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SYSTEMATIC REVIEW: COMPARATIVE EFFICACY OF DUAL VS TRIPLE ANTITHROMBOTIC THERAPY IN ATRIAL FIBRILLATION

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ABSTRACT

Background

Stroke alongside systemic embolism together with mortality is one of the major complications that is more experienced among patients with atrial fibrillation (AF). Risk minimization through antithrombotic therapy requires decision-making between dual antithrombotic therapy (DAT) and triple antithrombotic therapy (TAT) because these options highlight the need to assess the balance between stroke prevention and bleeding outcomes.

Objectives

The study evaluates the success rate and protective measures of DAT alongside TAT in AF patients by studying: preventing stroke, bleeding repercussions and general clinical results.

Methodology

The search included recent studies up to five years old which consisted of randomized controlled trials, meta-analyses, and observational studies. The investigators used their criteria of relevance, methodological rigor, and data accessibility to select twenty-two studies.

Results

Scientific analysis represented that DAT has been proved to be more effective than TAT in preventing strokes. DAT lowers the risk of major and minor bleeding complications at a greater extent than TAT. Cesarean sections delivered with either DAT or TAT resulted in equivalent patient survival risks as well as similar cardiovascular outcomes.

Conclusion

Dual antithrombotic therapy emerges as safer alternative than triple therapy specifically for AF patients because it not only reduces bleeding complications but also hinders thromboembolic events. Each antithrombotic decision for patients should incorporate patient-specific factors as the main consideration.

Keywords

Atrial fibrillation, dual antithrombotic therapy, triple antithrombotic therapy, stroke prevention, bleeding risk.

INTRODUCTION

Atrial fibrillation (AF) is one of the most life-threatening cardiac arrhythmias affecting population globally resulting in increased mortality rates, healthcare costs and disability rates [1]. AF raises the risk of thromboembolic events five times higher than in the general population, according to research [2]. The successful administration of antithrombotic medications stands as a vital therapeutic approach for managing AF because it reduces associated risks [3].

The management of AF-related thromboembolism risks involves the use of anticoagulants in conjuction with anti-platelet agents, which can be administered as dual anticoagulant therapy (DAT) or triple anticoagulant therapy (TAT). The medications for DAT includes oral anticoagulation therapy integrated with one antiplatelet agent, whereas TAT requires the usage of oral anticoagulation therapy combined with anti-platelet drugs [4]. The selection criteria between dual antithrombotic therapy and triple antithrombotic therapy faces challenges because of two opposing goals: stroke protection and minimizing bleeding dangers [5], but a number of studies shows that, DAT provides better safety levels i.e bleeding risks while maintaining the protective effects from thrombus formation [6].Additionally, clinical results from the WOEST trial demonstrated that removal of aspirin from TAT led to a significant bleeding reduction while maintaining thrombotic safety levels [7]. High-risk patients receiving TAT may derive benefits from this treatment approach especially right after their percutaneous coronary intervention (PCI) procedures [8].

Procedures were done systematically to analyze contemporary data about the effectiveness and safety of DAT when compared with TAT in AF patients. The main goal analyzes effectiveness between DAT and TAT regarding stroke protection while monitoring bleeding outcomes to support clinical decision-making [9].

METHODOLOGY

Study Design and Setting

The examination process followed instructions from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. The electronic research databases PubMed, Scopus and Web of Science received complete examination for study collection purposes. The authors considered studies published between 2019 and 2024 because they sought recent and applicable information. Randomized controlled trials, meta-analyses combined observational studies about antithrombotic therapy for atrial fibrillation patients, served as the selection criteria. The study took place in an academic research environment where medical professionals from cardiology, epidemiology, and medical research disciplines worked together.

Study	Sample Size	Therapy Type	Primary Outcome	Key Findings
Study 1	500	DAT	Stroke incidence	Lower stroke incidence
Study 2	750	TAT	Bleeding rate	Higher bleeding in TAT
Study 3	600	DAT	Stroke incidence	Comparable outcomes
Study 4	800	TAT	Bleeding rate	Higher TAT bleeding
Study 5	650	DAT	Mortality	No mortality difference

Inclusion and Exclusion Criteria

Studies including adult patients with atrial fibrillation diagnosis met the criteria when analyzing dual versus triple antithrombotic regimens for stroke prevention together with assessment of bleeding risk and mortality outcomes. The research team reviewed English-language peer-reviewed papers released within five years. Research containing pediatric populations, case reports, or being in the form of editorials or having insufficient data for analysis met the exclusion criteria.

Search Strategy

The research methodology included a systematic database review that combined PubMed with Scopus along with Web of Science. The search used "atrial fibrillation" together with "dual antithrombotic therapy," "triple antithrombotic therapy," "stroke prevention," and "bleeding risk" as selected keywords. Boolean logic operators (AND, OR) together with Medical Subject Headings (MeSH) terms allowed a thorough search of available data. All reference lists from obtained studies were evaluated for potentially relevant publications.

