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O001 / #1312

ENDOVASCULAR THROMBECTOMY WITH OR WITHOUT ALTEPLASE FOR LARGE VESSEL OCCLUSION IN ACUTE ISCHEMIC STROKE PATIENTS: A COST-EFFECTIVENESS EVALUATION BASED ON META-ANALYSES

FREE COMMUNICATIONS 01: ENDOVASCULAR THERAPY FOR ACUTE STROKE, ANEURYSMAL

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Background and Aims: The benefit of intravenous thrombolysis with alteplase before endovascular thrombectomy (EVT) for acute ischemic stroke patients due to large vessel occlusion (LVO) remains debated. Several randomized controlled trials (RCTs) failed to demonstrate non-inferiority of EVT alone. In this study, we analyzed the cost-effectiveness of alteplase before EVT versus EVT alone from the Dutch healthcare payer perspective.
Methods: A 10-year Monte Carlo simulation using a decision tree and Markov model was conducted to estimate the total costs, total quality-adjusted life years (QALYs), and incremental net monetary benefit (INMB) of alteplase before EVT compared to EVT alone. Functional outcome of each treatment was derived from pooled results of RCTs. Alteplase followed by EVT was considered cost-effective in case of a positive INMB at a threshold of $84,000 per QALY gained.
Results: Applying weighted averages of functional outcomes collected from six RCTs, alteplase before EVT implied a 0.02 QALYs loss, while increasing costs by $236, compared to EVT alone. Restricting the analyses to Western or Dutch patients only, alteplase before EVT yielded a 0.22 QALYs gain also at higher costs ($5,387 and $11,572), leading to a positive INMB ($12,937 and $6,544), respectively. At a threshold of $84,000, alteplase before EVT appeared cost-effective in only 2.4% of the simulations for Western and Asian patients together, 98.4% for Western patients, and 64.8% for Dutch patients.
Conclusions: Alteplase before EVT was likely cost-effective in LVO patients in the Netherlands and should remain as the standard treatment strategy.

O002 / #1684

MECHANICAL THROMBECTOMY IN ISCHEMIC STROKE PATIENTS WITHOUT SALVAGEABLE BRAIN TISSUE ON COMPUTED TOMOGRAPHY PERFUSION IMAGING

