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REVIEW

Pharmacological prophylaxis of choice in venous thromboembolic disease in major orthopedic surgery: aspirin vs LMWH and other anticoagulants

Profilaxis farmacológica de elección en la enfermedad tromboembólica venosa en cirugía ortopédica mayor: aspirina vs HBPM y otros anticoagulantes

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ABSTRACT

Introduction: venous thromboembolic disease, deep vein thrombosis and pulmonary embolism are important causes of long-term morbidity and mortality, and are preventable. The risk of VTE is established in patients who will undergo major orthopedic surgery, given by factors such as the duration of surgery and reduced perioperative mobility. Studies show that without pharmacological thrombo prophylaxis, VTE rates are significant. For this reason, it is essential to establish an effective thrombo prophylaxis protocol to prevent VTE without significantly increasing the risk of bleeding. There is no evidence with strong results regarding the drug of choice for thrombo prophylaxis, but currently meta-analyses and systematic reviews establish aspirin as an effective, accessible and low-cost option, with low risk of postoperative bleeding in low-risk patients. Aspirin is an easy-to-administer drug, does not require blood monitoring and is well tolerated, with an excellent safety profile. However, there are some theories that newer oral agents may have higher risks of bleeding, such as major hemorrhages and complications from postsurgical wounds. Therefore, there is still considerable debate about which agents should be preferred in terms of effectiveness and lower risk of bleeding.
Objectives: to establish the drug of choice for thromboprophylaxis in VTE in patients undergoing major orthopedic surgery.
Method: a bibliographic search and analysis was carried out, only 15 articles were suitable for the research, articles from international databases such as PubMed, Scopus and Cinahl were used.
Results: there were no significant differences in the risk of VTE (OR = 0,93; 95 % CI: 0,69-1,26; p = 0,64), DVT (OR = 0,72; 95 % CI: 0,43-1,20; p = 0,21) or PTE (OR = 1,13; 95 % CI: 0,86-1,49; p = 0,38) between the groups that received LMWH prophylaxis and those that received aspirin. Nor were significant differences found in mortality (p = 0,30), bleeding (p = 0,22), or surgical wound complications (p = 0,85) between the two groups.
Conclusions: aspirin is at least as safe and effective a drug for thromboprophylaxis as OACs and LMWH.

Keywords: Orthopedic Surgery; Venous Thromboembolism; Prophylaxis; Arthroplasty Replacement Hip/Knee; Aspirin; Heparin Low-Molecular-Weigh.

RESUMEN

Introducción: la enfermedad tromboembólica venosa, trombosis venosa profunda y embolia pulmonar son causas importantes de morbimortalidad a largo plazo, siendo una causa prevenible. El riesgo de ETV está establecido en pacientes que serán sometidos a cirugías ortopédicas mayores, dado por factores como la duración de la cirugía y la movilidad perioperatoria reducida. Los estudios demuestran que sin trombo profilaxis

farmacológica, las tasas de ETV son significativas. Por este motivo, es indispensable protocolizar una trombo profilaxis eficaz para prevenir la ETV sin aumentar significativamente el riesgo de sangrado. No hay evidencia con resultados fuertes respecto al fármaco de elección para la trombo profilaxis, pero actualmente los metaanálisis y revisiones sistemáticas establecen como una opción efectiva, accesible y de bajo costo, con bajo riesgo de sangrado postoperatorio en paciente de bajo riesgo a la aspirina. La aspirina es un fármaco de fácil administración, no requiere monitoreo de sangre y es bien tolerada, con un excelente perfil de seguridad. Sin embargo, existen algunas teorías de que los agentes orales más nuevos pueden tener mayores riesgos de sangrado, como hemorragias importantes y complicaciones de heridas postquirúrgicas. Por lo tanto, sigue habiendo un debate considerable sobre qué agentes deberían preferirse en cuanto efectividad y menor riesgo de sangrado.
Objetivos: establecer el fármaco de elección para tromboprofilaxis en ETV en pacientes sometidos a cirugía ortopédica mayor.
Método: se realizó una búsqueda bibliográfica y análisis de la misma, solo fueron aptos para la investigación 15 artículos, se utilizaron artículos provenientes de bases de datos internacionales como PubMed, Scopus y Cinahl.
Resultados: no hubo diferencias significativas en el riesgo del TEV (OR = 0,93; IC 95 %: 0,69-1,26; p = 0,64), TVP (OR = 0,72; IC 95 %: 0,43-1,20; p = 0,21) ni TEP (OR = 1,13; IC 95 %: 0,86-1,49; p = 0,38) entre los grupos que recibieron profilaxis con HBPM y los que recibieron aspirina. Tampoco se hallaron diferencias significativas en la mortalidad (p = 0,30), sangrado (p = 0,22), ni complicaciones en la herida quirúrgica (p = 0,85) entre ambos grupos.
Conclusiones: la aspirina es un fármaco al menos tan seguro y eficaz en la tromboprofilaxis como los son los ACOs y las HBPM.

