Review Article

Role of Antiplatelet and Anticoagulant Drugs in Stroke Patient – An Overview

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ABSTRACT

Stroke remains a significant cause of morbidity and mortality worldwide. When someone has a stroke, it's crucial to find ways to prevent recurrent strokes and improve their health. Antiplatelet and anticoagulant therapies play important role in the prevention and treatment of ischemic and thromboembolic strokes. Antiplatelet drugs like aspirin and clopidogrel stop blood cells called platelets from sticking together, reducing the risk of recurrent ischemic events reducing the risk of recurrent ischemic events. Anticoagulants, such as warfarin and newer medicines like dabigatran, work differently by slowing down the blood's ability to clot, which can also lower the risk of strokes. This abstract explores the current understanding of the mechanisms, efficacy, and safety profiles of these pharmacotherapies in stroke management. However, selecting the most appropriate agent requires careful consideration of individual patient characteristics, including stroke subtype, comorbidities, and bleeding risk. Recent advancements, including the introduction of DOACs and the emergence of reversal agents, have expanded therapeutic options and improved the management of stroke patients. Though, challenges persist in optimizing the balance between efficacy and safety, underscoring the importance of personalized treatment approaches and ongoing research to refine clinical practice guidelines. Newer medicines have made treatment more effective, but doctors still need to be careful to balance the benefits of preventing strokes with the risks of side effects like bleeding. This summary gives a simple explanation of how these medicines work and why choosing the right one is important for helping stroke patients stay healthy.

Keywords: Stroke, Antiplatelet, Anticoagulant, Medicines.

INTRODUCTION

Stroke frequently affects older persons and is one of the leading causes of death globally.[1] Stroke ranks third globally in terms of cause of mortality, after coronary heart disease and all forms of cancer. The incidence of stroke among India's elderly population was 1.9% in rural areas and 1.1% in cities. The prevalence of stroke survivors is positively correlated with age and negatively correlated with educational attainment.[2] The most effective strategy to reduce the burden of stroke is to prevent recurrent stroke.[3] The demographic, lifestyle, and socioeconomic shifts that have led to the rise of the stroke pandemic in India are threefold. The following are non-modifiable stroke risk factors: sex, low birth weight, age, ethnicity, and genetics[4,5]. Understanding the natural history of the condition, identifying risk factors, and identifying prognostic indicators that may result in markers for mechanisms of illness. Within ninety days following an ischemic stroke (IS) or transient ischemic attack (TIA), estimates of the risk of another stroke vary from 0.66 to 20.6%.[6-10] Inhibiting platelet aggregation is how antiplatelets work. As a result, this caused a revolution in cardiovascular medicine, and it is one of the main reasons why CVA occurs. The most often used antiplatelet and its combination medications are clopidogrel and aspirin together. Aspirin was once used as an antiplatelet medication for ischemic heart disease.[11,12,13] The major way that aspirin works is to prevent smaller, non-cardiovascular embolic strokes. Various strategies for lowering embolic occurrences include aspirin treatment, aspirin plus clopidogrel and warfarin, or one of the novel oral anticoagulants targeting either thrombin or factor Xa[14]. Anticoagulants are medications that slow down the production of fibrin, thereby preventing embolic problems and thrombus extension.[15] Anticoagulants are primarily used in hospital settings to treat disorders such as extra corpuscular circulation, pulmonary embolism, myocardial infarction, unstable angina, rheumatic heart disease, vascular surgery, prosthetic heart valve, extra corpuscular thrombosis, hemdialysate, and defibrillation syndrome.[16] A technique for tracking the distribution, dispensing, and prescription patterns of medications is the drug prescribing pattern. Studies on drug usage that primarily concentrate on the reasonable use of medications by populations are known as prescription pattern monitoring studies. It could include details on the quantity, quality, causes, and effects of drug usage as well as the financial consequences of those effects. Also, they support decrease and responsible use of medications under supervision.[17]

Additionally, they support the responsible use of medications under observation and the decrease in drug addiction and misuse. It offers advice and assistance to dispensers, prescribers, and the general public on how to utilize medications safely.[18] Inhibiting platelet aggregation is how antiplatelets work. As a result, cardiovascular medicine underwent a revolution, and this is one of the main causes of cerebrovascular accidents. Antiplatelet medications that are often utilized include aspirin, clopidogrel, and their combo. Anticoagulants work by slowing down the formation of fibrin, which stops thrombus from spreading and embolic consequences.[20]

The study's objective is to characterize the role of antiplatelet and anticoagulant drugs in stroke patient.

Pathophysiology of Ischemic Stroke

About 20% of ischemic strokes have an embolic origin, 45% are caused by minor or big arterial thrombus, and the other strokes have an unclear etiology.[37] The fundamental mechanism of atherothrombotic ischemic stroke is thrombosis, which can develop in the intracranial and extracranial arteries as a result of plaque building up along the damaged channel and roughening of the intima. The thrombus that forms at the location of plaque is caused by platelet adhesion and aggregation, which are started by endothelial damage. A clot travels from a remote source and lodges in brain arteries during an embolic stroke. Micro-emboli can separate from sclerosed plaque inside the artery or originate from cardiac conditions including hypokinetic left ventricle, patent foramen ovale, or atrial fibrillation.[37]

