Haemophilus influenzae non-type b Invasive Disease in Children ≤ 5 years of age: A Case Report and Review of Literature

Monica Abdelnour, MD, Ezzeldin Saleh, MD, Marcela Rodriguez, MD, MPH, Giovanna Capriolo, MD, Leslie Acakpo-Satchivi, MD, Subhash Chaudhary, MD

Background

Haemophilus influenzae type b (Hib) was the leading cause of invasive disease in children <5 years of age before the introduction of effective Hib conjugate vaccines. Currently, non-type b invasive serotypes are increasingly reported, driving the overall burden of invasive disease.

Aim

To describe a case of invasive *Haemophilus influenzae type a* (Hia) and a review of literature for non-type b Hi invasive disease in children ≤ 5 years in the last 10 years.

Figure 1. Coronal T1 weighted MRI with Gadolinium enhancement demonstrating bilateral subdural empyema over the frontal and parietal areas in a 4-month-old boy.

Case and Methods

A 4-month-old male who presented with fever and lethargy and was subsequently diagnosed with bacteremia and meningitis secondary to Hia. His clinical course was complicated by subdural empyema (figure1) and seizures with complete recovery following surgical drainage and prolonged antibiotic therapy. We searched PubMed and Embase from 2010 to 2020 for case reports of non-type b Hi invasive disease in children ≤ 5 yrs.

Results

Out of 138 articles screened, 17 were selected for review (table 1). 31 individual cases were summarized with 25% reported in the US. Calculated mean age was 1.5 yrs (0-5 yrs). Most common presentation was bacteremia (n=25, 80%) and meningitis (n=17, 55%). Most cases were caused by Hia (n=16, 52%). Comorbidities were reported (n=9, 29%), including immunodeficiency (n=4, 13%). Clinical sequelae included subdural collection and seizures (n=5, 16%). Most patients survived (n=14, 82%) with three reported fatalities.

Table 1. Summary of *Haemophilus influenzae* non-type b Invasive Disease Cases in Children ≤ 5 years of age: Review of Literature 2010-2020

Ref	Author (Year)	Location	Age	Sex	Clinical presentation	Comorbidity	Serotype	Outcome
Current Case	Abdelnour (2021)	Illinois, USA	4 mo	M	Meningitis & Bacteremia	Gastroesophageal reflux	Hia	Recovered. Seizure, subdural empyema
1	Gozum (2020)	New York, USA	2 yr	M	Bacteremia	Tympanostomy tubes Hx Pseudomonas sepsis	Serotype e	Recovered. Diagnosed with X-linked agammaglobulinemia
2	Terrat (2020)	California, USA	4 yr	M	Bacteremia	Neonatal hemochromatosis, Liver transplant	Not typed	Recovered
			2 yr	M	Meningitis & Bacteremia		Biotype VI	Recovered. Diagnosed with X-linked agammaglobulinemia
			<5 yr	NA	Meningitis & Bacteremia	Unknown	Hia	Recovered. Subdural empyema, fever
			<5 yr	NA	Meningitis & Bacteremia	Unknown	Hia	Recovered. Seizure
3	Albrecht (2019)	Minnesota, USA	5 yr	F	Bacteremia & Sepsis, Osteoarthral infection	Previously healthy	Hia	Recovered. Diagnosed with congenital asplenia
4	Cerqueira (2019)	Canada	At birth	M	Respiratory distress, bacteremia		Nontypeable, II	Recovered
			2 mo	M	Bacteremia, Meningitis		Hia, II	Seizures, transferred to tertiary center
5	Konduri (2019)	Alabama, USA	8 mo	F	Meningitis	Previously healthy	Hia	Recovered. Seizure, subdural empyema
			2 yr	M	Meningitis & Bacteremia	Previously healthy	Hia	Recovered
6	Romaneli (2019)	Sao Paulo, Brazil	7 mo	NA	Bacteremia	Bronchiolitis/intubation	Nontypeable	Recovered
			1 mo	NA	Bacteremia	Bronchiolitis/intubation	Nontypeable	Recovered
			21 mo	NA	Bacteremia	Adrenal Carcinoma	Nontypeable	Recovered
			1 mo	NA	Bacteremia	Previously healthy	Hia	Recovered
			4 yr	NA	Meningitis	Lymphangioma, tracheostomy, gastrostomy	Hia	Died
7	Headrick (2017)	Texas, USA	4 yr	F	Meningitis & bacteremia	Previously healthy	Hia	Recovered. Septic arthritis, endocarditis, pneumonia, diagnosed with asplenia
8	Sawardekar (2017)	Oman	17 mo	F	Meningitis & bacteremia	G6PD	Hia	Recovered, subdural effusion
9	Golebiewska (2016)	Mazovia Poland	4 yr	M	Meningitis, Bacteremia, sepsis	Previously healthy	Serotype f	Died
10	Roaa (2016)	Riyadh Saudi Arabia	10 mo	M	Meningitis & Bacteremia	Previously healthy	Hia	Recovered
			3 mo	M	Meningitis & Bacteremia	Previously healthy	Hia	Recovered. Seizure
11	Dobbelaere (2015)	Belgium	At birth	NA	Sepsis/Bacteremia, Respiratory distress	Preterm 35 weeks, maternal fever, leukocytosis	Nontypeable, II	Recovered
12	Hoshino (2015)	Japan	3 yr	M	Bacteremia	Mitochondrial disease	Serotype f	Died
			7 mo	F	Meningitis	Previously healthy	Serotype f	Recovered
			5 mo	M	Meningitis	Previously healthy	Serotype f	Recovered
13	Cardoso (2013)	Sao Paulo, Brazil	1 yr	M	Meningitis & Bacteremia	History of Pneumonia	Serotype f	Recovered
14	Le Quellec (2013)	Lyon, France	1 yr	F	Osteomyelitis/Septic arthritis, Bacteremia	Premature birth, underweight	Nontypeable, III	Recovered
15	Calado (2011)	Evora, Portugal	5 mon	M	Meningitis	Craniosynostosis	Serotype d, IV	Recovered. Subdural empyema
16	Ito (2011)	Japan	2 yr	F	Meningitis & Bacteremia	Previously healthy	Nontypeable, III	Recovered
			15 mo	M	Pneumonia & empyema, Bacteremia	Not reported	Hia	Recovered
17	Kelly (2011)	Northern Ontario, Canada	33 mo	M	Osteomyelitis/septic arthritis, Bacteremia	Previously healthy	Hia	Recovered
			4 yr	M	Pneumonia, Bacteremia	Morbid obesity	Hia	Recovered

Abbreviations: M: Male, F: Female, NA: Not available, Hia: *Haemophilus influenzae type a*

Conclusion

Non-type b Hi invasive disease can lead to high morbidity and mortality in children. Epidemiologic surveillance and serotyping are crucial to monitor changing epidemiology of Hi invasive disease. Inclusion of non-type b strains in the Hib conjugate vaccine may be necessary to protect against *H. influenzae* invasive disease.

References

SCAN ME