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Review Article

Rapid Health Technology Assessment of Argatroban in the Treatment of Acute Ischemic Stroke

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Keywords

- Argatroban;
- Acute ischemic stroke;
- Rapid health technology assessment

Abstract

Objective: Application of rapid health technology to evaluate the effectiveness, safety, and efficacy of Agatroban Injection in the treatment of acute ischemic stroke, providing evidence-based reference for selecting clinical treatment plans. Method: Retrieve Chinese and English medical databases and health technology evaluation websites. Two researchers independently screened and extracted literature based on inclusion and exclusion criteria, evaluated the quality of the literature, and summarized and evaluated the results.

Method: A total of 12 articles were included, of which 8 were used for systematic evaluation and meta-analysis, and 4 were used for pharmacoeconomics research. Effectiveness analysis shows that the use of Agatroban injection can improve overall clinical efficacy, as well as improve neurological deficit scores and daily living activity scores. Safety analysis shows that the use of agatroban injection does not increase the risk of bleeding, and the safety is relatively high. The economic analysis results indicate that the use of agatroban injection has specific economic advantages.

Conclusion: Agatroban injection has good efficacy, safety, and economic advantages in the treatment of acute ischemic stroke

INTRODUCTION

Acute ischemic stroke is one of the common types of cerebrovascular diseases, accounting for 69.6% to 70.8% of stroke types [1]. About 20% of patients with ischemic stroke die within 2 weeks of acute onset, and the mortality rate shows a positive trend with age. Anticoagulant therapy has always been a research hotspot in ischemic stroke, reducing the recurrence rate of stroke or deep vein thrombosis to a certain extent, but also increasing the risk of bleeding events [2]. Therefore, the use of anticoagulants for treatment and prevention remains controversial.

Agatroban injection, as a novel thrombin inhibitor, exerts anticoagulant effects by inhibiting fibrin formation, platelet aggregation, coagulation factors V, VIII and XII, and C protein activity [3], its characteristic is that it has high selectivity and does not rely on thrombin III inactivation related to fibrinogen thrombus binding, which is of great significance for improving the hypercoagulable state of patients. In recent years, studies have shown that agatroban can inhibit the progression of penumbral injury in stroke patients, improve blood supply, and thus slow down neurological impairment [4]. Although it has significant therapeutic effects on acute ischemic stroke patients and is widely used in clinical practice, there is still some controversy about the therapeutic effect and safety. This study utilizes rHTA to quickly collect and integrate relevant clinical evidence to evaluate the efficacy, safety, and economy of agatroban in the treatment of acute ischemic stroke, providing scientific basis for clinical practice.

MATERIALS AND METHODS

Information

This study developed inclusion and exclusion criteria based on the PICO principles of evidence-based medicine to obtain research data.

Inclusion criteria: (1) Literature types include: HTA reports, systematic evaluations, meta-analysis, and pharmacoeconomic studies; (2) Research subjects: Patients with acute ischemic cerebral infarction, regardless of age, gender, or race. (3) Intervention measures include Argatroban Injection or the combination of Argatroban Injection with other treatments; The control measures are placebo or other treatment methods. (4) Achievement indicators: including effectiveness, safety, and economic indicators. (5) The language is Chinese or English.

Exclusion criteria: duplicate publications, inability to obtain full text literature, case reports, and other literature that does not meet the research type.

Literature retrieval, screening, and evaluation

Retrieval method: Retrieve CNKI, Wanfang, VIP databases, China Biomedical Literature Database (Chinese database), and PubMed, Embase, Web of Science, Cochrane Library English databases; Simultaneously searching the official websites of HTA institutions such as the International Health Technology Assessment Agency Collaboration Network (INAHTA), the Canadian Agency for Drug and Health Technology (CADTH), and the National Institute of Clinical Excellence (NICE) in the UK, there was no search deadline from the establishment of the database until March 1, 2023. Chinese search formula: (Agatroban or Agatroban Injection) and subject: (Cerebral Infarction or Cerebral Infarction or Embolism or Thrombosis or Stroke or Ischemic Stroke or Stroke or Ischemic Stroke) and subject: (Meta Analysis or Meta Analysis or System Evaluation or HTA or HTAi or INAHTA or Economics or Costs or Economics or Expenses); English search format: ((((Agatruban)) OR (Agatruban injection)) AND (((((((((Cerebral infarction) OR (brain infarction)) OR (infarction of the brain)) OR (cerebral embolism)) OR (cerebral thrombosis)) OR (stroke)) OR (cerebral apoplexy)) OR (ischemic stroke)) OR (ischemia apoplexy))) AND ((((((((((Meta analysis) OR (system assessment)) OR (system evaluation)) OR (economics)) OR (cost)) OR (costing)) OR (degression)) OR (economics)) OR (expense)) OR (charge))

