

## A history of bladder stone<sup>1</sup>

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Cutting for the stone! There is no other phrase in the whole of surgery that ranges over such vistas of medical history, human suffering or surgical endeavour.

The oldest bladder stone yet discovered was found in the grave of a youth of 16 years in an Egyptian excavation, dated about 4800 BC. Unfortunately, it was broken by the pick of the excavating workmen, but the damaged specimen was presented to the museum of the Royal College of Surgeons by Sir Grafton Elliott-Smith in 1901. Still more unfortunately, it was destroyed when the College was damaged by a bomb in 1941.

Descriptions of cutting for the stone are found in ancient Egyptian, Hindu and Greek writings. It is mentioned, of course, in the Hippocratic Oath, where we read 'I will not covet persons labouring under the stone but will leave this to be done by men who are practitioners of this work' – surely evidence of the first demarcation dispute and enough to suggest that Hippocrates was not only the father of medicine but also of the trade union movement!

There are three possible approaches to the bladder and its contained calculus: to cut down onto the base of the bladder through the perineum, to open the bladder above the pubis or to crush the stone by means of instruments passed along the urethra. Each has its own long and painful history.

Perineal lithotomy was well described by Celsus in the first century AD and for many years was termed the 'methodus Celsiana'. The operation was only really effective in children below the age of 14, since the presence of an enlarged prostate made the operation more difficult in adults. A child was held in the lap of a strong assistant but adult patients were held in the lithotomy position by three or four attendants (Figure 1). One or two fingers were passed into the rectum and the stone pressed against the perineum. An incision was made in front of the anus and carried into the region of the bladder trigone; the stone was then evacuated either with a finger or a hook. This simple operation was termed the 'apparatus minor', but about 1520 a new and more radical operation was introduced in Italy and popularized by Marianus. Because of the large number of instruments employed, it was also termed 'the apparatus major'. A grooved sound was passed into the urethra and an incision made into the perineum down upon the groove (Figure 2). The wound was then dilated, thus tearing through the

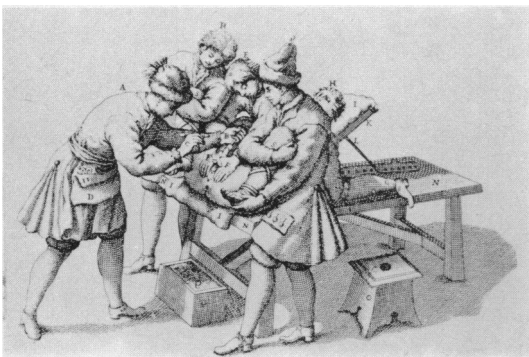


Figure 1. Patient held in the lithotomy position

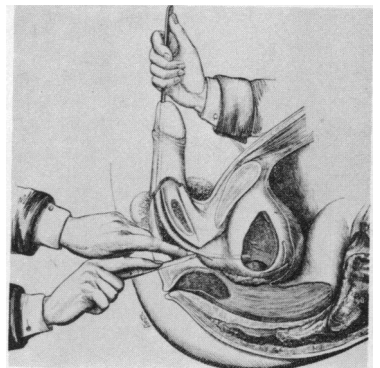


Figure 2. Perineal lithotomy; cutting onto the grooved director. (Reproduced from Ellis 1969, by kind permission)

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prostate and base of the bladder. Stone-holding forceps were passed into the wound to remove the calculus or, if it proved too large, it was first crushed and the fragments removed with a scoop. Those who survived the initial haemorrhage and sepsis were often left incontinent with persistent draining and infected perineal fistulae.

The most remarkable lithotomist was undoubtedly Jacques Baulot, born in 1651. He was a medically unqualified itinerant lithotomist who, by chance, hit upon the lateral perineal approach to the bladder which gave roomier and safer access. He adopted the habit of a priest and called himself Frère Jacques. He must be the only surgeon, qualified or otherwise, to have a nursery rhyme which immortalizes his name.

