

The Torch of Clinical Neuroscience in the Middle East

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Neuroscience clinical practice in the Middle East was pre-launched as sporadic initiatives in the early fifties and sixties. Avant-gardes like Dr. Osman Souror, Dr. Samuel Boctor, Dr. Fuad Haddad, Dr. Faisal Sabbagh, Dr. Anton Tarazi, Dr. HishamBakdash and Dr. Amin Sabra were among few experts in the field and were affiliated with medical colleges or private health sectors. The ambition to establish modern health facilities and promote neuroscience centers mirrored the leap made in neuro-imaging, neurophysiology testing and innovation in neuro-surgical technics and equipment.

Saudi Arabia's quest to establish a modern healthcare system was prompted in 1970 as a result of oil economic prosperity and part of its long-range plan. This was supported by its constitution and declaration to take charge of all aspects of healthcare and ensure it is provided to all citizens. Saudi Arabia has since invested heavily in healthcare. A number of initiatives and measures were introduced to provide excellent healthcare around the country, establish modern hospitals, acquire new technologies, support staffing, training and education, establish new programs; enhance healthcare networks, referral systems and outreach programs, introduce a credentialing body and improve medico-legal legislation. The New Year fiscal' report for 2015 unveils the largest national budget for the Kingdom of Saudi Arabia with focus on infrastructure, education and health. Allocation of \$ 42.7 Billion on health services and social development corresponds to an expenditure of 19 % of total budget, second highest expenditure this year to education 25% (1). This increase in funding reflects the growing demands of the steady population growth, increased public awareness, changing patterns of diseases, expansion and promotion of new programs and facilities, proliferation of high-tech medical equipment and increased overall costs. The provision of healthcare is shared among autonomous government organizations: Ministry of health services, King Faisal Specialist Hospital and Research Center (General

Organization), Armed Forces and Security Forces health facilities, National Guard hospitals, University hospitals and the Royal commission and has included recently the private sectors. Two major reforms have been proposed and implemented: The enacted health insurance law for employment, and to encourage the private sector to undertake greater role in financing, constructing and management of health facilities.

Neuroscience clinical practice in Saudi Arabia during the past 40 years has progressed to internationally recognized high standards. Although neurological evaluation, diagnosis, and emergency neurosurgical interventions are widely available throughout the country, neuroscience academic clinical centers are more concentrated in Riyadh (central region), Jeddah, Mecca and Medina (western region), Dammam/Al-khobar (eastern province) and Assir, Najran (southern region). Corresponding medical centers have advanced neurosurgical equipment, sophisticated diagnostic laboratories, and modern imaging facilities and are able to perform advanced investigations and complex interventions.

King Faisal Specialist Hospital and Research Center reflects the high level of neuroscience healthcare offered in the Kingdom of Saudi Arabia, the one thousand bed health facilities lead the tertiary neuroscience services in the region among other established centers in the Middle East and serve as an inspiration to other national and regional institutions. It has been the icon of excellence in health care to visit by dignitaries: Kings, presidents, astronauts, ministers and celebrities (Figure 1). It was erected in 1975 following a Royal decree by King Faisal in 1970 (Figure 2). The multi-specialties tertiary care hospital recruited consultant neurologists, neurosurgeons and pediatric neurologists, who offered their expertise within their corresponding Departments in the late 70s and early 80s: Dr. MZ. Alkawi and Dr. R. Bashir introduced the first neurology service and neuro-electrophysiology testing in the hospital. Dr. Guthkelch and later Dr. P. Car-