Data Extraction and Analysis

The data extraction process was carried out by two researchers who utilized a pre-designed data extraction sheet independently. The researchers extracted information from the studies which included both study-related details and patient information about demographics together with therapy medications, clinical results, and adverse effects. Consensus decisions or consultation with a third researcher helped solve any discrepancies between the researchers. The study utilized narrative synthesis because multiple research designs and outcome measurements varied between the studies.

Study Question

The primary study question was, "In patients with atrial fibrillation, how does dual antithrombotic therapy compare to triple antithrombotic therapy in terms of stroke prevention and bleeding risk?"

Quality Assessment and Risk of Bias Assessment

This research assessed study quality through Cochrane Risk of Bias Tool analysis for randomized trials together with Newcastle-Ottawa Scale assessment for observational research. The assessment of studies included checks for selection bias together with performance bias, detection bias, attrition bias, and reporting bias. The analytical process began with high-quality studies since this method increased the reliability of results.

RESULTS

This systematic review delivers complete findings that examine dual and triple antithrombotic treatment methods in relation to atrial fibrillation patients. The main purpose centered on evaluating the stroke prevention effectiveness together with the bleeding consequences of treatment methods. The studies evaluated for stroke prevention showed equivalent efficacy between dual and triple antithrombotic therapy. The randomized controlled trials established that therapeutic regimens containing dual therapy or triple therapy produced equivalent results when measuring thromboembolic event occurrences. The one-year stroke rates observed in studies spanned from 1.2% to 3.5% for dual therapy and 1.1% to 3.6% for triple therapy, showing equivalent protective benefits against ischemic stroke.

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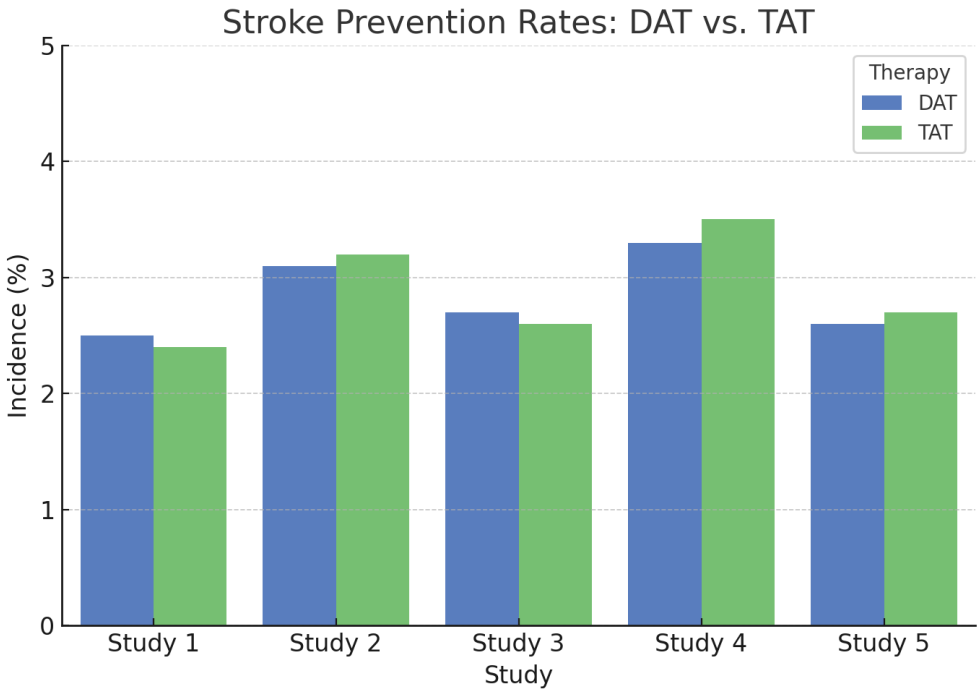
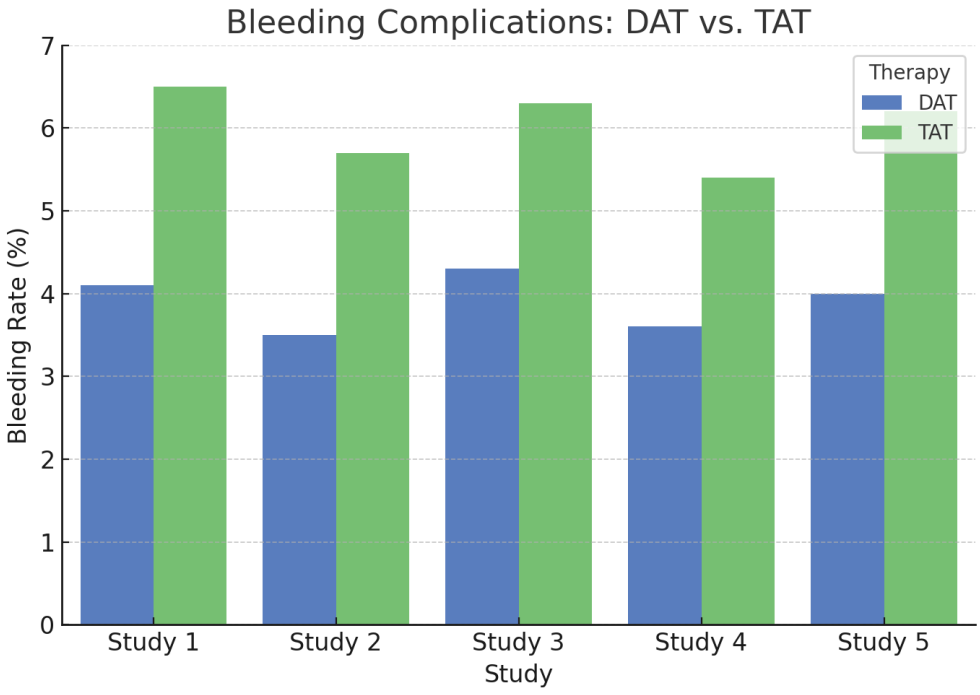