Emboli can happen after surgical operations, most typically during heart surgery, although they can also happen after lengthy bone surgeries. Emboli can be blood, fat, or air.[38] In Arteritis, infections, and drug abuse—including cocaine use—are among the other reasons[15,13,16] The term "ischemic cascade" refers to a series of biological activities that take place when a thrombosis or emboli reduce the blood flow to the brain tissue.[17]

ANTIPLATELET DRUGS

Aspirin

When used alone or in combination treatment with other antiplatelet medicines, aspirin is the most extensively researched antiplatelet medication used in the acute phase and secondary prevention of ischemic stroke. Acetylsalicylic acid (ASA), often referred to as aspirin, is one of the most commonly used drugs; an estimated 40,000 tonnes (44,000 tons) or 50 to 120 billion tablets are taken annually. The safest and most efficient medications required in a healthcare system are listed on the World Health Organization's (WHO) List of Essential Medicines. Low-dose aspirin inactivates platelet cyclooxygenase (COX)-1, which suppresses thromboxane (TX) A2 synthesis and TXA2-mediated platelet activation and aggregation over an extended period of time [25]. Aspirin's distinct ability to prevent atherothrombosis among COX-1 inhibitors and its common tendency to produce bleeding with other antiplatelet medicines can both be explained by this effect, which is both required and sufficient [26]. Since aspirin lowers the risk of recurrent incidents by around 18%, it is a key component in the prevention of cardiovascular (CV) events [27]. Antiplatelet medicines are useful for preventing secondary strokes at both the acute and chronic phases, according to well-accepted guidelines based on the results of prospective clinical studies and subsequent systematic reviews [28,29]. When it comes to secondary stroke prevention, aspirin is the antiplatelet drug that is most frequently administered[30].

Adenosine Diphosphate P2Y12 Antagonists

The thienopyridines clopidogrel and prasugrel are prodrugs that require liver digestion to frame their dynamic metabolites, which irreversibly tie to P2Y12. After digestive assimilation, clopidogrel is generally processed into dormant metabolites by pervasive esterase proteins. The leftover part (15%) goes through enactment by the hepatic cytochrome P450 (CYP450) enzymatic pathway. Clopidogrel enactment requires a two-step of the oxidative change process, first to 2-oxo-clopidogrel then to dynamic thiol metabolite. The two stages include a few hepatic CYP isoenzymes. Prasugrel as a prodrug first goes through quick de-esterification to halfway thiolactone and afterward is changed in the liver over completely to the dynamic metabolite in a solitary CYP-subordinate cycle. Clopidogrel and prasugrel are irreversible adversaries of the P2Y12 receptor. Ticagrelor is an immediate acting, reversible, noncompetitive bad guy of the P2Y12 receptor and doesn't require metabolic enactment. Dynamic metabolites of the thienopyridine prodrugs tie covalently to the P2Y12 receptor, prompting irreversible, circuitous platelet restraint. There are the freshest direct-acting P2Y12 inhibitors (cangrelor, elinogrel) that change the compliance of the P2Y12 receptor [31].

Prasugrel

Prasugrel, a prodrug and thienopyridine of the third generation, is converted into the active metabolite R-138727, which inhibits the platelet P2Y12 receptor in an irreversible manner. This forestalls the limiting of ADP and forestalls enactment of the glycoprotein IIb/IIIa complex.[41]Dissimilar to clopidogrel, loss of capability polymorphisms in CYP2C19 and CYP2C9 are not related with decreased pharmaco-accessibility of the dynamic metabolite of prasugrel.

Ticagrelor

Ticagrelor applies its intense antiplatelet action by reversibly restricting to and repressing the platelet adenosine diphosphate P2Y12 receptor. Its antithrombotic impacts are deep rooted in the administration of patients with ACS.

Dipyridamole

Dipyridamole is an antiplatelet specialist hindering the re-take-up of adenosine diphosphate and platelet phosphodiesterase's. The European Stroke Counteraction Study 2 (ESPS-2) enlisted patients with late TIA or ischemic stroke to assess decrease of stroke risk apportioning patients to ASA alone (50 mg day to day), changed discharge dipyridamole alone (400 mg everyday), the two consolidated specialists, or fake treatment [32]. Consolidated ibuprofen in addition to dipyridamole diminished stroke risk contrasted with fake treatment. The chances proportion of diminished risk for consolidated treatment was 0.59, contrasted with 0.79 for ibuprofen, and 0.81 for broadened discharge dipyridamole. Dipyridamole in addition to ASA (200/25 mg two times everyday) was

likewise contrasted with clopidogrel for auxiliary stroke avoidance (75 mg day to day). Concentrate on discoveries showed no measurable distinction between the two medication conventions [33]. Government drug organization endorsed dipyridamole as an adjunctive specialist for thromboembolism prophylaxis in patients going through heart valve swap and for thallium-atomic pressure testing. Dipyridamole is likewise involved off-mark for the anticipation of stroke. A mix of ibuprofen with broadened discharge dipyridamole was allowed for clinical use including for the stroke counteraction as an elective treatment for patients with deplorable migraine. The European Meds Organization (EMA) showed dipyridamole as a specialist for a coronary indicative test, for myocardial perfusion imaging adjusted for patient's incapable to go through sufficient activity stress, and for the estimation of partial stream save (FFR) of single coronary vein stenosis during obtrusive coronary angiography when rehashed FFR estimations are not expected.

