ASSESSING SHORT-TERM OUTCOMES OF CAROTID ARTERY STENTING AT HUE CENTRAL HOSPITAL

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ABSTRACT

Stroke is an important medical problem in all countries of the world. Preventing stroke is a priority goal of community health programs and each individual. Carotid stenting is a less invasive alternative in comparison to surgery. This study was conducted on 19 patients with internal carotid artery stenosis, in which the stent was placed to recreate the flow, at Hue Central Hospital from January 2018 to January 2020. Results: Age was 61.1 ± 16.1 years, history stroke was 57.9%, hypertension was 78.8%, dyslipidemia was 68.4%, smoking was 57.9%, bilateral carotid lesion was 57.9%, the patients whose stenosis was ≥70% and ≥ 90% accounted for 100% and 47.4% respectively, the success of the procedure was 100%, blood flow to the brain improved (36.7%). There was no case with dangerous events such as embolism, infarction or cerebral hemorrhage. After 6 months, clinical outcomes and the prognosis improved according to NIHSS and mRS. No death or complication of cerebral infarction, cerebral hemorrhage was reported.

Key words: *carotid artery, stent, cerebral infarction, cerebral hemorrhage*

I. INTRODUCTION

Stroke is an important medical problem in all countries of the world due to its high incidence, mortality and disability. In western countries, stroke is the fourth leading cause of death, after heart disease, cancer and chronic respiratory disease [1]. Of these, carotid artery disease accounts for 10 to 15% of all ischemic causes of stroke [2]. In the United States, stroke was ranked as the third leading cause of death, after ischemic heart disease and cancer. Every year, about 160.000 out of 800.000 patients die of stroke. In 2009, the economic burden was estimated at $ 68.9 billion in direct and indirect costs. This is also the most important cause of disability, with 20% of survivors needing care in the health facilities after 3 months and 30% permanently disabled. The burden is expected to worsen in the next 20 years, in part due to the aging population, especially in developing countries [1, 3, 4].

Preventing stroke is the priority goal of community health programs and each individual. Extracranial cerebrovascular stenosis reduces the pressure of distal perfusion, increases the speed of blood flow, causing ulceration, desquamation of atheroma causing stroke [5]. Randomized controlled trials (RCTs) have shown the benefits of carotid endarterectomy to treat patients with carotid artery disease and are an effective method to prevent stroke. Over the past two decades, with advances in

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science, technology, equipment, and experience of the surgeon, carotid stenting has emerged as a less invasive alternative compared to surgery to treat patients with internal carotid artery disease.

Extracranial cerebrovascular stenosis was identified by the American Heart Association (AHA) in 2011 as one of the risks of stroke and stenting is recommended when stenosis is over 50% symptomatic (group IB), over 70% asymptomatic (group IIB) [6]. Stenting for extracranial cerebrovascular stenosis is a safe and effective treatment that has been proven in many countries around the world. In Vietnam, in recent years, along with the strong development of the Interventional radiology industry, stenting for extracranial cerebrovascular stenosis has frequently indicated. Therefore, the current research aims to:

- Assessing the success rate and the events of stenting for carotid artery stenosis at Hue Central Hospital.

- Assessing short-term effectiveness of patients after the intervention.

II. MATERIALS AND METHODS

2.1. Participants

19 patients with internal carotid artery stenosis was placed stent to recreate the flow at Hue Central Hospital from January 2018 to January 2020.

2.1.1. Criteria for selection

The patients underwent a digital subtraction angiography (DSA) and met either of the following two criteria:

- Symptomatic patients whose diameter of the lumen of the ipsilateral internal carotid artery is reduced more than 50%.

- Asymptomatic patients whose diameter of the lumen of the internal carotid artery is reduced more than 70%.

If the patients have a transient ischemic attack, amaurosis fugax, or minor nondisabling stroke, they will be considered to be symptomatic. The degree of stenosis was determined according to the North American Symptomatic Carotid Endarterectomy Trial (NASCET) criteria.

2.1.2. Exclusion criteria

Patients who are older than 80 years, stroke less than 4 weeks, severe renal failure, uncontrolled heart arrhythmia, contraindications to antiplatelet agents, coagulopathy and patients refusing to perform the procedure were excluded from the study.

2.2. Research methods

- Descriptive, prospective and follow-up for 6 months after interventions.

- Ultrasound performed on Phillip HD 11, taking DSA and interfering with stenting on Phillip Intergis 9.

- Data analysis by SPSS 23.0 software.

III. RESULTS AND DISCUSSION

Having conducted the research on 19 patients with the carotid artery stenting, we obtained the following results:

3.1. Participants' characteristics

Table 1: Participant's clinical characteristics

Characteristics	**Result (N=19)**
Age, (mean ± SD)	61.1 ± 16.1
BMI, (mean ± SD)	22.1 ± 1.5
History of cerebral infarction and / or TIA, n (%)	11 (57.9%)
Diabetes, n (%)	6 (31.6%)
Hypertension, n (%)	15 (78.9%)
Dyslipidemia, n (%)	13 (68.4%)
Smoke, n (%)	11 (57.9%)

- The participants were relatively old, along with many risk factors for vascular disease such as history of stroke, hypertension, dyslipidemia, smoke, diabetes. Especially, hypertension, dyslipidemia, and smoking were the among the most common risk factors.

- Research by Hakan Posacioglu et al (2009): 56 patients were placed stent with an average age of 65.8 ± 9, of which 35.7% of patients were older than 70, 69.4% had coronary artery disease, 59.2% had a stroke and/or transient ischemic attack before intervention, hypertension was 89.8%, smoking was 69.4%, lipid metabolism was 32.7%, diabetes was 20.4% [7].

