THROMBECTOMY AND STENTING MANAGEMENT IN BASILAR ARTERY OCCLUSION ASSOCIATED WITH ACUTE STROKE CASE REPORT: IMPORTANT ROLE OF RADIOLOGY FOR DIAGNOSTIC AND TREATMENT

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ABSTRACT

Occlusions of the basilar artery (BA), which are typically caused by thromboembolism and atherosclerosis, may account for as much as 27% of posterior circulation ischemic strokes. The symptoms of BA occlusion (BAO) can range from temporary weakness or paraesthesia to near-complete paralysis, leading to a high risk of morbidity and mortality. CT and MRI are the imaging modalities of choice for identifying and locating the infarct area, ruling out any other lesions, and detecting vascular abnormalities. The combination of thrombectomy and stenting has been shown to increase the safety and durability of angioplasty without causing noticeably negative side effects, and it may be utilized as the first line of treatment for BA stenosis or occlusion in acute stroke.

MeSH Keywords: Basilar Artery Occlusion, stroke, imaging, thrombectomy, stent

Introduction:

The basilar artery (BA), which was formed by the union of two vertebral arteries on the surface of the brainstem, is an essential component of the posterior circulation [1-3]. When the blood flow is compromised due to atherosclerosis or from an embolus anywhere from the heart to the basilar artery, an infarct of the brainstem (particularly the pons) or other brain regions supplied by the basilar artery and its branches might happen [1,2]. Although they only account for 1% of all strokes, BA occlusions (BAO) may be the cause of 27% of ischemic strokes in the posterior circulation, with a 2:1 ratio of higher prevalence in men [5-7], and a 90% chance of mortality if the patient is not provided prompt and effective care [3–6].

Similar to causes of anterior circulation strokes, causes of posterior circulation ischemia include large vessel obstruction (LVO) by thromboembolism, large-artery atherosclerosis, penetrating small artery disease, arterial dissection, and infrequently dolichoectasia or vasculopathy or unknown reasons [2,5,7]. The most frequent cause is atherosclerotic basilar artery stenosis, which typically occurs between the sixth and seventh decades of life [5]. Hypertension is the most prevalent risk factor, occurring in 70% of cases, followed by diabetes mellitus, coronary artery disease, peripheral vascular disease, tobacco use, and hyperlipidemia [3,7].

The symptoms of BAO can range from transient weakness or paraesthesia to almost full paralysis, and they can appear in a variety of ways and get worse quickly. Acute neurologic symptoms most frequently seen in individuals with basilar artery occlusion include motor deficits, sensory impairment, contralateral hemiparesis or quadriparesis, facial palsies, headaches, dizziness, vertigo, dysarthria, and other speech abnormalities. Patients may also experience nausea, vomiting, and visual problems. Most patients exhibit an atypical level of consciousness and focal motor weakness as the defining signs. More than forty percent of patients exhibit pupillary abnormalities, oculomotor symptoms, and pseudobulbar manifestations (facial palsy, dysphonia, dysarthria, and dysphagia) [2,3,7–9].

Case Report:

A 67-year-old man with the GCS E3V2M6 (11/15), BP 140/90 mmHg, was taken to the emergency department with right-sided body weakness and inability to speak for approximately 2 hours, accompanied by nausea, head & neck pain, and mild dizziness for approximately 1 to 2 weeks. He experienced a similar episode with the same presentation two weeks prior, but recovered completely in an hour. He had a past medical history of hypertension, hyperthyroidism, and smoking. The MRI revealed bilateral acute posterior circulation infarction with pc-ASPECTS 7/10. Time-of-flight Magnetic Resonance Angiogram showed that the BA was completely occluded (Figure 1). Acute ischemic stroke resulting from clots in the posterior cerebral circulation was identified. An emergency cerebral angiography revealed that the BA was occluded with no flow identified distally, while the vertebral arteries remained patent. The clot removal was performed (Figure 2). Post treatment MRI assessment revealed complete resolution of the cerebral infarcts as a result of the treatment, which had a patent blood flow.

(Figure 3) Stenting placement was performed a month later (Figure 4).

Discussion:

Computed Tomography (CT) is typically the initial imaging examination conducted since it is capable to detect greater areas of ischemic damage and can rule out hemorrhagic stroke. A hyperdense basilar artery might be visible on the CT. However, CT has a limited sensitivity for detecting early ischemia and is less useful for assessing the brainstem, cerebellum, and posterior circulation [3]. Head and neck CT or MR angiography with subsequent intravenous access are indicated to evaluate cerebral arteries and rule out an LVO if the CT head is negative for bleeding and if there is a potential risk of BA obstruction [2].