Suprapubic lithotomy is now the method of choice in modern surgical practice. Its story goes back over 400 years since the first recorded removal of a calculus by this technique was carried out by Pierre Franco in 1561. The patient was a child of three with a bladder stone the size of a hen's egg. Franco was unable to remove the stone by the usual perineal route through the narrow pelvic outlet. He therefore got his assistant to push the stone upwards with his fingers in the rectum, cut down immediately above the pubis onto the calculus and successfully removed the stone. Although his patient recovered, Franco advised others not to follow his example because of the extreme hazard of this approach and most surgeons did indeed take his advice and that of Hippocrates before him, who had stated that wounds of the bladder were invariably fatal. James Douglas (who described the pelvic peritoneal pouch that now carries his name) studied the anatomy of the surgical approaches to the bladder. His surgical brother, John, realized that the bladder could be opened extraperitoneally above the pubis when distended with water, carried out the operation in 1719 and reported that 3 of the first 4 patients operated upon by this method recovered safely. Douglas had a short but brilliant career, being elected a Fellow of the Royal Society, a Freeman of the City of London and was admitted to the freedom of the Company of Barber Surgeons. In 1721 he received what I consider the greatest honour that a surgeon can achieve – he was appointed to the consultant staff of Westminster Hospital! The great William Cheselden, one of the most experienced lithotomists, adopted Douglas' suprapubic operation with enthusiasm. Very soon, however, the operation fell into disuse and Cheselden himself returned to the perineal approach. No doubt this was the result of disasters in which the peritoneum was inadvertently opened, prolapsed bowel lacerated or the bladder itself burst from injecting too much water. It was only at the end of the nineteenth century, with the development of effective anaesthesia and antisepsis, that the suprapubic operation became the routine and safe procedure that it is today.

Throughout the centuries, patients teased by the agonies of bladder stone and surgeons dissatisfied with the difficulties and dangers of cutting for calculus dreamed of some means of breaking up the stone within the bladder so that the fragments could pass per urethram. In the collection of instruments at the Royal College of Surgeons in London is the curved metal sound with a roughened edge which General Martin of Lucknow used to disintegrate the stone in his bladder by nine months of steady labour. It remained for Jean Civiale (Figure 3) to carry out the first successful lithotripsy in 1824 at the Necker Hospital in Paris. He had commenced his experiments in 1817 while he was still only a second-year medical student. His first crude apparatus was extensively modified by himself, by other surgeons and by instrument makers both in France and in this country until the lithotrite as we know it today was developed.

In July of 1858 an event took place which, at the time, seemed of little significance but which was to provide the basis of one of the most fascinating stories in the history of bladder stone in which an English surgeon was to use the lithotrite on two Royal patients. This event was a visit to Paris by Henry Thompson of University College Hospital in which he learnt from Civiale the art of lithotripsy. In 1862, Leopold I of Belgium came to visit his niece, Queen Victoria, at Osborne. While in this country he was seized with the agonies of bladder stone. Sir Benjamin Brodie, the Sergeant Surgeon, gave excellent advice to the 73-year-old patient, which was to return to Brussels and call in Civiale from Paris. Civiale, in spite of several attempts, failed to crush the stone and Langenbeck of Berlin was summoned. He in turn carried out repeated

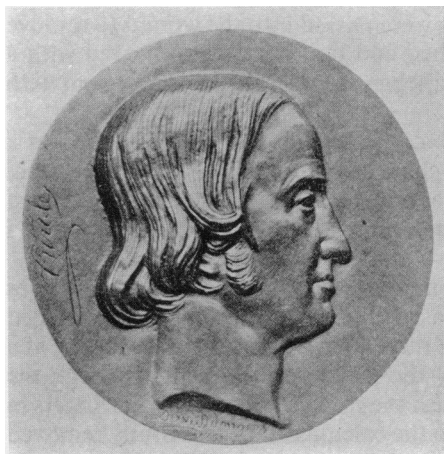


Figure 3. Jean Civiale (1796–1867)