Palabras clave: Cirugía Ortopédica; Tromboembolia Venosa; Profilaxis; Artroplastia de Cadera/Rodilla; Aspirina; Heparina de Bajo Peso Molecular.

INTRODUCTION

Venous thromboembolic disease (VTE), which includes deep vein thrombosis (DVT) and pulmonary embolism (PE), is one of the main postoperative complications in patients undergoing major orthopedic surgery, such as total hip replacement (THR) and total knee replacement (TKR). VTE not only carries a significant risk of morbidity and mortality but also represents a major burden on healthcare systems due to the cost of treatment and prolonged hospital stays.[1,2]

For decades, various anticoagulant drugs, notably low molecular weight heparins (LMWHs) and direct oral anticoagulants (DOACs) have been used for PTE prophylaxis. However, in recent years, aspirin has become a more economical, accessible, and easy-to-administer alternative. Unlike other anticoagulants, aspirin does not require rigorous monitoring, has a favorable safety profile, and various international clinical guidelines support its use.[3,4,5]

Despite these theoretical benefits, the debate about its effectiveness compared to other agents continues. While some studies maintain that aspirin is as effective as enoxaparin and other anticoagulants in preventing thromboembolic events, others indicate that its efficacy may be lower, especially in patients with high-risk factors. In addition, issues such as optimal dosage, duration of treatment, and combination with mechanical methods of prophylaxis still raise questions among healthcare professionals.[6,7]

In this context, the present study focuses on conducting a qualitative systematic review of the efficacy and safety of aspirin versus LMWH and other anticoagulants in the prophylaxis of VTE in patients undergoing major orthopedic surgery. We analyze recent articles to compare the primary outcomes (incidence of VTE, DVT, PTE) and secondary outcomes (bleeding events, wound complications, mortality) to provide updated evidence to optimize clinical decision-making.[8,9]

Given the growing interest in aspirin's cost-effectiveness, it is essential to understand its proper scope and limitations in this clinical context. This review aims to contribute to the design of safer, more effective, and personalized protocols that prioritize preventing serious events and reducing unnecessary risks.[10,11,12]

Is aspirin an effective and safe alternative to low molecular weight heparin and other anticoagulants in the prophylaxis of venous thromboembolic disease in patients undergoing major orthopedic surgery?

Objective: to evaluate the efficacy and safety of aspirin compared to other anticoagulants such as low molecular weight heparin and oral anticoagulants in preventing venous thromboembolic disease in patients undergoing major orthopedic surgery.

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METHOD

This research study conducted a qualitative systematic review using case reports of patients with venous thromboembolic disease (VTE) in the context of major orthopedic surgery.

Search strategy

An exhaustive literature search was conducted on evidence-based medicine platforms: PubMed, Jamal, and Elsevier, using MESH terms (orthopedic surgery.

[MeSH Terms]) AND (venous thromboembolism [MeSH Terms]) AND (prophylaxis [MeSH Terms]). ((“Arthroplasty, Replacement, Hip/mortality”[Mesh] OR

“Arthroplasty, Replacement, Hip/statistics, and numerical data“[Mesh])) AND ‘Aspirin’[Mesh] and ((”Arthroplasty, Replacement, Knee”[Mesh]) OR ‘Arthroplasty, Replacement, Hip’[Mesh]) AND ‘Heparin, Low-Molecular-Weight’[Mesh]) AND ‘Aspirin’[Mesh].