FREE COMMUNICATIONS 01: ENDOVASCULAR THERAPY FOR ACUTE STROKE, ANEURYSMAL

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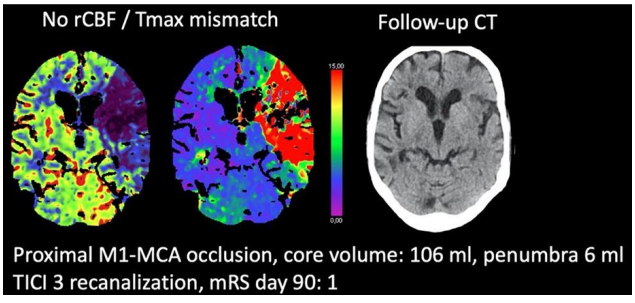
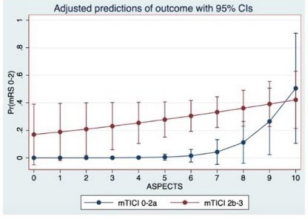
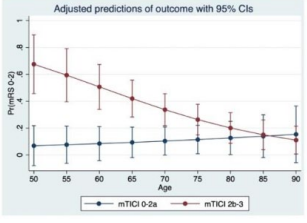
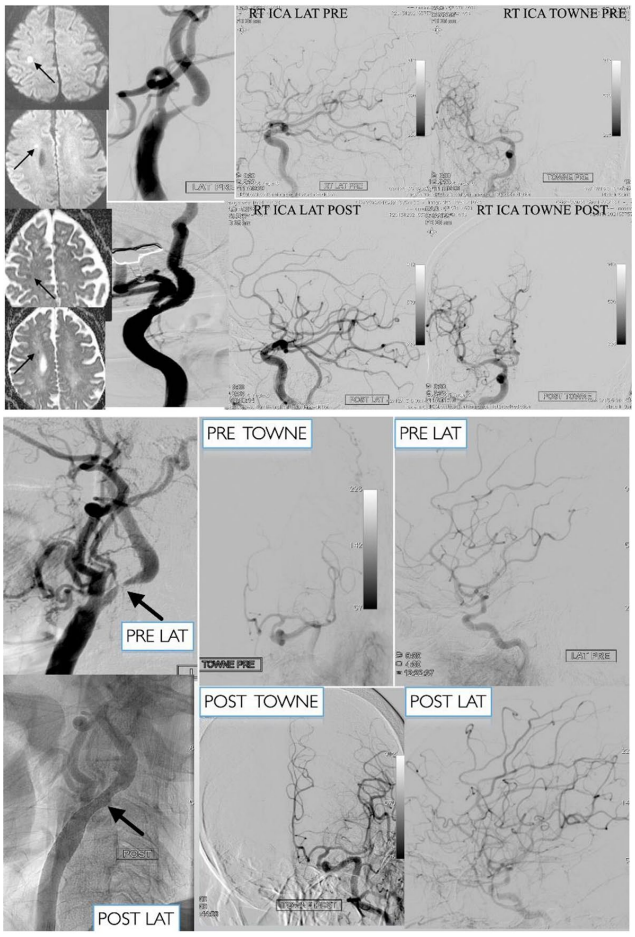
Background and Aims: Computed tomography perfusion (CTP) is regularly used to guide patient selection for mechanical thrombectomy (MT). However, the effect of MT in patients without salvageable tissue on CTP has not been investigated.
Methods: Observational study analyzing ischemic stroke patients triaged by multimodal-CT undergoing MT. CTP lesion-core mismatch profiles were defined according to the EXTEND criteria. Primary endpoint was the rate of functional independence at 90-days, defined as modified Rankin Scale (mRS) score of 0-2 . Recanalization was evaluated with the mTICI scale. The effect of baseline variables on functional outcome was assessed using multivariable logistic regression analysis. Outomes of patients with and without CTP-mismatch profiles were compared using 1:1 propensity score matching (PSM).
Results: Of 724 patients who met the inclusion criteria, 110 patients (15%) had no CTP-mismatch and were analyzed. Succesful recanalization was achieved in 66% (73) and associated with functional independence at 90-days (aOR: 5.92, 95%CI: 1.10-31.79, p=0.04). A signifcant interaction was observed between recanalization and age as well as the extent of









Conclusions: In stroke with large clinico- radiological disparity with carotid/vertebral stenosis, hemodynamic stroke should be considered as adiagnostic possibility . Whenever feasible CAS/ VAS should be offered as early as possible. Emergency angioplastic-stenting must be offered in similar line to MT in all such patients even after 24 hours.

EP050 / #2080

ENDOVASCULAR INTERVENTION OF CAROTID-CAVERNOUS FISTULA IN MAKASSAR, INDONESIA

E-POSTER VIEWING: AS02ENDOVASCULAR THERAPY FOR ACUTE STROKE, ANEURYSMAL SAH, AVMS

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Background and Aims: Carotid cavernous fistula (CCF) is still highly prevalent in Indonesia, and occurs as a result of both traumatic and non-traumatic etiology. The main approach for management includes initial performance of diagnostic cerebral angiography followed by subsequent endovascular intervention using either coiling or detachable balloons. The study aims to provide a brief update on the clinical characteristic and the endovascular management of CCF in our centre, the Wahidin Sudirohusodo Hospital, Makassar, Indonesia.
Methods: This retrospective study utilized CCF patient records from January 2022 until January 2023 at the Brain Center of Dr. Wahidin Sudirohusodo General Hospital, Makassar, Indonesia. Clinical characteristics, angiogram results, and results of endovascular intervention were recorded and analyzed for the study.
Results: Angiograms of all patients confirmed typical CCF lesions. Within the period, there were 12 confirmed CCF patients, all of which had traumatic etiology (motor vehicle accident). Endovascular intervention approaches that were used include coiling (10 patients), detachable balloon (1 patients) and onyx injection (1 patient). Variations in endovascular approach is based on several reasons including anatomic variation and due to the insurance rules in our centre. All patients showed favorable outcome, with gradual improvement of orbital symptoms.
Conclusions: Trauma remains the main cause of CCF in our centre. Using gold standard cerebral angiography, 12 cases of CCF were confirmed in our centre within the 1 year period. The most common interventional approach was coiling, but other approaches like detachable balloon and onyx injection showed similar favorable outcomes.