ny and Dr. Grove were recruited as Neurosurgeons and Dr. Carny was appointed as Chairman of Surgery. Dr. O. Al-Mefty joined in early 1982 followed by Dr. J. Fox who was recruited as the Chairman for the Department of Neurosurgery (Figure 3). Both were the driving force in promoting skull base surgery, refined FOZ approach and introduced CO2 laser in neurosurgical intervention. DR. Fox performed the first anatomical hemispherectomy for treatment of refractory case of epilepsy in addition to his expertise in neurovascular surgery. In 1985, Dr. E. Siqueira was recruited as Chairman of Neurosurgery and few months later Dr. B. Rahm and I joined as consultant neurosurgeons (Figure 4). During the following years, pediatric neurosurgery, skull base surgery, pituitary tumor surgery and stereotactic intervention were promoted to new dimensions following the progress made in the field. Fixter stereotactic frame was adopted in 1988 and later replaced by Leksell system. CUSA was acquired and replaced CO2 laser use in several procedures. Minimally invasive neurosurgery concept was adopted by the author who had proceeded in 1988 with the first application of keyhole endoscopic stereotactic neurosurgery intervention using Neodymium-YAG laser fiber for ablation of

intra-ventricular brain tumor (Figure 5) and performed 3rd ventriculostomy. Shortly thereafter, the author introduced modified trans-eyebrow approach for resection of skull base tumors and promoted endoscopic direct trans-sphenoidal approach. Dr. M. Hassounah, a returning scholar trained in Canada, played a valuable role in promoting pediatric Neurosurgery and the management of pediatric craniofacial anomalies. Dr. Siqueira started the microsurgery training courses in 1989. Dr. Rabe a senior expert from Tufts University was the first pediatric neurologist to join the hospital in 1985. Dr. N. Sakati, Dr. P. Ozand and Dr. G. Gascon (pediatric neurologist) all played a major role in the recognition and management of neuro-metabolic and neurogenetic diseases, described new syndromes and instituted new treatment protocols. The first initiative of comprehensive Epilepsy Program was established in early 1990, which included (Dr. G. Gascon, Dr. D. MacLean, Dr. B. Stigsby, Dr. Z. Alkawi, Dr. O.J. Brismar, Dr. O. Dabbagh, and Dr. I. Kanaan) (Figure 6). The first functional hemispherectomy and selective mesial temporal lobe resection for the treatment of refractory epilepsy were carried out successfully by the author (IK).



Figure 1. From Left to Right: King of Sweden visit to KFSH & RC 1981; Prime Minister of England Visit to KFSH & RC 1981; Japanese Princess visit to KFSH & RC 1981; Mr. Mohammed Ali “sport icon” visit to KFSH&RC 1990

Figure 2. Collection of Historical Images



a) Original mosaic art work (1975) commemorates King Faisal bin Abdul-Aziz Al Saud, founder of KFSH & RC; b) Celebration of laying the cornerstone for construction of KFSH & RC 1971; c) Historical postal stamp dates the inauguration of KFSH&RC

Figure 3. Group Photo of KFSH&RC Neurosciences Pre-Amalgamation 1983



Drs. Al Mefty, Willis, Sami, McArthur, Sakati, Chalabi, Shaker, Hassounah (Front) and Drs. Bashir, Lambert, Jenkins, Fox, Dew, Holoubi (Back)

Figure 4. Group Photo Department of Neurosurgery 1992



Dr. Rahm, Dr. Siquiera, visitor, Dr. Kanaan (Front) and Dr. Jallu, Dr. Shail, Dr. Hassounah (Back)

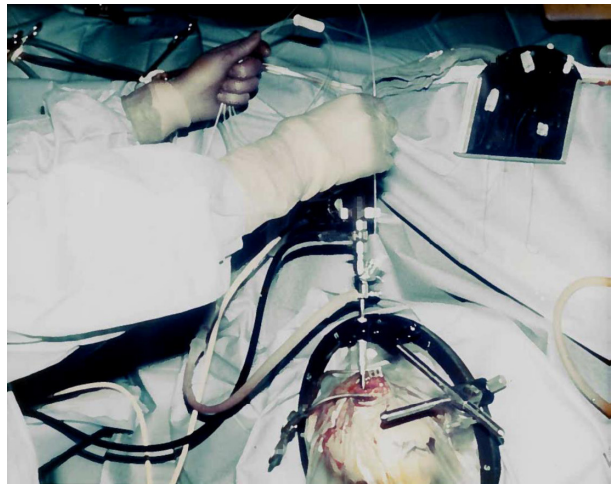


Figure 5. Key-hole Endoscopic Stereotactic lesion ablation using Yag-laser fiber and Fixter Stereotactic Frame 1989 (Courtesy of Dr. Kanaan)