In addition, the Boolean operators “AND” and “OR” were used as filters: publication date “5 years,” of which only those considered significant were selected, their titles and abstracts were examined, and then saved and downloaded to the Zotero program. The search methodology identified 31 articles relevant to the research published between 2019 and 2023.

Study design

A qualitative systematic review was conducted using systematic reviews, meta-analyses, bibliographic reviews, retrospective multicenter studies XX, and randomized trials.

Study population

The study population selected for this research consisted of patients undergoing major orthopedic surgery, with a mean age of xx, who underwent TKA or TKR and received pharmacological thromboprophylaxis.

Inclusion criteria

The inclusion criteria for the articles analyzed in the systematic reviews and meta-analyses included:

- Indication for major orthopedic surgery.
- Adults.
- Both sexes.
- A retrospective study was conducted for this work, using variables with or without comorbidities.

Exclusion criteria

- Patients undergoing minor orthopedic surgery.
- Patients undergoing other types of non-orthopedic surgery.
- Pediatric patients.

Scope of the study

University

Sample selection and size

Multiple articles were selected by analyzing their titles and abstracts, and those significant for this research study were saved and downloaded using the Zotero program.

Operational description of the variables

As this is a systematic review study, the variables established are qualitative, as the risk factors for developing DVT and PTE were analyzed.

- Dependent variable: venous thromboembolic disease, deep vein thrombosis, pulmonary thromboembolism.
- Independent variable: major orthopedic surgery, risk factors.

Data analysis plan

The data were systematically organized in a table by reviewing various scientific articles corresponding to the topic under analysis. Articles that met the requirements established in this study were selected and analyzed. To this end, a table was created describing the authors of each article and detailing the statistical results for subsequent analysis and the establishment of conclusions.

Data collection instruments

A bibliographic search was conducted on Pubmed, Elsevier, and Jama platforms.

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Table 1. Theoretical foundations and results

	Theoretical foundations		
	Title	**Methods**	**Results**
1	"Effect of aspirin versus enoxaparin on symptomatic venous thromboembolism in patients undergoing hip or knee arthroplasty. The CRISTAL randomized trial." Verinder S. et al JAMA. 2022;328(8):719-727. doi:10.1001/jama.2022.13416. https://jamanetwork.com/journals/jama/articleabstract/2795528	A total of 9,711 eligible patients (5,675 in the aspirin group and 4,036 in the enoxaparin group) were enrolled between April 20, 2019, and December 18, 2020. Final follow-up occurred on August 14, 2021.	The symptomatic VTE rate in the first 90 days was 3,45 % in the aspirin group and 1,82 % in the enoxaparin group (estimated difference, 1,97 %; 95 % CI, 0,54 %–3,41 %). This was significantly higher for enoxaparin (P = 0,007). Of 6 secondary outcomes (readmission, reoperation, major bleeding events, and mortality within 90 days; reoperation within 6 months after surgery; and adherence rates as assessed by audits), none were significantly better in the enoxaparin group enoxaparin compared with the aspirin group.
2	Risk of venous thromboembolism in thromboprophylaxis between aspirin and low molecular weight heparins after total hip arthroplasty or total knee arthroplasty. Systematic review and meta-analysis Jorge H. Núñez et al. 2023 Elsevier https://drive.google.com/file/d/1LPy7SkXynrOPnzevsWqXZYFcuWWAQbQr/view	Three groups of studies were evaluated: 14 studies evaluated the incidence of VTE, while 12 studies evaluated the incidence of DVT and 13 studies evaluated the incidence of PTE..	Three groups of studies were evaluated: 14 studies evaluated the incidence of VTE, while 12 studies evaluated the incidence of DVT and 13 studies evaluated the incidence of PTE..
3	Prevention of venous thromboembolism with aspirin after knee surgery: a systematic review and meta-analysis Marrannes S. et al. 2021 PubMed https://pubmed.ncbi.nlm.nih.gov/34760289/	Thirty-two studies (9 RCTs and 23 observational studies) were included to compare the efficacy of aspirin prophylaxis after ATR with LMWH, vitamin K antagonists, and factor Xa inhibitors.	No significant differences were found in the efficacy of VTE prevention between aspirin, LMWH, and warfarin. Factor Xa inhibitors were more effective, but more bleeding complications were reported. As the evidence is limited and of low quality with substantial heterogeneity, further research with high-quality trials with adequate statistical power is needed..
4	Aspirin versus enoxaparin for the initial prevention of venous thromboembolism after elective hip or knee arthroplasty: a systematic review and meta-analysis. Juan E Farey et al. 2020 PubMed https://pubmed.ncbi.nlm.nih.gov/32631716/	Four trials involving 1507 participants who underwent elective lower limb arthroplasty were included..	There was no significant difference in overall VTE rates when comparing aspirin versus enoxaparin (RR, 0,84; 95 % CI: 0,41 to 1,75; p = 0,65). One study reported mortality and no events were recorded. There were no significant differences in rates of all major bleeding events (RR, 0,84; 95 % CI: 0,08 to 9,16) or minor (RR, 0,77; 95 % CI: 0,34 to 1,72) bleeding events between the aspirin and enoxaparin groups. The included trials demonstrated a significant risk of bias and low to very low quality of evidence for the primary outcomes and moderate to very low quality for the secondary outcomes.
5	Comparison between the use of direct oral anticoagulants and aspirin for the risk of thromboembolic complications in patients undergoing total knee and hip arthroplasty: a systematic review and meta-analysis JY Cai et al. 2021 PubMed https://pubmed.ncbi.nlm.nih.gov/34730204/	A total of 117 full-text studies were evaluated. A total of 161,463 patients undergoing total joint arthroplasty with a mean age of 66,2 ± 5,0 years were identified in 14 studies.	Increased risk of venous thromboembolism (OR: 1,56, 95 % CI 1,21–2,01), pulmonary embolism (OR: 1,63, 95 % CI: 1,31–2,04) and overall mortality (OR: 1,35, 95 % CI 1,04–1,74) for patients receiving aspirin compared with direct oral anticoagulants. There were also mild bleeding complications for patients receiving direct oral anticoagulants compared with aspirin. This finding may have implications for the development of best practice guidelines to reduce the risk of VTE complications in patients undergoing CTA or ATR.