Cilostazol

Cilostazol is a phosphodiesterase III (PDE3) inhibitor. The PDE3s catalysts hydrolyse cyclic guanosine monophosphate (cGMP) and cyclic adenosine monophosphate (cAMP). The PDE3 catalysts are situated inside the heart sarcoplasmic reticulum and in the smooth muscle of conduits and veins. These catalysts assume a part in managing both heart and vascular smooth muscle contractility. Cilostazol acts by repressing phosphodiesterase movement and by stifling cAMP corruption. Restraint of PDE3 permits a high centralization of cAMP in the platelets and veins. The centralization of cAMP consequently prompts expanded convergences of the dynamic type of protein kinase A (PKA) straightforwardly connected to restraining platelet conglomeration. Elevated degrees of the PKA inactivate myosin light-chain kinase, creating a vasodilating result on smooth muscle cells. Cilostazol is presently viewed as an antiplatelet drug and is recorded in enemy of thrombotic pharmacotherapy[33]

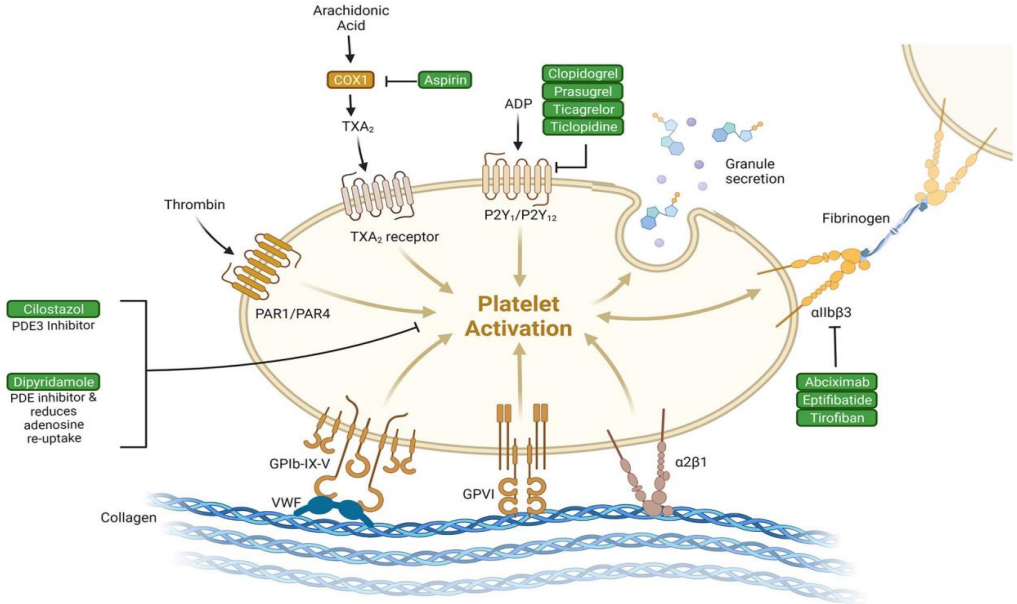

Figure 1: Antiplatelet agents and their mechanisms of action on the platelet.

Abbreviations: ADP, adenosine diphosphate; COX, cyclo-oxygenase; TXA2, thromboxane A2

ANTICOAGULANTS DRUGS

Early utilization of anticoagulants might diminish the volume of infarcted cerebral tissue by lessening the engendering of a blood clot in an intracerebral course and, hence, decline the neurological shortage and dangers of handicap and passing in patients with intense ischemic stroke (AIS). Furthermore, anticoagulants could restrain the development of new blood vessel and venous apoplexies thus decrease the gamble of early intermittent thromboembolic stroke, profound vein apoplexy, and aspiratory embolism. Nonetheless, these advantages could be counterbalanced by the expanded gamble of drain.

Vitamin K bad guys Vitamin K adversaries (VKAs, for example, warfarin capability by obstructing the vitamin K-epoxide reductase, in this way forestalling development of the dynamic type of the vitamin K-subordinate thickening factors.[41] The VKAs have an underlying favourable to thrombotic impact, by at first impeding proteins C and S, trailed by a postponed antithrombotic impact, through the restraint of coagulation factors II, VII, IX, and X.[41]

Warfarin

Government Medication Organization signs for use incorporate long haul anticoagulation following a thrombotic occasion or counteraction of thrombotic occasions in patients at high gamble, including post-employable states, atrial fibrillation, and those with fake valves.[42] In view of the underlying supportive of coagulant impact, in the event that quick anticoagulation is required, warfarin is matched with a fast acting parenteral anticoagulant, which can be stopped after restorative levels

are accomplished and stable throughout the span of 24 hours. Warfarin is taken orally, at dosages commonly going from 5-10mg every day, custom fitted in view of the global standardized proportion (INR), the widespread observing list in light of prothrombin time (PT). Warfarin is fundamentally used through the P450 system.[43] Acceptance or restraint of the isoenzymes associated with warfarin's digestion might possibly build the INR significantly.[41] Moreover, adjustments in oral vitamin K utilization can make huge vacillations in the INR.[44]

