PICO SEARCH ASSIGNMENT WORKSHEET

Brief description of patient problem/setting (summarize the case very briefly)

The patient is a 51-year-old, Spanish-speaking male, post-operative day (POD) 2 from a robotic-assisted partial gastrectomy. His past medical history is significant for Type 2 diabetes mellitus, hyperlipidemia, and morbid obesity. The procedure was complicated by an iatrogenic liver laceration. Post-operatively, a series of three blood tests has revealed a progressive decrease in platelet count: 140k, followed by 90k, and most recently 70k. It was later noted that the patient had been on Heparin prior to the surgery, leading the treatment team to suspect Heparin-induced thrombocytopenia (HIT) as the underlying cause. Aside from this hematological concern, the patient is recovering well. He has been afebrile, with no shortness of breath or signs of surgical site infection. He is compliant with his incentive spirometer use and the stage 1 bariatric diet. The primary concern at this time is the patient's risk for deep vein thrombosis (DVT), as his ambulation is currently limited. While he was initially placed on Heparin for DVT prophylaxis, the suspicion of HIT has prompted a re-evaluation of his anticoagulation strategy. The team is now deciding between alternative agents, including Apixaban, Aspirin (ASA), or Argatroban.

Search question: Clearly state the question (including outcomes or criteria to be tracked)

In an adult postoperative patient unable to take Heparin for DVT prophylaxis, does the use of ASA compared to anticoagulants like Argatroban or Apixaban result in comparable rates of venous thromboembolism and hemorrhagic complications?

Question type: What kind of question is this?

☐Prevalence	☐Screening	☐Diagnosis
☐Prognosis	☐Treatment	☐Harm

Assuming that the highest level of evidence to answer your question will be meta-analysis or systematic review, what other types of study might you include if these are not available (or if there is a much more current study of another type)? Please explain your choices.

If meta-analyses or systematic reviews are unavailable, other types of studies I may consider include randomized controlled trials (RCTs), as these provide the highest level of primary evidence by minimizing bias, which allows for the most reliable comparison between aspirin (ASA) and alternative anticoagulants. I would also consider prospective cohort studies, retrospective cohort studies, and case series. Prospective studies can follow patients with suspected HIT over time, comparing outcomes between different treatment plans to determine their effectiveness and safety. Given that HIT is a relatively rare condition, retrospective cohort studies and case series are particularly valuable, as they can help identify associations and key clinical features that guide treatment plans when larger trials are not practical.

PICO search terms:

P	I	C	O
Heparin-induced thrombocytopenia	Aspirin	Argatroban	Venous thromboembolism
HIT	ASA	Apixaban	DVT

Postoperative	Antiplatelet agent	Direct oral anticoagulants	Pulmonary embolism
Post-surgical	Acetylsalicylic acid	DOAC	Bleeding
Surgical patients		Direct thrombin inhibitors	Hemorrhage
Bariatric		Non-heparin anticoagulants	thrombosis
Adult			Post-operative complications
Morbidly obese			

Search tools and strategy used:

Please indicate what databases/tools you used, provide a list of the terms you searched together in each tool, and how many articles were returned using those terms and filters. Explain how you narrowed your choices to the few selected articles. For example, if your search returned 25 articles among the several databases used, what was the process used to determine which four articles to use?

PubMed

PICO search terms: "postoperative" AND "DVT prophylaxis" AND "Aspirin" AND "anticoagulants" – 120 results

Filters applied:

Publication date: published within 5 or 10 year – 43 results

Text availability: abstract

Article type: case reports, clinical study, clinical trial, comparative study, meta-analysis, RCTs, review, systemic review – 14 results

Language: English – 14 results

Other: MEDLINE – 11 results

Of the 11 articles, I selected articles based on their titles, which indicated a direct comparison between aspirin (ASA) and oral anticoagulants for postoperative DVT prophylaxis. The remaining articles were excluded because they compared aspirin to heparin. Given that my patient was suspected to have Heparin-induced thrombocytopenia (HIT), heparin was contraindicated and therefore could not be a comparison.

