


Management of Haemarthrosis in Patients On Oral Anticoagulants

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Abstract

Aims: Our aim was to investigate the management of patients who were admitted to hospital with an acute haemarthrosis whilst taking oral anticoagulants, and highlight the outcomes of different management strategies. **Methods:** A retrospective review was performed of all orthopaedic admissions over a 42-month period (January 2015–July 2018) to the Orthopaedic Department of a London District General Hospital. All patients admitted with a spontaneous joint haemarthrosis and concomitant use of oral anticoagulants was identified. Anonymised data was placed on a secure trust database. **Findings:** A total of 31 patients were included. 22 patients (71%) had their anticoagulant temporarily held during admission. 9 patients (32%) had their anticoagulation reversed with 10 mg of vitamin K. 5 patients had their haemarthrosis aspirated either on admission or during their hospital stay. The overall mean length of stay in patients with a haemarthrosis was 7.0 days. The mean length of stay in patients who had their anticoagulation held was 8.6 days. In contrast, patients who continued taking their anticoagulation were found to have an average length of stay of 2.3 days. No patients suffered a thrombotic event in the 60 days following discharge. No adverse events were recorded following joint aspiration. **Conclusion:** There is currently no consensus on the management of haemarthrosis in patients on oral anticoagulants. Continuing the anticoagulants did not increase length of hospital stay. Further research may focus on assessing the effect of management adjuncts on patient outcomes and their cost effectiveness to aid the development of local and/or national guidelines.

Keywords

haemarthrosis, anticoagulation, management

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Introduction

The use of oral anticoagulation therapy continues to increase.^{1,2} Anticoagulants are important in both the treatment and prevention of thrombosis and thromboembolic complications.³ Novel oral anticoagulants (NOACs) which inhibit thrombin or activated factor X are licensed for stroke prevention in atrial fibrillation, treatment of venous thromboembolism and venous thromboembolism (VTE) prophylaxis following orthopaedic surgery.⁴

The incidence of haemarthrosis associated with warfarin and NOACs ranges from 0 to 1.5% of patients.^{5–8} The current incidence is low, but as the use of NOACs and warfarin continues to rise, it is likely to increase in the future.²

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The management of haemarthrosis in this patient group is challenging. Several questions confront the clinician. When should the anticoagulants be held? What is the role of joint aspiration? What adjunctive therapies are available? The literature available to guide practice is limited to case reports and small case series.^{5-7,9-18} According to current recommendations, a single episode of acute haemarthrosis associated with oral anticoagulants should be managed by rest, ice, compression and elevation (RICE) principles, temporary cessation of anticoagulation where possible and potential aspiration of the joint.^{5,10-14}

Our aim was to investigate the approach to these patients in the Orthopaedic Department at a central London District General Hospital over 4 years and highlight the outcomes of different management strategies.

Materials and Methods

We performed a retrospective review of all orthopaedic admissions to a London District General Hospital over a 42-month period from January 2015 to July 2018. Approval for this work was granted by our Institutional Research Governance Board. All orthopaedic patients admitted with an atraumatic knee joint haemarthrosis and concomitant use of oral anticoagulation therapy were identified from admission databases. Documentation was reviewed for a minimum of 2.5 years following the admission to identify any venous thromboembolism or recurrent haemarthrosis.

Anonymised information was collected from paper and electronic patient notes and pathology reports. This included the type of anticoagulation and indication, whether the anticoagulation was held during admission, the length of time the anticoagulation was held and the decision of whether to restart the anticoagulation. Radiographic images were reviewed to ensure there was no evidence of concurrent bony injury or cause for the patient's effusion. A panel of blood tests were routinely performed in patients including a full blood count, renal function, inflammatory markers and clotting studies. Patient's laboratory results were reviewed to exclude the presence of an infective process, and where necessary a diagnostic aspiration with microbiology culture was performed to exclude a joint infection. Additional management strategies were documented and the length of admission and discharge planning were recorded.

Anonymised data was placed on a secure trust database and basic statistical tests performed on the data. An unpaired t-test was used to analyse the difference in the length of stay between the groups.

Results

Across the study period, 31 patients were eligible for inclusion. Participants' age ranged from 42 to 99 (median 81, standard deviation 14.2). 42% of participants identified

as male and 58% as female. Patient co-morbidities were reviewed; 83% of patients had a diagnosis of atrial fibrillation (AF), 58% had hypertension, 19% had a deep venous thrombosis and 1% had either congestive cardiac failure or chronic kidney disease.

All included patients were deemed to be suffering with an atraumatic haemarthrosis of the knee, which was a clinical diagnosis of exclusion. 83% of the patients had radiographs of the affected joint. 67% of these radiographs had evidence of a simple effusion as reported by a consultant radiologist. No patients had a concurrent acute bony injury or fracture. The laboratory results of all patients did not show any evidence of active infection. 16% of patients underwent joint aspiration.

