For Immediate Release

HKSH Uses AI for Speedier Diagnosis and Assessment for Severe Acute Stroke Patients Going Beyond the Golden 3-Hour Treatment Time Window

(25 January 2021, Hong Kong) Hong Kong Sanatorium & Hospital (HKSH) has launched an enhanced programme for severe acute stroke patients in which artificial intelligence (AI) is used to determine the amount and percentage of salvageable brain tissues based on neurovascular magnetic resonance imaging (MRI) and perfusion scanning. This will allow doctors to determine the patient's eligibility for endovascular therapy (Intra-arterial thrombectomy / IA thrombectomy) and bring hope for more treatment options to patients who might have missed the golden 3-hour window after stroke onset.

With the launch of Acute Stroke Activation Programme 2.0 (ASAP 2.0) eight months ago, HKSH was the first medical institution in Hong Kong to apply RapidAI software, an AI-enhanced cerebrovascular imaging system, for stroke diagnosis and treatment as well as the first local private hospital to provide 24/7 acute stroke service and IA thrombectomy for ischaemic stroke patients. Two acute stroke patients received IA thrombectomy with the guidance of the AI system and achieved a desirable treatment outcome.

HKSH has all along been serving our patients with state-of-the-art medical technologies. The application of the AI system has made it possible for us to go beyond the limit of the acute stroke golden 3-hour time window by assessing the amount and ratio of salvageable to irreversibly damaged brain tissues. With the launch of ASAP 2.0, severe ischaemic stroke patients who arrive at the hospital beyond 3 hours after onset can undergo perfusion scanning and assessment with RapidAI software. The combination of perfusion scanning and AI system provides objective measurement to guide neurologists and neurosurgeons in determining the patients' eligibility for IA thrombectomy which is not limited to within 3 hours of stroke onset. That said, the earlier the acute stroke patients get medical treatment, the better the chance of good recovery .

This enhanced 2.0 programme will be built on the existing ASAP 1.0 programme which was launched in 2016 and has so far managed a total of 98 cases. Assessment and treatment are two essential service aspects under ASAP. Upon the arrival of any suspected stroke patient to the 24-hour Outpatient Department (OPD), the Resident Medical Officer (RMO) will provide priority assessment to the patient. If the preliminary diagnosis of acute stroke is established, ASAP 1.0 will be activated and priority CT brain scan will be performed on the patient to differentiate between haemorrhagic or ischaemic stroke, while in-house neurologist will be called back to provide assessment.

The ASAP 1.0 programme mainly caters for patients with acute ischaemic stroke presenting within 3 hours of the onset of stroke to provide them with intravenous thrombolytic therapy (i.e. administration of drugs via injection to dissolve blood clots in vessels to restore cerebral blood flow). In general, the treatment is most effective if thrombolytic therapy can be commenced within 3 hours of the onset of stroke, while some patients may show improvement if treatment is commenced within 4.5 hours.

For severe stroke patients whose conditions do not improve after receiving intravenous thrombolytic therapy, or who have arrived at the hospital after the desirable time limit for administering intravenous thrombolytic therapy, ASAP 2.0 will be activated. They will be arranged

to undergo MRI or CT perfusion scanning on the brain and cerebral blood vessels to determine if there is large vessel blockage. With the RapidAI software, the amount and ratio of salvageable to irreversibly damaged brain tissues can be assessed and calculated to determine whether they are suitable for IA thrombectomy.

Timely treatment is vital to ensuring the chance of survival and satisfactory recovery of acute stroke patients. The AI system will play a significant role in saving time as the report can be generated at about 10 minutes and it will enable neurologists and neurosurgeons to decide on the best treatment option for the patients including the feasibility of IA thrombectomy in the most effective and efficient manner. Hence, treatment options for acute stroke patients can be extended beyond the 3-hour time limit.

IA thrombectomy is a type of minimally invasive surgery that can be used for treatment of acute ischaemic stroke patients with large vessel occlusion. During the procedure, the neurosurgeon will guide the instrument through the patients' arteries to the blockage and remove the blood clot to re-establish blood flow to the affected part of the brain. IA thrombectomy is best performed within 6 hours of the onset of severe stroke. Researches have shown good functional outcome in ischaemic stroke patients receiving IA thrombectomy within 16 hours[1] or 24 hours[2] if they meet certain criteria with the use of perfusion scanning and AI system.

There are certain risks for IA thrombectomy such as blood vessel damage. The attending doctors must carefully assess the patients' eligibility for this procedure with guidance by the data generated by the AI system. Under ASAP 2.0, patients who have undergone IA thrombectomy will be transferred to the Intensive Care Unit (ICU) for treatment and close monitoring of their blood pressure and vital signs for the next 48 hours.