Literature screening: Import the literature into EndnoteX9, and two evaluators will screen the initial Chinese and English literature layer by layer. Firstly, duplicate literature is selected based on inclusion and exclusion criteria, and then the titles and abstracts of the reading literature are preliminarily screened. After obtaining the full text, filter again. If there are disagreements during the literature selection process, they can be resolved through discussion or by inviting a third evaluator to participate in the discussion.

Data Extraction and Literature Evaluation: One evaluator independently extracts the corresponding information according to the pre designed data extraction table, and another evaluator conducts a review. In the preset data extraction table, the content includes information such as study time, subjects, intervention measures, control measures, number of studies included, and outcome indicators. Pharmacoeconomics research should extract content such as country/region, research perspective, research time frame, patient population, intervention measures, and control measures. For meta-analysis and systematic evaluation, AMSTAR 2 tool is used for literature quality evaluation [5].

Data Analysis

The conclusions of this evaluation report are obtained by conducting descriptive evaluations of the included studies, analyzing the research objectives, results, and conclusions. In the process of data organization, if there are inconsistencies or differences in research results between literature, research results with high quality, recent publication years, and large sample size will be selected.

RESULTS

Literature search results

A total of 92 literature were searched, and after deduplication, reading the title and full text of the literature, a total of 14 literature met the criteria, Among them, 8 are systematic evaluation and meta-analysis, and 6 are economic analysis [6-10]. The literature selection process is shown in Figure 1.

Basic characteristics and quality analysis of included literature

The basic information of the 8 included systematic evaluations and meta-analyses includes literature years, research subjects, intervention measures, control measures, indicator results, and literature quality evaluation AMSTAR2, as shown in Table 1. The basic information included in the four pharmacoeconomic studies includes country, perspective, research methods, time-bound intervention methods, and control measures, as shown in Table 2.

Effectiveness evaluation

Efficiency: ① Agatroban+conventional treatment vs conventional treatment or Agatroban vs placebo: A meta-analysis incorporating 12 RCTs showed that the effective rate of using Agatroban in conventional treatment (91.1%) was higher than that in conventional treatment (72.3%), with a statistically significant difference [RR=1.26, 95% CI (1.18, 1.34), P<0.0001] [13]; Another meta-analysis, which also included 12 RCTs, showed that compared to conventional treatment or placebo, the improvement of neurological deficits with agatroban was more effective than conventional treatment or placebo, with a statistically significant difference [OR=2.40, 95 CI% (1.65,3.49), P<0.0001] [9]. However, there was also a meta-analysis that included two studies that showed that the effectiveness of using agatroban in improving neurological deficits was not superior to conventional treatment, and the difference was not statistically significant [RR=1.00, 95CI%(0.72,1.39), P=0.99] [12].

② Agatroban+ateplase+conventional therapy vs ateplase+ conventional therapy: A meta-analysis incorporating 15 RCTs showed that the total effective rate of combined treatment with ateplase+conventional therapy was significantly better than that

