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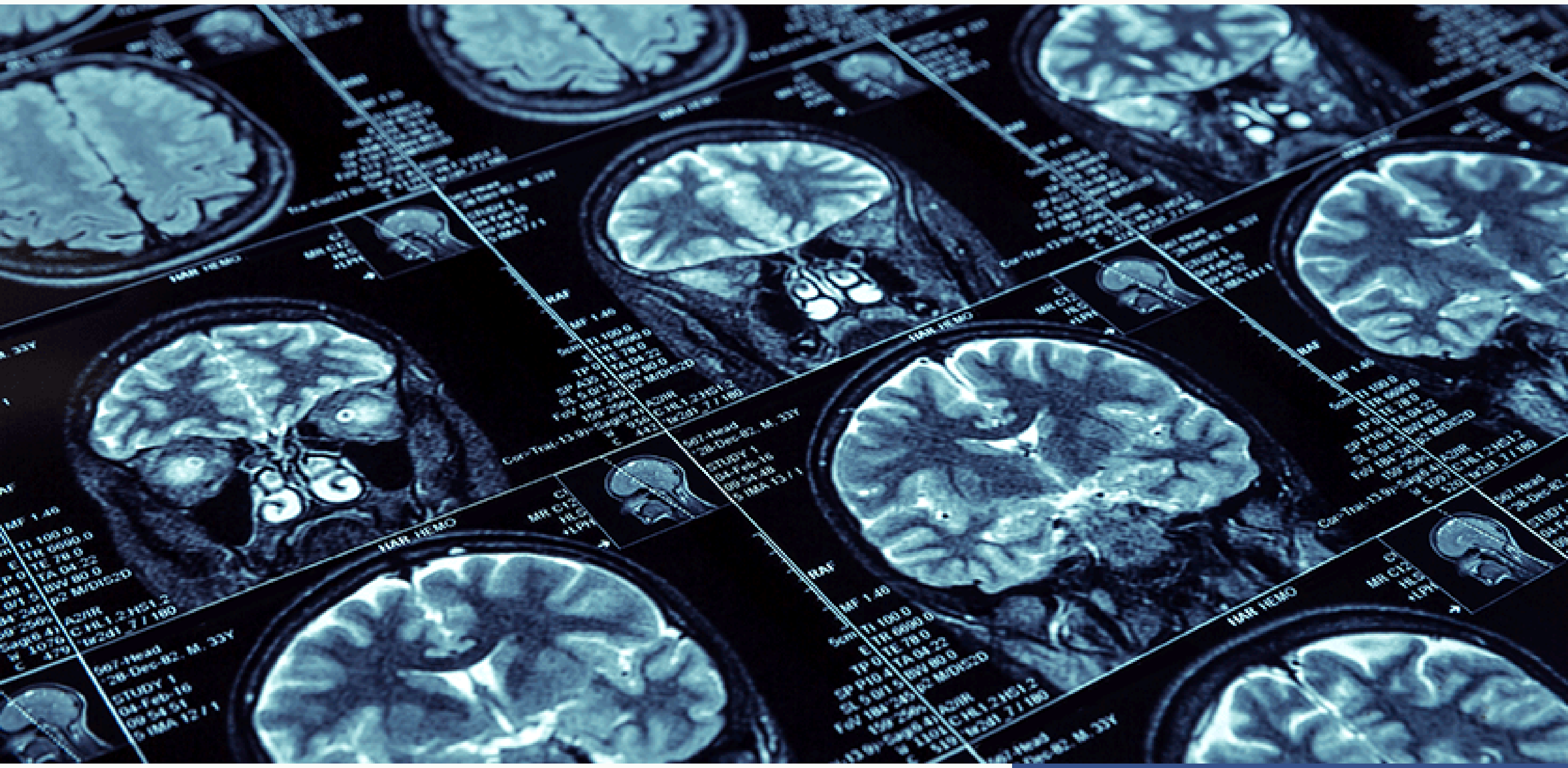
neurobulletin

