Infant Botulism - Experience of 3 cases-report in a Paediatric Hospital

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Background and Importance

Infant botulism (IB) is a potentially life-threatening disorder caused by the ingestion of Clostridium botulinum spores, which subsequently colonize the gut and produce neurotoxins. IB primarily affects children under 12 months of age, with higher incidence in those younger than 6 months. (1,2) The different routes of botulism toxin exposure can be classified as follows: Foodborne botulism, Infant Botulism, Wound botulism, Iatrogenic botulism and inhalational botulism. (1)

The initial symptoms typically include constipation in 90% of cases, followed by neuromuscular paralysis, which begins with cranial nerves and progresses to peripheral and respiratory muscles. Clinical diagnosis is confirmed through laboratory identification of the toxin or microorganisms in the feces. (1-3)

Treatment is initiated following hospitalization with supportive measures and should commence as soon as the diagnosis is suspected. (1,2,4) Specific treatment involves the administration of Human Botulism Immune Globulin (BIG-IV) BabyBIG® , with earlier administration leading to more effective outcomes and lower mortality rates. (1,2)

Aim and Objectives

Presentation of 3 cases of IB in a pediatric hospital and description of the procedures leading to their resolution.

Materials and Methods

Three infants with IB were admitted in different years (2009, 2022, and 2023), all aged 6 months or younger, presenting symptoms such as constipation, hypotonia, irritability, and feeding difficulties. Their clinical data were compiled for analysis.

Figure 1 describes the process for the 3 patients, from symptom onset to the administration of BabyBIG®.

Figure 2 details the acquisition process of BabyBIG® through importation to our hospital.

