Comparison of Early Diagnosis of Cerebral Palsy in the High-Risk Neonatal Population

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BACKGROUND

The method for diagnosis of cerebral palsy (CP) in pediatric development clinics at the University of Wisconsin has evolved over the past decade. A systematic review published by Novak et al. in 2017 identified several objective measures as part of a new pathway for early and accurate diagnosis of cerebral palsy in infants. Prior research has highlighted the importance of early intervention for improved prognosis with early diagnosis a key. This study reviews the utilization of objective measures and implementation of these new guidelines for early diagnosis of cerebral palsy by developmental pediatricians with the hypothesis that patients would be diagnosed earlier for those evaluated in 2018 or later.

METHODS

A retrospective chart review of patients diagnosed with cerebral palsy at the Waisman Center was completed. Patients met inclusion criteria if they were given the initial diagnosis of "cerebral palsy" or "at risk for cerebral palsy" by a developmental pediatrician between 2010 and 2020. Patients diagnosed by other specialties or those who had neurologic injury outside the perinatal period were excluded. The following were compared between groups diagnosed 2010-2017 and 2018-2020:

- date of initial mention of CP
- date of official diagnosis
- time from presentation to initial mention of CP
- time from initial mention of CP to official diagnosis
- method of diagnosis
- gross motor function classification system (GMFCS) (categorizes motor function on a scale of I-V with V being the most severe)

Initial mention of CP and official diagnosis were defined as the first documented conversation with the family regarding a possible CP diagnosis and a documented conversation confirming a CP diagnosis, respectively. GMFCS was not recorded for patients under the age of two. Given the non-normal distribution of data, the Wilcoxon signed rank test used to compare the two groups.

Children diagnosed with cerebral palsy between 2018-2020 were *diagnosed on a similar timeline* to those diagnosed between 2010-2017 while having significantly *more mild motor symptoms.*

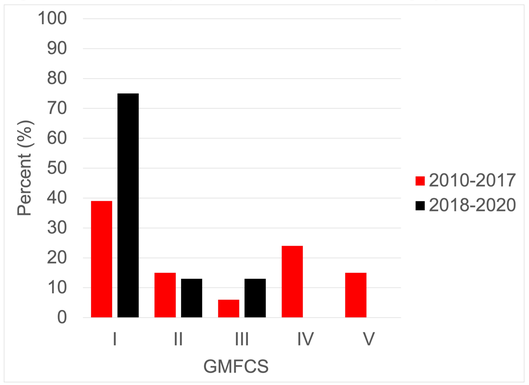
RESULTS

Forty-six out of 346 patients met inclusion criteria. Median age of first CP mention was 9 mo (1.0-5.0) in the first group (1/1/10-12/21/17) and 10 mo (2.0-34.0) in the second group (1/1/18-12/31/20) (p=1.0). Median GMFCS was 2 (1.0-5.0) in the first group and 1 (1.0-3.0) in the second group (p=0.0496). Five patients in the second group did not have a GMFCS recorded secondary to age less than 2 yo. Median time from initial presentation to first mention was 5 months (0.0-23.0) in the first group and 0.0 (0.0-33.0) in the second group (p=0.7592). Median time from first mention to diagnosis was 0 months (0.0-25.0) in the first group and 4 months (0.0-20.0) in the second group (p=0.2974). Objective measures were used for diagnosis in 36% of patients in the first group compared to 92% of patients in the second.

	2010-2017 (n=33)	2018-2020 (n=13)	
Adjusted Age at First CP Mention, Median (Range)	9.0 (3.0-30.0)	10.0 (2.0-34.0)	p= 1.0
Time from Presentation to First Mention, Median (Range)	5.0 (0.0-23.0)	0.0 (0.0-33.0)	p=0.7592
Time from First Mention to Diagnosis, Median (Range)	0.0 (0.0-25.0)	4.0 (0.0-20.0)	p=0.2974

Table 1. Median age at first mention of CP, time from presentation to first mention, and time from first mention to diagnosis between patients diagnosed 2010-2017 and 2018-2020.

Figure 1. Percent of patients in each GMFCS category



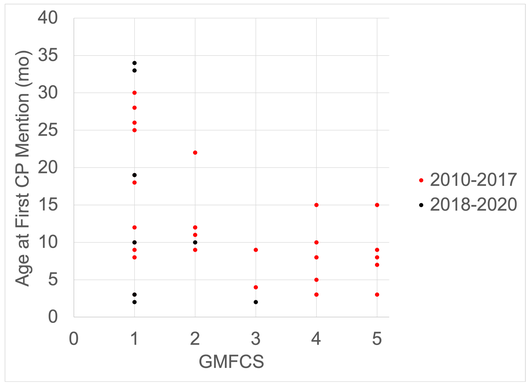
CONCLUSIONS

While the average age of first mention of cerebral palsy was similar between groups, children had significantly lower GMFCS levels in the latter group correlating with more mild motor symptoms and were diagnosed on a similar timeline to those with more severe CP. Evidence-based objective measures were used for diagnosis consistently in the second group resulting in earlier initiation of targeted therapies due to concerns found on these tests. Whether the GMFCS scores were lower due to earlier therapies, improved neonatal care, or other factors is unknown. It remains clear that the use of objective tests encourages early and aggressive intervention.

ADDITIONAL KEY INFORMATION

Other Key Information:
The study was limited by sample size in the second group. GMFCS level was unable to be recorded for five patients in the second group related to age. Next steps include adding additional patients with time. While this study evaluated high-risk infants, a large group of children receive a diagnosis of cerebral palsy outside of newborn follow-up clinic with potential for less standardization in method of diagnosis across fields. Though outside the scope of this study, further evaluation of method of diagnosis and timing of intervention for these patients is warranted.

Figure 2. Motor function compared to age at first mention



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