Figure 6. First Comprehensive Epilepsy Program at KFSH & RC (Riyadh) early 90s



From left to right: Drs. Kanaan, Kawi, McLean, Jean Aicardi (Visiting), Gascon, Nester, Siquiera, Dabbagh, Brismar

The Neuroradiology service started with the recruitment of Dr. R. Jenkins in 1979, the first neuroradiologist at KFSHRC upon installation of the first CT Brain. He

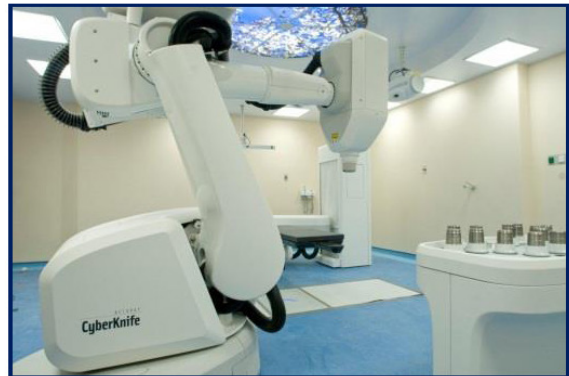
was joined later in mid 80s and early 90s by several colleagues to establish the Section of Neuroradiology under the Department of Radiology (Dr. M. Banna/ Chairman,

Dr. R. Coats, Dr. J. Brismar, Dr. J. Watban, Dr. S. Patay). This was complemented by the great contribution of Dr. A. Rifai in the field of ultrasound, nuclear medicine and PET scan functional studies of neurological diseases, brain and pituitary tumors. The first MRI was installed in the hospital in 1987 and later replenished with 3 additional state of the art machines including a 3 tesla MRI, 4 helical CT scans and state of the art Angiography suite. Close collaboration between Neurosurgery and Neuroradiology was fostered by the frequent locum visits of Dr. Pierre Lasjuanias, which lead to the establishment of Interventional Neurovascular working group (Dr. J. Brismar, Dr. I. Kanaan, and Dr. J. Watban). The Neuropathology service was led by Dr. A. Ali in the early 80s. Additional members were recruited to form the section of neuropathology

(Dr. A. Ali, Dr. A. Haidar, and Dr. B. Lach)

In 1998, a team from Radiation Oncology, Neurosurgery and Biophysics Departments at KFSH and Research Center established a state of the art Stereotactic Radiosurgery Program (Dr. A. Al-Amro, Dr. I. Kanaan, and Dr. H. Schulz, Dr. A. Betairi) using Varion-BrainLab micro multi leaves System for complementary treatment of Brain Tumors and Vascular Malformations. In parallel Gamma-knife was adopted in Jordan and in Egypt. Dr. Salah Al Akkad, an expert radiation oncologist, joined the hospital upon inception with the mandate to lead the first Department of oncology. The first Cyber knife facility in the region was installed at our institution in 2009 (Figure 7). KFSH and RC continues to be the leading center for comprehensive management of cancer in the Middle East.