6	Comparison of efficacy and safety between aspirin and oral anticoagulants for the prophylaxis of venous thromboembolism after major orthopedic surgery: a meta-analysis of randomized clinical trials. Xing Yue Zheng, et al 2024 PubMed https://pubmed.ncbi.nlm.nih.gov/38259284/	Twelve randomized clinical trials (RCTs) were included, with 5,088 participants, including 2,540 participants receiving aspirin, 2,205 participants receiving rivaroxaban, and 323 participants receiving warfarin.	Aspirin was found to be less effective than oral anticoagulants in thromboprophylaxis after major orthopedic surgery (RR = 1,206; 95 % CI: 1,053-1,383). In terms of safety events, aspirin showed no significant differences in major bleeding (RR = 0,952, 95 % CI 0,499-1,815), all-cause mortality (RR = 1,208, 95 % CI 0,459-3,177), and wound-related events. (RR = 0,618, 95 % CI 0,333-1,145) compared with oral anticoagulants, and aspirin was associated with a reduction in the risk of minor bleeding events (RR = 0,685, 95 % CI 0,552-0,850) and total bleeding (RR = 0,726, 95 % CI 0,590-0,892).

RESULTS

The selected articles discuss the efficacy of aspirin as a prophylactic agent for venous thromboembolic disease as the primary outcome. Some results indicate that aspirin is inferior to other drugs, while others find no significant differences, as follows:

Articles 1, 5, and 6 in table 4 show negative results for aspirin as a prophylactic agent for VTE:

Article 1 reveals that symptomatic VTE occurred within 90 days in 187 of 5416 patients (3,45 %) in the aspirin group and 69 of 3,787 patients (1,82 %) in the enoxaparin group (estimated difference, 1,97 %; 95 % CI, 0,54 %-3,41 %), meaning that aspirin did not meet the non-inferiority criterion and was significantly superior to enoxaparin (P = 0,007).

