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Anticoagulation-Associated Delays in Acute Hip Fractures

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Abstract

Introduction

Delayed surgical management of hip fractures increases mortality. The Irish and UK guidelines recommend surgery within 48 hours of presentation.[1-3] Our study aimed to evaluate the prevalence of hip fracture surgery delays secondary to anticoagulation, while also documenting anaesthesia preferences, rates of appropriate dosing as well as rates of venous thromboembolism, bleeding events and cerebrovascular accidents.

Methods

Single centre retrospective analysis of hip fracture patients admitted during a one-year period.

Results

In the year 2022, 48 out of 251 (19.1%) hip fracture surgeries were delayed beyond 48-hours. Notably, 26 (54.1%) of these patients were on a DOAC. In 23 (88.5%) cases, anticoagulation was the sole cause of delay. Only 9 (39.1%) of these delayed cases were documented by anaesthetics.

Of patients who experienced delays on anticoagulation, patient weights were documented in 7/22 (31.8%) of cases, hindering dosing review. Of documented weights, 9/22 (41%) were

receiving the wrong dose anticoagulant. Only 4/22 (18%) of those delayed due to anticoagulation had an acute kidney injury on admission.

7/22 (31.8%) of delayed patients due to anticoagulation received general anaesthetic while, 15/22 (68.1%) received spinal anaesthetic. No major bleeding, or clotting events were reported six months post-operatively. Patients aged over 80 years accounted for 15/22 (69.5%) of those delayed due to a DOAC.

Our study revealed that 23 out of 48 (47.9%) of the hip fracture surgical delays in our centre in the year 2022 were associated with patients taking DOACs on admission. We advocate for the elimination of these delays in alignment with the latest best evidence.

Introduction

Hip fractures, represent a significant healthcare burden globally, with over 3,000 cases reported annually in Ireland.[1] Among elderly patients, hip fractures are associated with a one-year mortality ranging from 14% to 36%.[2] Timely surgical intervention is crucial in mitigating adverse outcomes, as delays beyond 24 hours have been linked to increased 30-day mortality rates.[4] Reducing a patient's time to surgery to under 36 hours could provide a 1-year mortality benefit.[3] The Irish Hip Fracture Standards (IHFS) state that all medically fit patients should have hip fracture surgery within 48 hours of admission.[3]

However, admission on an anticoagulant is frequently linked to surgical postponement, primarily due to theoretical bleeding risk.[5] Despite this concern, research indicates that delaying surgery for hip fractures does not reduce postoperative bleeding or confer a mortality benefit.[6] Notably, patients undergoing surgery within 48 hours of their last preoperative dose of direct oral anticoagulants (DOACs) have demonstrated reduced transfusion requirements and shorter hospital stays, with no significant change in mortality or complication rates compared to those with delayed surgery.[7]

Additionally, while preference for spinal anaesthetic is a common reason for delay, recent studies demonstrate non superior outcomes in terms of survival, ambulation recovery or post operative delirium rates compared to general anaesthetic.[8] As the number of patients presenting on anticoagulants continues to rise, there is increasing urgency to enhance the management of these individuals, ensuring timely and safe surgical interventions.[8]

In this study, we aimed to evaluate the prevalence of hip fracture surgery delays secondary to anticoagulation, document anaesthesia preferences in these patients, and examine the specific occurrences of the postoperative complications i) venous thromboembolism, ii) bleeding events, and ii) Cerebrovascular accidents (CVA) or Transient Ischemic Attacks (TIAs) within six months. Furthermore, we sought to review the rates of appropriate dosing of anticoagulants upon admission.

Methods

We conducted a single centre retrospective analysis of 251 consecutive patients who underwent hip fracture surgery in Galway University Hospital during the year 2022. Data was collected using theatre logbooks and electronic patient records.

Patients who did not undergo surgery and those under the age of 65 were excluded from the study. Datapoints collected included time of presentation, time to theatre, anticoagulant on admission, dose of anticoagulant, documented reason for delay, patient co-morbidities likely to cause delay (e.g. chronic obstructive pulmonary disease (COPD), heart failure), early warning score on admission (including new oxygen requirements), abnormal bloods, dialysis or transfusion requirements pre-operatively, abnormal admission (non-hip) admission scans (e.g. chest x-ray, computed tomography of brain), patient weight, patient creatinine on admission and at baseline, anaesthetic used, major bleed, clot or stroke six months postoperatively.

We performed simple descriptive statistical analysis of the collected observational data to elucidate trends, patterns, and associations. This study was approved by our local ethics committee. Due to the retrospective design, patient consent was waived.

Results

In the year 2022, 48 out of 251 fractures (19.1%) did not undergo surgery within the recommended 48-hour timeframe. Notably, 26 (54.1%) of these patients were on an oral anticoagulant. In 23 out of 26 (88.5%) of these cases, oral anticoagulant was the sole apparent cause of delay. Therefore, 23 out of the 48 (47.9%) delays were caused primarily by anticoagulation. One patient was on warfarin, while the rest were on a direct oral anticoagulant (DOAC). Patients with other potential causes of delay were excluded. These included co-morbidities such as heart failure, COPD, abnormal bloods on admission, requirement for pre-operative transfusion or dialysis or an abnormality on admission imaging outside of hip imaging. Only 9 out of 23 (39.1%) of delays with no other cause other than anticoagulation were documented as an anticoagulation related delay by anaesthetics.

Among the remaining 25 delays, 6 out of 48 (12.5%) were attributed to delayed diagnosis. Instances where the emergency theatre exceeded capacity were cited as the cause of delay in 3 (6.25%) cases. Two patients experienced delays due to dual anti-platelet therapy. The remaining 8 delays were associated with exacerbations of heart failure, pneumonia, hyperkalemia, and a subdural haematoma. In 6 (12.5%) cases there was no documentation of cause of delay, and no co-morbidity likely to contribute to the delay recorded.

