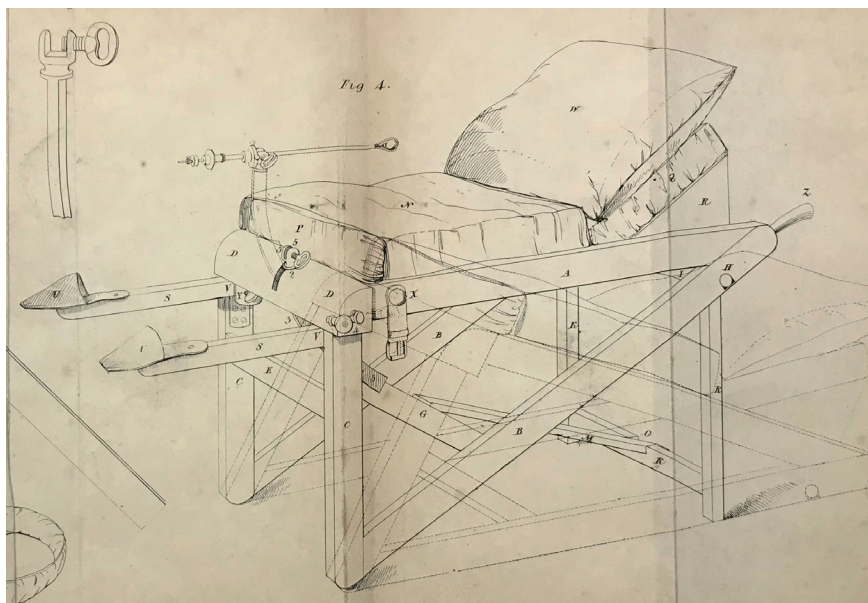


Figure 2: The Heurteloupe table. From *Principles of Lithotripsy* by Baron Heurteloupe, 1831. Author's collection.

before. His instruments were few and simple and he opposed the newer 'improvements' in the techniques and the dangerous new instruments such as Caesar Hawkins' sharpened gorget or the 'destructive weapon' that was the French bistoury cache.

William Keith was also a great advocate of preparing the patient fully prior to the major surgery of lithotomy. In young, fit patients, he was prepared to operate soon after admission, but in older, frail or unfit patients, he would spend many days trying to improve their fitness for surgery. On average, in his early stone series, 25 days were spent preoperatively, 35.5 days were spent on average postoperative, his patients spent in total on average 60 days in hospital. Frail, weak patients were given a build-up diet, while 'fat and florid' patients were put on a reducing diet. Treatment was given to calm down the bladder as much as possible. We might now call this an 'advance recovery programme'.

Overall then, William Keith appears to be, 'the best stone man in Scotland'. So why did his students call him, "Old Danger"? This phrase appears in a biography of the famous Scottish surgeon Sir Alexander Ogstan (1844–1929). Ogstan was a pupil of Keith in 1862 and he gives, in his memoirs, an excellent picture of surgery in Aberdeen at that time. He recalls that Keith was the chief opponent of the introduction of chloroform anaesthesia into Aberdeen. Ether anaesthesia was first used in 1846 and chloroform, always a more popular anaesthetic in Scotland, in 1847. According to Ogstan, Keith felt his stone patients did better without it and told them to "Put your trust for a minute in Dr Keith and God". If this is true, in defence of Keith, the operation of lithotomy usually took two or three minutes and there were not inconsiderable dangers of

early anaesthetics. However, Keith presented a series of cases to the Edinburgh Medico-Chirurgical Society in 1849 in support of chloroform and he is certainly recorded as administering a chloroform anaesthetic on 18 August 1865 to the seven-year-old Eliza Shirriffs, whose right arm had been crushed by the wheel of a loaded cart as Professor William Pirrie (1807–1882) amputated it. So, it would appear that Keith was not against chloroform, but perhaps he came to believe his speedy operation of lithotomy was safer without it. Certainly, by the time Ogstan was appointed to Aberdeen as junior surgeon in 1868, he said chloroform had been widely adopted.

Ogstan also paints a vivid picture of surgery before antisepsis in Aberdeen in Keith's time. The theatre had no washing facilities, the instruments lay uncovered on a shelf, the needles, lubricated and ready, pushed into a jar of rancid lard and the sand box to soak up the blood smelling of cat urine (the theatre at Aberdeen was apparently the favoured retiring room for the ward sister's cats). Unsurprisingly, all wounds festered and it was with great delight and excitement that Ogstan read Robert Lister's 1867 paper on antiseptic surgery. After visiting Lister in 1869, he brought the ideas back to Aberdeen. There was shock from the hospital managers about the cost of the antiseptic carbolic putty (somewhat more expensive than the red zinc sulphate lotion and rags used before) and indifference and hostility from the senior surgeons (although Ogstan does not name Keith specifically). The arguments against antisepsis were not confined to Aberdeen and included the feeling that wound suppuration was a normal part of healing and was indeed necessary, that hospital sepsis could be cured by better ventilation

of the ward and that wound infections and subsequent haemorrhage were due to the sloughing of the silk sutures used to secure bleeding vessels. Due to the latter, new techniques were devised such as torsion of the vessels without ligatures (promoted by James Syme (1799–1870) or acupressure, a system using compressive metal wires (promoted by Syme's rival James Young Simpson (1811–1870)). It is not clear where William Keith stood on the introduction of aseptic surgery but he did co-author a book with fellow surgeon Professor William Pirrie on acupressure in 1867.

Sir Henry Thompson, probably the premier British expert on urology in the late 19th century, thought William Keith an excellent stone surgeon, despite his students calling him, "Old Danger". He opposed chloroform for lithotomy cases and may have been against Lister's antisepsis, but he clearly did use anaesthetics on some patients and was certainly not alone in his distrust of antisepsis at that time. William Keith was definitely an early user of accurate clinical audit, freely sharing his results, good and bad, and spent time and effort to optimise his patients for major surgery (an early advanced recovery programme!). Maybe his students just found him a hard task master and frightening examiner? Keith's last 13 stone cases and his careful summaries of the 45 patients who died in his series were published posthumously in the *BMJ* to ensure the lasting legacy of his complete and accurate audit of the stone cases of Aberdeen.

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