

“Thrombectomy and Back:” A Novel Approach for Treating Patients with Large Vessel Occlusion in the Eastern Province of Saudi Arabia

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Abstract

Background: Timely access to comprehensive stroke centers for patients suffering from acute ischemic stroke due to large vessel occlusion (LVO) remains a commonly encountered obstacle worldwide, especially in areas with no comprehensive stroke or thrombectomy-capable stroke centers.

Objective: To present our novel experience with a “thrombectomy-and-back” model implemented in the Eastern Province of Saudi Arabia.

Methods: King Fahd Hospital of the University (KFHU), a 600-bed hospital located in Al Khobar with an open-access emergency department, was designated as a comprehensive stroke center in the Eastern Province. “Thrombectomy-and-back” was designed such that the neurologist in the referring hospital directly communicates with the attending neurovascular team at KFHU for their anticipation of the case, and subsequently confirms LVO presence through urgent acquisition of a CT and a CT angiogram. Once LVO was confirmed, the patients were timely transferred to KFHU for mechanical thrombectomy. Upon procedure completion, the patients returned to the referring hospital with the same medical and EMS team. The safety of transfer and peri-procedural complications were analyzed.

Results: From December 2017 to December 2019, 20 thrombectomy-and-back codes were activated, of which 10 were deactivated on negative LVO and 10 remained activated. Of these 10 patients, 2 required admission to our hospital’s Neuro-ICU: one was because the middle cerebral artery reoccluded during the procedure and the other was due to hemodynamic instability upon arrival; this first patient passed away 2 months later due to the complications of the malignant left middle cerebral artery stroke.

Conclusions: The novel Thrombectomy-and-Back model in the Eastern Province of Saudi Arabia has proved to be a safe and efficient approach for patients presenting with LVO to receive timely interventional therapy and minimizing futile transfers.

Keywords: Acute ischemic stroke, occlusion, tele-stroke, thrombectomy

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INTRODUCTION

Ischemic stroke due to large vessel occlusion (LVO) has serious consequences for patients if left untreated. There is a growing body of literature with a strong level of evidence demonstrating the benefits of mechanical thrombectomy (MT) for patients with LVOs.^[1,2] This is evident in patients treated within 6 hours of last seen well (LSW) and for a carefully selected few within 24 hours of LSW.

Due to geographical or logistical restraints, some acute ischemic stroke (AIS) patients might not have access to a dedicated interventional neuroradiology (INR) services at the receiving hospital. This is compounded by the limited number of neuro-interventionists available to cover a large catchment area. The classic transfer model of patient would risk burdening any thrombectomy-capable center with the anticipated long-term recovery period of stroke patients who suffer from LVOs. This raises the need to provide patients with timely transfer to Comprehensive Stroke centers with 24/7 INR services with a pathway that ensures their safe return to their receiving hospital.^[3,4]

We aim to describe our unique experience as the first comprehensive stroke center in Saudi Arabia to implement the “Thrombectomy and Back” (T&B) protocol, which provides acute MT for patients presenting with LVOs from different hospitals throughout the Eastern Province of Saudi Arabia who were eligible for MT or urgent endovascular thrombectomy and transferring them back to the referring hospitals after the procedure.

METHODS

King Fahd Hospital of the University (KFHU) in AlKhobar, Saudi Arabia, is a tertiary care center that has an open-access Emergency Department. KFHU offers comprehensive stroke services to the region and has dedicated Neurovascular and Neuro-ICU services, with an average of 40 MTs performed annually. The proposed model was designed to allow patients in primary stroke centers, who do not have access to the time-sensitive MT, to be transferred to comprehensive stroke/thrombectomy-capable stroke centers, where they would receive timely treatment.^[5] This is done by direct communication between the treating neurologists of the regional primary stroke center and the INR team at KFHU. To reduce the possibility of “futile transfers,” the model was designed to provide the acquisition of an urgent CT/CT angiogram in the primary stroke center to document the LVO prior to the initiation of the transfer. This would not interfere with the decisions of

IV thrombolysis for eligible patients, conforming to the drip and ship model.^[6]