EP051 / #1899

THORACIC ARTERY CALCIFICATION: A PREDICTOR OF MECHANICAL THROMBECTOMY OUTCOME IN ACUTE LARGE ARTERY OCCLUSION PATIENTS

E-POSTER VIEWING: AS02ENDOVASCULAR THERAPY FOR ACUTE STROKE, ANEURYSMAL SAH, AVMS

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Background and Aims: Background: Calcification is used widely as an imaging indicator of atherosclerotic burden and cerebrovascular function. We aimed to estimate the predictive value of thoracic artery calcification for poor outcome in acute large artery occlusion (LAO) after mechanical thrombectomy (MT).
Methods: Consecutive patients with LAO who received MT at a single comprehensive stroke center between 3/2018-3/2021 were included. The Agatston integral method was used to evaluate the overall calcification of thoracic artery based on non-contrast CT. The principle of integral calculation is calcification density * calcification volume. Three-month modified rankin scale score of 3-6 was designated as poor outcome.
Results: After reperfusion therapy, 61.8% (94/152) of patients had poor clinical outcomes. Patients with poor outcome had a significantly higher calcification volume integral (OR=1.060, 95%CI=1.016-1.105, P=0.0007). Receiver operating characteristic (ROC) analysis showed that the area under the curve (AUC) for predicting poor outcome by thoracic artery calcification volume integral was 0.697 (95%CI=0.612–0.782, P<0.005) with an optimal cutoff threshold of 3.7689.
Conclusions: Thoracic artery calcification volume integral was effective in predicting three-months poor outcome in patients with LAO after MT.

EP052 / #1760

PREDICTORS OF EARLY STENT PATENCY AFTER ENDOVASCULAR TREATMENT FOR ACUTE ISCHEMIC STROKE DUE TO TANDEM LESION IN ANTERIOR CIRCULATION: RESULTS FROM THE ASCENT STUDY

E-POSTER VIEWING: AS02ENDOVASCULAR THERAPY FOR ACUTE STROKE, ANEURYSMAL SAH, AVMS

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ENDOVASCULAR INTERVENTION OF CAROTID-CAVERNOUS FISTULA IN MAKASSAR, INDONESIA

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ABSTRACT

Background and Aims

Carotid cavernous fistula (CCF) is still highly prevalent in Indonesia, and occurs as a result of both traumatic and non-traumatic etiology. The main approach for management includes initial performance of diagnostic cerebral angiography followed by subsequent endovascular intervention using either coiling or detachable balloons. The study aims to provide a brief update on the clinical characteristic and the endovascular management of CCF in our centre, the Wahidin Sudirohusodo Hospital, Makassar, Indonesia.

Methods

This retrospective study utilized CCF patient records from January 2022 until January 2023 at the Brain Center of Dr. Wahidin Sudirohusodo General Hospital, Makassar, Indonesia. Clinical characteristics, angiogram results, and results of endovascular intervention were recorded and analyzed for the study.

Results

Angiograms of all patients confirmed typical CCF lesions. Within the period, there were 12 confirmed CCF patients, all of which had traumatic etiology (motor vehicle accident). Endovascular intervention approaches that were used include coiling (10 patients), detachable balloon (1 patients) and onyx injection (1 patient). Variations in endovascular approach is based on several reasons including anatomic variation and due to the insurance rules in our centre. All patients showed favorable outcome, with gradual improvement of orbital symptoms.

Conclusion

Trauma remains the main cause of CCF in our centre. Using gold standard cerebral angiography, 12 cases of CCF were confirmed in our centre within the 1 year period. The most common interventional approach was coiling, but other approaches like detachable balloon and onyx injection showed similar favorable outcomes.