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Patient Case Sharing

An 84-year-old patient noticed right-sided limb weakness and slurred speech in early November 2020. After arriving at HKSH 24-hour Outpatient Department, he was immediately assessed and diagnosed with acute stroke by the Resident Medical Officer. Although the patient arrived at the hospital within one hour of the onset of symptoms, he was considered not suitable for intravenous thrombolytic therapy because of his medical history of atrial fibrillation and the fact that he was taking anticoagulant. He underwent MRI perfusion scanning with the application of RapidAI software to calculate the amount and ratio of salvageable to irreversibly damaged brain tissues. The patient was found to be eligible for IA thrombectomy. He showed good neurological recovery after treatment: his speech and swallowing ability greatly improved, and he also recovered the power of his limbs. He was discharged from the hospital two and a half weeks later.

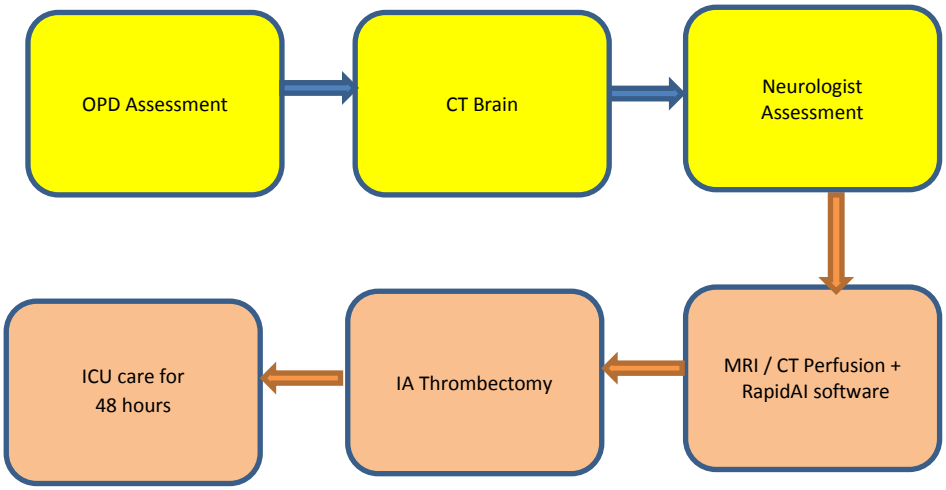
[1] Albers GW, Marks MP, Kemp S, et al. Thrombectomy for stroke at 6 to 16 hours with selection by perfusion imaging. N Engl J Med 2018;378:708-718.

[2] Nogueira RG, Jadhav AP, Haussen DC, etal. Thrombectomy 6 to 24 hours after stroke with a mismatch between deficit and infarct. N Engl J Med 2018;378:11-21

Supplementary Materials

Acute Stroke Activation Programme 1.0

Acute Stroke Activation Programme 2.0



HKSH Medical Group

Officially launched in September 2017, promotes public health and advanced medicine through a multi-faceted, coordinated approach in clinical services, medical education, scientific research and public health education. Members of the Group, including Hong Kong Sanatorium & Hospital, HKSH Healthcare HKSH Eastern Medical Centre, are dedicated to offering top-quality holistic care to patients, upholding the motto “Quality in Service, Excellence in Care”.

Hong Kong Sanatorium & Hospital

Hong Kong Sanatorium & Hospital is one of the leading private hospitals in Hong Kong. With the motto “Quality in Service Excellence in Care”, the Hospital is committed to serving the public as well as promoting medical education and research.

Neurology Centre

Opened on 1 January 2014, the Neurology Centre provides a wide range of services in diagnosis, treatment and care for patients with different neurological disorders. One of its major services is acute stroke management. With a particular focus on stroke prevention and patient rehabilitation, it is supported by a multi-disciplinary team of specialists in emergency medicine, intensive care, cardiology, radiology, speech therapy, physiotherapy, clinical psychology, etc. providing total patient care for patients. Other service areas include such neurological disorders as Parkinson's

disease, Alzheimer's disease, neuromuscular diseases, epilepsy, movement disorders, multiple sclerosis and headaches.