MRI/MRA is more sensitive than CT for detecting abnormalities in the posterior fossa, such as early ischemia and vascular occlusion. The most sensitive sequence for acute brainstem or cerebellar infarction within seconds of artery occlusion is the combination of diffusion-weighted imaging (DWI) with an apparent diffusion coefficient map. The location of a vascular blockage can be revealed using a non-invasive MR angiography. The appearance of microhemorrhages on GRE-T2* or SWI can help to identify the underlying cause of hypertensionton. Cerebral angiography is the gold standard for vascular imaging and should be considered when initial non-invasive imaging is non-diagnostic or contradictory [2,3,5].

Numerous studies have examined the prognostic factors for acute BA stroke, with early and complete recanalization, distal lesion site, excellent collateral circulation, and retrograde flow from the posterior communicating artery serving as predictors of favorable clinical outcomes [6,10]. The main objectives of the examination are to identify the site of the vascular lesion and to decide if urgent intervention is necessary to achieve recanalization in a timely manner. BA stenosis treatment options include medication anticoagulant therapy, endovascular stenting or balloon angioplasty, and neurosurgical procedures like as bypass grafting [4]. Recanalization is essential for the effective treatment of basilar artery thrombosis and improvement of prognosis [3].

If the patient came within the tPA window (less than 3 to 4.5 hours from the last known normal) and does not have a tPA contraindication, alteplase/tPA or tenecteplase should be administered right away for intraarterial thrombolysis. If eligible, the patient should be transferred within 24 hours of the latest known normal to the angiography suite for mechanical thrombectomy (MT) [2]. Compared to surgical therapy, which is more difficult and associated with high rates of mortality, complications, and failure; mechanical thrombectomy is a successful and effective method for treating BAO [6,11]. The combination of thrombectomy and stent insertion could be regarded a first-line treatment for BA stenosis or occlusion. In some circumstances, it is reasonable to pursue mechanical endovascular thrombectomy for up to 2-3 days if the patient has symptoms and a mild stroke on brain MRI [3].

Stent-assisted angioplasty may be a potential treatment approach for patients with basilar artery stenosis. The benefits of stent-assisted angioplasty over conventional

angioplasty alone include the exclusion of dislodged plaque and regions of dissection from the artery lumen, as well as the prevention of vascular recoil and rupture [11]. Stenting has been found to improve the safety and durability of angioplasty in all circulatory beds where it has been applied without producing severe neurological harm [12].

Conclusion:

BAO is frequently associated with severe neurological deficit and is a potentially fatal diagnosis with significantly worse outcomes compared to anterior circulation strokes, leading to a high rate of morbidity and mortality (up to 86% mortality rate if untreated). It is one of the most challenging conditions for clinicians to diagnose and manage, highlighting the role of the healthcare team in precisely and promptly identifying, assessing, and treating patients with this condition [2,4,5,13].

The primary goals of the examination are to identify the site of the vascular lesion and deciding whether immediate intervention procedure is required to achieve recanalization [3]. CT angiography and MRI, both with and without perfusion, are regarded as the initial imaging modalities of choice for identifying the infarct location, ruling out the possibility of any other lesion, and detecting vascular abnormalities (occlusion, dissection, rupture) [2]. The combination of emergency thrombectomy and stent insertion may be the best method for achieving possibly favorable clinical outcomes [4]. Therefore, radiography plays an important role not only in the diagnosis but also in the management of patients with BAO.

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Figure Legends:

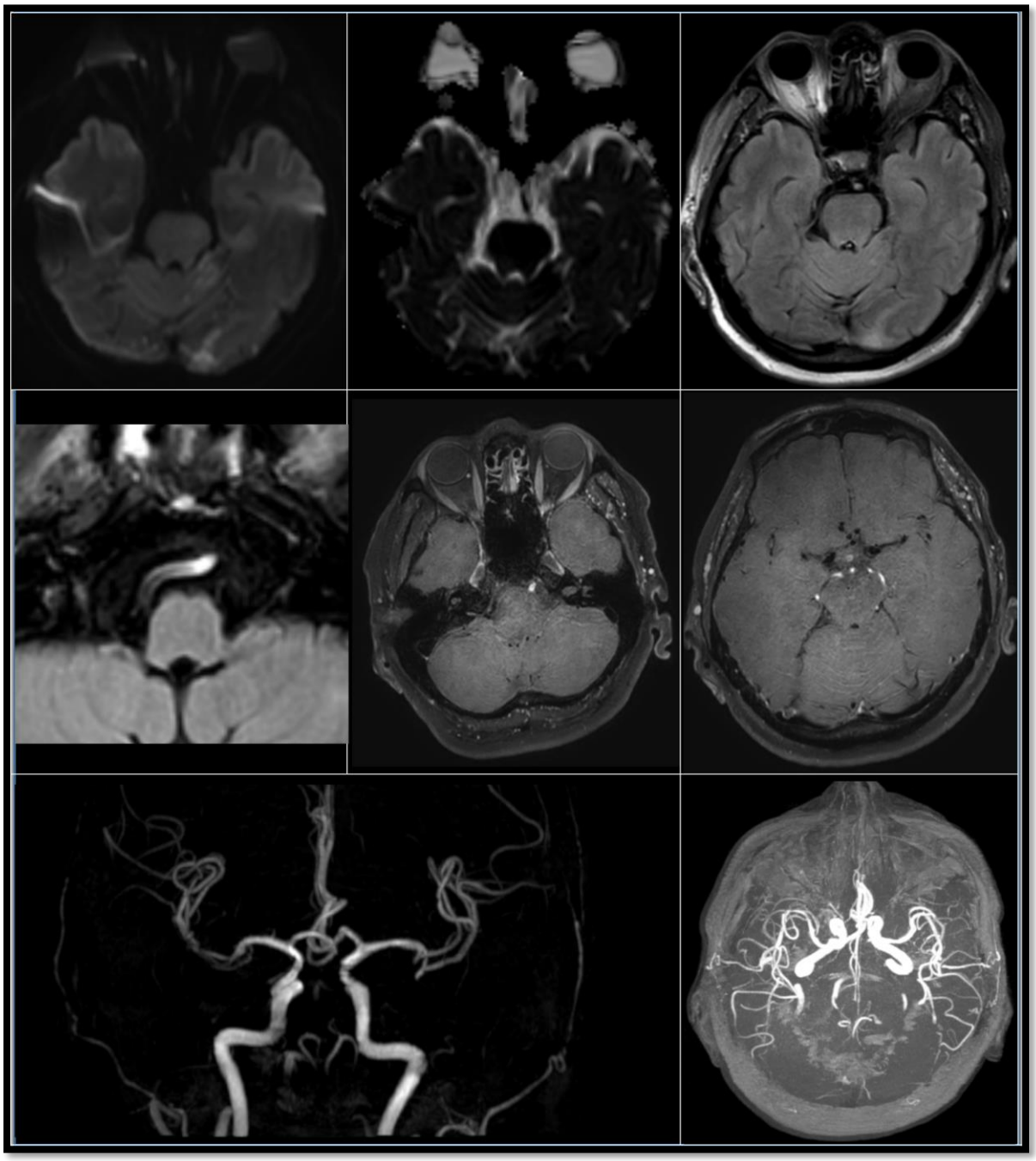

Figure 1: MRI showed acute bilateral posterior circulation infarction with full occlusion of the BA.