Keywords: carotid cavernous fistula; endovascular intervention; detachable balloon; endovascular coiling; onyx

INTRODUCTION

Carotid Cavernous Fistula (CCF) is an abnormal connection between the carotid artery and the cavernous sinus. CCF can be classified based on etiology (traumatic or spontaneous), hemodynamics (high flow or low flow), and anatomy (direct or indirect). Traumatic CCF is the most common type, accounting for approximately 75% of all CCF cases. Spontaneous CCF accounts for around 30% of all CCF cases, usually occurring in the elderly and women[1].

In general, carotid cavernous fistulas are divided into direct and indirect types. The direct type often results from head trauma, accounting for 75% of all fistulas. The indirect type is often caused by non-traumatic etiology, often found in women aged 40-60 years. Barrow et al categorized CCF into four different types according to arterial supply with type A having a direct high-flow connection between the internal carotid artery and cavernous sinus, while types B-D are indirect dural arteriovenous fistulas fed by the meningeal artery branching from the internal maxillary artery, the carotid artery. external, or branches of the internal carotid artery or both[1].

Clinical manifestations of CCF can appear within hours or days, in the form of exophthalmus which develops when arterial blood enters the sinus and causes dilatation of the superior and inferior ophthalmic veins of the eye. The orbital cavity feels painful and there is interference with eye movement due to pressure on the ocular nerve that crosses the sinus. The sixth cranial nerve is most commonly affected, the third and fourth nerves less frequently[2]. The most common signs and symptoms of direct CCF are proptosis, chemosis, orbital bruits, and headache. The patient also complained of visual disturbances including diplopia, blurred vision, and orbital pain. Indirect CCF is generally low flow with unclear symptom onset. Conjunctival injection is a prominent symptom and patients are often treated for other diagnoses such as conjunctivitis[1].

The main approach for management includes initial performance of diagnostic cerebral angiography followed by subsequent endovascular intervention using either coiling or detachable balloons[1-3]. The study aims to provide a brief update on the clinical characteristic and the endovascular management of CCF in our centre, the Wahidin Sudirohusodo Hospital, Makassar, Indonesia.

METHODS

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Clinical characteristics, angiogram results, and results of endovascular intervention were recorded and analyzed for the study.

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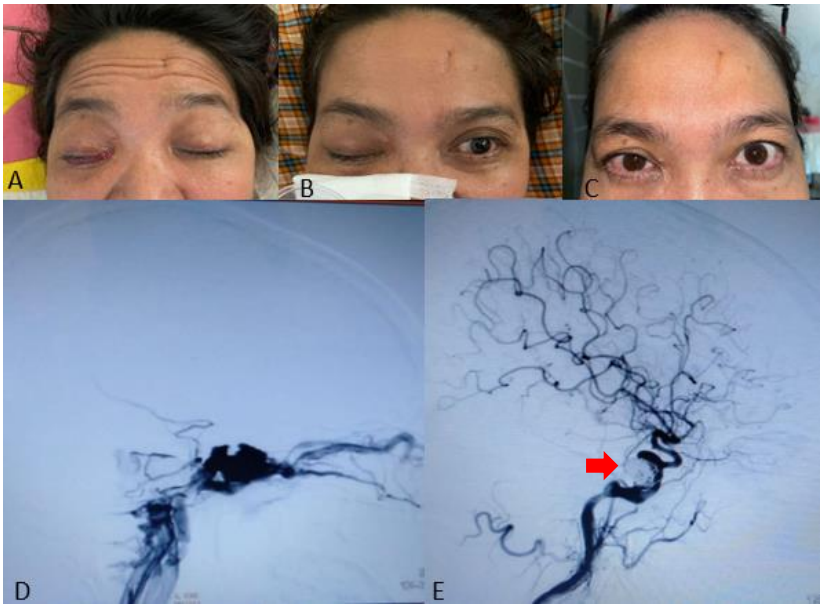

Figure 1. Example of a carotid cavernous fistula (CCF) case in our center. (A) Prior to embolization, the right eye exhibits proptosis, edema, and erythema. (B) Eleven days and (C) three months after intervention. (D) Cerebral angiography of the right internal carotid artery (RICA) lateral view shows fistula of the right internal carotid artery segment C4 to the right cavernous sinus. (E) Follow up angiography after coil embolization showing CCF resolution.