Dandy Netherlands Neurosurgical Club



Introduction new board

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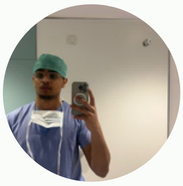

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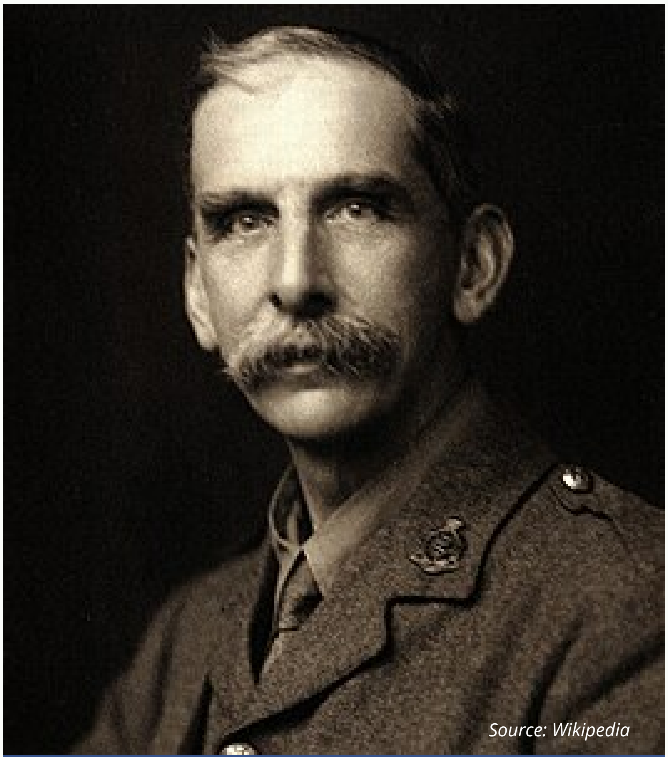
NEUROSURGEONS THROUGH HISTORY
-- SIR VICTOR HORSLEY --

The history of neurosurgery spans several millennia, with one of the earliest recorded procedures being the trepanation of the cranial vault, which dates back approximately 7,000 to 10,000 years. However, it was not until the late 19th and early 20th centuries that neurosurgery blossomed as a distinct specialty. A key figure in this evolution is Sir Victor Horsley (1857 – 1916), often regarded as the "father of neurosurgery." As the inaugural publication in this series, it is only fitting to center our attention to the pioneer of neurosurgery. In this synopsis, we will briefly explore Sir Horsley's early life and contributions to neurosurgery.



Source: Wikipedia

Early Life

Victor Alexander Haden Horsley was born in Kensington, London, England on April 14, 1857 to John Callot Horsley and Rosamund Haden. He was named after Queen Victoria as he was born on the same day as Her Majesty's youngest child. Horsley attented medical training at University College Hospital in London at the age of 16! His inclination for research started manifesting at a young age, with him winning countless prizes and starting off his publication list with a paper on the microscopic composition of the lumbar disc. Furthermore, Horsley was a phenomenal anatomist – considering he was already illustrating textbooks as a student. A trait perhaps passed down from his father, as John Horsley was a famous artist. Some of these illustrations were even presented by Sir William Gowers.