Side effect of warfarin

Hemorrhage is the main unfavorable impact related with warfarin and is straight forwardly connected with the degree of INR; the risk of hemorrhage is icreased if the INR is more noteworthy than five.[41] Risk factors for warfarin related hemorrhage include old age, serious comorbid conditions including malignant growth, chronic kidey disease (CKD), liver dysfunction, arterial hypertension, earlier stroke, alcohol abuse, and the concomitant use of antiplatelet or other drugs.[41] In case of hemorrhage, the anticoagulant impacts of warfarin can be reversed with the administration of vitamin K (phytonadione), fresh frozen plasma (FFP) or prothrombin complex concentrates (PCCs).[45,46] likewise, recombinant factor VIIa (rfVIIa) has been suggested as a possible reversal agent. While the use of rfVIIa has been shown to give a quick decrease in the INR, its use isn't related with improved clinical outcomes.[47,48]

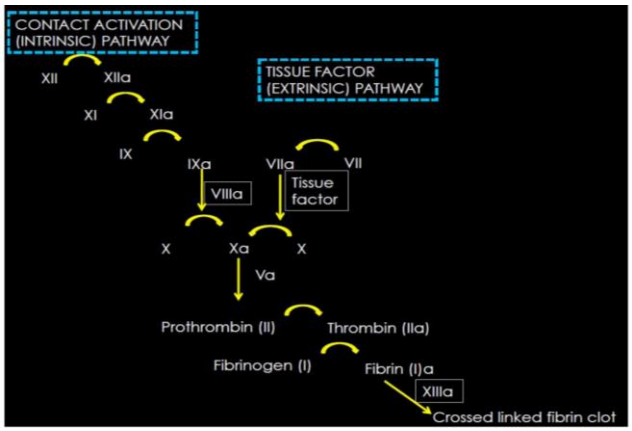

Figure 2: The coagulation cascade.

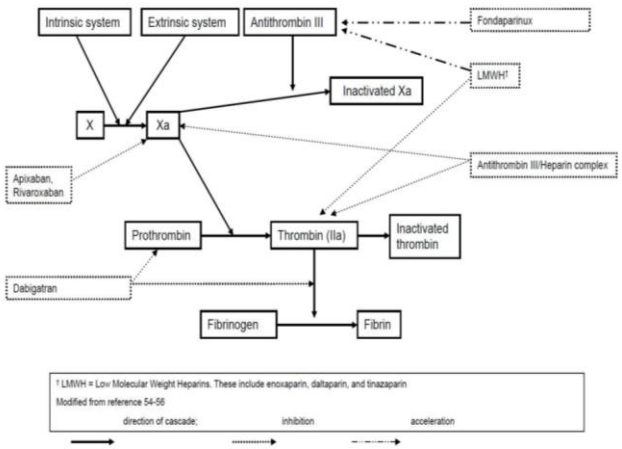

Figure 3: Site of action of drugs. Modified, with permission, Gresham C, Levine M, Ruha AM[49]

Heparins Antithrombin III (AT3) is a peptide that inhibit few of the activated coagulating factors. Drugs that increase the capability of AT3 act as anticoagulants. Unfractionated heparin (UFH) ties to and expands the action of antithrombin III by prompting a conformational change to Factor Xa, which eventually prompts restraint at Xa and IIa in a 1:1 ratio.[16] Unfractionated heparin likewise has some hindrance on factors IXa, XIa, XIIa.[49] Low sub-atomic weight heparins (LMWH), which likewise tie AT3, are more modest and relatively affect Xa, versus IIa, in a 3:1 or 2:1 ratio.[49] Because of this restraint, both the UFH and LMWH at last repress thrombin enactment.

Unfractionated Heparin (UFH) UFH is shown for various circumstances including the treatment and prophylaxis of venous thromboembolisms (VTE), blood clot prophylaxis in atrial fibrillation, and treatment of spread intravascular coagulation.[51] Not at all like warfarin, UFH is regulated parenterally, both subcutaneous for its prophylaxis use and as a nonstop intravenous implantation when utilized remedially. UFH has a lot quicker beginning of activity when contrasted with warfarin; when utilized intravenously, remedial viability happens very quickly, while helpful viability is arrived at inside 20-an hour when controlled subcutaneously. [43] UFH has a more limited half-life than warfarin, and doesn't need measurements change in renal disappointment. [43]

Side Effects

Discharge is a super unfavourable occasion in those getting UFH. The frequency of significant draining changes in view of the sign of its utilization, measurements and course of organization. Overall, UFH is related with a 2.0% occurrence of significant draining when utilized restoratively for VTE[19]. While significant draining can be possibly deadly, UFH can be switched with the organization of protamine sulphate. Regularly, protamine is dosed in light of how much UFH directed, not in view of research facility anomalies. A portion of 1mg will switch 100 units of UFH. One more critical and irrefutably factual unfriendly result of UFH use is the improvement of heparin-prompted thrombocytopenia (HIT). A nitty gritty conversation of HIT, in any case, is past the extent of this survey. Regardless, treatment choices for HIT incorporate cessation of UFH, and the ensuing utilization of an alternate class of NAC, either an immediate thrombin inhibitor (for example argatroban) or a component Xa inhibitor (for example fondaparinux).