ScienceDirect Journals

PICO search terms: "Postoperative state" AND "antiplatelet agent" AND "Anticoagulant therapy" OR "morbid obesity" OR "Venous Thrombosis" – 61 results

Filters applied

Publication date: published within 5 years – 24 results

Of the 24 articles reviewed, I selected those that evaluated the use of aspirin (ASA) and oral anticoagulants for venous thromboembolism (VTE) prophylaxis in patients with morbid obesity, as this aligned with my patient's clinical characteristics. Additionally, I prioritized studies that provided direct comparisons between these two intervention options

Results found:

Identify at least 3 articles (or other appropriate reputable sources) that answer your specific question with the highest available level of evidence (you will probably need to look at more than 3 articles to get the 3 most focused and highest-level articles to address your question). Please make sure that they are Medline indexed.

Article 1

Citation:

Hong, Z., Su, Y., Zhang, L., & Luo, H. (2025). Aspirin Is as Effective and Safe as Oral Anticoagulants for Venous Thromboembolism Prophylaxis After Joint Arthroplasty: A Systematic Review and Meta-Analysis of Randomized Clinical Trials. *The Journal of bone and joint surgery. American volume*, *107*(7), 760–770. https://doi.org/10.2106/JBJS.24.00946

Type of article: Systematic review and meta-analysis of randomized controlled trials

Abstract:

Background: Joint arthroplasty effectively treats osteoarthritis, providing pain relief and improving function, but postoperative venous thromboembolism (VTE) remains a common complication. This study therefore assessed the effectiveness and safety of aspirin compared with oral anticoagulants (OACs) for VTE prophylaxis after joint arthroplasty.

Methods: A systematic review and meta-analysis was performed by searching PubMed, Embase, the Web of Science, and the Cochrane Library for randomized controlled trials (RCTs) up to May 14, 2024, that compared the effect of aspirin versus OACs on VTE prophylaxis in adults undergoing joint arthroplasty. Data extraction followed the PRISMA guidelines. Two independent researchers conducted the literature searches and data extraction. A random-effects model was used to estimate effects. The primary outcome was the incidence of VTE, including deep vein thrombosis (DVT) and pulmonary embolism (PE); secondary outcomes included bleeding, wound complications, and mortality.

Results: The meta-analysis included 11 RCTs with a total of 4,717 participants (55.1% female) from several continents. The relative risk (RR) of VTE following joint arthroplasty was 1.11 (95% confidence interval [CI], 0.93 to 1.32) for aspirin compared with OACs. Similar results were observed for DVT (RR, 1.12; 95% CI, 0.90 to 1.40) and PE (RR, 1.18; 95% CI, 0.51 to 2.71). There were no significant differences in the risks of bleeding, wound complications, or mortality between patients receiving aspirin and those receiving OACs. Subgroup analyses considering factors such as study region, type of joint surgery, type of VTE detection, year of publication, use of mechanical VTE prophylaxis, aspirin dose, type of OAC comparator, study quality, and funding also found no significant differences in VTE incidence between aspirin and OACs. The overall quality of evidence for VTE and DVT outcomes was high.

Conclusions: Based on high-quality evidence from RCTs, aspirin is as effective and safe as OACs in preventing VTE, including DVT and PE, after joint arthroplasty, without increasing complications.

Key findings:

- Meta-analysis found no significant difference in the rates of venous thromboembolism, deep vein thrombosis or pulmonary embolism between patients on aspirin and those on other anticoagulants after hip or knee replacement surgery.
- Study confirmed that ASA did not lead to higher risk of complications such as bleeding, wound issues, or death compared to OACs.
- The authors also performed subgroup analyses to see if the results would vary based on other factors such as geography, surgery type, or ASA dosing. The findings of “no difference” between ASA and OACs held true across all these subgroups.

- One strength of this study was that it had a low statistical heterogeneity which meant that the results were very consistent across all 11 RCTs.

