SUCCESSFUL HOME INR MONITORING FOLLOWING KAWASAKI DISEASE

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ABSTRACT

Most paediatricians will encounter at least one case of Kawasaki disease complicated by aneurysmal damage of the coronary arteries. Current consensus recommends anticoagulation with warfarin to reduce the risk of myocardial ischaemia and infarction in such cases. Monitoring warfarin treatment in these children may be challenging. We describe a case of an 11 week old Caucasian boy who presented with evolving Kawasaki syndrome complicated by giant coronary aneurysms. His subsequent anticoagulation has been managed with near patient finger prick INR testing, initially in a hospital clinic then at home. The case illustrates some of the advantages and disadvantages of this process.

1. INTRODUCTION

Kawasaki disease is the most common form of acquired heart disease in childhood. This vasculitis has a predilection for the coronary arteries; some cases develop giant aneurysms and thrombus. Lifelong anticoagulation with aspirin and warfarin combination is recommended for this situation. With its narrow therapeutic index, careful control of INR is paramount. Frequent venous blood testing to measure INR is distressing; the strategy of finger prick INR testing in children in hospital then at home is therefore a worthy therapeutic aim.

2. CASE REPORT

An 11 week old Caucasian boy presented with a single day history of low grade fever, a widespread maculopapular rash and evidence of haemodynamic compromise with tachycardia (heart rate 168), cool peripheries and prolonged capillary refill time (3 seconds). Initially he was treated for suspected sepsis with intravenous cefotaxime and fluids. Blood tests on day 1 revealed anaemia (Hb 8.6), thrombocytosis (platelets 493) and CRP 143. CSF, urine and stool bacterial and viral cultures were negative and chest radiograph was normal.
New clinical features were observed on day 2: he developed an erythematous tongue and bilateral non-purulent conjunctivitis. A systolic murmur was identified on day 3. Blood cultures grew *Streptococcus sanguinis* and bacterial endocarditis was considered in the differential diagnosis. No improvement in the fever was seen despite the addition of gentamicin and erythromycin. On day 5, he developed red lips and an enlarged lymph node; the diagnosis of Kawasaki disease was made and intravenous immunoglobulin and high dose aspirin were given.

An echocardiogram on Day 8 revealed uniformly dilated right and left coronary arteries, which progressed to bilateral giant aneurysms with right-sided intraluminal thrombi on repeat scanning. Lifelong combination therapy with the addition of warfarin was commenced with a target INR of 2-3.

For the first 9 days, daily hospital attendances for fingerprick INR checks were employed. After this, monitoring every week or fortnight for 21 months was used to monitor his progress (diamonds in Figure 1). After parental education on fingerprick INR monitoring using a “Thrombocheck” system, home monitoring was commenced (square boxes in Figure 1). No further hospital visits have been required for INR dosing and queries have been answered by a phone call to the anticoagulation nurse team. The results show that this patient’s INR control has remained stable since moving to home testing.

**Figure 1: Comparison of INR control – Hospital versus Home testing**

![INR Control Chart](chart.png)

Dose of Warfarin (mg)
3. DISCUSSION

Coronary artery and other cardiac involvement in Kawasaki disease is more frequent in infants under 6 months of age, with a higher incidence of abnormalities of the coronary artery walls, coronary dilatation and aneurysm. (1) If aneurysms form, intensive anticoagulation is recommended to prevent thrombus formation. Low molecular weight heparin may be prescribed initially, converting to warfarin and sometimes in combination with aspirin.

Anticoagulation in children is challenging for a number of reasons. Regular monitoring is key to achieving the optimal levels of anticoagulation. Repeated venous blood tests with hospital phlebotomy services are unpleasant for children and time consuming, taking children away from school and parents away from work. Even when children and their parents are compliant with medication the delicate balance of the INR can be upset by intercurrent illness and numerous medication and diet interactions. Genetic polymorphisms also influence the anticoagulation effect of warfarin. In an active and otherwise healthy child even minor trauma can cause significant haemorrhage when anticoagulated. The combination of aspirin and warfarin has been shown to increase the risk of gastrointestinal haemorrhage.

Continued use of low molecular weight heparin (LMWH) has been compared with warfarin. Manlhiot et al (2) demonstrated that anticoagulation levels were better controlled using LMWH and that the maximum size of coronary artery aneurysms diminished with time using LMWH but did not
with warfarin. Although this suggests a viable alternative to warfarin, some disadvantages were noted, particularly more frequent minor bleeding. From the perspective of safety therefore warfarin remains the mainstay of anticoagulation treatment in KD.

Near patient or finger-prick INR testing can improve anticoagulation control. Portable monitors which allow the patient to check and regulate their INR at home have been in use since the 1990s and have found to be equivalent to clinic and laboratory based testing. A Cochrane review examined 18 studies of 4723 adult and paediatric patients who had been trained in both self-monitoring (checking of INR) and self-management (adjusting warfarin dose accordingly). It found that that home INR self-management led to a reduction of both thrombotic events and mortality (RR 0.50 and 0.64 respectively), whilst self-monitoring reduced rates of major haemorrhage (RR 0.56). In 12 of these trials improvement in maintaining a therapeutic INR was reported. (3) Home monitoring has particular value for infants with Kawasaki disease as it allows patients to be monitored with fewer hospital visits, less pain and with reasonable accuracy. A good working relationship between local anticoagulation services and the child’s parents is key: this requires parent training, good communications and cooperation. (4) Our case highlights that this is desirable option is achievable.

New anticoagulants such as direct thrombin inhibitors (e.g. dabigitran) or factor Xa inhibitors (e.g. rivaroxaban or apixaban) are now employed in adults with atrial fibrillation. These agents have a lower risk profile for bleeding and do not require regular blood monitoring. However the application of these in the paediatric population has not yet been thoroughly evaluated. In the absence of a more suitable alternative to warfarin, near patient INR testing and home monitoring offer a reliable and more acceptable method of maintaining therapeutic anticoagulation.

4. ACKNOWLEDGEMENTS:

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5. REFERENCES:

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