The First Neurosurgeon

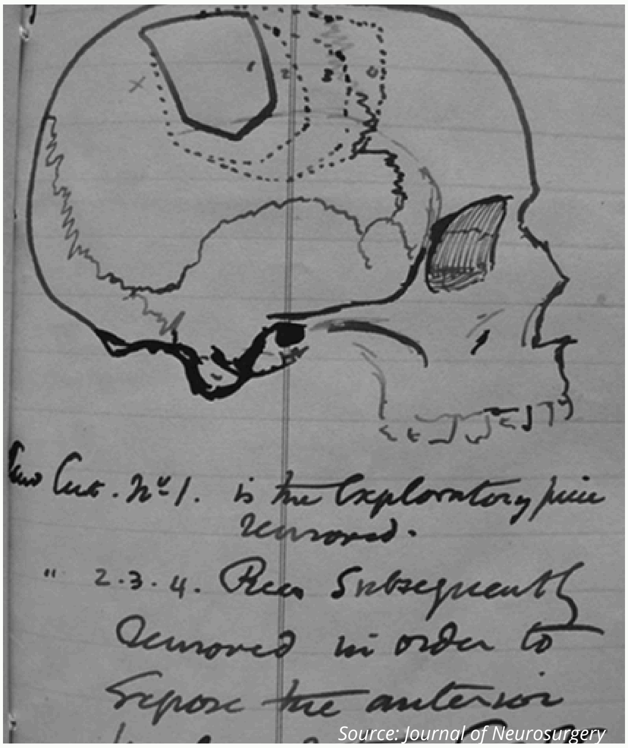
He graduated from medical school around 1881, and soon became a surgical registrar within 2 years of qualification. In February 1886, Victor Horsley was appointed by the Board of Governers of the National Hospital for the Paralyzed and Epileptic (now known as the National Hospital for Neurology and Neurosurgery) in Queen Square, London, to take lead and propel cranial surgery forward. He was the first appointed neurosurgeon in the United Kingdom, often considered the first neurosurgeon in the world. By this time, Horsley already had made quite a name for himself. He was an outstanding researcher involved in several (inter)national projects. He truly embodied the concept of being a physician-scientist. Prior to indulging in this role, Horsley was involved in conducting research on rabies and advocating for the use of rabies vaccine in the UK, based on the work of Louis Pasteur.

The board of Governers were compelled to appoint a surgeon as the new 'lead' for cranial surgery due to the reports of cranial neurosurgery by two leading British neurosurgeons. These surgeons, specifically Sir William Macewan and Sir Rickman Godlee, detailed cranial operations; however, unlike Macewan, Godlee performed only one cranial surgery, which unfortunately resulted in the patient's death. Moreover, three key factors significantly contributed to the development of neurosurgery: 1) the invention of anesthesia, 2) the introduction of antiseptic techniques in surgery, and 3) improved understanding of the brain's topography and somatotopic organization.

Man of many firsts

Horsley's techniques were unparalleled for his time and provided a paradigm shift within neurosurgery. He introduced several techniques and added almost an artistic flavor to his craft. Based on observations from canine skulls, he noticed that modeling wax was useful to stop bleeding. As a result he crafted antiseptic wax, using beeswax, salicylic acid, and almond oil (circa 1886) to act as a hemostatic wax. Furthermore, he introduced the curved skin flaps (circa 1886), prior to the incisions actually impeded efficient wound closure and healing. In terms of neurosurgical procedures, he was the first to operate for epilepsy, pituitary tumors, subarachnoid hemorrhages, and spinal tumors. He was the first reported surgeon to perform a carotid ligation for cerebral aneurysm, to use the trancranial approach for pituitary tumors, to perform craniectomy for microcephaly, and to operate on the intradural division of the trigeminal nerve root.

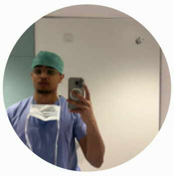
Horsley's earliest surgery was done on a patient who had intractable epilepsy as a result of head trauma sustained at a young age. This operation involved resecting the cortical scar, and was a great success. This success was followed by 11 other surgeries within a year, with only one mortality – a posterior fossa tumor. This equalled the total of all cranial surgeries performed in the whole world.



Source: Journal of Neurosurgery

Of note, Horsley was also specialized in the removal of Gasserian ganglion for trigeminal neuralgia. He had actively pushed for this curative treatment and developed the subtemporal approach even further. As for spinal tumors, he performed the first laminectomy for spinal neoplasms. This was conducted on a Army officer with signs of spinal cord compression – postoperatively the officer showed considerable improvement in his clinic within a year.