For the 22 patients admitted on a DOAC, whose surgery was delayed, patient weight was documented in only 7 (31.8%) cases, hindering correct dosing review. Of documented weights, 9 (41.0%) were receiving the wrong dose anticoagulant. Only, 4 (18%) patients whose surgery was delayed due to anticoagulation had an acute kidney injury on admission.

Regarding choice of anaesthesia for patients on anticoagulation who experienced delays beyond 48 hours, 7 (31.8%) went on to have general anaesthetic and 15 (68.1%) had spinal anaesthetic.

No major bleeding, stroke or clotting events were reported six months post-operatively among the patients whose surgery was delayed due to a DOAC.

Age and delays

The average patient age included in our study was 81.2 years. 15 out of 22 (69.5%) of patient's whose surgeries were delayed due to a DOAC were over 80 years.

Discussion

UK statistics indicate that approximately 30-40% of hip fracture patients are taking an anticoagulant or an antiplatelet on admission.[9] The Association of Anaesthetists highlights four primary risks associated with antiplatelets/ anticoagulation; bleeding, vertebral canal haematoma (in relation to spinal anaesthesia), sudden discontinuation of medication and surgical delays.[9]

Anticoagulation-induced delays likely represent the most impactful and perilous consequence of anticoagulation in the hip fracture setting. Surgical intervention is almost always indicated for hip fractures, except for non-ambulatory patients or patients deemed unlikely to survive fixation. Non-operative management is associated with a four-fold higher mortality at 1 year.[10] Delayed surgical fixation beyond 48 hours is associated with increased short and long term mortality, minor and major medical complications, as well as increased risk of pressure sores.[11] Patients undergoing surgery within 48 hours of their last preoperative dose of DOAC have demonstrated reduced transfusion requirements and shorter hospital stays, with no significant change in mortality or complication rates compared to those with delayed surgery.[7] Despite research demonstrating the safety of early surgery, our centre is not unique in finding anticoagulation related delays.[5, 11, 12] Unlike elective surgery, hip fracture surgery is time critical and anticoagulation should not delay treatment.[11] One survey revealed that 73.6% of

orthopaedic surgeons feel there is insufficient guidance regarding anticoagulation management in the context of hip fractures.[13]

Surgical delay for patients on anticoagulation often occurs to facilitate spinal anaesthetic. In our study, we observed that even among those whose surgeries were delayed due to anticoagulation, the utilization of spinal anaesthesia was as low as 68.1%. Avoidance of vertebral canal haematoma is the main reason for this delay. However, the incidence of vertebral canal haematoma as a complication of spinal anaesthetic across all surgeries is estimated to be 1 in 118,000.[9] This risk is considered lower for emergency hip fracture surgery.[14] The Association of Anaesthetists suggest that while this risk may be slightly elevated in patients taking anticoagulants, it likely remains very low. However, precise quantitative evidence on this risk is not available. Moreover, recent research indicates that spinal anaesthesia does not offer superior outcomes compared to general anaesthesia in terms of survival, ambulation recovery or postoperative delirium rates at 60 days post hip fracture surgery.[15] Therefore, both the risk of vertebral haematoma is exceedingly small, and spinal anaesthesia does not demonstrate superiority over general anaesthesia.

Our study reported no major bleeding or clotting events within six months post-operatively among patients on DOACs. Paradoxically, patients on DOACs who have earlier surgery have been shown to have lower transfusion rates than those who are delayed.[16] Aziz et al. showed that prolonged delays on DOACs had no effect on intra-operative blood loss.[17] If the bleeding risk is considered very high surgical strategies to limit blood loss can be used, these include topical haemostatic agents, as well as the use of intra-operative cell salvage., and potentially newer bipolar saline-coupled diathermy technology.[11, 18] Anaesthetic strategies to reduce blood loss can include permissive hypotension, avoidance of hypothermia and systemic haemostatic agents.[11]

Three primary factors are used to determine appropriate dosing of anticoagulants. These include weight, age, and creatinine clearance. Accurate documentation of weight is essential for calculating creatinine clearance. However, in our study, a significant proportion of patients

lacked sufficient weight documentation (only documented in 31.8% of cases), hindering dose verification. While it may be hypothesized that some anticoagulation related delays stemmed from acute renal impairment, only 18% of patients with inappropriately delayed surgeries in our study had acute kidney injuries on admission (classified according to the KDIGO guidelines).[19]

Anticoagulants have a broader impact not only on hip fracture surgeries but pose difficulty within all surgical specialties and beyond. A review published by the State Claims Agency in 2018 reported that anti-thrombotic agents were responsible for the greatest number of medication related incidents.[20] Among the top ten drugs involved in these incidents, apixaban and rivaroxaban ranked second and fourth, respectively.[20]

Of note, less than 20% of patients included in the trials for non-valvular atrial fibrillation were aged over 80 and less than 5% were aged over 85.[21] However, data from 2019 showed that at least 40% of patients in receipt of DOACs under the medical card scheme in Ireland are aged over 80.[22] Of note, in our study 69.5% of those whose surgeries were inappropriately delayed due to a DOAC were over 80 years old indicating, that age might influence the anaesthetists decision to postpone surgery.

In conclusion, our study revealed that 47.9% of the hip fracture surgical delays in our centre could be attributed to patients taking anticoagulants on admission. We advocate for the elimination of these delays in alignment with the latest best evidence.

Declarations of Conflicts of Interest:

None declared.

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