Sickle cell disease (SCD) is a lifelong genetic disease caused by a single mutation in the HBB gene and is characterized by hemolytic anemia, vasculopathy, and episodic vaso-occlusive events (VOEs)²⁻³.

When glutamic acid in the sixth position of adult hemoglobin is replaced by valine, the result is hemoglobin Sickle (HbS)⁴⁻⁵.

Under low oxygen conditions, HbS molecules undergo a conformational change, which causes HbS molecules to bind to one another and form polymers; HbS polymerization correlates with high concentrations of HbS within red blood cells (RBCs)⁶⁻⁷.

HbS polymerization distorts the RBC, leading to the distinct sickle shape, increased fragility, aggregation, and hemolysis⁸⁻¹⁰.

Sickled RBCs induce chronic hemolytic anemia, vasculopathy, and episodic VOEs¹¹⁻¹².

Vaso-occlusions manifest as both unpredictable acute and ongoing chronic complications.

Acute complications may occur suddenly and resolve quickly, but the underlying damage associated with acute complications may occur and worsen over time. Recurrent VOEs can lead to serious and chronic complications and organ damage¹²⁻¹³.

Acute complications include:
- Acute pain
- Acute chest syndrome
- Infection (including sepsis and parvovirus)
- Priapism
- Overt thrombotic and hemorrhagic stroke
- Cerebral vasculopathy
- Splenic sequestration

Although the occurrence of acute complications in SCD is unpredictable, the chronic damage that results from the disease is expected and deserves careful monitoring and management¹⁴⁻¹⁵.

Chronic complications can affect any organ in the body and may lead to progressive organ damage and even organ failure¹⁶⁻¹⁷.

Chronic complications include:
- Sickle cell retinopathy
- Pulmonary hypertension
- Cardiovascular complications
- Cerebral vasculopathy
- Cholelithiasis
- Renal dysfunction
- Avascular necrosis of femoral head
- Recurrent, chronic leg ulcers
- Silent stroke (asymptomatic cerebral infarction)
- Depression and anxiety
- End organ disease

Beyond the physiological effects of SCD, patients often experience a psychosocial burden attributed to the disease¹⁸⁻¹⁹.

Physicians can take the following steps to optimize treatment for patients with SCD:

1. Individualize pain management for each patient.

   The published guidelines recommend an individualized protocol for pain management.

2. Monitor and manage for chronic complications and organ damage.

   Consult the published guidelines for information about the management of chronic complications of SCD.

3. Initiate a discussion with patients about any struggles they face beyond SCD.

   Work with patients to understand what support they can provide and help to connect them to mental health resources, community, and sickle cell organizations.

References:
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