Low Atomic Weight Heparin (LMWH) The LMWH are parenterally-regulated medicates, and incorporate dalteparin, enoxaparin, and tinzaparin. Contrasted and UFH, the LMWH enjoy the benefit of a more unsurprising portion reaction curve. Subsequently, the LMWHs are controlled at a decent portion, in view of complete body weight, and don't need tight guideline and checking as is shown with warfarin and UFH.[17] These medications have close to 100 percent bioavailability and arrive at top levels 2-4 hours after subcutaneous administration.[9,17] They have a half-existence of 3-4 hours and are killed principally (80%) through renal freedom, in this manner requiring portion

decrease contemplations in patients with renal insufficiency. Furthermore, since dosing depends on all out-body weight, as opposed to ideal body weight, dosing entanglements emerge in hefty patients.[17] While restorative observing isn't regularly demonstrated, in instances of renal deficiency, stoutness, or when iatrogenic excess is a worry, antifactor Xa levels can be utilized to screen LMWH.[9,17] In a perfect world, the antifactor Xa level ought to be gotten four hours after the organization of the LMWH.

There are inadequate clinical information straightforwardly contrasting unfractionated heparin and low sub-atomic weight (LMW) heparin for ischemic stroke treatment. One randomized, open-label investigation of intense ischemic stroke patients tracked down no huge distinction between therapy with intravenous heparin as contrasted and sub-cutaneous enoxaparin two times daily.[34] Foundational and cerebral embolic occasions, draining difficulties, and result at 90 days were comparable in the two gatherings. One more preliminary found that subcutaneous enoxaparin was basically as protected and compelling as unfractionated heparin for counteraction of venous apoplexy in intense ischemic stroke patients.[35] The biggest randomized controlled preliminary, which was acted in Britain and concentrated on two portions of subcutaneous heparin in vague stroke patients, showed no critical advantage with heparin.[36] LMW heparins enjoy a few expected upper hands over unfractionated heparin including simplicity of organization, more fast accomplishment of helpful impact, diminished prerequisites for blood testing (LMW heparins don't need PTT observing in patients who are not pregnant), and lower paces of thrombocytopenia. One impediment is that LMW heparins are more costly, albeit this might be offset by decreased organization and checking costs.

Factor Xa inhibitors

Factor Xa inhibitors are utilized for prophylaxis and treatment of VTE, as well with respect to prophylaxis of embolic illness in non-valvular atrial fibrillation, and as an elective anticoagulant in the setting of HIT. These medications hinder factor Xa, the most important phase in the normal pathway, either straightforwardly or by implication. The hindrance happens in a portion subordinate manner.[21] Apixaban and rivaroxaban, straightforwardly tie to the dynamic site of element Xa, consequently restraining both free and clump related factor Xa. These medications likewise restrain prothrombinase activity.[5] Backhanded Xa inhibitors, for example, fondaparinux, tie to AT3, coming about in a conformational change, consequently repressing component Xa without significantly affecting IIa. Fondaparinux is principally disposed of unaltered in the pee. Consequently, its utilization in patients with renal deficiency is contraindicated as its utilization in this understanding populace might expand the gamble of drain. There are no particular lab boundaries accessible to screen the anticoagulant effect of element Xa inhibitors. A portion subordinate prolongation of aPTT and PT might be seen 1-4 hours after organization of direct Xa inhibitors, for example, rivaroxaban, matching the pinnacle plasma level; be that as it may, this increment is brief and overall PT, aPTT and draining time ought not be impacted at helpful levels of these drugs.[9] Supratherapeutic centralizations of Xa inhibitors, nonetheless, have been related with a portion subordinate expansion in PT.[9] This expansion in PT doesn't straightforwardly connect with the expansion in PT optional to VKAs, and there is definitely not a reliable change between the PT and the INR with these drugs.[22] Antifactor Xa levels were initially planned and adjusted for LMWH; in any case, they can likewise be utilized to screen or affirm excess of variable Xa inhibitors.9 This test should be explicitly aligned for Component Xa inhibitors, as the consequences of the antifactor Xa level is measure specific.[17,23] Secondary effects and Inversion Specialists Unfriendly occasions connected with Xa inhibitors incorporate discharge, just like with all anticoagulants. Thrombocytopenia has additionally been accounted for following the utilization of Xa inhibitors; in any case, the component is unclear.[17] While no particular inversion specialist exists, both rVIIa and PCC have been proposed.[9,19] The Apoplexy and Haemostasis Society of North America recommends that four-factor PCC might be the most ideal choice as of now available.[24]

Direct thrombin inhibitors (DTIs)

As their name infers, the immediate thrombin inhibitors (DTIs) restrain the inborn action of the thrombin. Dissimilar to heparin, which likewise hinders thrombin, the DTIs don't need an element, and can restrain thrombin directly.[7,26] Most direct thrombin inhibitors are regulated parenterally, including argatroban, bivalirudin; in any case, dabigatran is orally managed. These medications are utilized for prophylaxis and treatment of VTE and ACS, and for prophylaxis of clots arrangement in non-valvular atrial fibrillation. They are additionally utilized as anticoagulation choices in the setting of HIT. Dabigatran, the just orally accessible DTI, is supported for treatment of VTE in patients treated with accompanying parenteral anticoagulation for somewhere around five days, and for the treatment of clots auxiliary to nonvalvular atrial fibrillation. Lab assessment of the DTIs incorporates estimation of a thrombin time (TT) or ecarin coagulating time (ECT).[29] In any case, these tests are not broadly accessible, subsequently restricting their materialness, especially in the crisis setting. The Hemoclot test is a weakened thrombin time examine planned explicitly as a measure for the DTIs; be that as it may, similar to the TT and ECT, this test isn't regularly available.[30,31] In the clinical setting, enacted halfway thromboplastin time (aPTT) can be utilized as a proxy to screen the impact of the DTIs; aPTT increments following a non-direct portion reaction bend and levels at higher groupings of DTIs. In this manner, a typical aPTT rejects the presence of critical measures of a DTI, however the level of rise of the aPTT doesn't be guaranteed to correspond with the level of DTI-prompted coagulopathy.[29] Secondary effects and Inversion Specialists The essential harmfulness of patients on DTIs is discharge, including gastrointestinal draining and