Figure 7. Improvements



a) Dr. Akkad receiving RH. Prince Philip during his visit to 1st oncology department, 1977; b) New Cyberknife machine installed at KFSH & RC Riyadh, 2009

The Department of Neurosciences was inaugurated in 1995, amalgamating 5 sections under one department and Chaired first by Dr. M. Muentner, a neurologist from Mayo Clinic group. Dr. M. Fiole (epileptologist), Dr. R. Chaves (pediatric Neurologist) and other astute colleagues also joined the department as new members to provide their expertise. The section of Psychiatry/neuropsychology was established to include senior colleagues, Dr. Q. Shalabi, Dr. M. Nester and Dr. V. Escandel. Dr. F. Leblanc eventually replaced Dr. Muentner as new Chairman in 1997, an expert epilepsy surgeon from Calgary, Canada. He served a five- year term as chairman, during which the Epilepsy Program was promoted with upgrade of EMU. Movement Disorder program was formulated, DBS and later VNS were introduced. The new section of Neurophysiology was established and lead by Dr. D. McDonald, introducing sophisticated invasive electrophysiology recording and intraoperative monitoring during complex neurosurgical interventions. A new neuronavigation system (BrainLab) replaced the previously acquired Admiral II system (Compass). Interim acting Chairmen were assigned followed by the nomination of Dr. I. Kanaan in 2009 as Chairman of the Department.

The Neurosciences department was declared as one of the hospitals is strategic core program, recognized by the world federation of neurosurgical societies as one of the training centers towards international fellowship in skull Base-surgery. Returning scholars pursued their career path and excelled in their corresponding field. KFSH and RC launched leadership programs, introduced LEAN methodology, established quality indicators using key performance improvement (KPIs) and adopted modern integrated clinical information systems and the picture archiving and communication system (PACS). The eleven stories building (North Tower) was commissioned in 2010 to host the new outpatient clinics facilities (Figure 8). Autism and ADHD centers were inaugurated. A state of the art BrainSuite facility was launched in 2014 (Figure 9). KFSH and RC received several awards, recognitions and accreditations: JCIA (Joint Commission International Accreditation), Magnet, WFNS (World Federation of Neurosurgical Societies), ISO (International Organization for Standardization) and AACE (American Academy of Continuous Education) golden seal, these were only few among other distinguished international organizations. The institution has also established strong liaisons with

regional and international organization and world leading academic centers. Department of Neurosciences conducted several international workshops and symposia and was honored to invite leaders in the field of neuroscience to share their experience and enhance collegial collaboration, among them were: J.P. Mohr, J. Hardy, C. Drake, P. Lasjuanias, R. Spetzler, C. Poser, T. Fukushima, J. Aicardi, J. Wada, Di Mauro, R. Daroff, R. Sawaya, J. Ruthke, C. Raybaud, E. Laws and V. Dolenc.

The Department of Neurosciences has been deeply involved in teaching and education and conducts several residency and fellowship training programs. National

training programs for Neurology, Neurosurgery and pediatric neurology were pre-launched in early 1990s as a result of fruitful collaboration among the leading medical centers in the kingdom including KFSH and RC (King Faisal Specialist Hospital and Research Center). These programs were eventually incorporated under the newly established Saudi Council for Health Specialties. The different neuroscience clinical programs have attracted many high-scoring graduates to pursue their career towards the Saudi Board certification in their specialty. The programs weld the European and the North American training guidelines into one modified system with strict

Figure 8. Buildings Through Time



a) KFSH & RC Original building near completion, 1975; b) KFSH & RC first expansion, 1985; c) North Tower expansion, 2010

