



# A new home for the Helsinki Neurosurgical Department — closure of Töölö Hospital after 90 years of neurosurgical history

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The Helsinki neurosurgical department has been housed for 90 years at the Töölö Hospital located on the western side of the Helsinki peninsula. Hospital's operations at Töölö will end in 2023, and neurosurgical services will be transferred to the centralized Meilahti hospital campus of the Helsinki University Hospital, in the new Siltasairaala (Bridge Hospital) currently under construction (Fig. 1). We present a short overview of the history of neurosurgery at Töölö Hospital along current and future perspectives of neurosurgery in Helsinki.

## History of neurosurgery at Töölö

The initial preparations for the construction of the hospital began as early as 1919 by the initiative of Carl Gustav Mannerheim, at the time regent of the Finnish state (and future president). Based on the experiences the Finnish Civil War (1918) brought on, there was a growing realization for the need of specialized trauma care in Finland. The Töölö Hospital was founded as a trauma center called the Finnish Red Cross Hospital and was officially opened in 1932 [16] (Fig. 2).

Due to the growing number of road traffic accidents in the capital region at that time, the hospital was confronted with a rising number of cranial traumas. The head of surgery, Simo Brofeldt, sent his younger colleague, Aarno Snellmann (Fig. 3), to Stockholm to be trained by Herbert Olivecrona, a pioneer of neurosurgery in Europe. After his return, Snellmann was the first to perform a craniotomy in Finland in 1935 at Töölö.

After Brofeldt's death in 1942, Aarno Snellman was appointed chief physician and served in this position during the years of the Second World War. This time proved challenging due to the lack of resources and staff but boosted the experience with all forms of trauma to the central and peripheral nervous system. After the war, it became evident that neurosurgery was needed as a separate specialty and hospital wards were gradually transformed into an independent neurosurgical clinic. Aarno Snellman was appointed the first professor of neurosurgery at the Helsinki University in 1947, marking the dawn of neurosurgery in Finland [10, 16].

After Snellman's retirement in 1961, he was succeeded by Gunnar af Björkesten who was particularly interested in aneurysm surgery and published extensively on the subject [1–4]. During the first years of his chairmanship, the Helsinki department remained the only neurosurgical service in Finland until the second department was founded in Turku in 1967, after which other departments followed (Kuopio (1977), Oulu (1977), and Tampere (1983)) [15]. He was succeeded as chairman by Henry Troupp in 1976, who continued Töölö Hospital's clinical and scientific expertise in vascular malformations and skull base tumors. Under the chairmanship of Juha Hernesniemi, beginning in 1997, the department grew rapidly with an increase in funding, personal staff, and annual number of surgeries [10]. After his visits to Yaşargil in Zürich, Hernesniemi introduced the counterbalanced operating microscope with mouth-piece into the operating rooms of Töölö. Neurosurgery in Helsinki gained further visibility in the neurosurgical community and became international renown in the field of neurovascular and skull base surgery.

Mika Niemelä (Fig. 4) took over the helm in 2015, and under his leadership, the department has further grown with an increase in surgical procedures, medical staff, and scientific output. The department in its current form employs 21 subspecialized neurosurgeons, all holding PhD degrees and half of which hold associate professorships. The department serves a catchment area of 2.2 million people comprising

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**Fig. 1** The new Siltasairaala (Bridge Hospital) at the Meilahati Hospital Campus where the Helsinki neurosurgical department will be situated starting from 2023 (Source: Integrated Healthcare Design Oy)



**Fig. 2** The Finnish Red Cross Hospital (Töölö Hospital) shortly after its completion in 1932

almost half the Finnish population. The high female to male (8/13) ratio of neurosurgical staff reflects how gender equality is deeply embedded into Finnish culture. With over 3600 surgical procedures performed and 80 peer-reviewed scientific papers published annually, the Helsinki department of neurosurgery counts as one of the largest and most scientifically active in Europe. As a pilgrimage and training camp for neurosurgeons around the world, the department has been visited by more than 3000 neurosurgeons in the last 25 years. (Fig. 5) To put it in Robert F. Spetzlers words: “Their list of distinguished visitors reads like an international Who’s



**Fig. 3** Portrait of Professor Aarno Snellman, father of neurosurgery in Finland (painting by Thomas von Boem)

Who of Neurosurgery” [10]. Additionally, many renowned international neurosurgeons have acted as PhD opponents during public examinations of doctorate defenses at the Helsinki department.



**Fig. 4** Mika Niemelä, current chairman of the Helsinki University Hospital's department of Neurosurgery since 2015 (photographed by Markus Sommers)

Operating under the microscope and microsurgical thinking and skill development have deep roots within the mindset of neurosurgery at Töölö [12]. The Helsinki department's motto of "clean and fast surgery, preserving normal anatomy," has driven the use of smaller craniotomies and taken full advantage of the operating microscope's abilities. This while maintaining a relaxed and open atmosphere with equal treatment of medical students, fellows, and visiting professors within this high-performance environment.