intracranial discharge. The pace of draining is portion subordinate, and is more normal in those more than 75 years of age.[27,28] Like numerous different NACs, no particular cures exist. The American School of Cardiology Establishment and the American Heart Affiliation suggest bonding of pressed red platelets and FFP, notwithstanding careful mediation, if practical, to control bleeding.[32] In any case, considering that FFP contains factor II, which is repressed from enactment by DTIs, the utilization of FFP is probably not going to be beneficial.[25] For patients with debilitated renal capability who have dangerous draining following dabigatran-prompted coagulopathy, haemodialysis has been suggested by some experts.[29] Others have recommended that in case of critical dying, the utilization of a four-complex PCC might be the best choice; nonetheless, there is restricted proof based data.[25]

Anticoagulant treatment for intense stroke may just be viewed as after a mind imaging study has rejected discharge and assessed the size of the infarct. Early anticoagulation ought to be stayed away from when likely contraindications to anticoagulation are available, like an enormous dead tissue (in view of clinical disorder or cerebrum imaging discoveries), uncontrolled hypertension, or other draining circumstances

Antiplatelets and Anticoagulants in Combination Therapy

In specific circumstances, anticoagulant treatment for optional counteraction of stroke is believed to be gainful over antiplatelet specialists. One such situation would be the utilization of anticoagulants poststroke in patients who have atrial fibrillation (AF). The mix of the two anticoagulants and antiplatelet specialists is viewed as in patients with stroke with regards to prior cardiovascular sickness, like coronary corridor illness within the sight of AF. In this present circumstance, the patient is probably going to be begun on anticoagulants to treat the AF poststroke, yet the proof for keeping on, halting, or adding an antiplatelet specialist when coronary conduit illness likewise exists is less clear It has additionally been explored assuming the utilization of heparin notwithstanding standard treatment further develops result in the initial a half year poststroke, and again no extra advantage was observed. While summing up to the ischemic stroke populace, there seems, by all accounts, to be little advantage of mix treatment. The proviso to this however might be that in specific circumstances when a patient presents with stroke and temperamental coronary supply route sickness, the utilization of mixes of antiplatelets and anticoagulant medications might give additional advantage. Presently, there is no RCT level proof of the advantages of blend treatment poststroke evaluating this specific gathering and is a significant region for future examination to explore.

CONCLUSION

The choice between these two agents depends on factors like stroke etiology, risk of bleeding and platelet characteristics. Antiplatelet therapy is the preferred choice for preventing recurrent strokes in most patients. Anticoagulant therapy should be carefully considered and only used when specifically indicated based on individual patient factors and conditions. Antiplatelet therapy Offers modest but valuable benefits in long-term stroke prevention and survival. It may be used in combination (dual antiplatelet therapy) for short periods after a stroke in specific cases like mild strokes or high-risk transient ischemic attacks (TIAs). They Carries a potential increased risk of bleeding. On the other hand, Anticoagulant therapy is not recommended for routine use in most stroke patients. It may be considered in specific situations like atrial fibrillation, where the risk of stroke is significantly higher. They carries a higher risk of bleeding compared to antiplatelet therapy.

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REFERENCES

1. Preethi P, Abdul Naveed, S, Sri Lakshmi G and Vinay Rao. Prescribing pattern of drugs in stroke patients admitted to a multispecialty hospital. Indo American Journal of Pharmaceutical Research, 2014; 4(2): 1015-1020.
2. Tapas Kumar and Shyamal Kumar. Epidemiology of stroke in India. Neurology Asia, 2006; 11: 1 - 4.
3. Helen L. Po, Ya-Ju Lin, and I-Hung Hseuh. The Prescribing Patterns of Antithrombotic Agents for Prevention of Recurrent Ischemic Stroke. Acta Neurol Taiwan, 2009; 18: 98-103
4. Ansari AK, Akhund IA and Shaikh AQ. Stroke in elderly: identification of risk factors. J Ayub Med Coll Abottabad, 2001; 13: 11-3.
5. Ali L, Jameel H and Shah MA. Risk factors in stroke. J Coll Physicians Surg Pak., 1997; 7:7-10.
6. Giles MF, Rothwell PM. Risk of stroke early after transient ischaemic attack: a systematic review and meta-analysis. Lancet Neurol. 2007;6:1063–72. Cardiol Ther (2023) 12:675–687 685 7. Amarenco P, Lavallee PC, Labreuche J, et al. One year risk of stroke after transient ischemic attack or minor stroke. N Engl J Med. 2016;374:1533–42.
7. Ildstad F, Ellekjær H, Wethal T, et al. Stroke risk after transient ischemic attack in a Norwegian prospective cohort. BMC Neurol. 2019;19:2.
8. Wu CM, McLaughlin K, Lorenzetti DL, Hill MD, Manns BJ, Ghali WA. Early risk of stroke after transient ischemic attack: a systematic review and meta-analysis. Arch Intern Med. 2007;167:2417–22.

