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COMPARATIVE REVIEW OF THE OUTCOME EFFECTIVENESS PREVENTING OF CAROTID ENDARTERECTOMY AND CAROTID STENTING

Stroke of the brain takes second place, after myocardial infarction, in the structure of mortality of the world population. In this review we will study the stroke, as an outcome caused by revascularization by CAS or CEA and the effectiveness of its prevention by these methods. We collected several clinical trials, interpreted their results and gave a recommendation on use of the specific method.

Keywords: reconstructive surgery, carotid stenosis, carotid endarterectomy, carotid stenting, stroke

Introduction. Stroke occupies a leading position as one of the dangerous medical conditions, which may bring to disability or even to death. 1/5 of all cases are caused by carotid stenosis. [1,2] Carotid revascularization is a good method to reduce the stroke occurrence. [3-6] Modern surgery uses Carotid endarterectomy (CEA) to reduce the probability of stroke incidence, but there is also an alternative strategy in the form of Carotid artery stenting (CAS). [7] Also CAS gained popularity due to less injury to the occluded vessel. [8] Many long-termed randomized clinical trials were made to show, which of the method will demonstrate less probability of postprocedural adverse events appearance. Consequently, this article will be a simplified review of literature, will try to summarize the results and give recommendations.

Methods and materials. A systematic search of the electronic databases EMBASE, PubMed, Google Scholar and Cochrane Central Register of Controlled Trials, was conducted in September 2018 using the key words: 'endarterectomy', 'carotid stenosis', 'carotid stenting', for studies published in the interval of last 5 years. Further we filtered the necessary articles by choosing the next criteria: clinical trial, last 5 years, full text, ages 65+ years. Reference lists of relevant studies were searched manually. Our review did not have a registered protocol but followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. Titles and abstracts of articles were scanned independently by three researchers to identify articles to retrieve in full. Inclusion criteria were: (1) prospective investigations of vascular outcome (stroke) following reconstructive surgery; (2) patients with carotid stenosis; (3) within-subjects design; (4) long-termed randomized clinical trials. Exclusion criteria were: (1) femoral and other peripheral artery surgeries; (2) studies which did not use endarterectomy; (3) ultrasound core laboratory results; (4) cranial nerve injury; (5) outcomes as Ischemic cardiac diseases and other non-vascular diseases.

Results and Discussion. Carotid Angioplasty with Stenting Versus Endarterectomy. This clinical trial was conducted in Kentucky state and includes 189 patients, of whom CEA was assigned for 44 patients with asymptomatic and 53 patients with symptomatic carotid stenosis and other 44 patients with asymptomatic and 51 patients with symptomatic carotid stenosis were treated by CAS [9,10]. Stroke was not the highest cause of death (6/173; 3.5%) in which the group treated by CAS (5/90; 5.7%) was superior than the group of CEAs (1/83; 1.1%). Despite this, ischemic stroke was ipsilateral to treated artery only in 1 of the case. The remaining cases were hemorrhagic, contralateral to the treated artery, or vertebrobasilar in distribution, and consequently, unconnected with the previous treatment [11]. Patients who were treated by CAS revealed nonfatal ischemic strokes, which didn't emerge in the allocation of the indexed carotid artery. The main limitation was the small sample size, so we can't be sure the ipsilateral ischemic stroke was not caused by chance. The strength was the duration of trial (10-13 years) and small patient attrition (91%). In conclusion, this long-term trial demonstrated the equality of prevention of ipsilateral ischemic stroke in both CAS and CEA [12].

Long-term outcomes after stenting versus endarterectomy for treatment of symptomatic carotid stenosis: The International Carotid Stenting Study (ICSS) randomized trial. This clinical trial randomly distributed 1713 patients into two groups; stenting (855) and endarterectomy (858) and followed up for 2-4 years. The patients were taken randomly from 50 centers worldwide. The endpoint was the occurrence of disabling or fatal stroke. From the beginning 3 patients withdrew immediately. At the end of follow-up number of fatal or disabling strokes didn't have high statistical significance (CAS =52 vs CEA=49). However, the difference between the incidence of non-disabling strokes were quite significant (CAS=119 vs CEA=72). This clinical trial showed relative results in long-term outcomes and risk of fatal or disabling stroke for CEA and CAS [13].

