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# Does the COVID-19 pandemic cause late diagnosis and delay in treatment in developmental dysplasia of hip patients?

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## Abstract

**Background:** The aim of the current study was to search the effect of COVID-19 restriction on developmental dysplasia of hip (DDH) screening.

**Material and Methods:** We retrospectively reviewed the patients who brought to DDH screening in April-May and June-July 2020 and compared with the same period of 2019. We recorded age, gender, DDH type and risk factors of the patients.

**Results:** The number of patients taken for DDH screening was 430 and 400 in April-May 2019 and June-July 2019, respectively. In 2020, the number of patients taken for DDH screening was 159 and 776 in the same period, respectively. Thirteen patients were diagnosed with DDH older than 3 months age in June-July 2020. There were only two patients in same period in 2019. In 2020, 6 of 13 patients who applied to the hospital late for the routine US and had pathologic hips were not taken to orthopaedics or follow-up by their families.

**Conclusion:** In the era of COVID-19, the number of late diagnosis and lost follow-up for DDH are increased. To prevent future morbidities and reduce surgical interventions, special measures should be taken.

## 1 | INTRODUCTION

Developmental dysplasia of hip (DDH) is the general name of a wide spectrum of pathology that can develop in the congenital or postpartum period and includes different degrees of anatomic disorders of the hip such as teratological, unstable, subluxated, dislocated hip and acetabular dysplasia.[1] Radiologically, DDH definition also includes a stable hip with dysplastic acetabulum that does not show clinical symptoms.[2] Although clinical examination in the neonatal period has an important role in the diagnosis of the DDH, it is accepted that examination may be insufficient for diagnosis in some cases.[3] The prognosis of the disease can be excellent with early diagnosis and appropriate treatment in DDH. On the contrary, important deformities can be seen when the diagnosis is late. Neonatal hip ultrasonography (US) is used in the diagnosis of DDH in the first 3 months of life.[4] There are two approaches regarding use of neonatal hip US for DDH. According to the first approach, all newborns are screened clinically, and US examination is performed on all of them, while according to the second approach, US examination is used only for babies with risk factors.[5]

In recent years, studies on early diagnosis of DDH have increased because of the fact that DDH was detected in a group of patients who did not contain significant risk factors and whose physical examinations were normal. In our country, "DDH Early Diagnosis and Treatment Program" has been conducted since 2010.[6] The aim of the programme is examination of all newborns for DDH at 3- or 4-week-old and refer them to hip US examination at 3- to 6-week-old if there is any risk factor or clinical sign of DDH. The diagnosis of DDH after 3 months old is named as late diagnosis.[7] The late diagnosis may increase the need for surgical intervention.[8]

The World Health Organization (WHO) declared the COVID-19 pandemic on 11 March 2020.[7] In our country, the first COVID-19 case was also detected on 11 March 2020, and after a very short time, some serious restrictions were taken to prevent the spread of the disease. Non-emergency surgeries were postponed in hospitals and patients were informed not to go to the hospital unless required. However, experts in the field of DDH suggested that screening should not be considered a non-urgent practice, since delayed diagnosis and treatment can have long-term consequences and indirect costs on child health.[8]

  

We hypnotised that COVID-19 restrictions increased late administration of the patients for DDH screening and so increased the late diagnosis of DDH. In this study, we aimed to search the number of patients who did not apply to the hospital in the first 3 months of life to DDH examination in the period of restrictions in the COVID-19 pandemic. We also aimed to contribute to the guidelines for future pandemics by discussing the difficulties that may be in the late-onset treatment of children who do not have routine physical and neonatal hip US examination on time.

**What's known**

- Late diagnosis of DDH may cause the failure of conservative treatments.
- The newborns should be examined for DDH in first month of their life and treated early if they have DDH.

**What's new**

- Our study showed that parent had hesitation to take their babies to hospitals for DDH screening and follow-ups in COVID-19 era.
- Late diagnosis or inappropriate treatment because of parents' hesitation about hospital visits may cause serious hip problems in child future life.