Table 2: Vascular lesion characteristics

Characteristics	Result (N=19)
Lesion distribution, n (%)	Lateral stenosis: 8 (42.1%) Bilateral stenosis: 11 (57.9%)
Degree of stenosis, mean ± SD (%)	87.0 ± 6.9 % Stenosis ≥70%: 19(100%) Stenosis ≥90%: 9(47.4%)
Lesion length, mean ± SD (mm)	11.2 ± 4.0 mm
Calcified lesion, n (%)	8 (42.1%)
Ulcerated lesion, n (%)	7 (36.8%)

- According to the characteristics of lesion distribution, 57.9% of the participants were mostly bilateral carotid artery lesions. According to Thomas G. Brost (2010), 50.6% of lesions are the left carotid artery [5].

- The degree of stenosis is quite severe, the rate of ≥70% is 100%, ≥90% is 47,4%, accompanied by vascular lesions at high risk of stroke such as Calcified lesion, Ulcerated lesion. According to Thomas G. Brott (2010), the rate of severe stenosis ≥ 70% is 86.9%, average lesion length: 17.8 ± 8.5mm. According to Hakan Posacioglu et al (2008) the degree of stenosis ≥ 90% is 19.6% [5, 7].

3.2. Treatment results:

Table 3: Effective procedure for stenting

Characteristics	Result (N=19)
Successful ratio, n(%)	19 (100%)
Degree of stenosis before stenting, mean ± SD (%)	87.0 ± 6.9%
Degree of stenosis after stenting, mean ± SD (%)	40.0 ± 14.7%
Stenosis difference before and after the intervention, mean ± SD (%)	72.2 ± 12.3%
Increased blood flow after intervention, n (%)	7 (36.7%)

The success of the procedure was 100%, stenosis difference before and after the intervention was clear (72.2 ± 12.3%). Blood flow to the brain was improved (36.7%).

Table 4: Carotid artery stenting procedural risk assessment

Events	Ratio (N=19)
Sinus bradycadia, n (%)	5 (26.3%)
Embolism during or after intervention, n (%)	0 (0%)
Hemorrhage or Ischemia after intervention n (%)	0 (0%)
Symptoms of reperfusion (headache, nausea, vomiting ...)	4 (21.1%)

- There was no dangerous event related to procedures such as embolism, infarction or cerebral haemorrhage. Other common events included sinus bradycardia during the procedure, and headache, nausea, and vomiting due to reperfusion.

- According to the study of Alex Abou-Chebl (2004) retrospecting 450 patients with carotid artery stenting, the rate of reperfusion syndrome was 5 patients (1.1%), of which 3 patients had hemorrhage (0.67%), 2 patients died due to increased perfusion (0.44%) [8].

3.3. Short - term effect

Table 5: Features of complications after 6 months

Features	Result (N=19)
Hemorrhage or Ischemia, n(%)	0 (0%)
Re-stenosis after 6 months, n(%)	1 (5.3%)
Mortality, n(%)	0 (0%)

- No dead case or hemorrhage, recurrent infarction was monitored after 6 months of intervention. 1 patient was re-stenosis related to acquired vascular pathology (Takayasu).

- CREST Study (2010) was conducted on 1261 intervention patients, in which the mortality was 0.71%, stroke was 4.12%. The ICSS (2010) studied 853 patients, in which the mortality was 2.22% and stroke was 7.62% [9, 10].

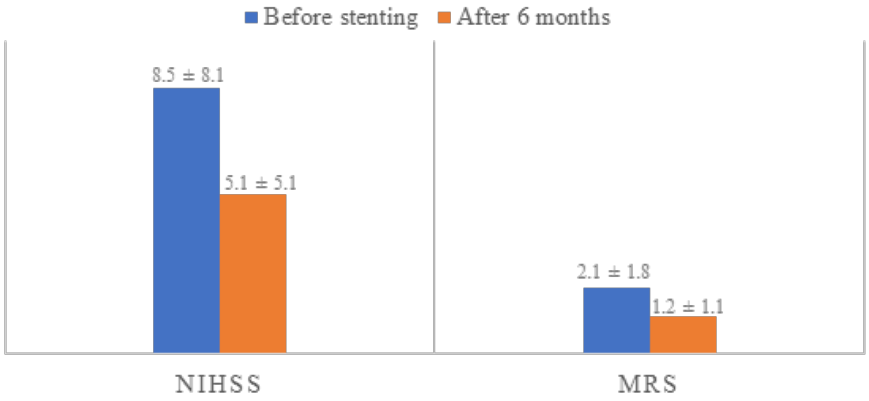

Figure 1: Clinical change after 6 months

After 6 months, clinical outcomes and the prognosis improved according to NIHSS and mRS.

IV. CONCLUSION

Completing the study of 19 patients with the carotid artery stenting, we have drawn out the following conclusions:

- Clinical characteristics: age was quite high (>60 years old), patients had many high risk factors of stroke such as hypertension, dyslipidemia, smoking, and diabetes, in which hypertension is the most common. The majority of patients had a history of stroke.

- The patients whose stenosis was ≥ 70% and ≥ 90% accounted for 100% and 47.4% respectively, accompanied by vascular lesions at high risk of stroke such as calcified lesion and ulcerated lesion.

- The success of the procedure was 100%, the degree of stenosis after intervention was significantly improved. There was no severe events such as embolism, cerebral infarction or cerebral hemorrhage during and after the intervention. Some common symptoms were sinus bradycardia, headache, nausea, vomiting.

- After 6 months, clinical outcomes and the prognosis improved according to NIHSS and mRS. There was neither death case nor cerebral hemorrhage and recurrent cerebral infarction. Re-stenosis was very low, only one case of re-stenosis (who is related to Takayasu's pathology) required intervention.

- The carotid artery stenting was an alternatively safe method, which is also a good prognosis.

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