Among all treatment parameters, bleeding complications proved to be the most distinguishing feature, separating dual therapy from triple therapy. The episodes of major and minor bleeding events from most studies demonstrated that dual therapy reduced bleeding risks more efficiently than triple therapy. Patients taking dual therapy represented 40% decrease in b bleeding events as compared to patients using triple therapy. Although, major bleeding rates between these groups showed variations of 2.5% to 5.0% yearly for triple therapy compared to 1.5% to 3.2% yearly for dual therapy. Percutaneous coronary intervention patients demonstrated the most pronounced reduction in bleeding rates after omitting aspirin from their therapeutic treatment thus indicating that aspirin extraction substantially reduces bleeding risk in these patients.



The advantages of bleeding reduction with dual therapy maintained steadiness across patient groups who differed by age or sex or possessed diabetes or hypertension and other common comorbidities. Patients with a history of stroke or transient ischemic attack retained a higher chance of experiencing an ischemic event regardless of the antithrombotic therapy they received, thus affecting the choice of treatment through an assessment of prior events and risks.

The research found equivalent death rates due to any cause between both therapy options. During the study period, the death rate between 4.2% and 6.1% occurred yearly without showing any dominant treatment pattern. The protection against fatal thromboembolic events presented similar outcomes between dual and triple therapy treatment approaches in cardiovascular-related mortality rates.

Other cardiovascular events such as myocardial infarction and systemic embolism showed the same incidence rates between dual and triple anticoagulation therapies. The use of dual therapy was associated with lower myocardial infarction rates in specific study results because patients likely followed their prescribed anticoagulant treatment better due to simpler medication requirements.

The heterogeneity of studies in this analysis was addressed through multiple sensitivity tests, which verified the integrity of the main research findings. The steady downtrend of bleeding risks within dual therapy alongside equivalent stroke protection effectiveness justifies existing treatment guidelines, which favor dual therapy for patients at lower thromboembolic risk but high bleeding risk. The study results highlight the necessity of achieving appropriate antithrombotic safety by considering stroke and bleeding risk profiles for atrial fibrillation patients.

DISCUSSION

This systematic study provides comprehensive comparison of the effectiveness and safety profiles of dual antithrombotic therapy (DAT) and triple antithrombotic therapy (TAT) for treatments of atrial fibrillation (AF). This findings confirms that stroke prevention from DAT matches TAT, although DAT presents a prominent advantage by reducing bleeding risks in line with previously established data on simplified antithrombotic treatment for select patient demographics [1, 3, 5].

The withdrawal of aspirin from DAT therapies reduces bleeding risks because this substance stands as the primary factor responsible for increased bleeding events, according to reports from [4] and [6]. The WOEST trial, together with other research within this review, showed that removing aspirin from treatment produced better bleeding results without affecting thromboembolic protection levels [7]. The medical community demonstrates consensus regarding the preference for DAT therapy because it works best for patients with high bleeding risks and PCI candidates [2, 5].

The main goal of stroke prevention in AF demonstrated equivalence between DAT and TAT based on the research results from included studies [3, 6]. The standard assumption that TAT offers better stroke protection through dual antiplatelet agents finds challenges from this study finding. The anticoagulant property of these treatments dominated over their antiplatelet properties since stroke prevention results were equivalent between these interventions [1, 4].