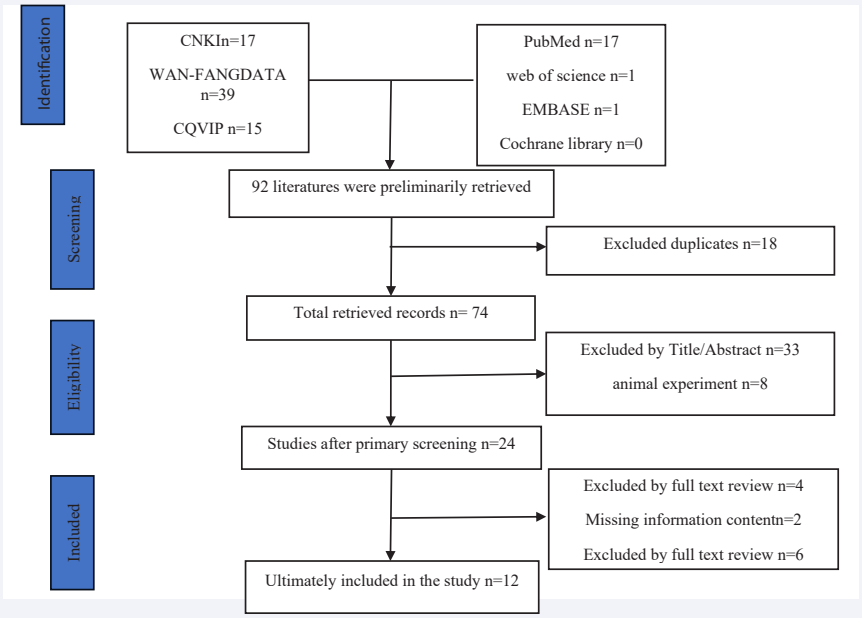

Figure 1 Flow chart of literature screening

Table 1: Basic information table of included studies in the systematic review/meta-analysis of alteplase for acute ischemic stroke patients

Serial number	Author and year	Number of studies	Trial Group	Control group	Outcome measures		AMSTAR 2 quality evaluation
					Effectiveness	Safety	
1	CAI Peishan [6] 2022	22 RCTs	Agatroban + control group	Alteplase + conventional treatment	(1) Total effective rate; (2) NIHSS score; (3) BI score; (4) mRs Score;	(1) incidence of adverse bleeding reactions; (2) incidence of intracranial hemorrhage adverse reactions;	Medium
2	Hu Yinqin [7] 2022	25 RCTs/ Non-RCTS/ Cohort Studies	Agatroban treatment (alone or combined control group)	Placebo/conventional treatment includes antiplatelet agents, intravenous thrombolysis, and mechanical thrombectomy	(1) Early improvement in neurological function; (2) early neurological function deterioration; (3) mRS Score; (4) recurrence rate;	(1) the risk of symptomatic intracranial hemorrhage; (2) the risk of any intracranial hemorrhage; (3) systemic bleeding risk; (4) mortality;	Medium
3	Wang Ruolan [8] 2022	13 RCTs	Agatroban + control group	Basic treatment + Alteplase	(1) Total effective rate; (2)NIHSS score; (3) BI score;	(1) incidence of adverse reactions;	low
4	Kong Yan [9] 2011	11 RCTs/ Semi-RCts	Agatroban (alone or in combination with control)	Placebo/conventional treatment (aspirin/ ozagrel sodium /other)	(1) Effective rate of improvement of neurological deficits; (2) mortality or deterioration rate; (3) BI score; (4) mRS Score;	(1) intracranial hemorrhage; (2) systemic hemorrhage;	Extremely low
5	Cao Jie [10] 2018	6 RCTs	Agatroban + control group	Edaravone + symptomatic treatment	(1) Total effective rate; (2) NIHSS score and CSS score; (3) BI score;	(1) intracranial hemorrhage; (2) hemorrhage of other organs;	Medium
6	Junfeng Liu [11] 2014	11 RCTs	Agatroban (alone or in combination with other treatments)	Placebo/other treatments (sulxuening, Edaravone, Shuxuetong, aspirin, batroxobin)	(1) Long/short term death dependence rate; (2) neurological deficit score, including CSS, MESSS score, NIHSS score, ESS; (3) effective rate of improvement of neural function deficit;	(1) intracranial hemorrhage; (2) other bleeding;	Extremely low
7	BinLv [12] 2022	4 RCTs	Agatroban	Other treatments	(1) Improvement of neurological deficits, including NIHSS score, mRS Score, BI score, activities of daily living, and efficiency;	(1) bleeding risk;	Extremely low
8	Zhou Jiajun [13] 2014	14 RCTs	Agatroban + control group	Other treatments (any other medical or non-medical treatment other than agatroban)	(1) Total response rate; (2) NIHSS score; (3) Barthel score;	(1) Adverse reactions: rash, abnormal liver function;	low