Twenty two patients were on warfarin. Six were on rivaroxaban, 2 on apixaban and 1 patient was taking acenocoumarol.

Indication for Anticoagulation

The most common indication for anticoagulation was AF with 25 (83%) of patients falling into this category. DVT was the indication for 5 (16%) of patients. One patient was on anticoagulation for a metallic valve. [Figure 1](#) gives a graphic representation of this data.

Anticoagulant Continuation and the Role of Aspiration

22 (71%) of patients had their anticoagulant temporarily held during admission, for an average of 4.7 days (range 2 to 23). 9 (32%) of patients had their anticoagulation reversed with 10 mg of vitamin K; all of these patients were taking warfarin.

5 patients had their haemarthrosis aspirated either on admission or during their hospital stay.

Discharge Plan

Of the 22 patients who had their anticoagulant held, in 15 patients (48%) it was restarted prior to discharge. A further 6 patients (19%) had their anticoagulant restarted in the community. One patient (3%) had their anticoagulant stopped completely after consultation about the relevant risks and benefits. None of the patients who had their anticoagulation held during admission, or stopped following discharge, had a thrombotic event in the 60 days following discharge. Three patients suffered a recurrence of their haemarthrosis in the 2.5 year follow-up period. The plan for anticoagulant use on discharge is summarised in [figure 2](#).

Length of Stay

The mean length of stay among all patients was 6.8 days with a median of 3 (range 1–83). In patients where the

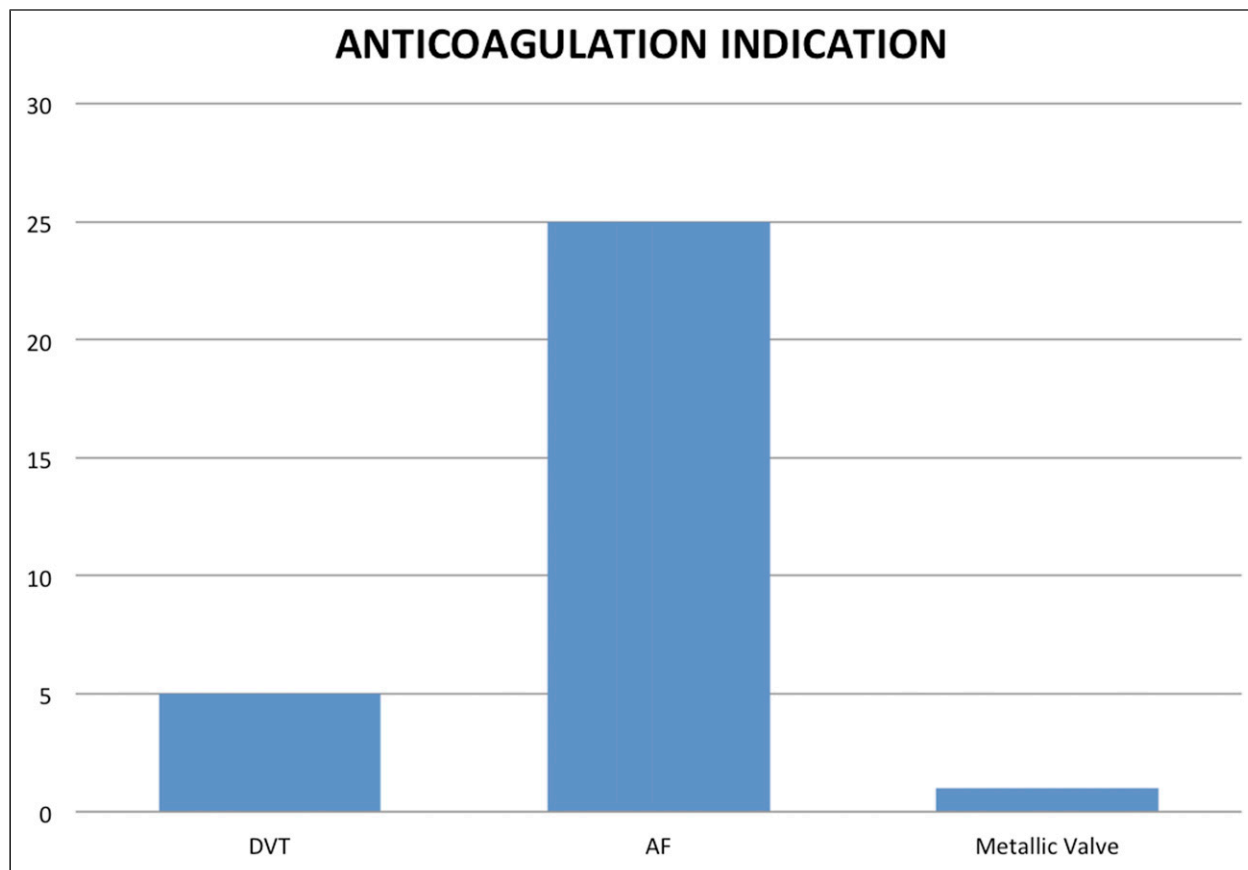


Figure 1. Indication for anticoagulation. AF - Atrial Fibrillation, DVT - Deep Vein Thrombosis.