9. Johnston SC, Gress DR, Browner WS, Sidney S. Short-term prognosis after emergency department diagnosis of TIA. JAMA. 2000;284:2901–6.

10. Tasneem Sandozi & Fouzia Nausheen. Drug utilization study in ischemic heart diseases associated with diabetes and hypertension. International Journal of Pharma and Bio Sciences, 2010; 1(3): 1-4

11. Hormoz Ayromlou, Hassan Soleimanpour, Mehdi Farhoudi. Eligibility Assessment for Intravenous Thrombolytic Therapy in Acute Ischemic Stroke Patients; Evaluating Barriers for Implementation, 2014; 16(5): 1-4

12. Prasanna Kumar, B Jewargi, Ravi D Mala. Drug Utilization Study in Congestive Heart Failure at a Tertiary Care Hospital. Scholars Journal of Applied Medical Sciences, 2015; 3(2): 857-862.

13. Ming-Ju Hsieh1, Sung-Chun Tang, Wen-Chu Chiang, Kuang-Yu Huang. Utilization of Emergency Medical Service Increases Chance of Thrombolytic Therapy in Patients with Acute Ischemic Stroke. NIH Public Access, 2014; 113(11): 813–819

14. Getnet Mengistu, Bayisa Lemma, Mulugeta Molla. Utilization Patterns of Anticoagulants at Medical Ward of Hiwot Fana Specialized University Hospital, Harar, Ethiopia. Journal of Basic and Clinical Pharmacy, 2017; 8(4): 235-238.

15. . Bruno Ramos Nascimento, Marcos Robertode Sousa, Fabio Nogueira Demarqui, Antonio Luiz Pinho Ribeiro. Risks and Benefits of Thrombolytic, Antiplatelet, and Anticoagulant Therapies for ST Segment Elevation Myocardial Infarction. ISRN Cardiology, 2014; 4(1): 1-7

16. Mukesh Kumar, Vicky Dahiyaa, Shruti Mishrab. Cardiovascular disease prevalence and drug utilization patterns at a tertiary care hospital in north eastern India. International Journal of Pharmacy and Pharmaceutical Sciences, 2016; 8(6): 116-119.

17. Anitta Thomas, Utkarsha Adake, Apurva Ashokkumar Sharma, Asawari Raut. Drug utilization pattern in adult medical intensive care unit of a tertiary care hospital. CHRISMED J Health Res, 2019 Jan-March; 6(1): 35-38

18. Thuermann PA, Windecker R, Steffen J, Schaefer M, Tenter U, Reese E, et al. Detection of adverse drug reactions in a neurological department: comparison between intensified surveillance and a computer-assisted approach. Drug Saf 2002; 25:713-24

19. Getnet Mengistu, Bayisa Lemma, Mulugeta Molla. Utilization Patterns of Anticoagulants at Medical Ward of Hiwot Fana Specialized University Hospital, Harar, Ethiopia. Journal of Basic and Clinical Pharmacy, 2017; 8(4): 235-238.

20. Ronning M. Coding and classification in drug statistics-from national to global application. Norwegian J Epidemiol 2001; 11 : 37-40.

21. WHO. What is drug utilization research and why is it needed? In: Introduction to drug utilization research. Chapter 1. Geneva: World Health Organization; 2003. p. 8-12. Available from: http://apps.who.int/medicinedocs/pdf/s4876e/s4876e. pdf, accessed on September 30, 2011.

22. ATC/DDD classification: drug utilization data constrains in developing countries. WHO Drug Inf 2002; 16 : 233-40. Available from: http://apps.who.int/medicinedocs/pdf/s4951e/ s4951e.pdf, accessed on June 28, 2013

23. Drug utilization is nothing but the process of appraising and reconsidering the use of drugs to determine their effectiveness of drug treatment. In ICU most of the drugs are prescribed empirically and are mainly based on physician previous experience, resulting in the lack of quantitative precision of drugs usage. Therefore, utilization trends and costs of drugs prescribed in the ICU need to be urgently addressed.

24. Ujwala P Gawali, Rasika S Khobragade. Drug utilization and prescription pattern in medicine intensive care unit at tertiary care teaching hospital. Natl J Physiol Pharm Pharmacol, 2019; 9(7): 674-677

25. Born, G.; Patrono, C. Antiplatelet drugs. Br. J. Pharmacol. 2009;147(Suppl. S1):S241–S251. [CrossRef]

26. Wood, A.J.; Patrono, C. Aspirin as an Antiplatelet Drug. N. Engl. J. Med. 1994;330: 1287–1294. [CrossRef] [PubMed]

27. Fowkes, G.; Price, J.F.; Stewart, M.C.W.; Butcher, I.; Leng, G.C.; Pell, A.C.H.; Sandercock, P.; Fox, K.A.A.; Lowe, G.D.O.; Murray, G.D.; et al. Aspirin for Prevention of Cardiovascular Events in a General Population Screened for a Low Ankle Brachial Index: A Randomized Controlled Trial. JAMA 2010;303:841–848. [CrossRef] [PubMed]

28. Wang, Y.; Wang, Y.; Zhao, X.; Liu, L.; Wang, D.; Wang, C.; Wang, C.; Li, H.; Meng, X.; Cui, L.; et al. Clopidogrel with Aspirin in Acute Minor Stroke or Transient Ischemic Attack. N. Engl. J. Med. 2013;369:11–19. [CrossRef] [PubMed]

