Management of sickle cell disease: management of acute episodes in the community and in hospital

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Abstract

This review discusses the presentation and management of acute sickle crises, highlighting which aspects of diagnosis and management can be undertaken in the community and which require urgent referral to hospital. GP's, community nurse specialists, and community paediatricians should be aware of the different acute presentations in order to provide effective and safe care, and should understand warning symptoms and signs which indicate the need for assessment in hospital. It is also important that the parents have a good awareness of these symptoms and know when and how to seek help. The common complications which may be encountered in an acute hospital setting are described together with recommendations for management based on published evidence and the author's experience.

Keywords chest syndrome; crises; pain; sickle; stroke

Introduction

Management of the acutely ill child with sickle cell disease is challenging. The child and the parent are likely to be anxious and fearful. Delayed and inappropriate treatment can lead to a fatal outcome, or to permanent disability. An acute presentation requires a differential diagnosis, not just a diagnosis of a sickle crisis. For instance, a febrile infant with respiratory symptoms may have a common viral illness, may be suffering from bacterial pneumonia or from acute chest syndrome. If presenting to the emergency department, it is wise to take a cautious approach and observe a sick child until the diagnosis is clarified rather than sending home for later review. The underlying pathological processes giving rise to acute complications in SCD include:

- Increased susceptibility to infection with encapsulated bacteria (e.g. pneumococcus) and certain other pathogens.
- Acute worsening of anaemia due to increased haemolysis and/or sequestration of red cells.
- Microvascular occlusion, especially in the bone marrow leading to marrow infarction and severe pain.
- Large vessel stenosis and occlusion, particularly apparent in the cerebral circulation.

The clinical course of an individual with SCD is variable and sometimes categorised into a phenotype. The 'vaso-occlusive' phenotype describes children who suffer frequent acute pain crises and acute chest syndrome and who tend to have higher haemoglobin levels. The haemolytic phenotype describes children who are more anaemic, with increased blood markers of haemolysis, less frequent episodes of acute pain and chest syndrome, but more risk of acute stroke and of some other chronic complications. The probability of suffering a first episode of various acute complications in the East London cohort of children is illustrated in Figure 1. These acute presentations are generally commoner and more severe in children with HbSS than in those with HbSC.

Dactylitis

Dactylitis (Hand and foot syndrome) is often the first acute complication seen in a child with HbSS, and should be easily recognisable by an informed parent or GP. In general, dactylitis can be managed at home. In our cohort, this occurred in about 40% of infants by the age of 2, and was not common after the age of 5. The child is irritable and the affected hand and/or foot is puffy and uncomfortable to touch. Uncomplicated episodes resolve after one to several days, and are generally easy to manage with increased oral fluids, paracetamol and a non-steroidal anti-inflammatory agent (ibuprofen for an infant). Dactylitis can be a feature of a more complex crisis and a small minority of children get frequent and distressing episodes from an early age. These children tend to have frequent painful crises and recurrent acute chest syndrome when they get older.

Acute splenic sequestration (ASS)

ASS is an important and potentially life-threatening complication seen predominantly in infants with HbSS. Through regular abdominal palpation, acute enlargement of the spleen should be recognisable by the parent and GP. Management required urgent referral to hospital. The definition used in the Co-operative Study of Sickle Cell Disease is a fall of least 20% of haemoglobin associated with enlargement of the spleen by at least 2 cm from steady state. This emphasizes the need for information on steady state values, which should be documented at the child's annual review visit. Sequestration of red cells is associated with a reticulocyte count raised above the steady state level. This is a potentially life-threatening complication for infants because of the severity of anaemia and rapidity of progression. ASS is also seen in older children, but generally without such severe sequelae. In our cohort, about 20% of children with HbSS had an episode of ASS by age 5, the majority in the age range 6 months to 2 years.

Parents should be instructed about ASS and palpation of the abdomen from 3 months of age, so that severe episodes can be anticipated and dealt with quickly. This early warning mechanism only works if the acute medical staff understand the acute care pathway to be followed if the parent believes the spleen is getting large. It is important not to ignore 'minor' episodes of ASS. The same definition applies, but the child is apparently asymptomatic, or only has mild symptoms of anaemia. These episodes signify a risk of recurrent episodes of increasing severity and recurrent minor episodes should be regarded as an indication for intervention. Another common situation occurs when the infant already has an enlarged spleen, and there is moderate increase in size associated with a drop from an already low haemoglobin level. This is more confusing for the parent, but