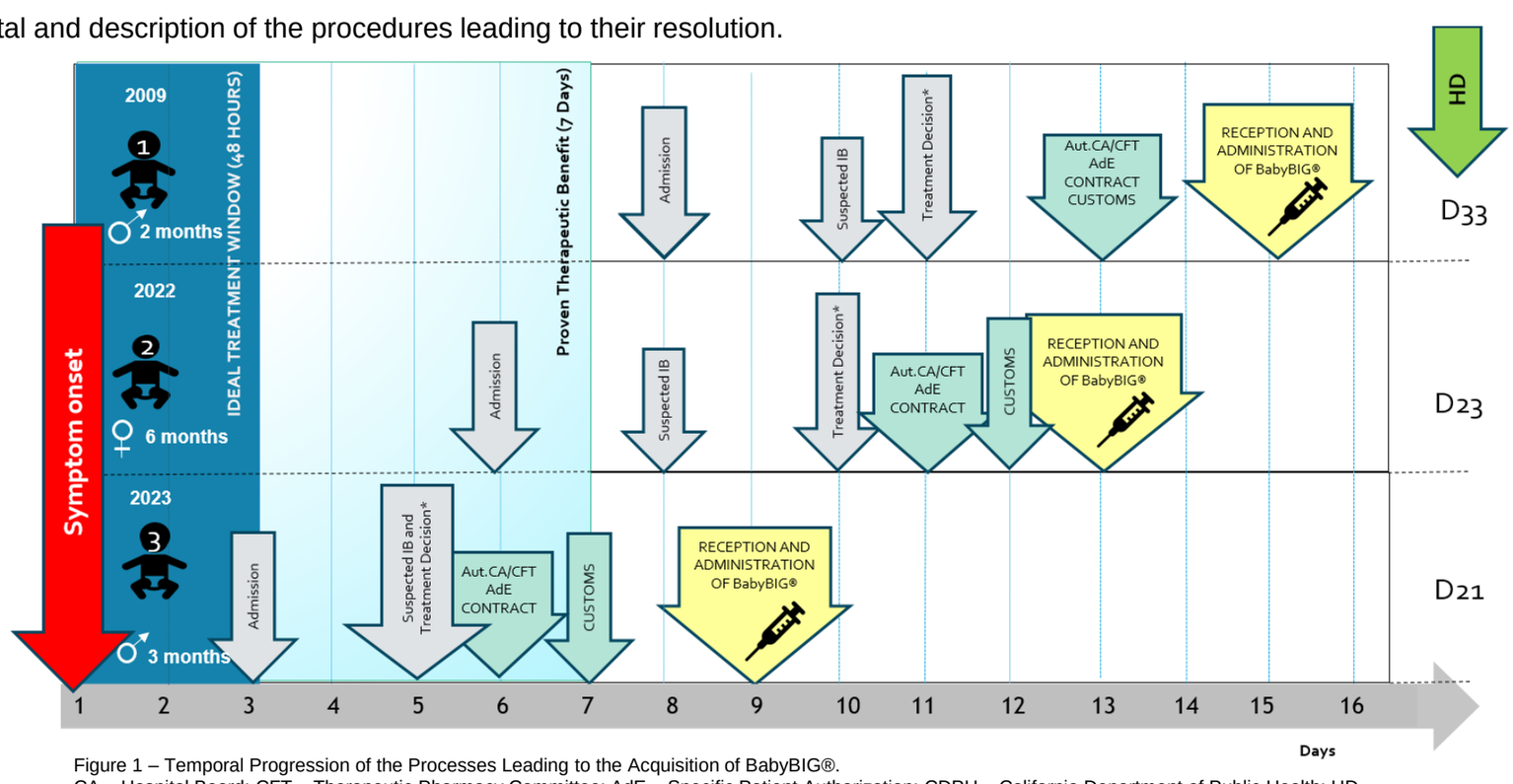

Figure 1 – Temporal Progression of the Processes Leading to the Acquisition of BabyBIG®.
CA – Hospital Board; CFT – Therapeutic Pharmacy Committee; AdE – Specific Patient Authorization; CDPH – California Department of Public Health; HD – Hospital Discharge. *Contact CDPH

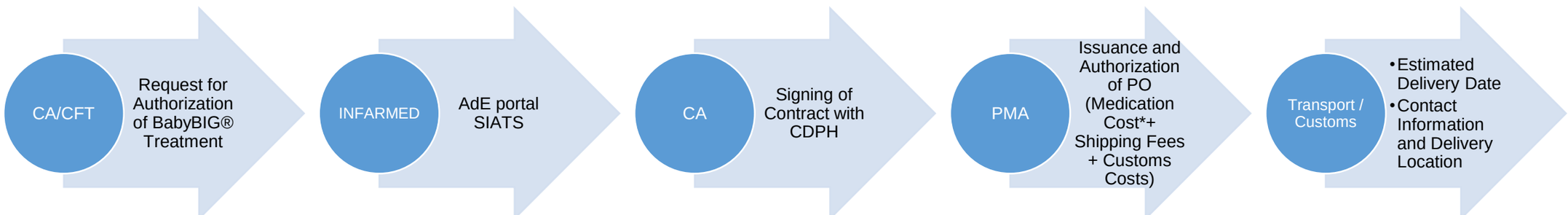

Figure 2 – Processes for the Acquisition of BabyBIG®.
CA – Hospital Board; CFT – Therapeutic Pharmacy Committee; INFARMED - National Authority of Medicines and Health Products; AdE – Specific Patient Authorization; SIATS – Health Technology Assessment Information System; CDPH – California Department of Public Health; PMA – Purchasing Management Area; PO – Purchase Order
*58 800 €

In Portugal, an equine-derived botulism antitoxin immunoglobulin (EqBA) reserve is available for the treatment of botulism in adults and children. (4) However, for the treatment of infant botulism, BabyBIG® is preferred, as EqBA is associated with a high rate of hypersensitivity reactions and a relatively short half-life (5-8 days), which is considered inadequate for a syndrome caused by the continuous intestinal absorption of botulinum toxin. (1,2)

Table 1 summarizes the main differences between BabyBIG® and EqBA (commercialized under the BAT® brand).

Table 1 – Characteristics of BabyBIG® vs BAT®, adapted from Antonucci, L et al., 2021.

	BIG-IV (BabyBIG®)	EqBA-IV (BAT®)
Indication	Treatment of IB caused by toxin type A and B in patients under 1 year old.	Treatment of symptomatic botulism resulting from exposure or suspected exposure to neurotoxins of serotypes A, B, C, D, E, F, or G in adults and children
Mechanism of action	Human IgG neutralise circulating BoNT type A and B	Fab or F(ab')2 fragments of equine IgG neutralise circulating BoNT from type A to type G
Half-life	About 28 days. Blood concentration remains sufficient to bind all free botulinum toxin that an infant may absorb for at least six months	About 7 days
Dosage	50 mg/kg [1 ml/kg] intravenous dose, in one-time	Age dependent

BoNT- botulinum neurotoxin.

Results

In the absence of hospital-acquired complications, the prognosis for infants with IB is generally positive, with complete recovery and gradual improvement in motor function. Infections are the most common complications. (1-3) Gastrointestinally, it is crucial to monitor for signs of secondary Clostridium difficile infection, which may result from colonic stasis due to botulism. Other described complications include respiratory issues, anemia, blood pressure instability, and hyponatremia. (1)

Figure 3 illustrates the clinical progression of patients after the administration of BabyBIG® and follow-up data post-discharge.

The three children were followed in Neurology and Infectiology OPDs (Outpatient Consultations). Regarding Patient 1, hospitalized in 2009, clinical follow-up data during the hospitalization could not be obtained due to the absence of electronic records at the time. In general, all patients showed clinical improvement after the administration of BabyBIG®.