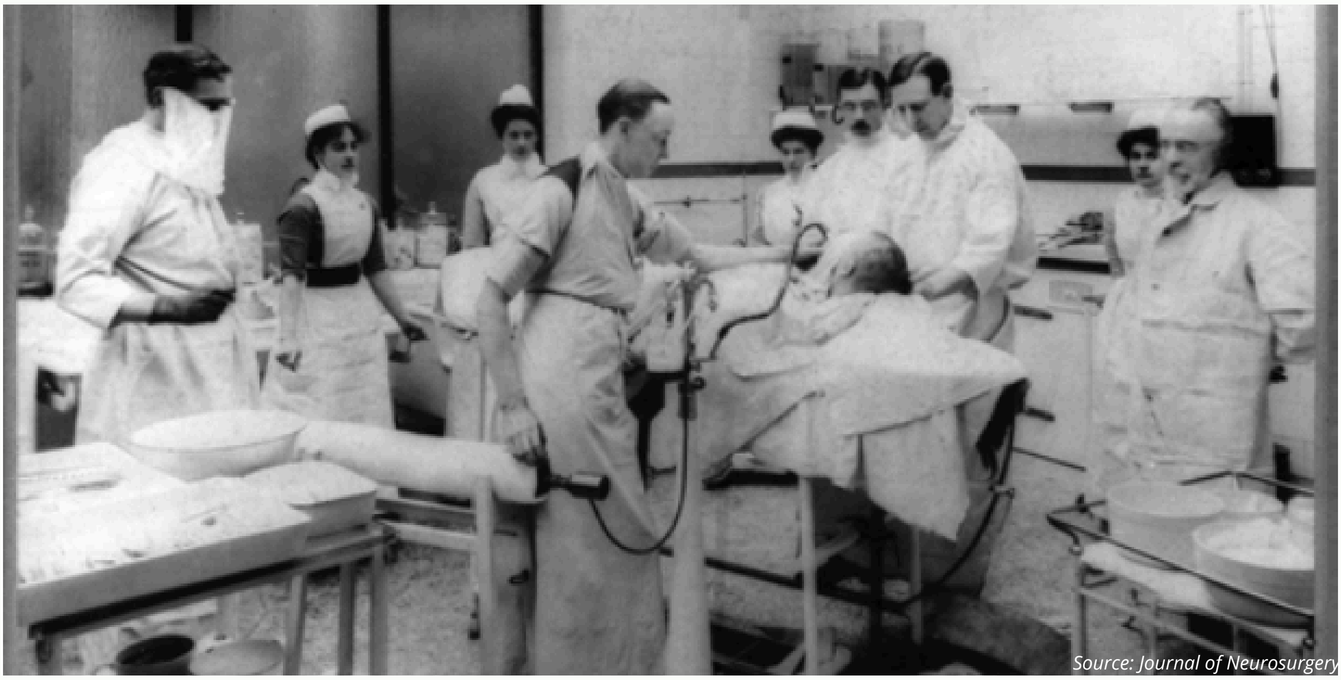
These operations were conducted with acceptable complication and mortality rates. Nowadays, it might be hard to understand how this was accomplished without modern investigations (the X-ray was not even invented until the 20th century!). However this talent could be due to his vast understanding of the human anatomy, his creativity, and ambidexterity. However by the mid 20th century his techniques were shunned upon, and perceived as too fast and rough. This came after the First World War. This is also around the time where Harvey Cushing, became the face of neurosurgery. It is often reported in literature that Cushing did not respect Horsley fast and dangerous method of neurosurgery. Cushing's slow and methodical philosophy had taken the forefront of neurosurgery in the world.