anticoagulation was held, the mean length of stay was 4.2 days with a median of 3 days (range 1–13). In contrast, the group who did not have the anticoagulation held had a mean length of stay of 13.1 days with a median of 5 days (range 1–83). A single patient in the group who did not have their anticoagulation held had an 83-day stay in hospital due to medical complications not associated with their haemarthrosis or anticoagulation. This 83-day stay significantly increased the mean length of stay for the “not-held” group. When the outlier was removed, the mean length of stay was 4.4 days, median 3 days (range 1–10 days). The patient characteristics within the 2 groups were homonymous, and there were no significant difference in terms of age, comorbidities or pre-injury level of mobility. An unpaired Student t-test, with all data included, showed no difference in length of stay between the groups ($P = .124$).

Discussion

Our approach to patients with haemarthrosis on oral anticoagulants varied. The majority of patients included in this study had their anticoagulation held temporarily which is in keeping with the published literature.^{5,10,11,14} There was no significant difference in length of stay between

patients in whom the anticoagulant was continued and patients in whom it was held. Warfarin was the most common anticoagulant prescribed to patients in this study. A single aspiration was performed in 5 patients representing less than 20% of the cohort. No patients underwent repeated aspiration, and no adverse effects following aspiration were reported.

The majority of patients in the literature received some aspect of the basic rest, ice, compression and elevation (RICE) principles.^{5,10,11} In one case report, the affected joint was immobilised for 3 months due to ongoing pain, but there was no evidence to support this practice.⁵

Joint aspiration is widely used as both a diagnostic and therapeutic tool in the management of an acute haemarthrosis. There remains no clear evidence to guide which patients would benefit most from joint aspiration. Our recommendation, and current practice in our institution, is to aspirate if the diagnosis is unclear in order to exclude infection or a crystal arthropathy. We also believe it can be safely used as a therapeutic tool when the patient’s anticoagulation has been held, and their clotting status has returned to normal. This is supported in the literature, and the majority of studies recommend careful and selective aspiration.^{5,12-14}

