Advent of Modern Anaesthetic Medicine in India

Contribution of Calcutta Medical College

Introduction

An indispensable modality of treating disease in the annals of human medicine is surgery which entails removal of a body part causing disease. Since the dawn of civilisation and man’s discovery of tools, surgery has been an integral part of medicine over the ages. However, removal of a live body tissue came with its own complications, most importantly pain. This stretched human endurance to the limit and indeed surgery itself was complicated by significant morbidity and mortality. The trade-off between cure and maim or even death often pushed surgery in the opposite direction.

A need therefore arose to provide painless surgery, i.e., a resection when the patient would be insensitive to pain. The earliest allusion to such a philosophy dates back to Sushruta in 500 BC where opium, alcohol and hemp were used to blunt the pain during surgery. Following this, all over the world, painkillers or drugs influencing sensorium were utilised to the same effect. Hypnotism or mesmerism in susceptible individuals worked to a certain extent. It was not until the Enlightenment period in Europe that chemical gases were identified which had a similar effect. Humphrey Davy in 1799 described two important effects of nitrous oxide which were euphoria and analgesia and recommended its use in surgery for the first time. Even before, a surgeon from London, James Moore observed nerve compression as a method to alleviate pain during amputations that was tried successfully only once by James Hunter, the father of modern surgery.
Davy subsequently elaborated nitrous oxide and later Michael Faraday was the first to study ether to numb pain during surgery in 1818. In 1844, Gardner Quincy Colton successfully used nitrous oxide for a dentist Horace Wells in Hartford, Connecticut for a painless tooth extraction. On 30th September 1846, William Morton, a dentist from Harvard Medical School and Wells' student performed the first painless tooth extraction in a patient with ether. This created a huge interest in the surgical world and led to the first public demonstration of a proper operation under ether anaesthesia on 16th October, the same year where a jaw tumour was removed at the operating theatre of the Massachusetts General Hospital in Boston. The world was ready for a revolution in surgery and no wonder, the technology arrived on the shores of the empire. The very first time that ether was successfully used in Britain was by a dentist James Robinson in 1846 on the 19th of December in Gower Street witnessed by the famous surgeon Robert Liston (Figure 1). Two days later the 21st of December 1846, Liston used the same technique for a painless amputation of UCL. The time was ripe for the use of ether to be disseminated in the empire and who else but the vanguard of Western Medicine in the empire to take up the responsibility, the Calcutta Medical College?

Western Medical Education in India - Calcutta Medical College

The Portuguese were the first to introduce Western medicine into India. The first ever medical school in Southeast Asia with professors from Coimbra University started in 1801 and later became the Escola Medica-Cirurgica de Nova Goa in 1842 in Panaji and still stands as the Goa Medical College. The French in Pondicherry in 1823, established L’Ecole de Médecine de Pondicherry that became the JIPMER in independent India. However, these two schools and hospitals did not admit the native populace. The Calcutta Medical College (CMC) as established by the British in 1835 was the first in the whole of Asia to impart Western medical education and hospital services to British and natives alike.

CMC since its inception pioneered several medical landmarks in the Indian context. The first human cadaveric dissection, the first students to sail to London to achieve higher medical training and degrees, the separation of medical jurisprudence from Materia Medica by Henry Mouat for the first time in history, the first intravenous saline administration for cholera by William Brooke O'Shaughnessy, the first time use of cinchona for malaria by Hugh Falconer, the first publication in the Lancet by Henry Goodeve and the recognition of the college by the Royal College of Surgeons, the University College of London and by the Royal Society of Apothecaries were all achieved within 1847 when another first was added as a feather to the cap of glittering achievements.

The birth of anaesthesia and its evolution in Calcutta Medical College

Astonishingly, within five months from Morton in the USA and three months from Robinson in Britain, the method percolated to the British Empire, CMC adopted the procedure routinely, just one week after the news reached Calcutta. Dr R. O'Shaughnessy, Professor of Surgery, Calcutta Medical College, and cousin of the illustrious William alluded earlier, on the 22nd of March 1847, successfully used ether to remove a jaw tumour. This case was published in The Lancet in 1848 (Figure 2).

On the 4th of November 1847, Sir James Simpson, an obstetrician from Edinburgh was experimenting with different chemicals in his laboratory with two other colleagues, when they all fell unconscious after inhaling chloroform. Thankfully, they did not inhale the toxic dose and on regaining consciousness, Simpson immediately saw the potential of using this for painless surgery in obstetrics. He tried it successfully in a very difficult labour on the 8th of November 1847. Within two months, CMC decided to apply chloroform in surgical practices. The very first obstetric procedure was carried out on 12th January 1848 by Professor J. J. Jackson. The very next year, CMC published its initial experiences with ether and chloroform in the General Record of Public Instruction in 1848 which was disseminated to the rest of the world (Figure 3).