In article 5, 14 studies identified 161 463 patients undergoing total arthroplasty with a mean age of 66,2 ± 5,0 years. There were increased risks of venous thromboembolism (OR: 1,56, 95 % CI: 1,21-2,01), pulmonary embolism (OR: 1,63, 95 % CI: 1,31-2,04), and overall mortality (OR: 1,35, 95 % CI: 1,04-1,74) for patients receiving aspirin compared with direct oral anticoagulants.

In article 6, 12 randomized clinical trials (RCTs) were included, involving 5088 patients. Of these, 2540 participants were in the aspirin group, 2205 participants were in the rivaroxaban group, and 323 participants were in the warfarin group. Aspirin was found to be less effective than oral anticoagulants in thromboprophylaxis after major orthopedic surgery (RR = 1206; 95 % CI: 1053-1383).

Articles 2, 3, and 4 conclude that there is no consistent difference between the use of aspirin in VTE prophylaxis and other anticoagulants: Article 2 reviews 39 studies, of which 14 studies evaluated the incidence of VTE, while 12 studies evaluated the incidence of DVT and 13 studies evaluated the incidence of PTE, finding no significant differences in the risk of VTE (OR = 0,93; 95 % CI: 0,69-1,26; p = 0,64), DVT (OR = 0,72; 95 % CI: 0,43-1,20; p = 0,21), or PTE (OR = 1,13; 95 % CI: 0,86-1,49; p = 0,38) after a TCA and/or ATR between aspirin and LMWH. Heterogeneity was found with I2 = 89 %, p < 0,001; I2 = 86 %, p < 0,001, and I2 = 15 %, p = 0,30, respectively.

Article 3 argues that, although lower DVT rates were observed with factor Xa inhibitors compared with aspirin, this result was insignificant (OR 1,39; 95 % CI: 0,98-1,98; P = 0,06).

Article 4 reviews four trials involving 1,507 participants, in which total VTE rates were 50 of 494 (10,1 %) in the aspirin group and 66 of 1103 (6,5 %) in the enoxaparin group. There was no significant difference in the overall VTE rate when comparing aspirin with enoxaparin for primary VTE chemoprophylaxis in lower limb arthroplasty (RR, 0,84; 95 % CI: 0,41 to 1,75; p = 0,65).

As a secondary outcome, we must evaluate the complication of bleeding events due to the use of the drugs in question.

Most of the following articles in the table argue that there are no significant differences in the increased risk of bleeding when using aspirin as prophylaxis: Article 1 reports major bleeding events in 17 of 5401 patients (0,31 %) in the aspirin group and 15 of 3779 patients (0,40 %) in the enoxaparin group (estimated difference, −0,05 %; 95 % CI, −0,25 % to 0,04 %). Article 2 found that there were no significant differences in mortality (OR = 1,10; 95 % CI: 0,92-1,32; p = 0,30) or increased risk of bleeding (OR = 0,70; 95 % CI: 0,39-1,25; p = 0,22), or a higher risk of surgical wound complications (OR = 0,95; 95 % CI: 0,54-1,65; p = 0,85) after a TKA and/or TKR between aspirin and LMWH.

Article 3 includes a review of twenty-two studies, most of which found no significant differences in bleeding events between aspirin and comparators. However, three reported an increase in bleeding events with LMWH compared to aspirin, and three studies reported increased blood loss or higher transfusion rates with factor Xa inhibitors.

Article 4 analyzes major and minor bleeding events, finding no significant differences in the rates of all major bleeding events (RR, 0,84; 95 % CI: 0,08 to 9,16) or minor bleeding events (RR, 0,77; 95 % CI: 0,34 to 1,72) between the aspirin and enoxaparin groups.

In article 5, we observe that the risks of bleeding complications (OR: 0,89, 95 % CI: 0,67-1,18) were insignificant.

Article 6 gives aspirin a point in its favor, compared to oral anticoagulants, associating it with a reduction in the risk of minor bleeding events (RR = 0,685, 95 % CI: 0,552-0,850) and total bleeding (RR = 0,726, 95 % CI: 0,590-0,892).

DISCUSSION

VTE is the most common cause of postoperative hospital death, and its complications involve a significant amount of healthcare resources.[13] Aspirin is widely available, inexpensive, does not require monitoring, and is associated with a lower risk of bleeding than other anticoagulants.[14]

The current study found no significant differences between aspirin and LMWH in reducing VTE events, such as PTE and DVT, in patients undergoing major orthopedic surgery, nor in reducing mortality, bleeding events, and wound complications between aspirin and LMWH.