### The Finnish way

The comprehensive Finnish welfare system and centralized healthcare with long-term patient follow-up have allowed epidemiological study of many diseases. Most of our knowledge regarding the natural history of intracranial aneurysms and arteriovenous malformations has been the result of Finnish population-based research [6–9, 13].

Finland is a relatively young European nation, and thereby, Finnish mentality shows no restrictions by tradition or conformism, which has resulted in pragmatic

and efficient problem solving. When Finland was confronted with high infant mortality rates in the 1930s, the so-called "baby box" was introduced. This maternity package containing all what is needed during the baby's first year and together with free perinatal care, this has resulted in one of the lowest infant mortality rates worldwide [14]. This outcome-oriented approach and striving for practical solutions and innovation is also seen in Finnish neurosurgical development with early adoption of technologies such as stereotactic surgery (Fig. 6), intra-operative neurophysiological monitoring, transcranial magnetic stimulation, training of hybrid vascular neurosurgeons, use of exoscope surgery, artificial intelligence, and robotics.

### Open door neurosurgery

Part of the philosophy at Töölö has always been an open-door policy welcoming all visitors and encouraging staff members to gain experience abroad. The C. Ehrnrooth Helsinki Vascular and Skull-base Fellowship has provided training opportunity for aspiring neurosurgeons from all over the world launching their future careers (2022 Fellows MV and TS) [5]. For 20 years in a row, during the first week of June, the department organized the Helsinki Live Microneurosurgery Demonstration Course in collaboration with the Aesculap Academy. These courses offer live surgery during which world-renowned neurosurgeons demonstrate their technical skills and expertise to an international neurosurgical audience. The courses included procedures by visiting surgeons such as Gazi Yasargil, Uğur Türe, Ali Krisht, Vinko Dolenc, Rokuya Tanikawa, Michael Lawton, Peter Vajkoczy, Luca Regli, and Marcos Tatagiba. The course would have celebrated its twentieth anniversary in 2020 but had to be cancelled due to the ongoing pandemic. In 2021, a tribute course was organized as a live webinar where all previous performing neurosurgeons were invited.

### The future of the neurosurgical hospital

The original building dating from 1932 will be preserved and given a new purpose, but all newer extensions of the small Töölö Hospital will be demolished. This site has offered the unique quality of being a neurosurgical hospital in which the operating rooms, intensive care unit, and nursing staff were solely dedicated to neurosurgery. Specialist neuroanesthesiologists provide continuity in care for patients from the emergency room door, through the



**Fig. 5** World map hanging in the operating theatre’s lobby demonstrating the origin of international visitors (Photographed by Tobias Rossmann)

operating room until reaching the intensive care unit. A growing trend of hospital reform in the Nordic countries and the rest of Europe is resulting in the closure of multiple smaller sites doing away with the advantages those environments offer [11, 17]. These include the easiness of internal communication, familiarity among personnel, and autonomy in elective and emergency bed capacity planning. Nonetheless, the advantages of unification of university hospital departments onto one campus are manifold and include non-exhaustive: fewer patient

transports, less displacements of medical personal for consult services, shorter duration of transports of blood and pathological specimen, easiness of exchange and sharing of expensive equipment between surgical specialties, etc. The authors have no doubt that after closure of the Töölö Hospital and the relocation of the Helsinki neurosurgical department, the mindset, philosophy, and true core of Helsinki neurosurgery will persevere for many generations to come.



**Fig. 6** The Laitinen Stereotactic frame developed by Lauri Laitinen at Töölö hospital (photographed by Anders Manns)

## Declarations

**Conflict of interest** The authors declare no competing interests.

## References

1. Björkstén G (1967) On several rare aneurysm locations. *Acta Neurochir* 16:178–179
2. Björkstén GA (1955) Coarctation of the aorta and subarachnoid hemorrhage. *Duodecim; laaketieteellinen aikakauskirja* 71:213–216
3. Björkstén GA (1958) Arterial aneurysms of the internal carotid artery and its bifurcation: an analysis of 69 aneurysms treated mainly by direct surgical attack. *J Neurosurg* 15:400–410. <https://doi.org/10.3171/jns.1958.15.4.0400>
4. Björkstén GA, Troupp H (1958) Aneurysms of the middle cerebral artery; a report on 52 cases. *Acta Chir Scand* 115:153–159
5. Haeren R, Schwartz C, Satopää J, Lehecka M, Niemelä M (2021) Letter: Training of microsurgical aneurysm clipping in the endovascular era: towards structured fellowship programs in Europe. *Neurosurgery* 88:E465–e466. <https://doi.org/10.1093/neuros/nyab011>
6. Korja M, Kivisaari R, Rezai Jahromi B, Lehto H (2017) Natural history of ruptured but untreated intracranial aneurysms. *Stroke* 48:1081–1084. <https://doi.org/10.1161/strokeaha.116.015933>
7. Korja M, Kivisaari R, Rezai Jahromi B, Lehto H (2018) Size of ruptured intracranial aneurysms is decreasing: twenty-year long