DISCUSSION

A complete diagnostic angiographic evaluation in CCF cases is necessary to select the appropriate therapeutic modality. Cerebral angiography is the gold standard for the diagnosis and classification of CCF. High risk fistulas require aggressive treatment to close the fistula, fistulas with low risk and mild symptoms may not require active intervention and can be managed conservatively[2]. CCF therapy modalities include conservative management, endovascular intervention, surgical treatment, and radiosurgical intervention[1].

Endovascular intervention has developed as a primary therapy for definitive treatment, including in emergencies. The choice of endovascular intervention is made according to the type, exact anatomy of the fistula, size of the arterial defect, and operator/institutional preference[2]. Occlusion using detachable balloons is an example option for endovascular intervention. Lewis et al reported a cure rate of 88% in a series of 100 cases of direct CCF treated with detachable balloons. The advantage of ballooning is that occlusion is achieved quickly with preservation of the ICA structure. This endovascular procedure cannot be performed on small diameter blood vessels which often form fistulas because it does not allow the entry of a balloon. However, technical difficulties may be encountered. The size of the cavernous sinus and fistula may influence the success rate of balloon embolization. The

cavernous sinus must also be large enough to accommodate the balloon. The size of the fistula should be smaller than the inflated balloon, but large enough to allow the deflated balloon or partially inflated balloon to pass through[2].

Balloon embolization is currently no longer used as a treatment for CCF in the United States and has largely been replaced by embolization using coils[3]. An example of coil embolization was presented in the case report illustration, wherein a patient with spontaneous CCF (Barrow classification type A) suspected to be the result of aneurysm rupture, endovascular coiling intervention was treated with good clinical outcomes with minimal sequelae (right abducens nerve paresis). Harniza et al in a literature study of 9 studies of endovascular coiling in direct CCF concluded that coiling could close the fistula in 80% of cases when radiological evaluation was carried out and resulted in clinical improvement in 90% of cases. Furthermore, it was concluded that no intraoperative or postoperative complications were reported, a fistula recurrence rate of 4% occurred in large CCFs[4]. The advantages of coiling over ballooning are ease of access and availability of various sizes of embolization devices. Disadvantages include slower staged fistula occlusion, which increases procedure time, and the risk of incomplete fistula occlusion with loss of transarterial access[2]. The research results of Lin et. al., 2016 reported CCF recurrence after endovascular therapy (16 patients from a total of 55 samples). C2 or C4 segment involvement (Debrun's classification) was found to be an independent risk factor for recurrence in CCF[4-6]. Harniza et. al, 2020 reported a CCF recurrence rate of 4% and this can be found in fistulas with larger tears associated with larger CCFs[4-5].

In essence, endovascular interventions, such as ballooning, coiling, stents, and parent artery occlusion have emerged as primary therapies for definitive treatment. The choice of endovascular intervention is tailored to the type, exact anatomy of the fistula, size of the arterial defect, and operator/institutional preference to prevent recurrent CCF[5-6].

CONCLUSION

Trauma remains the main cause of CCF in our centre. Using gold standard cerebral angiography, 12 cases of CCF were confirmed in our centre within the 1 year period. The most common interventional approach was coiling, but other approaches like detachable balloon and onyx injection showed similar favorable outcomes.

ETHICS

This study has passed the ethical review of the Health Research Ethics Committee, Faculty of Medicine, Hasanuddin University.

DECLARATIONS

The author hereby declares that this study has no funding from other parties or conflicts of interest in this research.

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15TH WORLD STROKE CONGRESS
2023
TORONTO, CANADA

ENDOVASCULAR INTERVENTION OF CAROTID-CAVERNOUS FISTULA IN MAKASSAR, INDONESIA

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Background and Aim

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Results

Within the period, there were 12 confirmed CCF patients with typical CCF lesions on angiogram, all of which had traumatic etiology (motor vehicle accident). Endovascular intervention approaches used include coiling (10 patients), detachable balloon (1 patient) and onyx injection (1 patient). Variations in endovascular approach is based on several reasons including anatomic variation and due to the insurance rules in our center. All patients showed favorable outcome, with gradual improvement of orbital symptoms.

Conclusion

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