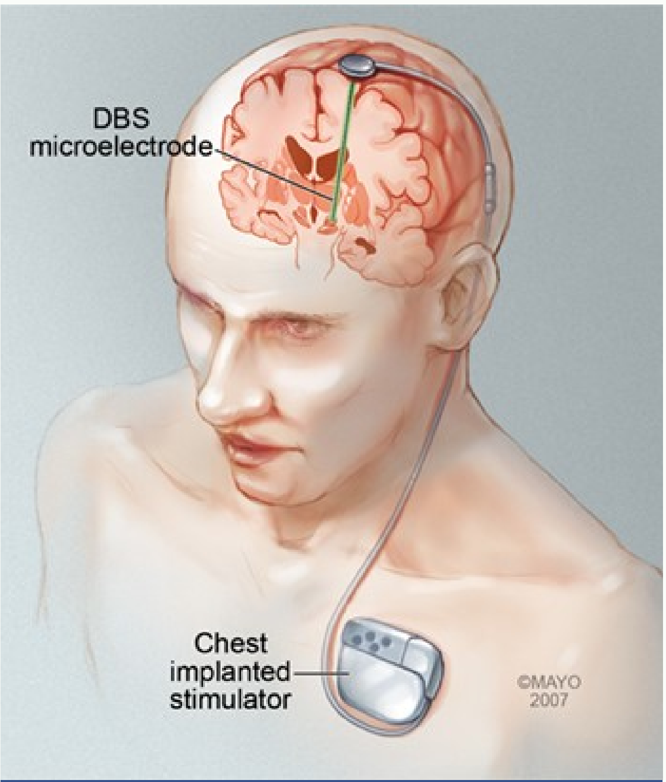
WRITTEN BY: PAWAN RAVINDRAN

Pioneer in medicine and social work

This synopsis merely takes a glimpse into the life of Sir Victor Horsley, merely mentioning some of his accolades. He has contributed significantly to neurosurgery, however his work did not stop there. He was an active researcher, contributing to findings such as the Rabies vaccine, elucidating the pathophysiology behind myxedema, and was an active social reformer. He was actively against the use of tobacco and alcohol, protected doctors under the Medical Defence Union, advocated for the National Insurance Act in the UK, and contributed to reforming the General Medical Council. These efforts also paved the way for him to run as a Liberal candidate for the London University seat in Parliament, although he was met with defeat. His political work was interrupted by (voluntary) military service, which was in line with Horsley's interest in the military. There too he accomplished several feats, however was unfortunately met with his demise. His death remains controversial, while some sources suggest parathyroid insufficiency, others suggest a beginning typhus. The cause of death was reported as heat stroke.



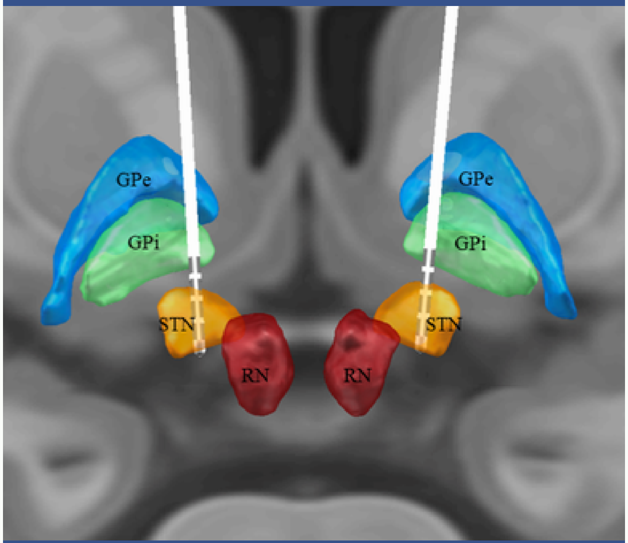
Source: Journal of Neurosurgery



There are two primary targets in DBS surgery: the GPi (globus pallidus interna) and the STN (subthalamic nucleus). Each target is used to address different neurological issues. GPi DBS is typically preferred for conditions involving dyskinesia, such as dystonia, while STN DBS is often used for Parkinson's disease to reduce motor symptoms like tremors and rigidity. I recently had the opportunity to observe a GPi DBS surgery at the University Medical Center Groningen (UMCG), a fascinating process that combines careful planning and incredible precision.

TAKING A CLOSER LOOK AT A DBS OPERATION

Deep Brain Stimulation (DBS) surgery, a groundbreaking technique in neurosurgery, was first developed in 1987 by Alim-Louis Benabid and has seen tremendous advancements since. It has become a life-changing procedure, especially for patients with movement disorders like Parkinson's disease and dystonia, offering them new hope for managing their symptoms. Over the years, technological improvements and better targeting techniques have made DBS safer and more precise.