Numerous studies show aspirin is as safe and effective in DVT prophylaxis as OACs and LMWH. Aspirin is well tolerated, easy to administer, and cheaper than other available drugs. Thus, it may become the most widely used drug therapy for thromboprophylaxis in the coming years.

The PEP study [15] included 17 000 patients undergoing hip and knee surgery who were assigned 160 mg of aspirin or placebo per day for 35 days starting before the operation. Based on this evidence, various clinical guidelines[16,17,18] recommend aspirin as one of the pharmacological options for thromboprophylaxis. Thanks to these guidelines, aspirin's popularity is increasing.

It is essential to clarify the distinction between hip and knee patients, as rehabilitation after knee surgery involves prolonged periods of immobilization, limited ambulation, and weight-bearing restrictions. This clarification is necessary because most of the VTE event rates between the enoxaparin and aspirin groups were due to DVT events below the knee. DVT below the knee represents a clinically less significant form of VTE compared to DVT above the knee or pulmonary embolism.

The CRISTAL study, the largest RCT comparing VTE between aspirin and LMWH after hip and knee arthroplasty, published in 2022, found that among patients who underwent TKA and/or TKR, aspirin compared with enoxaparin had a higher rate of symptomatic VTE within the first 90 days (OR: 1,97; 95 % CI: 0,54-3,41, p = 0,007). However, one of its limitations is that the main difference in the incidence of symptomatic VTE is related to the rate of DVT below the knee, with no difference in the rate of DVT above the knee or in the rate of PTE.[19,20,21]

Another extensive comparative study showed that patients who underwent RTA benefited more from the use of other anticoagulants (HBPM: OR = 0,47; factor Xa inhibitors: OR = 0,50; and fondaparinux: OR = 0,32) than from aspirin at a thromboprophylaxis level,[22] but more bleeding events were reported in these patients. This study concluded that the choice of pharmacological prophylaxis in VTE should be based on a risk/benefit balance for each drug.

Regarding secondary outcomes (risk of mortality, bleeding events, and wound complications), no significant differences were found between aspirin and other anticoagulants.[23] Yim et al.[24] in a population-based epidemiological study of 261 260 ATR and 45 652 ATC, found that patients who took aspirin as a thromboprophylaxis agent did not have a higher risk of blood transfusion compared to other anticoagulants (HBPM OR = 1,6, rivaroxaban OR = 1,46, and fondaparinux OR = 1,25).

In terms of safety, there was no statistically significant difference between aspirin and ACOs regarding significant bleeding, mortality, or wound-related problems ($p > 0,05$). Aspirin is associated with fewer minor bleeding events and total bleeding events. Several large-scale observational cohort studies have shown that the risk of bleeding with postoperative aspirin use in patients with ATR or ATC is negligible, encouraging its use.[25] Aspirin is traditionally recognized as the drug with the lowest rate of bleeding complications in surgical patients.[26]

Lindquist et al.[27] also reported increased bleeding with factor Xa inhibitors compared to aspirin and LMWH, and a meta-analysis by Venker et al. reported a higher risk of bleeding with factor Xa inhibitors compared to LMWH.

These large studies have limitations. They combine patients with diverse VTE risk profiles, thus introducing considerable bias that cannot be explained in the analysis.

Regarding aspirin dosage, recent studies have shown that low-dose aspirin is as effective as high-dose aspirin in preventing VTE (0,6 % vs. 1,3 %, p = 0,62).[28] In the study by Merkow et al.[29], patients with total knee arthroplasty had a higher incidence of VTE with high-dose aspirin (325 mg twice daily) than in the low-dose aspirin group (81 mg twice daily) (1,41 % vs. 0,23 %, $p < 0,001$). Both studies support the view that low-dose aspirin would be the most appropriate option. In addition, combining its use with mechanical thromboprophylaxis proved more beneficial.