Although treatment was administered after the window of proven benefit, there is supporting literature for its use.

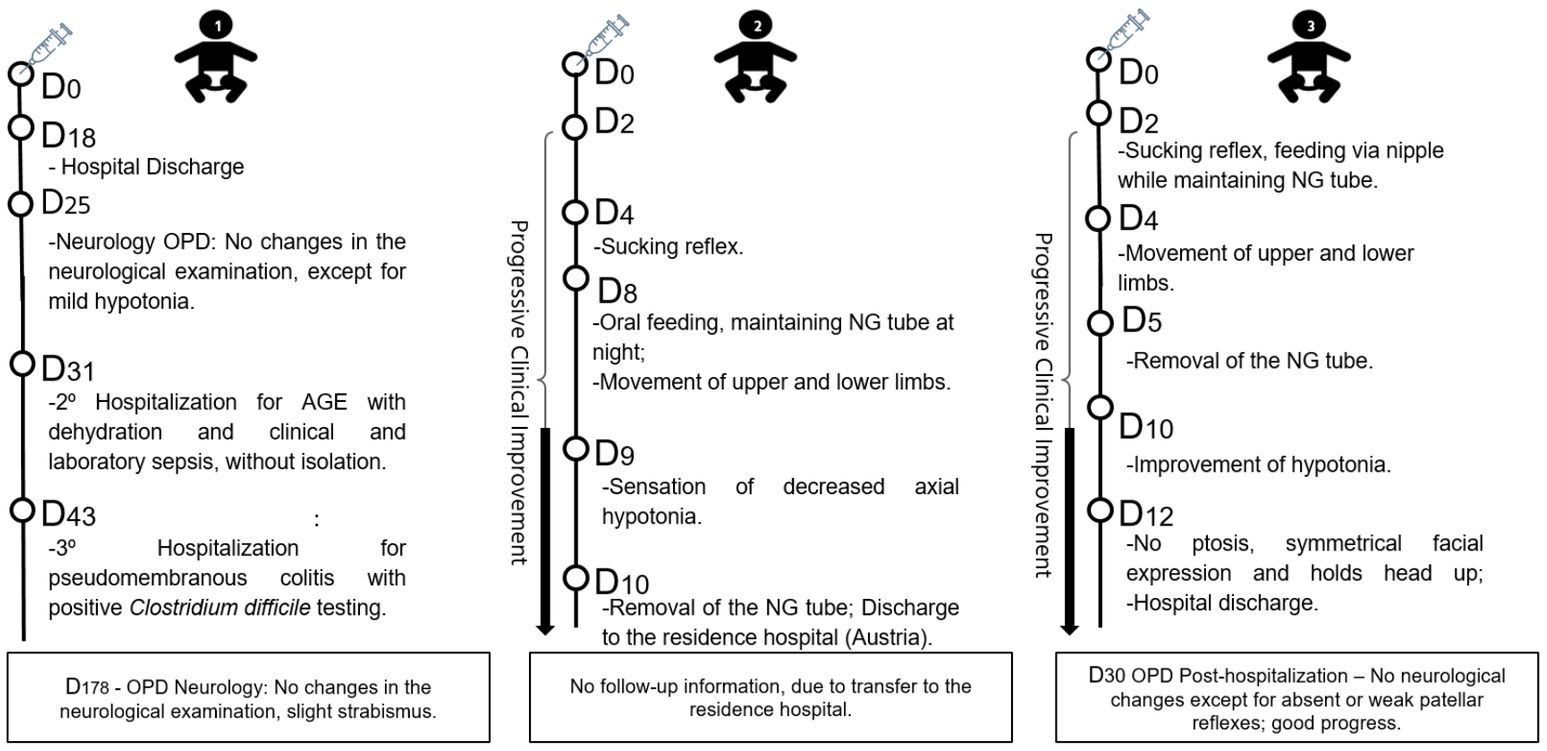

Figure 3 – Clinical Evolution of Patients Following BabyBIG® Administration.
D: Days after BabyBIG® administration; OPD: Outpatient consultation; AGE: Acute gastroenteritis; NG tube: Nasogastric tube

Conclusion and Relevance

The administration of BabyBIG® should be carried out as early as possible upon clinical suspicion of infant botulism, even before laboratory confirmation. Although Portugal has established a National Strategic Reserve of Botulinum Antitoxin (RENAB) for the availability of EqBA, it isn't recommended for children under 1 year of age with IB. (1) Therefore, it is essential to facilitate access to BabyBIG® for specific IB treatment, available in the United States of America, by streamlining the acquisition process to expedite importation or by including it in the RENAB.

References

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