I chose this article because it is a systematic review and meta- analysis of 11 RCTs analyzing the efficacy and safety of ASA in VTE, DVT prophylaxis compared to other OACs in surgical patients. The study measured DVT rates and hemorrhagic complications which were outcomes my PICO question was investigating. Although the 11 RCTs focused on orthopedic surgeries, subgroup analyses suggested that these results would be consistent in other surgery type.

Article 2
Citation:
Chokshi, S. N., Gay, S. S., Barimani, B., & Somerson, J. S. (2025). Effects and Complications of Apixaban versus Aspirin for Venous Thromboembolism Prophylaxis after Total Hip or Knee Arthroplasty. *The Journal of arthroplasty*, *40*(9), 2387–2392. https://doi.org/10.1016/j.arth.2025.03.072

Type of article: Retrospective cohort study

Abstract:

Abstract

Background: Major orthopaedic procedures, such as total hip arthroplasty (THA) and total knee arthroplasty (TKA), carry risk for thrombotic complications. To reduce the incidence of postoperative venous thromboembolism (VTE), surgical patients are often prescribed antiplatelet or anticoagulant treatment. The objective of this study was to compare rates of VTE events and complications between apixaban and aspirin for VTE prophylaxis following primary THA and TKA.

Methods: We searched a research network using Current Procedural Terminology and International Classification of Diseases, Tenth Revision codes for patients who underwent a THA or TKA from 2018 to 2023. Patients were then categorized into cohorts of patients who received only aspirin (81 or 325 mg, twice daily) or patients who received only apixaban (2.5 mg, twice daily) for VTE prophylaxis. Odds ratios with 95% confidence intervals were calculated to compare the associations of selected prophylaxis with VTE events and complications, and Chi-square analyses were performed to determine the significance of differences. Statistical significance was defined as a two-sided alpha value < 0.05.

Results: Patients who received apixaban after THA had increased odds of deep vein thrombosis (5.22, 4.60 to 5.93), pulmonary embolism (7.85, 6.55 to 9.41), transfusion (1.5, 1.27 to 1.81), hemarthrosis (1.87, 1.26 to 2.24), myocardial infarction (1.12, 1.03 to 1.23), and readmission (1.18, 1.09 to 1.28) within 90 days after surgery. Patients who received apixaban after TKA had increased odds of deep vein thrombosis (4.57, 4.15 to 5.02), pulmonary embolism (6.05, 5.33 to 6.88), transfusion (1.6, 1.36 to 1.96), hemarthrosis (1.48, 1.03 to 2.12), myocardial infarction (1.42, 1.29 to 1.63), stroke (1.16, 1.09 to 1.53), and readmission (1.84, 1.61 to 2.11) within 90 days after TKA.

Conclusions: Apixaban is associated with increased odds of thrombotic events and bleeding complications in the postoperative period of THA and TKA compared to aspirin. This highlights the potential risks associated with apixaban use and the importance of using data to guide patient management in the absence of standardized clinical guidelines.

Key findings:

- Apixaban was associated with worse outcomes than aspirin, significantly higher chances of both DVT/PE and bleeding complications. 8 times higher for PE and 5 times higher for DVT.
- Apixaban use was found to be associated with increased odds of myocardial infarction and hospital readmission within 90 days after surgery. Also linked with higher chance of strokes.
- Confounding variables are impossible to control in such a large sample size. These variables might influence why a surgeon may choose apixaban over aspirin for a particular patient who is perceived to be at a higher risk for DVT, which can make the apixaban choice appear to have worse outcomes.

I chose this article because it is a large retrospective cohort study that directly compares ASA to apixaban in patients undergoing surgery and found that apixaban was associated with significantly worse outcomes such as higher odds of DVT, PE, and bleeding complications. This finding suggest that ASA may even be associated with better outcomes than other anticoagulants. Additionally, other strengths of this study are its large sample size which can increase precision of the results, reduce random variable factors/errors, make results more reliable and is a better representation of the studied population as it is less likely to be skewed.