Table 2: Basic information table of included economic studies of alteplase for acute ischemic stroke patients

RESEARCH	Perspective	Research methods	Time limit	Cost (direct + indirect)	Effect	Method of analysis	Sensitivity Analysis	Conclusion
Wu Yubo [14] 2011	The Patient	Minimum cost analysis	/	A Agatroban 15,477.96 yuan B Batroxoban 13,098.27 yuan C Alteplase 21,040.86 yuan	A Total effective rate 85.00% B Total effective rate 88.89% C Total effective rate 94.74%	Minimum cost analysis method	According to the drug price decrease by 10%, the conclusion remains unchanged after rank sum test.	B Batroxoban is an economic scheme.
Wu Huijin [16] 2010	The Patient	Cost-effectiveness	1 year	A Agatroban 8025.31±789.17 yuan; B defibrase 14840.18±402.51 yuan; C1 alteplase 11963.87±375.02 yuan, surgery 15867.21±896.53 yuan	A: NIHSS improved by 0.65 ± 0.11; B: NIHSS improved by 0.89±0.14 C: 1NIHSS improvement 0.74±0.18, C2: NIHSS improvement 0.90 ± 0.21	Incremental cost-effectiveness ratio ICER () A: 13346.63 ± 1378.14 B: 16489.095 ±5445.31 C1:17091.24±534.32, C2:16702.33±807.11	/	Thecost-effectiveness of treatment in Group A is relatively good, but it is not comparable to the other three groups. C2 is better than C1, but there is no statistical difference.
Qiao Yuan [17] 2016	/	Minimum cost analysis	/	A Ginkgo dipyidamolum + Edaravone 8746.36 yuan; B Agatroban + Edaravone 10770.64 yuan; C ozagrel sodium + Edaravone 6264.67 yuan	A Total effective rate 81.82% B Total effective rate 89.47% C The total effective rate was 86.96%	Minimum cost analysis method	Assume a 10% drop in drug costs and a 5% increase in test fees.	Ozagrel Sodium + Edaravone is considered the most economical solution.
Yang Jiannan [18] 2022	Health system	Cost-effectiveness	1.5 years	A Yulechlin Group $22,090.82 B Agatroban Group 25,714.66 yuan C Combined group 27,204.99 yuan	A effective rate of 72.9 percent B The effective rate is 80.7% C The effective rate is 94.1%	Agatroban 464.59 Combined Group 241.23	The results of perceptual analysis were consistent with those of cost-effectiveness analysis	The economy of the combined scheme is superior to the other two schemes, which is the dominant scheme.
		Cost-utility	Simulate 30 years	A Yulicrin Group $121,467.53; B Agaqu group 125477.74 yuan; C combined group 128,429.57 yuan	Utility (QALY) A Eureklin group 4.575 B Agatriban Group 4.627 C Combined Group 4.835	Incremental Cost-Utility (ICUR) Agatroban 77119.42 Combined Group 26777.08	Univariate sensitivity analysis and probabilistic sensitivity analysis were more robust.	The combined scheme is more economical and advantageous. The economy of Agatroban scheme and Yulicrin scheme is similar, and there is no obvious difference.

of ateplase+conventional therapy, with statistical significance [RR=1.22,95CI (1.16,1.27), P<0.0001] [6]; Another meta-analysis that included 9 RCTs showed that the total effective rate of agatroban+ateplase+basic treatment was higher than that of ateplase+basic treatment, with a statistically significant difference [RR=1.21,95% CI (1.14,1.29), P<0.001] [8].

③ Agatroban+edaravone+conventional treatment vs edaravone+conventional treatment: A meta-analysis that included six RCTs showed that the total effective rate of combining agatroban on the basis of edaravone+conventional treatment (92.2%) was higher than that of edaravone+conventional treatment (72.2%), and the difference was statistically significant [RR=1.28,95% CI (1.17,1.39), P<0.0001] [10].

④ Agatroban+Other Treatments vs Ozagrel+Other Treatments: A meta-analysis incorporating two RCTs showed that Agatroban treatment was more effective in improving neurological function than Ozagrel, with a statistically significant difference [OR=2.01,95CI% (1.02,3.97), P=0.004] [9].