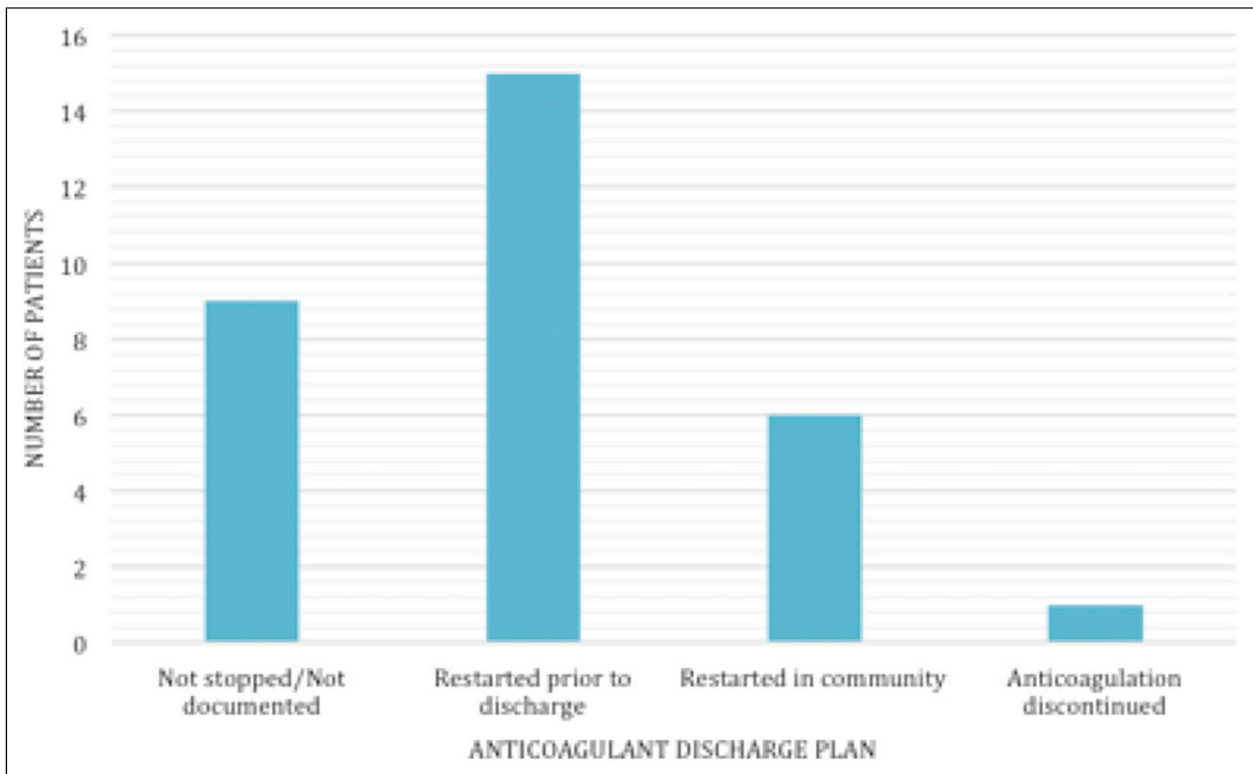


Figure 2. Decision regarding anticoagulation on discharge.

The diagnostic qualities of aspiration and the improvement in patient's symptoms post-aspiration are well documented.^{5,12-14} The complications of joint aspiration are primarily the risk of introducing infection and bleeding, particularly in the presence of concurrent anticoagulation use. Previous work demonstrates that aspirating a joint of an anticoagulated patient is safe.^{15,16} A large cohort study investigating complications following joint injections for patients on warfarin concluded that in their series of 2084 injections performed with an INR range of 1.7–5.5, no complications were observed.¹⁷ Ultrasound may be used to confirm the diagnosis of a haemarthrosis, particularly in cases where aspiration is not possible.¹¹ Despite the potential benefits of aspiration, it was only performed in 5 of the patients included in our study.^{5,12-14} This low rate of aspiration may be due to the perceived risk of introducing infection or causing further bleeding.

The decision to stop or switch the anticoagulant is generally deemed to be patient specific. The risks and benefits of stopping anticoagulation need to be assessed and an informed decision is then made. Patients in whom anticoagulation is stopped are at risk of thrombotic events. The risk of stroke in non-anticoagulated AF is 1.9% per year.¹⁸ Temporary or permanent cessation of the anticoagulant may improve patient symptoms and aid in resolution of the haemarthrosis.^{5,10,11,14} In contrast, continuing the anticoagulation has been associated

with prolonged symptoms and even recurrent episodes of haemarthrosis.^{5,12,19}

In more complex cases where anticoagulation cannot be stopped or the patient is experiencing recurrent episodes of haemarthrosis, some experimental techniques have been trialed. The use of arterial embolisation was shown to be an effective option in a small 10 patient case series and an earlier case report.^{20,21} In addition, the concurrent use of an intra-articular injection of tranexamic acid was shown to be effective up to 1-year follow-up.¹² A single patient case report also demonstrated good results at 8 months when using radiosynovectomy to treat recurrent haemarthrosis.¹⁹

The current literature recommends the application of the RICE principles, aspiration and suspension or reversal of anticoagulation. The basic management and application of the RICE principles was not well documented on review of the patient files included in this study. However, a review of ice application in haemophilia patients with haemarthrosis suggests that ice may disrupt normal clotting mechanisms and lead to further bleeding.²²

This study has potential limitations. It was performed in a single centre and is limited by the sample size. This may have contributed to the absence of a significant difference in length of stay. However, consecutive patients were reviewed over a 42-month period in a population common to the majority of district general hospitals.

Conclusion

The current published literature advises anticoagulant-associated haemarthrosis should be managed by applying RICE principles, holding anticoagulation and considering aspiration of the affected joint. The lack of consensus for the management of anticoagulation-associated haemarthrosis is reflected in the range of strategies described here. Holding anticoagulation did not have a significant impact on the length of patient stay in this observational study. This study highlighted the infrequent use of aspiration as both a diagnostic and therapeutic tool in our institution. We conclude that aspiration should be used as a diagnostic tool to exclude infection or crystal arthropathy when the diagnosis is unclear. It can also be used as a therapeutic tool when the patients' anticoagulation has been held and their clotting function has returned to normal. Future prospective work would be valuable to help guide clinical practice and aid in developing formal practice guidelines.

Author Contributions

JD: study design, data collection, data analysis and writing of article.

AD: study design, data analysis, literature review and article editing.

AB and SR: data collection, data analysis and article editing.

IG: study design, data interpretation and article editing.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

This study was approved by the Institutional Research Governance Board.

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