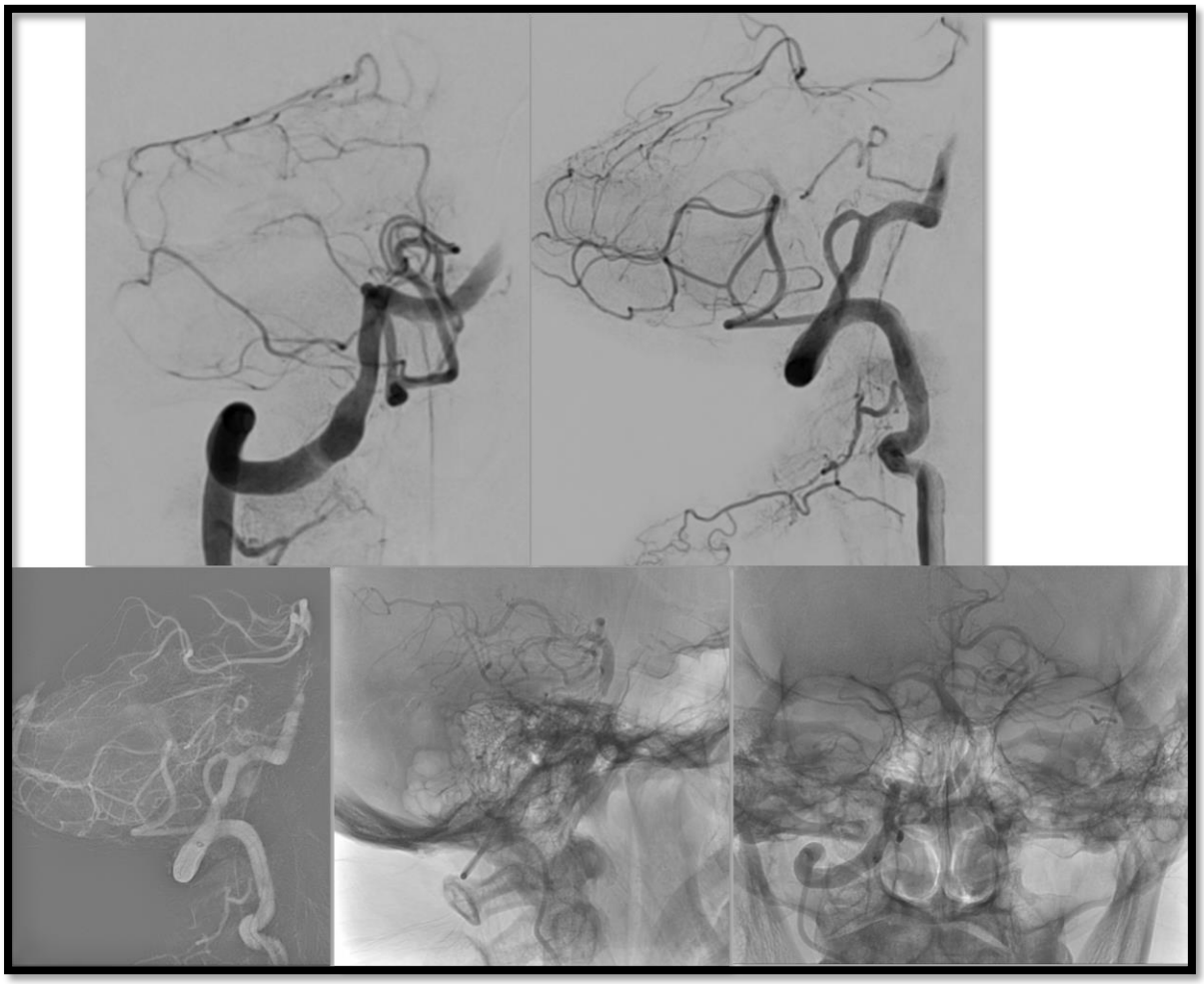

Figure 2: Cerebral angiogram showed occlusion of the BA with no flow identified distally followed by thrombectomy procedure.