⑤ Agatroban+Other Treatments vs Aspirin+Other Treatments: A meta-analysis incorporating two RCTs showed that Agatroban treatment improved neurological function better than aspirin, with a statistically significant difference [OR=2.70,95CI% (1.50,4.85), P=0.0009] [9].

Neurological deficit score: *NIHSS scoring*: ① Agatroban+Other Treatments vs Other Treatments: A meta-analysis incorporating 5 RCTs showed that after 14 days of treatment, the NIHSS score improved significantly with the combination of Agatroban and other treatments compared to other treatments alone (SMD=1.18,95% CI [1.64, -0.72], P<0.0001) [13].

② Agatroban vs antiplatelet drugs: A meta-analysis that included four RCTs showed that Agatroban was superior to

antiplatelet drugs in improving early neurological prognosis in patients, with statistically significant differences [OR=2.08, 95% CI (1.27, 3.43), P=0.004]. However, there was no statistically significant difference in early neurological deterioration between the two groups [OR=0.68, 95% CI (0.32, 1.47), P=0.330] [7].

③ Agatroban+antiplatelet drugs vs antiplatelet drugs: A meta-analysis incorporating four RCTs showed that there was no statistically significant difference between the two groups on the basis of improving early neurological function in patients with antiplatelet drugs combined with Agatroban injection [OR=2.82,95% CI (0.94,8.44), P=0.060], while there was a statistically significant difference between the two groups in reducing early neurological deterioration [OR=0.37,95% CI (0.24,0.56), P<0.001] [7].

④ A meta-analysis involving 11 RCTs showed that the NIHSS score of the combination of ateloplase and conventional therapy was significantly better than that of ateloplase and conventional therapy, with a statistically significant difference [MD=-1.92,95% CI (-2.46, -1.38), P<0.0001]; Another meta-analysis that included 11 RCTs also showed that the NIHSS score of agatroban combined with ateplase intravenous thrombolysis combined with basic treatment was better than that of ateplase intravenous thrombolysis combined with basic treatment, with a statistically significant difference [MD=-1.73,95% CI (-1.94, -1.52), P<0.00001] [8].

⑤ Agatroban+edaravone+other treatments vs edaravone+other treatments: A meta-analysis involving three studies showed that on the basis of edaravone+other treatments, agatroban combined with edaravone reported better NIHSS scores than edaravone+other treatments, with statistically significant differences [MD=-3.82, 95% CI (-5.21, -2.43), P<0.05] [10].

CSS Scoring: Agatroban+edaravone+other treatments vs edaravone+other treatments: A meta-analysis involving three studies showed that the CSS score of Agatroban+edaravone+other treatments was superior to that of edaravone+other treatments, with a statistically significant difference [MD=-4.39,95% CI (-6.97, -1.81), P<0.05] [10].

Daily Living Activity Rating: ***Barthel rating*****:** ① Agatroban+Other Treatments vs Other Treatments: A meta-analysis of 5 studies included showed that the Barthel score improvement after combined treatment with Agatroban was superior to other treatments, with statistically significant differences [SMD=1.09,95% CI (0.35,1.83), P<0.00001] [13].

② Agatroban+ateplase+conventional treatment vs ateplase+conventional treatment: A meta-analysis involving 10 studies showed that the Barthel score after agatroban+ateplase+conventional treatment was superior to ateplase+conventional treatment, with a statistically significant difference [MD=8.97,95% CI (6.64,11.30), P<0.0001] [6];

③ Agatroban vs Aspirin: A meta-analysis involving three studies showed that the Barthel score after Agatroban treatment was superior to aspirin, with a statistically significant difference [OR=6.93,95% CI (4.33,9.54), P<0.0001] [9];

④ Agatroban+edaravone+other treatments vs edaravone+other treatments: A meta-analysis involving three studies showed that the Barthel score of Agatroban combined with edaravone+other treatments was superior to that of edaravone+other treatments, with a statistically significant difference (MD=7.35, 95% CI [4.56,10.15], P<0.05) [10].

MRS score: ① Agatroban+ateplase+conventional treatment vs ateplase+conventional treatment: A meta-analysis that included three studies showed that the difference in mRS scores between agatroban and ateplase was statistically significant [MD=-0.58,95% CI (-1.05, -0.10), P=0.02] [6].