This is consistent with a review by Azboy et al., which found that low-dose aspirin was as effective as high-dose aspirin for preventing VTE after major orthopedic surgery.[30]

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Another finding was that aspirin is less effective for less than two weeks. The ideal duration of prophylaxis after orthopedic surgery is still unclear. In a study by Mula et al., the approximate time to symptomatic PE after orthopedic surgery was nine days.[31] Given the low cost of aspirin, future research should compare the effectiveness of different durations of prophylaxis and determine the cost-effectiveness of extending prophylaxis to six weeks

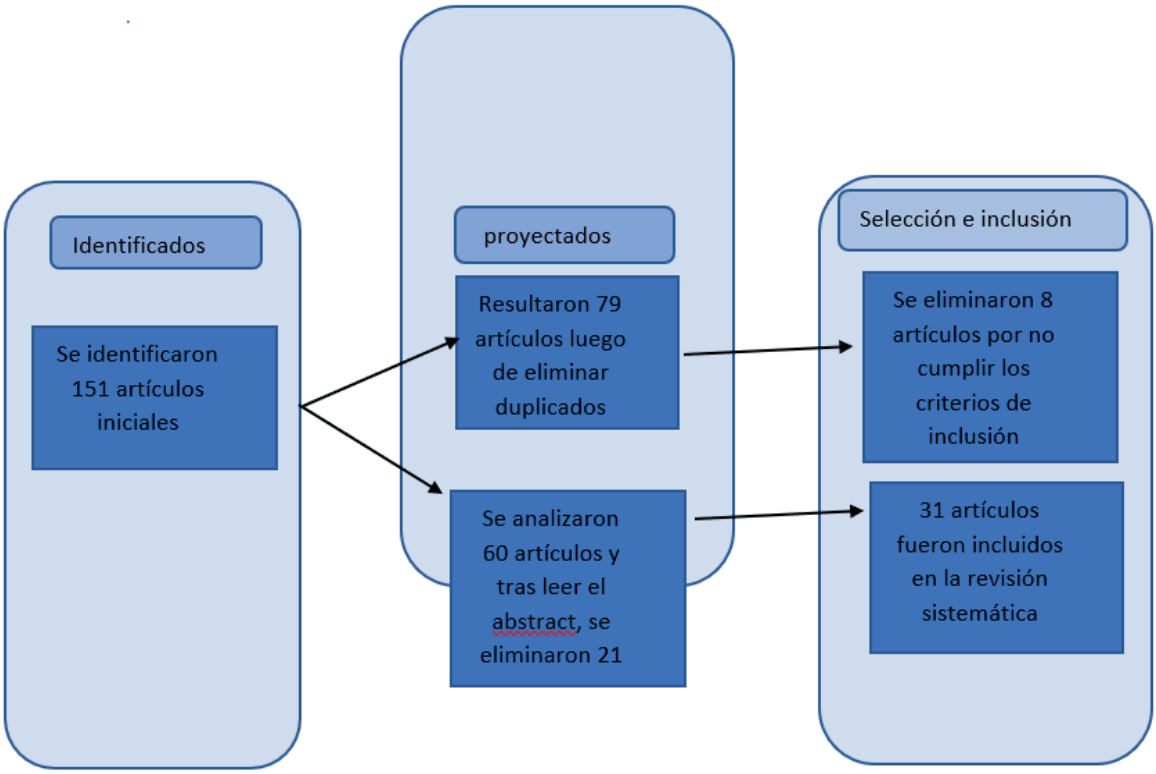

Figure 1. Article selection diagram

CONCLUSIONS

Current evidence suggests no statistically significant difference exists between the effectiveness of aspirin and LMWH or warfarin for the prevention of venous thromboembolism after major orthopedic surgery. Ideally, future research should include large, well-powered RCTs focused on each type of surgery, seeking the safest and most effective dosage for thromboprophylaxis with aspirin and working on protocols to stratify risk in each patient.

Ultimately, the choice of prophylaxis for VTE should be a balance between efficacy and safety individualized for each patient based on their risk of developing a thromboembolic event. VTE can occur even with the use of the most potent anticoagulant agents. Therefore, as indicated by Lieberman et al., future studies should aim to optimize risk stratification, considering it the key to selecting the appropriate prophylactic regimen.

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FINANCING

None.

CONFLICT OF INTEREST

Authors declare that there is no conflict of interest.

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