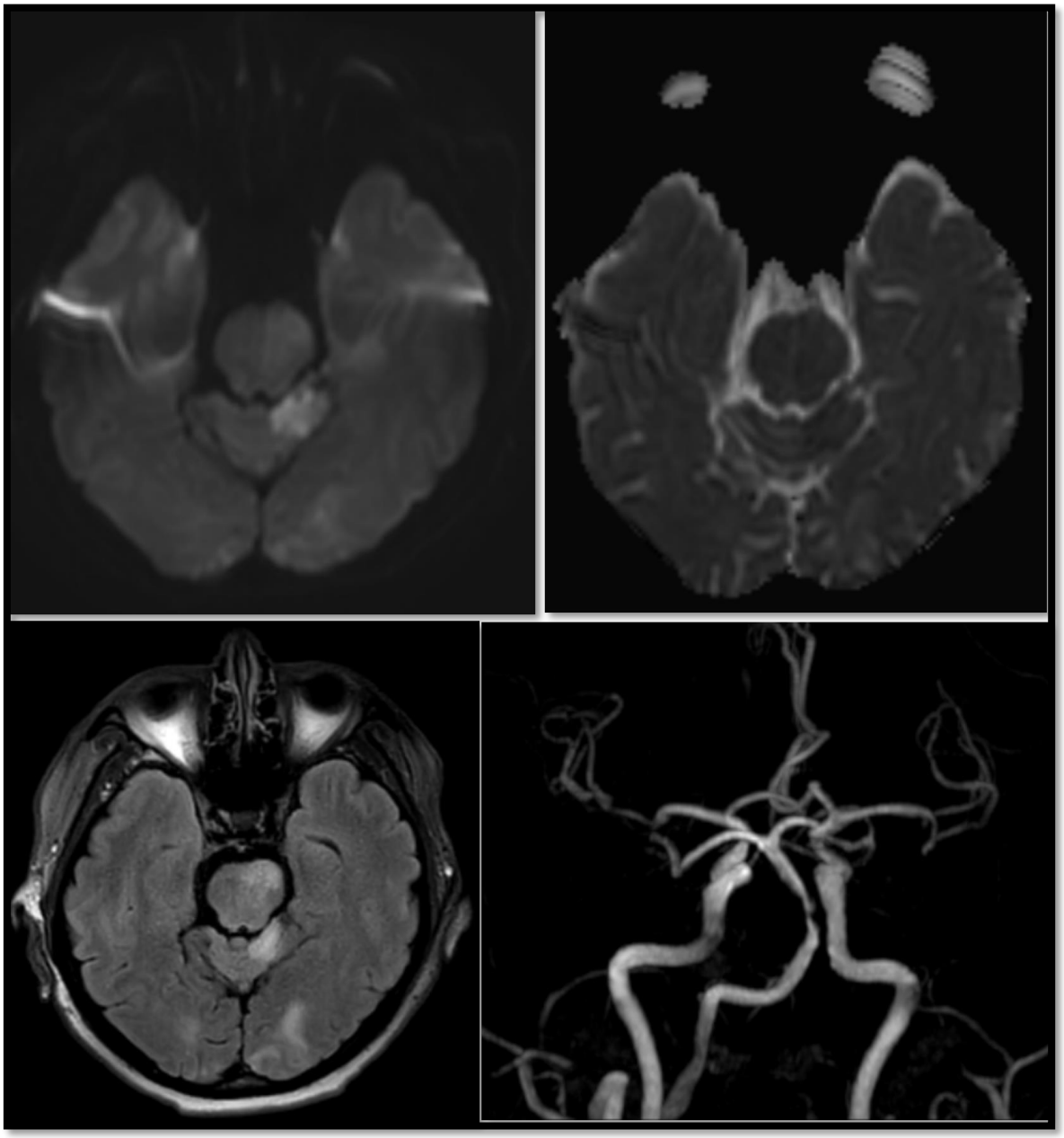

Figure 3: MRI evaluation showed resolution of the cerebral infarcts with patent flow in the treated BA.

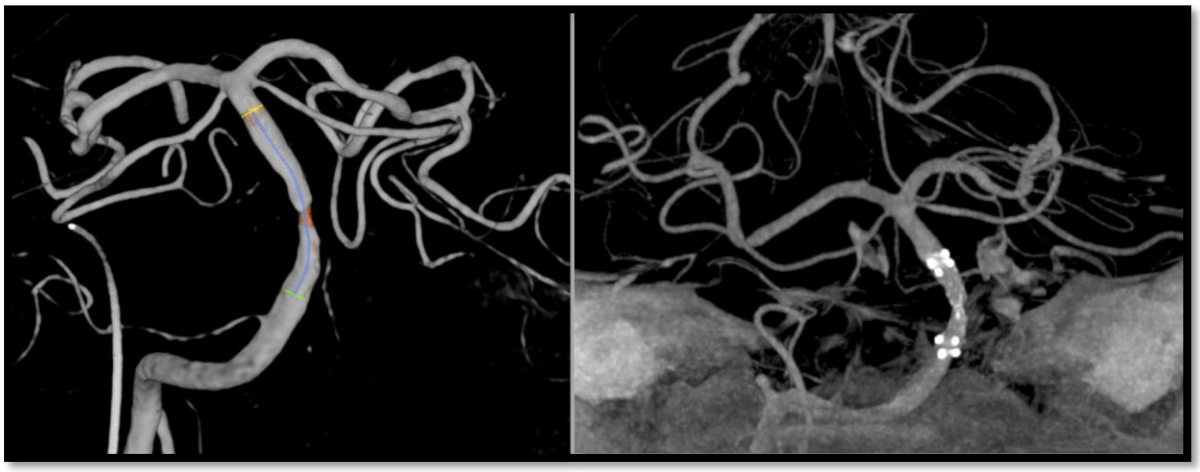

Figure 4: Stenting placement and post stenting.