The surgery actually begins days before the patient enters the operating room. A detailed MRI scan is taken in advance, allowing the medical team to map the brain and pinpoint the exact location for the electrode placement. Using advanced computer software, the neurosurgeon identifies the GPi and other relevant structures in relation to the third ventricle, a landmark in the brain that helps orient the placement. The surgeon then plans the precise coordinates, aiming to place the electrode at the back of the GPi for optimal therapeutic effect. With the mapping completed, the patient is ready for surgery.

The surgery at UMCG began at 8:30 a.m., with the team gathering to review the operation plan. UMCG opts for general anesthesia for patient comfort, as DBS can be somewhat uncomfortable or even painful if the patient is awake. Additionally, UMCG has found that intraoperative tests under general anesthesia don't necessarily predict long-term DBS outcomes, as it can take weeks or even months for patients to experience full symptom relief.

With the patient under general anesthesia, the first step is to position the Leksell frame—a metal frame that ensures precise targeting during the operation. The patient is then taken to a CT scanner. This new scan is carefully aligned with the earlier MRI, allowing the surgical team to determine the x, y, and z coordinates of the target area in the GPi with exact precision.

After this imaging step, the patient returns to the operating room. Two small incisions are made on the scalp, exposing the skull at the sites where the electrodes will be implanted. A second, sterile frame is placed, which is calibrated to match the coordinates from the imaging data. Now, the surgeon begins with the right lead. The frame is set to the exact coordinates, and a needle is used to mark the entry point on the skull.

Next, a small hole is drilled at this spot, creating a pathway for the electrode. Once drilled, the frame is reattached, and the surgeon carefully inserts the electrode to the correct depth. With the electrode in position, the needle is removed, leaving the electrode secured in place.

The procedure is then repeated on the other side of the brain. After both electrodes are successfully implanted, the surgeon closes the skull. A post-procedure CT scan is taken to confirm the electrodes are correctly positioned.

With the electrodes secured, it's time to implant the neurostimulator—a small, battery-powered device that will deliver electrical pulses to the brain. The stimulator is typically placed just beneath the clavicle, and extension wires connect it to the electrodes in the brain. Once connected, the device can be programmed to deliver the necessary stimulation to alleviate the patient's symptoms.

DBS has a transformative impact on patients with severe movement disorders like Parkinson's disease and dystonia, significantly improving their quality of life by reducing tremors, rigidity, and involuntary movements. Looking to the future, DBS holds promising potential for expanding its applications. Researchers are exploring DBS as a treatment for psychiatric disorders such as depression and obsessive-compulsive disorder, and even some forms of epilepsy.

A special thank you to the dedicated neurosurgery team at UMCG for allowing me to observe this fascinating procedure. Watching a DBS surgery firsthand was an inspiring experience, revealing the mix of technical precision, patient-centered care, and cutting-edge science that goes into every operation.

WRITTEN BY:
ELISE BROERSEN

QUIZ: TEST YOUR KNOWLEDGE ON NEUROSURGERY!

Q1. Which type of brain tumor is most commonly associated with neurofibromatosis type 2?

1. Meningioma
2. Schwannoma
3. Glioblastoma
4. Pituitary adenom

Q2. During a craniotomy, which anatomical structure must be carefully preserved to avoid possible paresis?

1. Corpus callosum
2. Basal ganglia
3. Corticospinal tract
4. Cerebellum

Q3. What is the primary purpose of intraoperative electrophysiological monitoring (IOM) during spinal surgeries?

1. To assess anesthesia depth
2. To monitor brain metabolism
3. To prevent nerve damage
4. To visualize vascular structures

Q4. Which of the following complications is a risk of cerebral aneurysm clipping?

1. Hydrocephalus
2. Intracerebral hemorrhage
3. Infection
4. All of the above

Q5. What is the primary mechanism of action for the drug mannitol in neurosurgical patients?