② Agatroban vs Aspirin: A meta-analysis that included two studies showed that Agatroban was more effective in improving disability in patients with acute cerebral infarction at 90 days compared to aspirin, with a statistically significant difference [OR=-0.36, 95% CI (-0.69, -0.04), P=0.03] [10].

Safety evaluation

Adverse reactions to systemic bleeding: Five meta-analysis results showed that there was no statistically significant difference in the incidence of bleeding between the two groups after the combination of ateplase and conventional treatment with agatroban [6,7,9-11] (P=0.05).

Adverse reactions to intracranial hemorrhage: Four meta-analysis results showed that there was no statistically significant difference in the incidence of intracranial hemorrhage between the two groups after the combination of ateplase and conventional treatment with agatroban [6,7,9,11] (P>0.05).

Mortality rate: A meta-analysis reported the incidence of mortality in 21 study patients, and found no statistically significant difference (P>0.05) between the Agatroban group and the control group. Similarly, in the other two meta-analyses, it was found that there was no significant difference (P>0.05) in the mortality or deterioration rate of Agatroban compared to conventional or placebo treatment [9,10]. In a meta-analysis, it was reported that the incidence of adverse reactions in the combination of agatroban and ateplase intravenous thrombolysis combined with basic treatment was lower than that in the combination of ateplase intravenous thrombolysis and basic treatment (P<0.05) [8,12-16].

Economic evaluation

Minimum Cost Analysis: ①Agatroban+Edaravone vs Ginkgo Damo+Edaravone vs Ozagrel Sodium+Edaravone: A study compared the economics of three treatment regimens: Agatroban+Edaravone, Ginkgo Damo+Edaravone, and Ozagrel Sodium+Edaravone using a minimum cost analysis method. The results showed that Agatroban+Edaravone had the highest clinical total effective rate, while Ozagrel Sodium+Edaravone was the most economical treatment regimen. Sensitivity analysis

showed that: Assuming a 10% decrease in drug costs and a 5% increase in examination fees, analyzing the impact on total costs, ozagrel sodium+edaravone remains the most economical treatment option [17].

② Agatroban vs Batroxobin: A study compared the economic benefits of Agatroban and Batroxobin in acute ischemic stroke. When only considering direct costs, there was no significant difference in cost and effectiveness between Agatroban and Batroxobin (P>0.05), and the economic benefits were comparable [14].

Cost effectiveness analysis: ① Agatroban vs Batroxobin vs Ateplase: A study compared the economic performance of Agatroban (anticoagulant) with Batroxobin (defibrase) and Ateplase (thrombolysis) groups. The cost-effectiveness analysis results showed that Agatroban had a moderate economic performance [15].

② Agatroban vs defibrase vs intravenous thrombolysis vs surgery: A study compared the economic benefits of Agatroban (anticoagulation), defibrase (defibrase), intravenous thrombolysis, and surgery in four groups. The costs included medication, nursing, living, work delay, examination, and surgical expenses for patients in the initial stage of treatment, six months, and one year, while the effects included health benefits. The cost-effectiveness analysis results show that Agatroban has the highest economic efficiency in treatment [16].

Cost Utility Analysis: ① Agatroban vs Urinary Kallidinogenase: A study compared the economics of Urinary Kallidinogenase with Agatroban and their combination. An incremental cost-effectiveness analysis showed that the combination group had the lowest incremental cost-effectiveness ratio and was more cost-effective than either Urinary Kallidinogenase alone or Agatroban alone. The conclusion of sensitivity analysis is consistent. The cost-effectiveness analysis results show that the use of agatroban alone is an absolute disadvantage, while the combination therapy regimen has significant economic advantages [17].

DISCUSSION

The anticoagulant therapy for acute ischemic stroke has always been a hot topic and challenging challenge in global research. As a new type of small molecule direct thrombin inhibitor, Aqu overtime inhibits coagulation by reversibly interacting with the catalytic site of thrombin, and can effectively penetrate and inhibit thrombin, acting on AIS treatment. However, there is currently significant controversy regarding the evaluation of the efficacy of agatroban in the treatment of acute ischemic stroke. Therefore, it is necessary to conduct a comprehensive health assessment to further clarify the effectiveness, safety, and cost-effectiveness of atraban in treating AIS, in order to provide decision-making for clinical treatment.