- consecutive series of hospitalized patients. *Stroke* 49:746–749. <https://doi.org/10.1161/strokeaha.117.019235>
8. Korja M, Lehto H, Juvela S, Kaprio J (2016) Incidence of subarachnoid hemorrhage is decreasing together with decreasing smoking rates. *Neurology* 87:1118–1123. <https://doi.org/10.1212/wnl.0000000000003091>
9. Laakso A, Hernesniemi J (2012) Arteriovenous malformations: epidemiology and clinical presentation. *Neurosurg Clin N Am* 23:1–6. <https://doi.org/10.1016/j.nec.2011.09.012>
10. Lehecka M, Laakso A, Hernesniemi J (2001) *Helsinki Microneurosurgery Basics and Tricks*
11. Magnussen J, Hagen TP (1982) Kaarboe OM (2007) Centralized or decentralized? A case study of Norwegian hospital reform. *Soc Sci Med* 64:2129–2137. <https://doi.org/10.1016/j.socscimed.2007.02.018>
12. Muhammad S, Tanikawa R, Lawton M, Regli L, Niemelä M, Korja M (2019) Microsurgical dissection of Sylvian fissure—short technical videos of third generation cerebrovascular neurosurgeons. *Acta Neurochir* 161:1743–1746. <https://doi.org/10.1007/s00701-019-03999-x>
13. Ondra SL, Troupp H, George ED, Schwab K (1990) The natural history of symptomatic arteriovenous malformations of the brain: a 24-year follow-up assessment. *J Neurosurg* 73:387–391. <https://doi.org/10.3171/jns.1990.73.3.0387>
14. Panzar K (2018) *The Finnish Way*. TarcherPerigee,
15. Romani R, Troupp H (2014) Gunnar af Björkstén (1912–1974) Pioneer of Finnish neurosurgery: the surgeon and the man. *Acta Neurochir* 156:1423–1426. <https://doi.org/10.1007/s00701-014-2068-y>
16. Törmä T (1981) Perspectives in international neurosurgery: neurosurgery in Finland. *Neurosurgery* 9:479–481. <https://doi.org/10.1227/00006123-198110000-00023>
17. Wyss K, Lorenz N (2000) Decentralization and central and regional coordination of health services: the case of Switzerland. *Int J Health Plann Manage* 15:103–114. [https://doi.org/10.1002/1099-1751\(200004/06\)15:2%3c103::aid-hpm581%3e3.0.co;2-s](https://doi.org/10.1002/1099-1751(200004/06)15:2%3c103::aid-hpm581%3e3.0.co;2-s)

**Comments** Veldemen and colleagues present a brief history of the Helsinki Neurosurgical Department, and its origins at the Töölö Hospital. They have chosen the transition from the original hospital to a new center, the Silasairaala (Bridge Hospital) to be completed in 2023, to review this history. In the early part of the twentieth century, the need for trauma care in Finland was revealed by the Finnish Civil War, increasing vehicular trauma, and later World War II. Nervous system trauma in these two conflicts, and because of modern transportation, crystallized the requirement for specialists in the care of nervous system injury. Professor Aarno Snellman was the forerunner of neurosurgery in Finland, having spent time with Herbert Olivecrona in Stockholm learning the fundamentals. His work as Neurosurgical Chairman at Töölö extended to his retirement in 1961, at which time Professor Björkstén assumed that role. Töölö continued as the sole neurosurgical clinic in Finland until 1967 when over the next 16 years, four other regional neurosurgical centers were established.

Professor Henry Troupp succeeded Björkstén, and later in 1997, Juha Hernesniemi assumed the Chairmanship. Under his leadership, the program at Töölö expanded substantially, and garnered an international reputation as a renowned center of excellence in Neurological Surgery, particularly around cerebrovascular and skull base neurosurgery, attracting visitors from all parts of the world. In 2015 Professor Mika Niemela assumed the Chair and has continued to build this exemplar of clinical and academic excellence in Neurosurgery. Furthermore, due to the comprehensive and systematic nature of Finnish healthcare, the natural histories of neurosurgically relevant conditions, specifically cerebrovascular

disease, have become more understandable when analyzed using this population database.

In summary, one neurosurgical center in a small country has made major contributions to the science and practice of Neurological Surgery, well out of proportion to its population. It has taken advantage of centralized healthcare to both concentrate neurosurgical expertise and to leverage valuable data to produce major insights into neurological disease. Moreover, Finland, and Töölö in particular, has demonstrated an uncommon willingness to share knowledge and expertise in our surgical discipline.

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