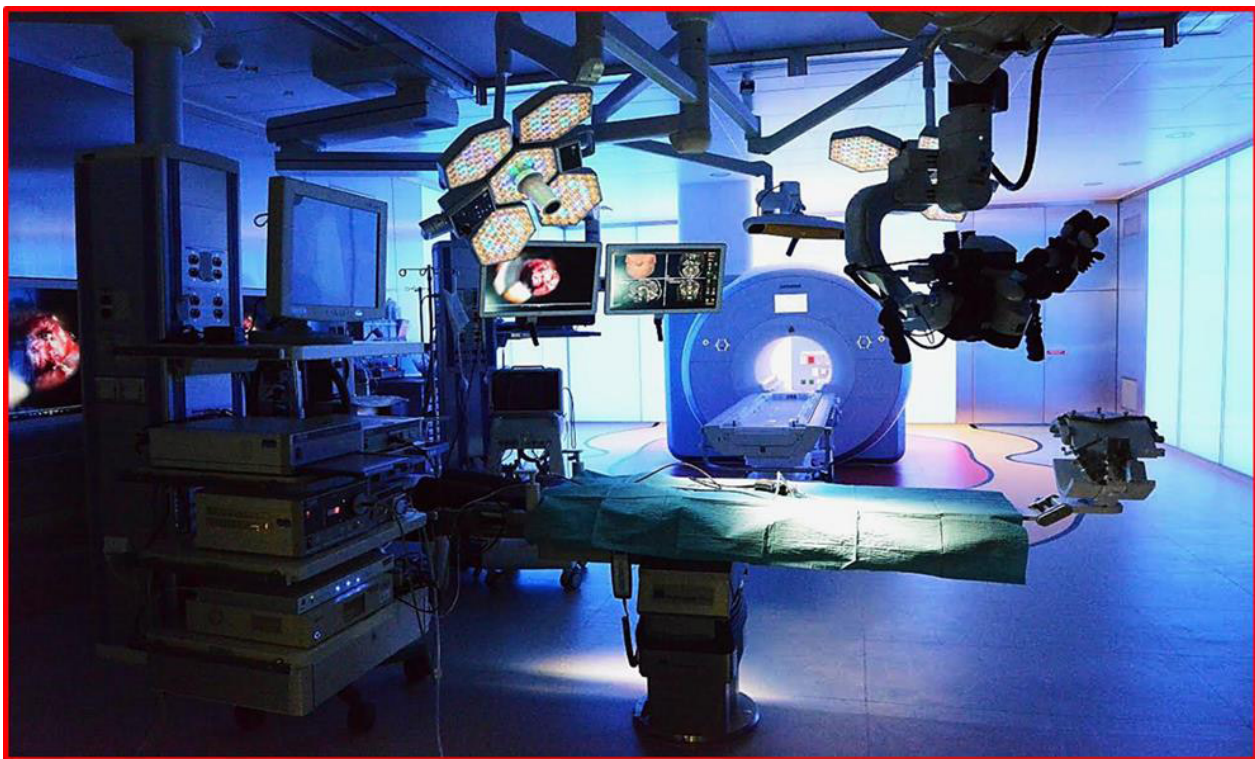


Figure 9. KFSH & RC New BrainSuite Facility, launched September 2014

admission and selection criteria, assigned rotations, an annual evaluation examination, and a final qualifying complex examination toward the Saudi board certification. More recently, our institution was affiliated with Al-faisal University and entrusted to edit its curriculum and teach its medical students.

Researcher, senior scientists and doctoral students at the internationally recognized KFSH research center collaborate with the clinical staff, introduce several registries and perform fruitful clinical research with focus on molecular neurobiology, genetics and stem cells. The results were applauded at international scientific forum and published in respected peer Journals. Hands-on courses on skull base approaches are conducted with close collaboration with WFNS (Figure 10).

Conclusion

This editorial reviewed the history in evolution of the Department of Neurosciences at King Faisal Specialist Hospital and Research Center general Organization. It represents a landmark for the practice of Neuroscience in the Middle East. The pre-requisites for successful mission remain in: an altruistic clinical practice towards patient's advocacy, a multidisciplinary approach among pillars in this field as described above and the focus on

research, education and innovation.

Figure 10. First KFSH&RC Comprehensive Hands-On Skull Base Dissection Course in Collaboration with WFNS, November 2011



Faculty: J. Landeiro, H. Bertalanffy, N. Pamir, I.Kanaan, M. Ammirati, F. Gentili and k. Yoshida

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