painful explorations of the bladder without success and Henry Thompson was recommended to Leopold. The doubts and anxieties of a surgeon, immediately before a Royal operation, are mirrored in the letter Thompson wrote to his wife: 'I slept only one and a half hours last night . . . I got thinking about my case and I got horribly anxious about it in the night. No-one knows how anxious, but those who are placed in like circumstances'. In spite of his anxieties, Thompson operated with complete success and the King made a remarkably rapid and successful recovery. It was only some years later that Thompson worked out why his Royal patient had such a smooth postoperative course, whereas the manipulations of his previous surgeons had always been followed by a sharp unpleasant fever. By now the antiseptic theory was well established and Thompson remembered that he himself had employed new instruments, freshly unpacked from their oily, greasy and sterile wrappings, on the King. This was in contrast to the instruments of Civiale and Langenbeck, that had been thoroughly inoculated with the bacteria of hundreds of previous patients. Thompson received the well deserved honour of a knighthood in 1867.

In 1872, Sir Henry Thompson was asked to visit the exiled Emperor Napoleon III, then living at Camden Place, Chislehurst, after the disastrous defeat of France in the Franco-Prussian War of 1870. Napoleon was suffering all the symptoms of bladder stone, with haematuria after any exercise, severe pain and heavily infected urine. After much hesitation Napoleon agreed to operative treatment and this was carried out on 26 December. The Emperor was anaesthetized by Dr Clover 'the most experienced chloroformist of the day'. Thompson sounded the bladder, found a stone and advised a crushing operation, which was carried out on 2 January. The following two days were accompanied by increasing frequency, pain and bleeding, suggesting that a fragment was engaged in the bladder neck. At a further session on 6 January, a large fragment of stone was impacted in the posterior urethra and this was dislodged and crushed. There was still evidence of obstruction and yet a third session was arranged for the morning of 9 January, but on that morning the exile lapsed into coma and died the same day, surrounded by his medical advisers, his Empress, the Prince Imperial and his confessor. At autopsy, performed by Professor Burdon-Sanderson, the kidney showed gross pyonephrosis and within the bladder itself was half a calculus, weighing about three quarters of an ounce. It can be seen to this day carefully preserved in the Hunterian Museum of the Royal College of Surgeons.

One of the intriguing mysteries of bladder stone is its frequency throughout history and yet its rarity in Europe today. One can understand the disappearance of stone in adult patients now that longstanding strictures and chronic retention of urine from enlargements of the prostate with gross sepsis and stagnation within the bladder have been, to a great extent, eliminated. However, it is the disappearance of bladder stone in childhood that is so surprising;

today bladder stone in children has virtually disappeared in the Western world although it still persists as a major problem in the Middle East, India and the Far East. It may be related to a high incidence of infantile diarrhoea, with dehydration and deposition of uric acid 'infarcts' in the kidneys (Ostergaard 1976).

Bladder stone will no doubt eventually die out, to become a surgical rarity throughout the world, yet who can say how much history has been altered by these strange concretions in the bladder? Who can say what might have happened in the Russian campaign in 1812 if Napoleon Bonaparte had not had a bladder stone? Or on the battlefield of Sedan in 1870 if modern surgical skill had been available for Napoleon III? How many personalities have been altered, decisions changed, judgments affected or genius thwarted by the torturing pains and uraemic renal damage resulting from bladder stone (Ellis 1969)? But there is the other side of the picture. Without this strange, centuries long, epidemic of bladder stone how much might the progress of surgery have been delayed? After all, it was upon this pathology that the art of surgery owed so much for its development. The countless victims who submitted themselves to the surgeon's knife through the ages might derive some post-mortem satisfaction that their sufferings contributed so much to the progress and good of humanity.

### **References**

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**Ostergaard A H** (1976) *Calculus Vesicae*. FADL Forlag, Copenhagen