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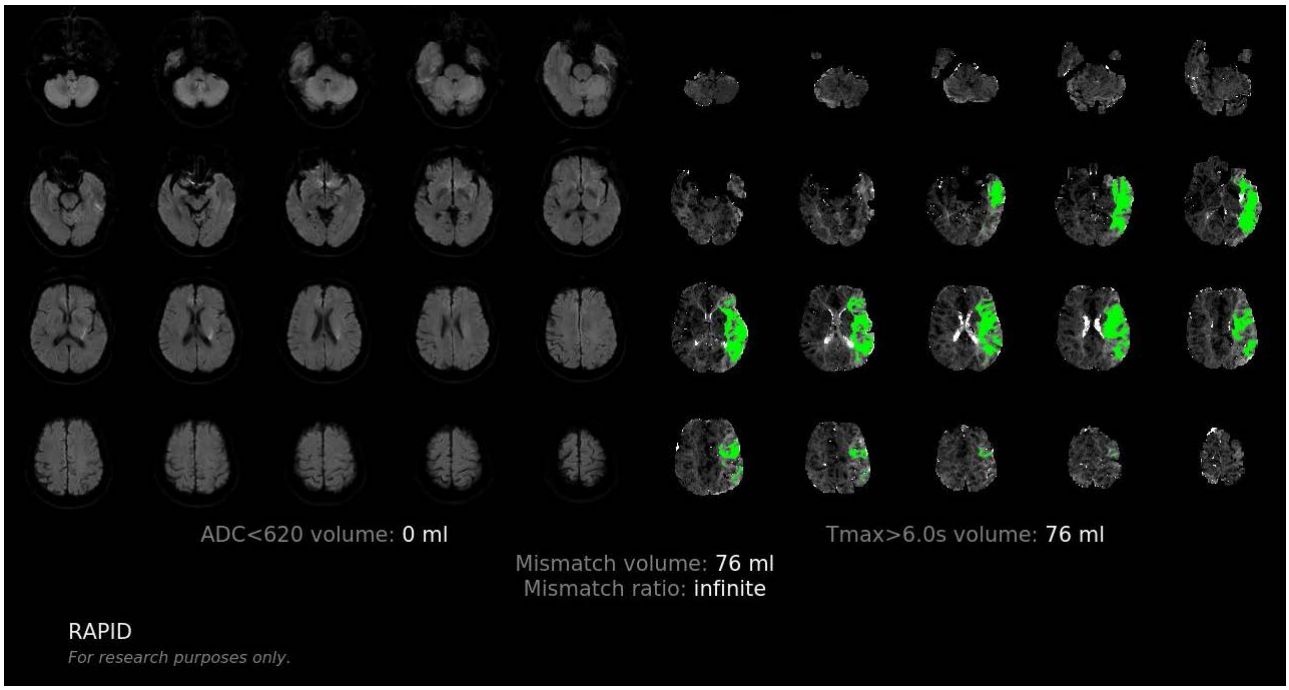
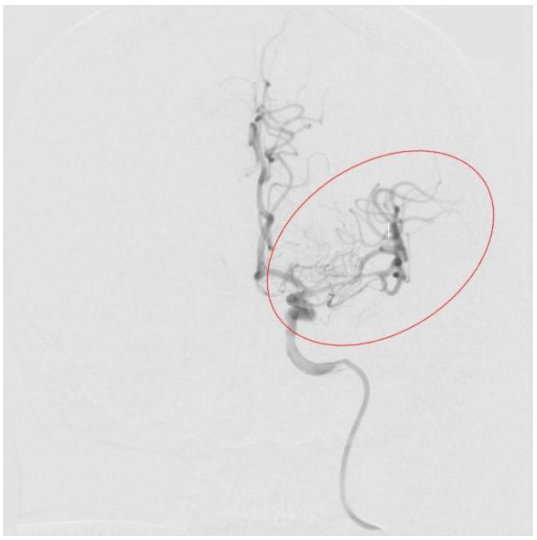
Photo:
1. This is the imaging analysis of the AI system RapidAI software. The green area showing the salvageable brain tissues. The larger the green area, the higher the likelihood for improvement in treatment outcome for the patient.



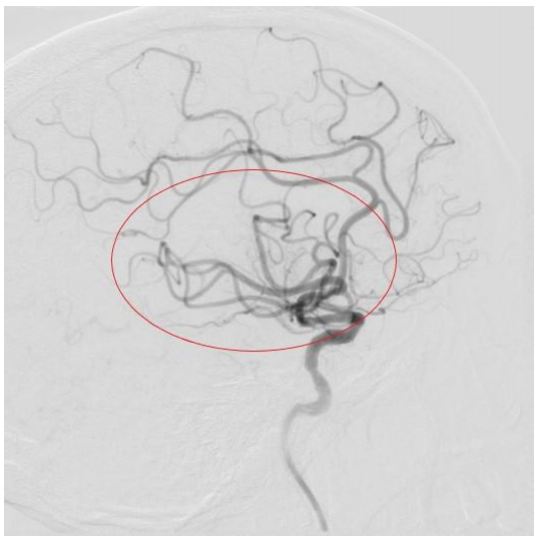
2. The angiogram showing the difference before and after IA thrombectomy, blood flow resumes in the area of red circle.

Before (Front)



After (Front)

Before (Lateral)



After (Lateral)

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