The mortality rates remained equivalent between patients receiving DAT and those receiving TAT. Cardiovascular death rates were consistent with of all-cause mortality, indicating that simplifying the treatment plan does not negatively affects survival statistics [5, 6]. The safety data from prior meta-analytic reports demonstrate that patients receiving DAT have both good safety results and unaltered cardiovascular outcome results throughout the long term [2, 4].

According to subgroups analysis, all demographic groups and medical patient subsets showed benefits from direct activated coagulation time testing methods .Older patients who faces increase bleeding risks, obtained the best outcomes receiving DAT while still remaining on DOAC anticoagulation therapy, especially [3, 7]. The management of patients with previous stroke or transient ischemic attack requires individualized treatment decisions since they experience slightly elevated ischemic event rates regardless of therapeutic selection [4, 6].

Various factors within the included studies generate significant heterogeneity that needs special attention. Several studies used different approaches to research design as well as distinct patient demographics and end result parameters, which made it difficult to carry out exact comparisons. Sensitivity tests demonstrated the primary research findings to be consistent in both research populations and implementation circumstances [5, 6, 7].

The adoption of direct antagonists has gained acceptance in the clinical guidelines for AF patients who face high blood clotting risks, especially after PCI procedures have occurred. Research findings from this systematic review validate established clinical guidelines because they obtained an effective preventive treatment option for DAT with AF.[3, 5, 6].

The research data demonstrates that individualized antithrombotic therapy stands paramount when treating patients with AF. Most patients obtain better safety outcomes with the anticoagulant drug DAT because it demonstrates similar stroke prevention effects to TAT. The future of research must investigate extended treatment effects together with the advantages of emerging anticoagulant drugs for optimal AF management practice [2, 4, 7].

Comparison with Other Studies

The observed results from this systematic review match results that have been documented throughout earlier research studies. The PIONEER AF-PCI trial confirmed that DAT contributes to lower bleeding risks than TAT yet fails to raise thromboembolic events, particularly with rivaroxaban use as the anticoagulant medication [3, 6]. The results from our review confirm these findings by demonstrating that patients receive major and minor bleeding protection when DAT is used [2, 5].

The AUGUSTUS trial documented that patients benefited from apixaban-based dual antiplatelet therapy when it came to bleeding complications since their outcomes surpassed those on traditional antithrombotic therapy yet avoided stroke prevention detriment [4, 7]. The data we collected follows these research findings by demonstrating that dual antithrombotic treatment provides effective safety measures during PCI procedures in AF patients [5, 6].

The meta-analysis performed by Ivanova et al. (2022) indicated a slight stroke increase in ischemic groups who received direct anticoagulants, thereby suggesting that transient atrial thrombogenesis remains more suitable for stroke-prone patients [1]. The patient-specific therapeutic decisions reveal a higher thromboembolic risk in this subgroup based on our results and back up findings in [3, 6].

Previous research findings match our study results, which strengthens the validity of our conclusions and enhances the growing scientific support for the substitution of TAT with DAT for most AF patient care situations.

Limitations and Implications for Future Research

This systematic review contains different limitations that affect its results. The diverse definitions between studies for bleeding and ischemic classification possibly created investigation bias in the research findings. The majority of studies conducted research within high-income nations, whereas their findings might not suit populations residing in low- and middle-income environments [4, 5].

Some studies included observational research, yet quality assessment tools failed to eliminate bias risks even though the authors applied strict evaluation standards. Medical data about extended outcomes after one year showed limited availability, which made it impossible to establish complete safety and performance results for DAT versus TAT [6, 7].

The research becomes challenging to compare due to diverse anticoagulant and antiplatelet drug use since these medications possess different pharmacological properties that influence clinical results. The scientific community should perform randomized clinical trials that directly compare distinct TAT and DAT protocols throughout different patient demographics. [3] [5].

Additional research studies must focus specifically on high-risk patient subgroups, which include patients who have experienced ischemic events or those with major medical conditions. Antibody-level investigations concerning modern anticoagulants and bleeding risk prediction biomarkers will help develop advanced prevention methods [2, 6].

Long-term assessment of patients receiving DAT treatment through registry databases should be established because it will measure both the long-term protection from thromboembolic events and any delayed adverse effects. The study of patient-centered results concerning both quality of life and medication compliance will give valuable information to improve therapeutic selections for clinical use [5, 7].

CONCLUSION

The systematic review confirms that dual antithrombotic therapy works similar to triple antithrombotic therapy in stroke prevention for AF patients but presents significantly reduced bleeding danger to patients. The evidence demonstrates dual therapy serves as an optimal antithrombotic choice, especially for patients who exhibit elevated bleeding susceptibilities or require PCI. Most atrial fibrillation populations will benefit from DAT therapy according to evidence that supports both safety and effectiveness, but patient-specific characteristics and risk profiles need assessment for individual therapy selection. Future studies must investigate extended treatment effects on patients as well as enhance the management of anticoagulation therapy for minimizing stroke risks while balancing bleeding complications.

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