29. Gouya, G.; Arrich, J.; Wolzt, M.; Huber, K.; Verheugt, F.W.; Gurbel, P.A.; Pirker-Kees, A.; Siller-Matula, J.M. Antiplatelet Treatment for Prevention of Cerebrovascular Events in Patients With Vascular Diseases. Stroke 2014;45:492–503. [CrossRef] 6. Jauch, E.C.; Saver, J.L.; Adam

30. Jauch, E.C.; Saver, J.L.; Adams, H.P., Jr.; Bruno, A.; Connors, J.J.; Demaerschalk, B.M.; Khatri, P.; McMullan, P.W., Jr.; Qureshi, A.I.; Rosenfield, K.; et al. Guidelines for the Early Management of Patients With Acute Ischemic Stroke. Stroke 2013;44:870–947. [CrossRef]

31. Trenk, D.; Hille, L.; Leggewie, S.; Stratz, C.; Nührenberg, T.G.; Aradi, D.; Schrör, K.; Sibbing, D. Antagonizing P2Y12 Receptor Inhibitors: Current and Future Options. Thromb. Haemost. 2019;119:1606–1616. [CrossRef] [PubMed]

32. Sacco, R.L.; Diener, H.-C.; Yusuf, S.; Cotton, D.; Ôunpuu, S.; Lawton, W.A.; Palesch, Y.; Martin, R.H.; Albers, G.W.; Bath, P.; et al. ASA and Extended-Release Dipyridamole versus Clopidogrel for Recurrent Stroke. N. Engl. J. Med. 2008;359:1238–1251. [CrossRef] [PubMed]

33. Kambayashi, J.; Liu, Y.; Sun, B.; Shakur, Y.; Yoshitake, M.; Czerwiec, F. Cilostazol as a unique antithrombotic agent. Curr. Pharm. Des. 2003;9:2289–2302. [CrossRef]

34. Woessner, R, Grauer, M, Bianchi, O, Mueller M, Moersdorf S, Berlit P, et al. Treatment with anticoagulants in cerebral events (TRACE). Thromb Haemost 2004;91:690-3.

35. Hillbom M, Erilä T, Sotaniemi K, Tatlisumak T, Sarna S, Kaste M. Enoxaparin vs heparin for prevention of deep-vein thrombosis in acute ischaemic stroke: A randomized, double-blind study. Acta Neurol Scand 2002;106:84-92.

36. International Stroke Trial Collaborative Group. The International Stroke Trial (IST): A randomized trial of aspirin, subcutaneous heparin, both, or neither among 19435 patients with acute ischaemic stroke. Lancet 1997;349:1569-81.

37. Hickey JV. The clinical practice of neurological and neurosurgical nursing. 6th ed. Philadelphia: Lippincott, Williams and Wilkins; 2008.

38. Cea W, Dennis M, van Gign J, Hankey GJ, Sandercock P, Bamford J. Stroke: A practical guide to management. 2nd ed. London: Blackwell Science; 2001.

39. American Association of Neuroscience Nursing core curriculum for neuroscience nursing (5th edition). Neuroscience Nursing; American Association of Neuroscience Nurses; 2010.

40. Blank-Reid C. How to have a stroke at an early age: The effects of crack, cocaine and other illicit drugs. J Neurosci Nurs 1996;28:19-27.

41. Hinkle JL, Bowman L. Neuroprotection for ischemic stroke. J Neurosci Nurs 2003;35:114-8. 18. Muir KW, Buchan A, von KR, Rother J, Baron JC. Imaging of acute stroke. Lancet Neurol 2006;5:755-68

42. Ageno W, Gallus AS, Wittkowsky A, et. al. Antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines. Chest. 2012;141suppl:e44S-e88S.

43. Douketis JD. Pharmacologic properties of the new oral anticoagulants: a clinician-oriented review with a focus on perioperative management. Curr Pharm Des. 2010;16:3436-3441.

44. Couris R, Tataronis G, McCloskey W, et al. Dietary vitamin K variability affects international normalized ratio (INR) coagulation indices. Int J Vitam Nutr Res. 2006;76:65-74.

45. Guyatt GH, Akl EA, Crowther M, et. al. Antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians Evidence-Based clinical practice guidelines. Chest. 2012;141;suppl:7S-47S.

46. Tran HA, Chunilal SD, Harper PL. An update of consensus guidelines for warfarin reversal. Med J Aust. 2013;198:198-9

47. DeLoughery EP, Lenfesty B, DeLoughery TG. The use of recombinant factor VIIa in warfarin patients with traumatic brain injury: a retrospective case. Blood Coagul Fibrinolysis. 2013;24:317-20

48. Nishijima DK, Dager WE, Schrot RJ, et al. The efficacy of factor VIIa in emergency department patients with warfarin use and traumatic intracranial hemorrhage. Acad Emerg Med. 2010;17:244-51

49. Gresham C, Levine M, Ruha AM. Case files of the medical toxicology fellowship at Banner Good Samaritan Medical Center in Phoenix, AZ: a non-warfarin anticoagulant overdose. J Med Toxicol. 2009;5:242-49.

50. Weitz JI. Blood coagulation and anticoagulant, fibrinolytic, and antiplatelet drugs. In: Goodman & Gilman's The pharmacological basis of therapeutics. Brunton LL (Ed). 12th edition. McGraw Hill Medical. New York. 211;848-76.