Long-Term Results of Stenting versus Endarterectomy for Carotid-Artery Stenosis. 2502 patients (only 1607 patients gave consent) from 117 centers were divided into groups of CEA and CAS and were evaluated for outcomes each 6 months during 10 years. The amount of periprocedural stroke was higher in stenting group comparing to endarterectomy group (4.1% vs 2.3%). On the other side the number of postprocedural stroke showed equality in outcomes (42CAS / 41CEA). In conclusion, the long-termed 10-year CREST didn't show any evidence of a significant variability in the long-term service time of stenting and endarterectomy. [14]

Effect of Carotid Revascularization Endarterectomy Versus Stenting Trial Results on the Performance of Carotid Artery Stent Placement and Carotid Endarterectomy in the United States. Researches from Minnesota University provided retrospective comparison of carotid artery stent replacement (CAS) and carotid endarterectomy (CEA) based on CREST (Carotid Revascularization Endarterectomy Versus Stenting Trial). Total number of patients, which had CEA or CAS procedure in CREST periods, is equal to 225191 (data from National Inpatient Sample). According to the results of research, there is no overall difference in CAS or CEA procedure. CAS patients continued to have renal failures, coronary artery disease and congestive heart failure. It proves that demographic characteristics, pretreatment profile and hospital outcomes do not show any changes during 2 time periods. CAS has an increased risk of postoperative neurological complications found in CREST. Respectively, further studies are essential to provide more accurate results. [15]

Early Outcomes After Carotid Artery Stenting Compared with Endarterectomy for Asymptomatic Carotid Stenosis. This study provides comparative work of early in-hospital results of carotid artery stenting (CAS) versus carotid endarterectomy (CEA). Research based on results of academic medical centers that take part in University Health System Consortium. According to data, 17716 (81.7%) patients underwent CEA procedure and 3962 (18.3%) to CAS. To evaluate effects of hospital variables, researchers used multilevel mixed-effects model. In fact, CAS patients were younger, predominantly black and out of high-risk zone due to less hypertension and smoking. Anyhow, postoperative stroke or lethal issues were more frequent after CAS (4% versus 1.5%). Despite the fact that surgical operation provided accurately, post-operative complications predominately mirrored in patients with CAS. While CEA patients showed no critical complications with some exceptions. [16]

Randomized Trial of Stent versus Surgery for Asymptomatic Carotid Stenosis. Researches from Massachusetts provided long term clinical trial comparison of carotid artery stenting and carotid endarterectomy. Research study involved 1453 patients with no high risk for surgical complications. However, the results showed that rate of lethal issues within a month after procedure in case of stenting was equal to 2.9% and 1.7% in endarterectomy. Overall, results of stroke-free survival after 5-year observation was 93.1% in stenting against 94.7% in endarterectomy. According to the conclusion of researches, there is no critical difference in outcomes of both procedures. Even though, quite encouraging results present in favor of endarterectomy. [17] The amount of stroke cases in CAS groups were shown higher to compare with the CEA groups. However, it's only the total stroke volume, if we look deep, we can see the non-significant difference in disabling and ipsilateral strokes number. This review literature can show the effectiveness of endarterectomy comparing with stenting in the stroke issue. However, there is a second major outcome, which has to be included, the myocardial infarction. Some studies show the dominance of MI occurrence in patients with CEA more than in patients with CAS. [17-20]

Conclusion. Our review suggest that carotid endarterectomy should be offered as the first choice for carotid stenosis at present, but more evidence is needed to reevaluate the comparative efficacy and safety of both techniques because rapid progress is being made in the development of devices and medical treatments. Therefore, the true effects of CEA and CAS should be further evaluated, and the polemic must continue.

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КАРОТИДТІ СТЕНТТЕУ ЖӘНЕ КАРОТИДТТІ ЭНДАРТЕРЭКТОМИЯ ПРОФИЛАКТИКАСЫНЫҢ НӘТИЖЕСІНІҢ ТИІМДІЛІГІНЕ САЛЫСТЫРМАЛЫ ШОЛУ

Түйін: Ми инсульті жер бетінде миокард инфарктынан кейін өлім деңгейі бойынша екінші орын алады. Бұл шолуда, КАС немесе КЭА себебінен болған инсульт ревазуляризация нәтижесі және әр тәсілдің профилактикалық тиімділігін қарастырамыз. Жұмыс барысында бірқатар клиникалық зерттеулерге сүйене отырып, нақты тәсілдің қолданылуына ұсыныс берділді.

Түйінді сөздер: реконструктивті хирургия, каротидті стеноз, каротидті эндартерэктомия, инсульт, каротидті стенттеу

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СРАВНИТЕЛЬНЫЙ ОБЗОР ЭФФЕКТИВНОСТИ РЕЗУЛЬТАТОВ ПРОФИЛАКТИКИ КАРОТИДНОЙ ЭНДАРТЕРЭКТОМИИ И КАРОТИДНОГО СТЕНТИРОВАНИЯ

Резюме: Инсульт головного мозга занимает второе место после инфаркта миокарда, место в структуре смертности населения земного шара. В данном обзоре мы рассмотрим инсульт, как результат

реваскуляризации из-за КАС или КЭА и эффективность его профилактики этими методами. Мы собрали несколько клинических исследований, интерпретировали их результаты и дали рекомендации по использованию конкретного метода.

Ключевые слова: реконструктивная хирургия, каротидный стеноз, каротидная эндартерэктомия, каротидное стентирование, инсульт