## 2 | MATERIALS AND METHODS

After the approval of the ethics committee in our hospital (No: 21-604), the records of patients who underwent neonatal hip US from 1 April to 31 May 2020, during the period of the pandemic restrictions and from 1 June to 31 July, when restrictions were reduced, were retrospectively reviewed. In addition, the records of patients who came to hip US 1 year ago within the same time period were retrospectively analysed and the US numbers from 2020 to 2019 were compared. The number of the children applying to the hip US for the first time when they were older than 3 months in 2020 and having pathology in US were detected and compared with the results of the corresponding patient group of 2019.

Detailed clinical information's of the babies were examined. Gestational birth weeks, ages during US (in weeks), alpha and beta angle values and risk factors (positive family history, prematurity, first child, female gender, breech presentation, accompanying deformity, torticollis, metatarsus adductus, oligohydramnios and multiple pregnancy) were evaluated. Hip ultrasound examination was performed by one experienced paediatric radiologist. Each hip was classified according to Graf's classification.[9]

### 2.1 | Statistical analysis

All statistical analyses were performed using SPSS version 20.0 software (IBM, Armonk, NY, USA). Fisher Freeman Halton test used to compare variables. *P*-values <.05 were considered as statistically significant.

## 3 | RESULTS

Totally 159 patients applied to our clinic for neonatal hip US in April and May 2020 during the pandemic restrictions (Table 1). Eighty-four (52.8%) of them were female and 75(48.8%) were male. Two patients (1.25%) had pathologic hips. In 2019, 430 patient underwent neonatal hip US on the corresponding dates (Table 1). Two hundred and eighteen (50.6%) were girls and 212 (49.4%) were boys. Seven (1.6%) patients of these had pathologic hips.

In June and July 2020, when restrictions were reduced, hip US was performed on 776 patients (376 females, 400 males), while 146 (18.8%) of these patients applied for the first time to US when they were older than three months (Table 1). Thirteen (8.9%) of these 146 patients had pathologic hips and 11 (84.6%) of those 13 patients were female. Of these pathologies, nine (69.2%) were type 2b pathological immature hip, three (23%) were type 2c dysplastic hip, and one (7.8%) was type 2d decentric hip. Totally, 18(2.3%) of the 776 patients had pathology in the US.

In June and July 2019, neonatal hip US was performed on 400 (220 female, 180 male) patients and 53(13.25%) of these patients applied for the first time to US when they were older than >3 months (Table 1). Only two (3.7%) of those patients had pathologic hips and both of them were female. The pathology of these two patients were also type 2b pathological immature hip. Totally, six (1.5%) of the 400 patients had pathology in the US.

Only one of the 13 patients had a family history, while the other patients had no additional risk factors other than gender and none of them had pathologic findings for DDH during the physical examination.

Although there was an increase in the number of late diagnosis and pathological hips, there was no statistically significant difference ($P = .813$).

In 2020, 6 (46.1%) (5 patient with 2b, 1 patient with 2c) of 13 patients who applied to the hospital late for the routine US and had pathologic hips were not taken to orthopaedics or follow-up by their families. Pavlik bandage was applied to the remaining seven (53.8%) patients. It was observed that hips normalised in three (42.8%) of seven patients who were applied Pavlik bandage. Two patients (%42.8) with persistent dysplasia were followed up with abduction orthosis, but it was observed that both were not taken to follow-up regularly in the later period. Closed reduction was applied to one patient with type 2c who did not improve with Pavlik bandage. The patient with Type 2d underwent open reduction.

It was observed that one of two patients who were admitted to the hospital late for routine neonatal US in 2019 did not come

**TABLE 1** Number of patients

| | All Patients | Pathologic hips of all patients | >3 mo old patients | Pathologic hips of >3 mo old patients | *P*-value |
|---|---|---|---|---|---|
| Date | | | | | .813 |
| 2020 June-July | 776 | 18 | 146 | 13 | |
| 2020 April-May | 159 | 2 | 22 | 0 | |
| 2019 June-July | 400 | 6 | 53 | 2 | |
| 2019 April-May | 430 | 7 | 45 | 2 | |

for follow-up. The other patient's hip dysplasia continued in the follow-up, but she was not taken to control when the pandemic restrictions started.