Article 3
Citation:
Humphrey, T. J., O'Brien, T. D., Melnic, C. M., Verrier, K. I., MGB Arthroplasty Outcomes Writing Committee, Bedair, H. S. (2022). Morbidly obese patients undergoing primary total joint arthroplasty may experience higher rates of venous thromboembolism when prescribed direct oral anticoagulants vs aspirin. *The Journal of Arthroplasty*, 39(5), 1189–1197. https://doi.org/10.1016/j.arth.2022.01.089

Type of article: Retrospective cohort study

Abstract:

A B S T R A C T

Background: Morbidly obese (body mass index [BMI] >40 kg/m^2) patients undergoing total joint arthroplasty (TJA) are at high risk for postoperative venous thromboembolism (VTE); however, there is debate surrounding the optimal pharmacologic agent for prevention of VTE after TJA in this patient subset. Current guidelines recommend against direct-acting oral anticoagulants (DOACs) in patients of BMI >40 kg/m^2 due to low quality evidence justifying their use. We evaluated whether patients of BMI >40 kg/m^2 undergoing primary unilateral TJA would have increased risk of postoperative VTE if prescribed DOACs compared to non-DOAC agents such as aspirin.
Methods: This retrospective study analyzed 897 patients of BMI >40 kg/m^2 undergoing primary unilateral TJA. Demographic and comorbidity-related variables were collected. The association between postoperative VTE and prophylactic pharmacologic agent prescribed was evaluated by multivariate logistic regression.
Results: After controlling for comorbidities, we found that the sole use of DOACs, specifically apixaban, for VTE prophylaxis was associated with an increased risk of developing VTE compared to prophylaxis with aspirin alone in patients of BMI >40 kg/m^2 (odds ratio 2.962, $P = .016$). Regardless of VTE prophylactic agent, patients with BMI >40 kg/m^2 undergoing TKA had at least 4.5-fold increased odds of developing VTE compared to patients undergoing THA (OR 4.830, $P = .019$).
Conclusion: In our retrospective study of a large sample size of patients with BMI >40 kg/m^2, we found that the use of DOACs, specifically apixaban, for VTE prophylaxis following TJA was associated with increased odds of a VTE complication compared to the use of aspirin alone.

Key findings:

- Patients prescribed DOACs for VTE prophylaxis had significantly higher odds of developing VTE compared to ASA alone. This association persisted even when DOACs were combined with ASA
- The overall VTE rate in morbid obese patients was 5.6% higher than those without it. Indicating that obesity is a significant risk factor for VTE
- Patient taking ASA alone had VTE rate of 2.47%, which was lower than rates of apixaban and rivaroxaban. Suggesting ASA might be more effective in morbid obese patients.
- DOACs have altered pharmacokinetics in morbidly obese patients such as increased volume of distribution and renal clearance. This can lead to low or sub therapeutic level of the drug.
- Selection bias present in this study as patients who were perceived higher risk by surgeons were given DOACs.

I chose this article because it directly compares ASA and DOACs for DVT prophylaxis specifically in morbidly obese patients, which closely aligns with my patient's profile. The study emphasizes that ASA may be more beneficial, effective, and safer for this population. It also suggests that DOACs may not work as well in patients with a BMI over 40 due to physiological changes in how the body metabolizes these drugs.

Clinical bottom line:

Based on these three studies, the clinical bottom line is that aspirin should be considered the preferred agent for VTE prophylaxis in patients undergoing surgery, especially those who are morbidly obese. The systematic review and meta-analysis of 11 RCTs confirms that ASA is just as effective as DOACs in prevent DVT and PE without an increase in risk of bleeding or wound complications. The other two large retrospective cohort study reinforces this by showing that DOACs were associated with worse outcomes such as higher odds of VTE, DVT, PE and complications like MI and readmission. The Humphrey study is particularly relevant to my patient as it demonstrates that DOACs may have altered pharmacokinetics in morbidly obese patients that can lead to sub-therapeutic levels of the drug. Suggesting that ASA is more effective and safer. Overall, the evidence from all three articles supports that ASA as the safer, equally effective and potentially the better choice for DVT prophylaxis postoperatively.