There are some interesting postscripts to the discovery of chloroform. Chloroform as a chemical was not Simpson’s discovery. It was discovered in 1831, its chemical structure identified in 1835 and its anaesthetic properties were described by Marie Jean Flourens, the French physiologist before Simpson. Flourens was the first to discover that the semi-circular canals in the vestibular system in the human ear are responsible for balance. The chemical was introduced to Simpson
by a Scottish physician turned chemist David Waldie. He devised a way of purifying chloroform from its impurities. He was never recognised by the medical profession and left England out of disappointment and frustration. Where did he go? He arrived in Calcutta and worked as a chemist for Malcolm and Company and then founded his own company Cossipore Chemical Works. This survives to this day as Waldies who specialises in manufacturing lead oxide. He died in Calcutta and was buried in Howrah and continued to supply chloroform to CMC till his retirement.

Sir Joseph Fayrer, the physician in residence during the Sepoy Mutiny in Lucknow was the professor director of Surgery in CMC. He debrided and excised pieces of bone from both tibiae in a Swiss gentleman in 1869 with bilateral compound lower leg fractures with chloroform. 24 hours later, the patient expired due to rapid jaundice, hepatic encephalopathy and kidney failure, all features of chloroform toxicity. This could well be the first report of delayed chloroform poisoning (Indian Medical Gazette 1869 – Figure 4).

Dr Alexander Crombie of Indian Medical Services and Professor of Materia Medica in CMC had been successfully using morphine for pain relief in a variety of medical conditions. A milestone was created when Professor G D McReddie used a tracheal catheter for the administration of chloroform to remove an osteosarcoma of the jaw in 1880 in CMC with morphine as a premedication administered by Professor Crombie (Indian Medical Gazette 1888). This is the first documented case of endotracheal insufflation anaesthesia and anaesthesia premedication in the world. Reports of two cases appeared in the Indian Medical Gazette in 1881 by Sir Kenneth McLeod, Professor and Head of the Department of Surgery in CMC (Figure 5).

Sir Kenneth McLeod introduced Listerism or sanitation methods in CMC, especially in surgical theatres and dramatically controlled infection-induced mortality after surgery. He described the operation theatre that was housed in our MCH building graphically in his seminal textbook, Operative Surgery in the Calcutta Medical College Hospital, published in 1885 (Figure 6).

Simultaneously with actual surgery, CMC felt the need to include anaesthesia as a part of the training curriculum for medical students from as early as 1906. Students were required to attend at least 10 operations under anaesthesia. It is to be noted that Great Britain started a programme in anaesthesia for trainees in 1918 and the USA in the 1940s.

Finally, the first Boyle’s apparatus was installed in India in CMC in 1935 at a cost of Rs 645 and the first oxygen plant was established in the same year. The first indigenous Boyle’s apparatus was manufactured by the IOC in 1950 and the first nitrous oxide plant in 1962, both in Calcutta.

Conclusions

CMC was quick to pick up the latest state-of-the-art cutting-edge medical scientific discoveries immediately after these discoveries, was prolific in publishing results of practical applications and continuously strove to innovate and discover newer techniques. The work in CMC paved the way for other medical facilities all over the Indian subcontinent especially Hyderabad and Bombay to pick up the reins and continue the good work.

Figure legends

Figure 1: Blue plaque in Gower Street London; courtesy: https://www.rcoa.ac.uk/about-college/heritage/history-anaesthesia

Figure 2: Jaw tumour excised under ether, 1847, Calcutta Medical College by R. O'Shaughnessy; courtesy The Lancet, Volume 30, Issue 768, 1838, Pages 268-271
Figure 3: Report of successful use of ether and chloroform in CMC reported 1848; courtesy: General Record of Public Instruction 1848

Figure 4: First report of chloroform poisoning by Joseph Fayrer; courtesy: Indian Medical Gazette 1869

Figure 5: Case number 7 a and b, reported by McLeod in 1881 with ET anaesthesia in surgery; courtesy: The Indian Medical Gazette 1881

Figure 6: Excerpt from Kenneth Mcleod’s Operative surgery in the Calcutta Medical College Hospital 1885; Note the description of the recovery room that was a unique innovation; courtesy: https://wellcomelibrary.org/item/b21957642

Bibliography

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