



A 15-year Retrospective Review of 30-day Post-Anesthesia Morbidity and Mortality in Children with Sickle Cell Disease at a Tertiary Children's Hospital



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BACKGROUND

- Stroke and acute chest syndrome (ACS) are debilitating complications of sickle cell disease (SCD) that can occur in the perioperative and postoperative periods.
- The primary goal of this study was to determine the prevalence of ACS, stroke, and death in children with SCD within 30 days of general anesthesia (GA) based on clinical documentation.
- A secondary goal was to describe the patient and surgical factors that were associated with morbidity and mortality in children with SCD undergoing GA.

METHODS

- A perioperative database was queried for all children with SCD under 18 years of age who underwent GA at CHOP from Jan 1, 2000 to December 31, 2016.
- Each patient's chart was screened for mention of 'stroke,' 'acute chest' or 'ACS' by a clinician within 30 days of the patient undergoing GA.
- Two reviewers (BP, AS) independently reviewed the records that passed the initial screening to confirm the cases that met ACS criteria:
 - Evidence of a new segmental lung infiltrate (excluding atelectasis),
 - And one or more of the following symptoms:
 - fever (38.5° C)
 - wheezing
 - cough
 - chest pain

Table 1. Demographics of Sickle Cell Patients

Demographic	ACS	Non-ACS	Stroke
Male, n (%)	24 (49)	408 (58)	1 (33)
Female, n (%)	25 (51)	291 (42)	2 (66)
Weight (kg), median (IQR)	29 (20-40)	26 (17-41)	29.4 (26-30)
Age (yr), median (IQR)	10 (5-14)	8 (4-13)	10 (8-12)

Table 2. Prevalence of ACS and Stroke by Procedure Areas

Procedure Area	ACS, n (%)	Stroke, n (%)	Total Area, n (%)
Endoscopy-Thoracic	1 (100)*	0	1 (0.13)
Abdominal-Laparoscopic	23 (13)	0	177 (23.7)
Abdominal-Open	1 (12.5)*	0	8 (1.1)
Neurosurgery	2 (12.5)	2 (12.5)	16 (2.1)
Endoscopy-GI	6 (10.9)	0	55 (7.4)
Orthopedic	4 (7.8)	0	51 (6.8)
MRI	2 (5.4)	0	37 (5.0)
Interventional Radiology	1 (5)	0	20 (2.7)
GU	1 (4.8)	0	21 (2.8)
T&A	4 (4.5) [§]	0	89 (11.9)
Multiple	3 (3.9)	1 (1.3)	76 (10.2)
Oral	1 (2.2)	0	46 (6.2)
Abdominal-Hernia-Repair	0	0	14 (1.9)
BMT	0	0	14 (1.9)
Cardiac	0	0	11 (1.5)
Craniofacial	0	0	1 (0.13)
CT Scan	0	0	1 (0.13)
Endoscopy-Pulm	0	0	2 (0.3)
ENT	0	0	17 (2.3)
LP	0	0	1 (0.13)
Ophthalmology	0	0	18 (2.4)
Plastic Surgery	0	0	6 (0.8)
Superficial	0	0	8 (1.1)
Ultrasound	0	0	1 (0.13)
Vascular/Access	0	0	57 (7.6)
Grand Total	0 (6.6)	0 (0.4)	748 (100)

* Only in first decade of study period.

§ None in the last five years of study period.

RESULTS

- A total of 748 SCD patients met the study criteria.
- The study cohort was 58% male, median weight was 26.7 kg (IQR 17-41), and median age was 8 years (IQR 4-13) (Table 1).
- 49 cases of ACS (6.6%), and 3 cases of stroke (0.4%) were identified.
- The most common procedural areas were intra-abdominal/laparoscopic (23.6%, n=177), tonsillectomy and/or adenoidectomy (T&A, 11.9%, n=90), and multiple (10.2%, n=76).
- The most common procedures performed were multiple (17.4%, n=130), T&A (11.2%, n=89), splenectomy (10.3%, n=77), and cholecystectomy (9.5%, n=71).
- Table 2 shows the prevalence of ACS and stroke based on procedural area.
 - Stroke and ACS occurred on the same day for one patient following neurosurgery.
 - The ACS rates in the three most commonly performed procedures were 4.5% after T&A, 15.6% after splenectomy and 11.3% after cholecystectomy.
- There were no deaths during this study period.

CONCLUSION

- This is the first study to use clinical reports to describe the patient characteristics and acute chest syndrome and stroke in a large perioperative pediatric SCD cohort.
- ACS rates were highest in abdominal, neurosurgical, and endoscopic procedures, lower in T&A and orthopedic, and nil in vascular access and non-T&A ENT cases.
- Future research includes identifying the perioperative risk factors to predict and decrease stroke and ACS in children with SCD.
- Identifying the perioperative conditions associated with common procedures, such as T&As, as well as the trends in morbidities and mortalities, can further improve outcomes for SCD patients.