Comparing data from two different areas about screening for DDH. Are our screening strategies still working?

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ABSTRACT.

Background & Objectives: Screening strategies and structures are difficult to build and maintain especially in developing countries, but once they are installed their outcome should be evaluated and compared. Healthcare structures and staff should continuously monitor and maintain those structures. To evaluate the outcome and benefits of screening for DDH, comparing the results of early diagnosis in two populations from two different geographic areas. Only in one of them active screening is applied. Also, reporting data about DDH from unscreened populations was another goal of this study.

Methods: In order to evaluate the importance of screening structures and strategies, we compared the incidence of early vs. late diagnosed cases of DDH from a district where active screening (general clinical screening and selective ultrasound) was applied since 2004, with the total population of children treated for DDH in our facility for the 2009-2014 period of time.

Cases treated with soft abduction devices (Pavlik, Mittelmeier, Frejka) were considered as early diagnosed and those treated with hard devices (Ilfield, plaster cast) or surgery as late diagnosed cases. The data were expressed in absolute value and percentage. The Fisher test was used for the statistical analysis and any values of p≤0.05 were considered significant.

Results: A total number of 1712 children with DDH, divided in two populations were studied. From the 88 children of the population no.1 (the district where active screening was applied), 69 children (78.4%) were diagnosed early and treated with soft abduction devices. In the population no.2, only 627 from 1624 children, (38.6%) were diagnosed early treated with the same devices. (p<0.0001)

Interpretation & Conclusions: The screening strategy definitely produced better results in the district where it was applied. We should activate and maintain a chain of early diagnosis for any congenital pathology countrywide. Even in the areas without any active screening strategy there was observed an increase in the early-detected cases probably due to the reinforcement of the general healthcare system.

Key words: DDH, screening strategies, selective ultrasound.
1. Introduction

Screening for DDH has been an area of controversy for years with different authors supporting different forms of screening, from universal clinical infant screening to ultrasound screening etc [1,2]. We believe active clinical screening of every newborn and selective ultrasound screening of the “at risk” group, (meaning children with positive clinical findings, breach presentations, known family history of DDH, other congenital deformities etc.), would be the right way especially for developing countries with limited human and economic resources. With this study we want to evaluate the outcome of our screening program already implemented in a district of our country and compare the results with other areas where no screening strategies exist. Also studies from unscreened areas are extremely rare in the literature so we believe this study will add interesting data on this field. Starting from the year 2000, an early screening structure was applied in a large district of our country with satisfactory results published before [3,4]. Meanwhile, in the rest of the country, early detection is still empiric and no screening strategy exists. Babies with equivocal clinical findings at the well baby’s regular visits are occasionally referred to orthopedic surgeons or treated from the pediatricians or family doctors. As a matter of fact, evidence of an increase of the early presented cases was observed even from the areas without screening especially in the big urban centers, making this investigation imperative.

2. Material and methods:

During 2009-2014, the total population of children with DDH treated in our facility was studied. Those cases came from two different areas of the country, but only in one of them screening is applied since 2000. The screening protocol consists in general clinical screening of each newborn and selective ultrasound only for those with positive clinical findings or having at least one major risk factor. We compared the two different populations regarding the early vs. late treatment modalities. Children treated with soft abduction devices like Pavlik, Mittelmeyer, Frejka were considered as early diagnosed and the rest of the cases treated with rigid devices like Ilfield, plaster cast or operated children were considered as late diagnosed. We also analyzed the yearly indexes of treated children from the areas without a specific screening program in order to see the yearly trend of early diagnosis.
The reported data were collected from the clinical charts, outpatient records and other hospital sources. The data were expressed in absolute value and percentage. The Fisher test was used for the statistical analysis and values of $p \leq 0.05$ were considered significant.

3. Results

A total number of 1712 children with DDH were treated in our facility during the period January 2009-December 2014. The male female ratio was 352/1712 or 1/5 (figure 1). 88 children came from the area where screening was applied and 1624 others from the rest of the country. We divided each group in smaller groups depending on the device used to treat the disease. Children six months of age or younger were normally treated with soft abduction devices (Pavlik, Becker-Mittelmeyer, Frejka) while the rest of them were treated with harder devices like the Ilfield Brace, short cast by Karagjozi [5], adductor tenotomy and closed reduction followed by plaster casts, or even open reduction with osteotomy, depending on their age at the moment of diagnosis. (figure 2)

We decided to consider as early treated cases the patients treated with soft abduction devices and compare their ratio with other modalities of treatment in both populations for each year. (figure 3) From the first population of children from the screened areas, 69 children or 78.4% were treated with soft abduction devices, 14 children with the Ilfield brace and 3 cases with closed reduction followed by plaster cast. We only had 5 cases operated for DDH from this area. The results from the unscreened population were as follows: from a total population of 1624 children, 627 or 38.6% were treated by soft abduction devices, and the rest of them were treated with harder devices, closed reduction or open surgery.

4. Discussion

If we analyze the data from the total population treated in our facility, at first sight we notice that still a lot of children are referred to us after the age of six months or even later. This becomes clear if we group the cases treated with soft devices or under six months and compare this cohort with the total population of DDH treated by us. (figure 4). The early diagnosis still remains in the range of 35%-40% with an increase in the last years. We do not know exactly the reasons for this increase but it probably happens because of the continuous strengthening of the health care system in our country especially the outpatient and well baby follow up centers.

Also concerning data emerge regarding the operability for DDH.
The general operability range for the studied period is 22%. The results show a decrease during the last two years but still remaining around 15%. (figure 5)

On the other hand, if we look at the results from the area where our screening program is applied, the situation is totally different. The early treated cases for the whole period of time continue to be at the range of 75% with most of children detected under the age of six months and treated with soft abduction devices. (figure 6)

The results were also satisfactory regarding the operability. We had only five children operated from the screened area, but in three of them treatment had previously started with soft devices which failed to obtain a stable reduction so we do not consider them as late diagnosed cases. (figure 7)

5. Conclusions
We believe that screening strategies are important and those structures should be build and continuously monitored and updated countywide with the latest protocols in order to produce good results. General clinical screening combined with selective ultrasound [6] for the babies with positive findings, and those identified as “at risk”, seems to be the right choice especially for countries in development or with limited financial resources. Children with DDH should be referred to the orthopedic surgeon who has the responsibility and competence of treatment of this delicate condition. Treatment with soft abduction devices should be initiated as soon as ultrasound or x-ray report positive findings in order to reduce the operability. The incidence of DDH treated early from the unscreened areas needs further investigation in the future regarding the causes and different contributing factors.

Abbreviations:
DDH-Developmental Dysplasia of the Hip

Competing interest:
The authors report no conflict of interest for this work.

Authors’ contributions:
Artid Duni, and Vilson Ruci have contributed in the conception and design of the study, by drafting the article; Julian Ruci has analyzed the data. All authors have read and approved the manuscript.

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References:


Figure 1.- Spread by year and gender

Figure 2.- Treatment modalities by year for both populations as a single group
Figure 3.- Treatment options for both populations

Figure 4.- Early vs. late diagnosed and treated children with DDH in our facility

Figure 5.- Operability for DDH
Figure 6. Comparing early treatment between the two populations

Figure 7. Comparing the operability between two populations