Anaesthetic Implications of Laparoscopic Splenectomy in Patients with Sickle Cell Anaemia

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Abstract
With the increasing immigrant population in the Republic of Ireland, the number of patients with sickle cell disease (SCD) seen in the paediatric hospitals is climbing. In this case report, we review the anaesthetic implications and outcome of the first two paediatric patients with SCD to have a laparoscopic splenectomy due to repeated splenic infarcts in the Republic of Ireland.

Case Report
A 4 year old Nigerian girl who was referred from the haematology service was diagnosed with SCD at the age of 7 months. She never received any blood transfusions and was commenced on penicillin and folic acid at the age of 2 years. All vaccines were up to date. At presentation, her baseline Hb was 8.0g/dL, her HbF 15.4%, WCC 16.7, platelet count 179 and LDH 973. There was no icterus and abdominal examination revealed a spleen measuring 3.5cm. She presented to A&E 5 months after initial review with a 3 day history of a sore throat and fever, splenomegaly and hepatomegaly and enlarged tonsils. She was diagnosed with acute exudative tonsillitis and acute splenic sequestration, admitted to hospital and commenced on intravenous (IV) ceftriaxone and IV fluids. Her Hb was 7.3g/dL. She was discharged home after 3 days but subsequently had 3 similar presentations suggestive of acute splenic sequestration.

After careful consideration with a multi-disciplinary approach, which included clinical nurse specialists, an anaesthetist, paediatric haematologist and a paediatric surgeon, it was decided that the best option for the patient was a splenectomy. She was commenced on the blood transfusion programme pre-splenectomy. This involved elective admission into hospital every 2 weeks to maintain a HbS of less than 30%. Our second patient is a 20 month old male of Congo descent born in Ireland. His mother was HepBsAg +ve and on routine blood testing, was found to have SCD and referred to the haematology service. On initial review, he was well, with no evidence of jaundice and no splenomegaly and his Hb was 10 g/dL. His first visit to A/E was at the age of 3 months, with vomiting, diarrhoea and abdominal pain. He subsequently was noted to have recurrent splenic sequestration crises. He was commenced on the blood transfusion programme and transfused every 4 weeks. After careful consideration, with a multidisciplinary approach, it was decided that the best option for him was a splenectomy.

Prior to splenectomy, our patients had 6 and 8 blood transfusions respectively. At induction, an arterial line was inserted to closely monitor arterial blood gas (ABG) measurements. A laparoscopic splenectomy was performed, with a pneumoperitoneum being created with the Hassan technique. Three 5mm ports were used and one 15mm port. The splenic flexure was taken down and the gastrosplenic and short gastric vessels divided. A Ligasure was used to ligate the splenic vessels, with good haemostasis. As can be seen in Figure 1 and Figure 2, there was no evidence of any hypoxic stress incurred on either patient throughout the procedure. There were no post operative complications and they were discharged home 2 days after the procedure, reviewed 3 weeks after discharge from hospital and were well.

Figure 1: Schematic changes in pO_2 over time

Figure 2: Schematic changes in lactate over time

Discussion
The anaesthetic implications of SCD are significant. The pre-operative assessment in any patient with SCD is important and aims to determine the potential risk of complications associated with SCD, in an attempt to prevent these from occurring [1]. This varies in every individual as there are many variable factors that contribute to this risk, including type of operative procedure, disease activity, increasing age and current organ dysfunction [2]. The peri-operative management is important and general guidelines should be adapted for each individual. Hypoventilation resulting from general anaesthesia can easily result in a sickling crisis [3].

There are special advantages of laparoscopic surgery in patients with SCD. Analgesia requirements are minimized and the technique reduces the risk of hypoxia and hypercarbia. Decreased amounts of analgesia facilitate shorter periods of immobility and shorter hospital stay. This procedure also results in better cosmesis in patients [4]. Maintaining hydration status with IV fluids until the patient is able to eat and drink is essential [5]. With shorter periods of immobility, patients are able to return to oral diet faster. Laparoscopic techniques are being used more often as an alternative to many procedures which were routinely done as open operations and remain a safe and effective route for splenectomy in children with sickle cell disease.

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