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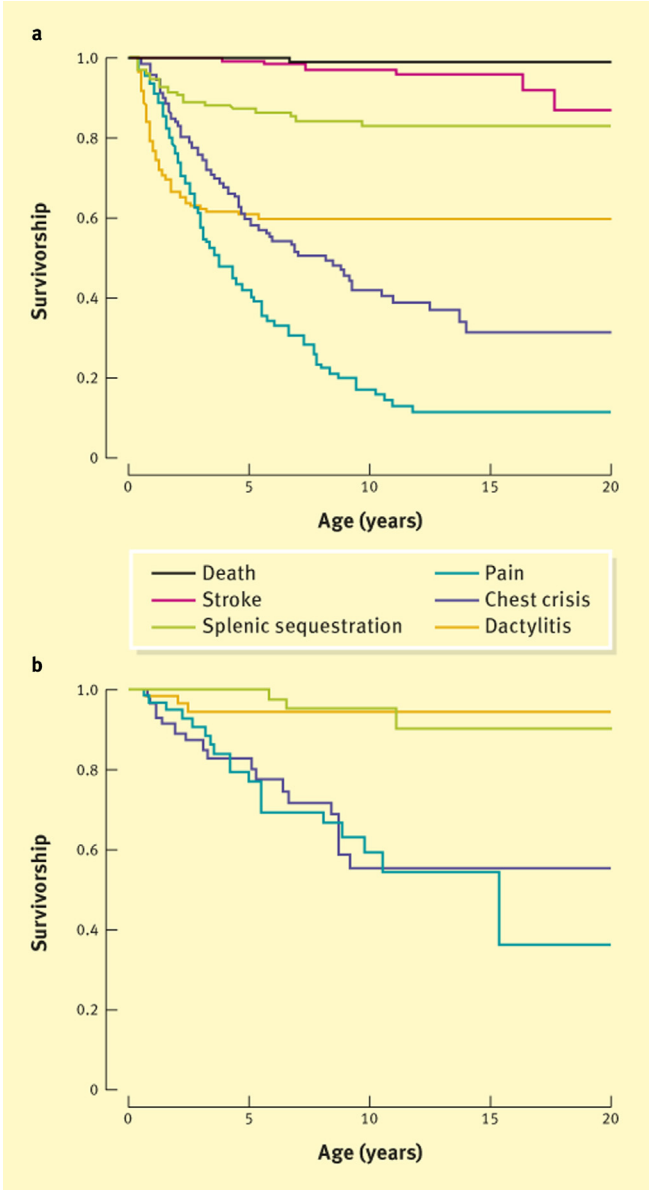

Figure 1 Kaplan–Meier curves indicating time to first event for common sickle crises. (**a**) Hb SS; (**b**) Hb SC. (Reproduced from Telfer et al., Haematologica. 2007 Jul;92(7):905–12, with permission.).

such children are also at risk of life-threatening anaemia with ASS and should be brought in for assessment.

Acute episodes resolve rapidly with transfusion of 10–15 ml/kg red cells (without aiming for a particular percentage of HbS). It is important not to over-transfuse (Hb more than 11 g/dl), as this can result in circulatory overload and hyper-viscosity. Exchange transfusion would only be indicated after an initial top-up transfusion if there were additional complications such as acute chest syndrome or stroke.

Splenectomy is generally indicated for recurrent events, however, it is important to weigh the benefits and risks. Although the spleen is hypofunctional in SCD, in many children there is residual function, and removal of the spleen in childhood will increase the vulnerability to bacterial infection and malaria (important for those are going on holiday to, or likely to return to live in Africa). We have seen two splenectomised children die from overwhelming sepsis, despite updated vaccinations and regular penicillin prescriptions. Splenectomy should not be undertaken for a single episode of ASS, and for very young children who are having recurrent episodes, an alternative approach of regular transfusion until the age of 5 is effective in controlling ASS. At this age the risks of ASS are less, and the child can be more safely reassessed off transfusion.

Acute painful crisis (APC)

The majority of painful crises are managed at home. Parents need education and support in effective home management of mild/moderate APC. The GP has a role in assessing a child with APC to ensure that there is no other complication, and in prescribing home-administered analgesics. Severe pain and co-morbidities need to be managed in hospital.

APC is the commonest reason for a child with SCD to present to the emergency department. In early childhood (age 2–5), swelling of an affected area is common (e.g. upper arm, elbow, thigh, shin) and the combination of pain, swelling and fever is easy to confuse with osteomyelitis. Generally it is unnecessary to subject the child to bone scans and surgical intervention, unless clearly septic with positive blood culture or there is a worsening of pain, swelling and fever over several days.

It is advisable to plan a clear and simple care pathway for APC, which is understood by medical, nursing staff and the parent. The principles of the pathway include:

- Rapid administration of analgesia. Most severe episodes will require administration of strong opioid pain analgesics. NICE guidelines recommend the first dose is given within 30 minutes, but ideally this should be as soon as possible after arrival in the emergency department.
- Sustained analgesia to continue until pain beings to settle. This requires frequently repeated doses especially in the first few hours of admission.
- Withdrawal of analgesics as the pain settles.
- Regular monitoring by nursing and medical staff to identify adverse effects of analgesics and development of additional sickle cell complications. NICE guidelines recommend that monitoring is done hourly for the first six hours. This should include pain score, respiratory rate, and sedation score.

There is no single analgesia regime suitable for all units. We have found intranasal diamorphine very effective for immediate analgesia, and most children can then be managed with a regime of oral morphine. Short acting morphine (Oromorph®) needs to be given pro-actively and more frequently during the first 6–12 hours of the crisis. We add in long-acting morphine (MST) at 6 hours if the pain is not well controlled, and have found it to be effective analgesic for background pain control (Figure 2). Intravenous opiates (via patient/nurse controlled analgesic devices) are used in many units, however these can be less satisfactory because of delay in initial set-up and prolongation of the overall hospital stay. One situation where intravenous short acting opiates are important is in acute chest syndrome (see below). There is minimal risk of opiate dependency during childhood if acute crises are managed with these protocols.