The use of Agatroban can improve the overall clinical efficacy, improve neurological impairment scores, and daily living activity scores

Research has shown that agatroban improves microcirculation and local ischemic symptoms by inhibiting the release of thrombin mediated endohelin-1. It can also promote endothelial recovery, dilate blood vessels, inhibit thrombin mediated vasoconstriction, reshape blood vessels, rebuild blood flow pathways, reduce ischemic penumbra, and promote neurological recovery. At the same time, it serves as an anticoagulant, exerting anticoagulant effects, and when used in combination with other drugs to increase the anticoagulant effect. Looking at the intervention measures included in the study, it was found that the clinical treatment of Agatroban for acute ischemic stroke patients is mainly based on anticoagulant therapy. The main outcomes include changes in neurological deficit score or neurological deficit improvement rate, covering indicators such as total effective rate, NIHSS score, CSS scale, Barthel score, and quality of life score represented by mRS scale [18,19]. The research results show that the single or combined use of agatroban has an improved trend in improving neurological function in patients with acute ischemic stroke. Although few studies have found that patients with acute cerebral infarction may not benefit from agatroban, this may be related to the number and heterogeneity of studies included, and the conclusion may not be reliable. Through the quality evaluation of the included studies, it was found that the quality evaluation results of most studies were relatively low. Therefore, the conclusions of this study may have limitations and require further validation from more high-quality studies.

Using Agatroban does not increase the risk of bleeding and has high safety

The risk of bleeding is an important reason why anticoagulant therapy is not recommended for early treatment of acute ischemic stroke. Agatroban can catalyze and induce thrombin, reversibly bind to the active site of thrombin, and produce anticoagulant effects without increasing the risk of bleeding [20]. In this study, safety evaluation was conducted, with safety indicators including intracranial hemorrhage risk, systemic hemorrhage risk, bleeding tendency, and mortality rate. The research results showed that there was no increased risk of bleeding compared to the control group, and there was no statistically significant difference between the two, indicating that agatroban can provide a safer anticoagulant effect. The use of agatroban medication for patients within 48 hours of the super window has high safety and can improve their neurological function and mobility [21]. Overall, Agatroban has fewer side effects, good safety, and is easy to tolerate for patients [22].

Using Agatroban has certain economic advantages

In this economic evaluation, the minimum cost analysis results showed that the combination of agatroban and edaravone had the best clinical effect, but it is not the most economical treatment option. Compared with batroxobin, no economic

advantage was found in agatroban treatment. In cost-effectiveness analysis, agatroban has certain economic advantages in treating acute ischemic stroke compared to defibrase, intravenous thrombolysis, and surgery. The cost-effectiveness analysis results show that the use of agatroban alone is an absolute disadvantage, while the combination therapy regimen has significant economic advantages. Comprehensive analysis shows that the cost and treatment time in the treatment of acute ischemic stroke are not the decisive factors for the therapeutic effect. With the improvement of medical technology, improving the patient's ability to live and quality of life is the best recommended plan. Comprehensive treatment methods should be adopted based on various factors such as the patient to reduce treatment costs. In 2017, Agatroban injection was included in the medical insurance catalog, and its usage increased accordingly. The time should be extended, and follow-up observations should be conducted to comprehensively evaluate its economic viability.

Shortcomings and Prospects

The insufficient quality of the literature included in the study may be related to the low quality of the RCT and cohort studies included, which limits the strength of the argument to a certain extent; secondly, the follow-up period for Agatroban in the study was relatively short, which may affect the authenticity and extrapolation of the research results. At present, research on Agatroban is mostly focused on domestic articles, with relatively few studies abroad. As Agatroban is included in the medical insurance catalog, relevant research data in China is also increasing. Subsequently, multicenter, large sample, and high-quality real-world studies can be conducted to verify the impact of agatroban on the prognosis of neurological function in acute ischemic stroke, as well as its safety and cost-effectiveness, providing high-quality evidence-based medical evidence for clinical decision-making.

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