Impact of Hip Surveillance Program in Pediatric Patients with Cerebral Palsy

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Introduction

Hip displacement is a prevalent issue among pediatric patients with Cerebral Palsy (CP) and can lead to significant morbidity. Surveillance programs aimed at monitoring hip displacement have been demonstrated to decrease the incidence of hip dislocations and surgical intervention, ultimately improving patient outcomes. The objective of this study was to determine if the implementation of a five-year hip surveillance program from 2017 to 2022 increased the frequency of radiographic evaluations and decreased the need for surgical intervention by identifying patients with CP at an earlier stage.

Methodology

A total of 592 patients with CP were identified and 468 of these patients had initial X-ray date data available. In this analysis, we included 246 patients who had their initial X-ray dates after 2012. We divided the study population into two groups based on the initial X-ray date, 2012-2016 vs. 2017-2022. One hundred and sixty (65%) patients were in the 2012-2016 group and 86 (35%) were in the 2017-2022 group. Statistical analysis was performed using various techniques such as two-sample t-test, Mann–Whitney U test, Chi-square/Fisher's exact test, and multivariable linear regression analysis. All statistical tests were two-sided and performed at the 0.05 level of significance. The analysis was conducted using R statistical software, version 4.0.03.

Results

Figure 1. Average Number Of X-rays

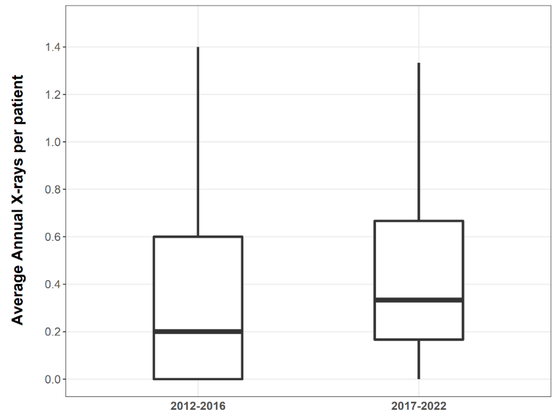

Fig 1. Mean and median avg. number of X-rays per year was significantly higher in 2017-2022 compared to 2012-2016. The mean avg. number of X-rays per year in 2017-2022 was 0.11 (95% CI: 0.02, 0.20, p = 0.017) higher in 2017-2022 compared to 2012-2016. When adjusted for age at initial X-ray, gender, race, ethnicity, and type of CP using multivariable linear regression analysis, this difference was even larger (difference 0.16, 95% CI: 0.06, 0.25, p = 0.001).

Table 1. Rate of Surgery

Characteristics	Levels	2012-2016 (N= 160)	2017-2022 (N= 86)	P value
Intervention rate, n (%)		65 (40.6)	11 (12.9)	**<0.001**
Intervention type, n (%)	None	95 (59.4)	74 (87.1)	**<0.001**
	Preventative	26 (16.2)	2 (2.4)	
	Salvage	1 (0.6)	0 (0.0)	
	Reconstructive	38 (23.8)	9 (10.6)	
Age at intervention (years)	Mean (SD)	8.4 (3.8)	8.9 (1.9)	0.676

*P values were obtained from Chi-square/Fisher's exact test

Table 1. The intervention (surgery) rate was significantly lower in the 2017-2022 cohort compared to the prior (12.9% vs. 40.6%, p <0.001). When the type of intervention was further broken down, the rate of reconstructive surgeries in the 2017-2022 group was significantly lower than in 2012-2016 (10.6% vs. 23.8%, p <0.001).

Conclusion

The results of this study indicate that the implementation of a hip surveillance program resulted in more frequent radiographic evaluations, earlier identification of patients with CP, and a reduction in the need for surgical intervention from 2017-2022. In the 2012-2016 group, a higher rate of surgical interventions were performed due to the lack of a hip surveillance program in place, resulting in patients presenting at a later stage with more advanced disease. The implementation of a hip surveillance program led to more frequent evaluations of patients with an increasing number of X-rays obtained and a proportionately decreasing number of surgeries due to greater awareness of the progression of disease in our patients.

Recommendations

To improve the hip surveillance program, a long-term follow-up study and cost-benefit analysis are recommended. Comparing it with other surveillance programs could also identify best practices. Based on the findings of this study, it is recommended to enhance the hip surveillance program to identify patients with CP at an earlier stage, reducing the need for surgical intervention and ultimately improving patient outcomes.

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