In this model, the neurologist in the referring hospital activated T&B code, through direct communication with any INR team members’ cell phone as soon as they identify patients coming with acute neurological deficits, which could be attributed to an LVO before obtaining CTA. If the CTA was negative for an LVO, Code “T&B” would be deactivated. For those patients with LVO on CTA, the transfer was initiated, and the representative images were electronically shared. Upon arrival at KFHU, the patients had a brief period of registration in the emergency room, after which they were shifted to the angio-suite for thrombectomy. The transferring medical and EMS team remain in KFHU until completion of MT. If the patients transfer was delayed or if their NIH Stroke Scale/Score increased or clinical condition worsened during the transfer, CT/CTA were repeated along with CT perfusion in our hospital, to allow for proper assessment of tissue preservation to ensure eligibility for MT. Once the thrombectomy procedure is completed, the patient returns in the same ambulance to the referring hospital. The model proposes that if the patient deteriorates after MT, they are to be admitted under our Neuro-ICU service for further management.

We analyzed the safety and feasibility of our T&B model through patient transfer and peri-procedural complications.

RESULTS

From December 2017 to December 2019, a total of 20 Code T&B were activated from three hospitals. Of these, 10 patients did not have an LVO in their CTA and code T&B was deactivated, while 10 remained activated and were transferred to our hospital for MT.

Of the 10 patients for T&B, two required admission to our hospital’s Neuro-ICU [Table 1]. In the first case, the middle cerebral artery (MCA) reoccluded during the procedure, so we chose to keep patient in anticipation. The patient developed a malignant Left MCA infarction and subsequently passed away 2 months later. The second patient was found to have a right CCA dissection for which an acute treatment was deferred. During the procedure, the patient was found to be hemodynamically unstable precluding her transfer back to the referring hospital on the same day. She was admitted to our ICU and was transferred back 3 days later after she was stabilized. The T&B model prevented 50% futile transfers and mitigated the cost of admission of 8 AIS patients, all of which received their time-sensitive intervention in accordance to the standards of care.

Table 1: Patient demographics and details of thrombectomy and back

Age/ gender	LVO (location)	Time of arrival	Device used	Duration of the procedure (min)	Futile transfer	Requirement for admission
69/female	Left M1	Late evening	Solitaire	90	No	No
28/female	Right MCA (angiographic images showed right ICA dissection and complete occlusion)	Early evening	N/A	20	No	Yes (required admission for 3 days because of hemodynamic instability and then transferred back)
60/female	Left M2 cut off, right ICA stenosis	Early morning	N/A	N/A (no penumbra on CTP)	No	Yes (developed malignant Left MCA stroke, patient passed away after 2 months in MICU)
66/female	Left MCA	Evening	Solitaire/ aspiration catheter	110	No	No
55/female	Complete left ICA occlusion (no intervention)	Morning (during working hours)	N/A	N/A	No	No
49/male	Left distal M1/proximal M2	Afternoon (during working hours)	Sophia	20	No	No
54/female	No LVO	Evening	N/A	N/A	Yes	No
62/female	No LVO	Early morning	N/A	N/A	Yes	No
60/female	Free-floating thrombus in right vertebral artery	Evening	Aspiration Catheter (Sophia)	60	No	No
34/female	Right M1	Afternoon (during working hours)	Solitaire	50	No	No

LVO – Large vessel occlusion; MCA – Middle cerebral artery; ICA – Internal carotid artery; CTP – Computed tomography perfusion; MICU – Medical intensive care unit; NA – Not available

CONCLUSIONS

The Thrombectomy and Back proved to be a novel model of care for stroke patients suffering from LVOs that require urgent EVT in the eastern province of Saudi Arabia. This model can be duplicated in areas with similar logistical constraints.

Ethical considerations

This study was retrospectively approved by the Institutional Review Board at Imam Abdulrahman Bin Faisal University (Reference No. IRB-2020-01-254), Dammam, Saudi Arabia, on September 06, 2020. Informed consent was not sought because the study retrospectively reports de-identified information focusing on logistics of care rather than individual patient outcome.^[7]

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Conflicts of interest

There are no conflicts of interest.

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