1. Reduces inflammation
2. Increases cerebral blood flow
3. Decreases intracranial pressure
4. Enhances blood-brain barrier permeability

Q6. Which neurosurgeon is credited with developing the technique of stereotactic surgery in the 20th century?

1. Harvey Cushing
2. Walter Dandy
3. Lars Leksell
4. Charles B. Wilson

Q7. In neurosurgical terms, what does “mass effect” refer to?

1. Increased intracranial pressure
2. The displacement of brain structures due to a lesion
3. Swelling from surgical trauma
4. Vascular occlusion

Q8. What is the significance of the “monro-kellie doctrine” in neurosurgery?

1. It describes the anatomy of the cranial vault
2. It explains the relationship between intracranial volume and pressure
3. It outlines the surgical approach for brain tumors
4. It is a method for assessing neurological function.

ANSWERS ON THE NEXT PAGE!

RECAP: PEDIATRIC NEUROSURGERY

Last monday we had our first activity of the new academic year. Dr. D. R. Buis held a lecture on neurovascular conditions in children, a topic both rare in practice and study. Dr. Buis, a pediatric neurosurgeon at Amsterdam UMC, explained how intricate surgery on children can be. “I personally prefer operating on older children rather than newborns,” he said. “But it is important to note that older children are not tiny adults.”

During this first lecture, where students from various years and faculties joined either in-person or through zoom, 3 different neurovascular problems were highlighted and explained in great detail. Extra attention was given to the treatment process, accompanied with pictures and videos of surgeries performed by Dr. Buis. Additionally, Dr. Buis took some time explaining how these children perform after treatment. Because of their age, there is more room for adjustment, and most of these children show few symptoms after surgery. Nevertheless, there could always be symptoms we cannot track. “My boss always says: children are fun to treat, because you know what you have, but not what you’ll get,” Dr. Buis explained. “Older people know exactly what they had achieved before the surgery and what they are missing now. Children haven’t achieved anything yet, they are still a work in progress.”

Dr. Buis stresses that neurosurgery is not a one-man job. He likes to end his lectures with a short video of fighter jets performing stunts together. Everyone stays at exactly the same distance from each other, each jet turning at the exact same moment. And just like in the operating room, everyone involved plays an important role during the operation.

WRITTEN BY:
REBECCA VISCHJAGER

ANSWERS OF THE QUIZ: TEST YOUR KNOWLEDGE ON NEUROSURGERY!

Q1. = 2. Schwannoma
Q2. = 3. Corticospinal tract
Q3. = 3. To prevent nerve damage
Q4. = 4. All of the above
Q5. = 3. Decreases intracranial pressure
Q6. = 3. Lars Leksell
Q7. = 2. The displacement of brain structures due to a lesion
Q8. = 2. It explains the relationship between intracranial volume and pressure

FUTURE EVENTS

In the next few months, we have a few activities lined up for you. Keep an eye on our socials for the latest news surrounding our lectures.

December 14th - Surgery for epilepsy patients

11.00-12.30, online via Zoom

In December, neurosurgeon Dr. Mardhika will give a lecture on surgery as treatment of epilepsy patients. Dr. Mardhika, who resides and works in Indonesia, has done numerous studies within this field, and will highlight the current and future techniques used to treat epilepsy patients. Additionally, attendants will be able to see exclusive videos on these surgeries during the lecture!

February 27th - Pediatric neurosurgery

Time and location TBA

If you weren't able to attend the lecture in November from Dr. Buis, or if you simply have a fascination for pediatric neurosurgery, this lecture might be up your alley! Dr. Han, neurosurgeon at UMC Utrecht, will give a lecture on pediatric neurosurgery. More information will follow later. It will be a hybrid activity.

NEXT ISSUE

- **A DEEP-DIVE INTO THE HISTORY OF NEUROSURGERY**
- **NEW BRAINTEASER**
- **RECAP: SURGERY FOR EPILEPTIC PATIENTS**
- **UPCOMING EVENTS**
- **AND MORE!**

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