## 4 | DISCUSSION

Developmental dysplasia of the hip is an important problem in childhood, unfortunately, it is still common all over the world. The incidence varies greatly according to races and geographical regions. Its prevalence is around 1.5%-2%.[10] There have been many studies investigating DDH in our country and the prevalence of the disease was obtained quite different.[11] Late diagnosis and inadequate treatment could result in increase in the failure of noninvasive treatments and the need for surgical interventions.[12] DDH Early Diagnosis and Treatment Program significantly decreased late diagnosis of DDH.[12] In our study, we detected an increase in the number of late administrations for DDH examination and irregular follow-up in 2020 when compared with the same period of 2019.

Although the definition of pathological hip affects this ratio, in our study in which types 2b, 2c, 2d, 3 and 4 were considered pathological, the pathology prevalence detected in hip US was 2.3% in the COVID-19 pandemic. This rate was found to be 1.5% in June-July 2019. Rather than a single factor in the aetiology of DDH, several predisposing factors have been identified such as prenatal and post mechanical factors, maternal hormonal bond laxity, acetabular dysplasia, race characteristics, developmental factors, genetics and environmental factors.[13] Other identified risk factors were postural and structural foot deformities (metatarsus adductus, pes calcaneovalgus, pes equinovarus), torticollis, high birth weight, joint laxity, oligohydramnios, first baby and difficult birth history.[14] Girls have been found to be more affected than boys.[15] In our study, only female gender and family history were present among these risk factors. While there was female gender in 11(84.6%) of 13 patients in 2020 and in two (100%) of two patients in 2019, there was family history only in one patient.

The Graff's method has been widely used in US for the diagnosis of DDH since the 1980s.[9] Although there are various differences of opinion about the time of neonatal US in the literature, everyone agrees that neonatal US and initiation of the treatment should be performed in the first 3 months of life.[4] Late diagnosis may result in delayed treatment, decreasing the success of conservative treatments, increasing the need for surgery.[12,16] In the literature, it has been reported that 44% of patients with a late diagnosis needs surgical operation.[17] Also, late diagnosis of DDH is an important public health problem and significantly increases healthcare costs.

The number of patients applying to neonatal hip US during the period of pandemic restrictions in April-May 2020 decreased 63% compared with the previous year in our study. In June-July 2020, after the pandemic restrictions, the number of patients who applied to neonatal hip US increased 94% compared with the same time period of the previous year. The pathology rate increased from 1.5% to 2.3%. After the pandemic restrictions, the number of patients, which applied for the first time to US when they were >3 months old was increased 5.5% compared with the previous year. The pathology rate in these patients also increased by 5.2% compared with the previous year. The increase in the number of patients and the number of pathologies in the post-pandemic period compared with the previous year is obviously because of the patients who applied to the hospital late because of the fear of the COVID-19 pandemic. We also detected that patients with hip dysplasia were not taken to for treatment and regular follow-up in the COVID-19 era. In 2019, all patients were taken to regular controls by parents.

To best our knowledge, our study is the first study on this subject, and only one patient was reported in the literature.[18] But we believe that the number will increase as studies are carried out on this subject and that we will see this indirect effect of COVID 19. The results of this study showed that if we do not continue to care for patients with the right precautions during pandemics, unfortunately, this will have bad consequences for public health. Moreover, the pandemic is still ongoing, and it is not clear how long it will last.

Some studies have shown that ultrasound can be a vector in the spread of infections.[19,20] Therefore, some precautions should be taken during the US examination against a highly contagious infection such as COVID-19. US appointments should be planned properly to shorten the spent time of the patients in the hospital. Patients should be taken to the examination room with only one parent, and there should not be any other patient or staff in the room. Examination room, baby changing table and US probes should be cleaned every morning and just before every scan. Taking these precautions in US to reduce the spread of infection will relieve the society and will encourage the patients for hospital admissions if necessary.

Retrospective design and relatively small number of patients are major limitations of our study. Small sample size may be the cause of statistical insignificance.

## 5 | CONCLUSION

This is neither the first pandemic the world has faced nor will it be the last. That is why it's so important to create guidelines. Family health centres and paediatricians should warn the patients families about the diseases such as DDH during the pandemic period and ensure them to have a hip examination and US performed under appropriate conditions. Late diagnosis, inappropriate treatment and follow up may decrease the chance of conservative treatment and increase surgical intervention risk.

## DISCLOSURES

The authors declared no conflict of interest.

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