







Screening for developmental dysplasia of the hip in Greece: current practice and future perspectives

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Abstract

Screening for developmental dysplasia of the hip (DDH) in Greece is being performed according to the guidelines issued by the Institute of Child Health in 2015. Screening strategies include universal clinical screening and selective (based on clinical findings or risk factors) sonographic screening. Clinical examination is performed by neonatologists and paediatricians and findings are recorded in the baby's Health-Book. Whenever clinical examination is suspicious (however non-specific), children are referred for an ultrasound scan and/or to a (paediatric) orthopaedic surgeon. In the case of a positive clinical examination, children are referred to a (paediatric) orthopaedic surgeon, who treats them, when needed. All types of abduction devices are used for treatment (Pavlik, Tubingen), as well as plaster cast, which is preferred in older babies. There are no official guidelines over the selection of the sonographic method for screening; however, the mostly used technique is Graf's, according to publications from Greek centers. Training of operators on the sonographic examination technique is carried out during radiology residency, depending on hospital availability/expertise, through seminars with hands-on workshops and/or during fellowships. Radiologists and certified paediatric orthopaedic surgeons are the only ones legally allowed to perform neonatal/infantile hip sonography in Greece. Emphasis on the benefits of universal screening and standardized techniques are increasingly taught and repeated, which may eventually influence the decision-making process and standardize the performance of hip sonography within the next few years.

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Keywords

Developmental dysplasia of the hip, screening, hip ultrasound, hip sonography Greece, paediatric ultrasound

Introduction

Developmental dysplasia of the hip (DDH) is a broad term, covering a spectrum of abnormalities of the hip joint, which appear perinatally [1]. It is the most common musculoskeletal disorder of the newborn [2], with a complex etiology and a potential to cause permanent abnormalities to the joint, if not diagnosed and treated early [3, 4].

Screening for DDH during the postnatal period has been a source of debate and conflict [5]. Clinical examination [6] and imaging (mostly ultrasound [7] and radiography in selected cases [8]), form the basis for the diagnosis of the disorder and screening policies.

This report briefly summarizes the published guidelines which currently form the basis of DDH screening in Greece, comments on the application of the current screening strategy and attempts to trace the future trends about DDH diagnosis and management.

Primary healthcare guidelines

Screening for DDH in Greece is being performed according to the guidelines issued by the Institute of Child Health (<https://ich.gr/>), in 2015 [9]. Screening policy is presented in detail in the following table (Table 1).

Table 1. Screening policy in Greece [9]

Timing of routine examinations	Policies and actions
1st–2nd week (First routine examination)	<p>DDH screening of all neonates, includes:</p> <ul style="list-style-type: none">(a) History (looking for risk factors)*.(b) Clinical examination (includes Barlow and Ortolani maneuvers).<ul style="list-style-type: none">• Universal sonographic screening is not recommended. <p>Depending on the results:</p> <ul style="list-style-type: none">(a) Negative clinical examination** and no risk factors:<ul style="list-style-type: none">• Clinical (re-)examination at the age of two (2) months.(b) Negative clinical examination** and risk factors present:<ul style="list-style-type: none">• Perform hip ultrasound at six (6) weeks.<ul style="list-style-type: none">i. In case of positive imaging findings:<ul style="list-style-type: none">-Refer to a paediatric orthopaedic surgeon.ii. In case of negative imaging findings:<ul style="list-style-type: none">-Clinical (re-)examination at the age of two (2) months.(c) Positive clinical examination**, irrespective of the presence or absence of risk factors:<ul style="list-style-type: none">• Refer to a paediatric orthopaedic surgeon.<ul style="list-style-type: none">-Use of a triple nappy is not recommended (insufficient evidence to support it, may delay appropriate treatment).
2 months (Second routine examination)	<p>DDH screening of all the infants, includes:</p> <ul style="list-style-type: none">(a) History (looking for risk factors)*.(b) Clinical examination (includes Barlow and Ortolani maneuvers). <p>Depending on the results:</p> <ul style="list-style-type: none">(a) Negative clinical examination**:<ul style="list-style-type: none">• Follow up (no intervention).(b) Indicative/suspicious clinical findings (nonspecific findings, including asymmetries or restricted hip abduction, subtle “clicking” of the hip, with negative Barlow or Ortolani maneuvers):<ul style="list-style-type: none">• Sonographic examination and/or referral to a paediatric orthopaedic surgeon.

Table 1. Screening policy in Greece [9] (continued)

Timing of routine examinations	Policies and actions
	(c) Positive clinical examination**: <ul style="list-style-type: none">• Referral to a paediatric orthopaedic surgeon.

DDH: developmental dysplasia of the hip; * : risk factors include breech presentation, positive family history (1st or 2nd degree relative), female gender, etc., also see Table 2; ** : mainly based on Barlow and Ortolani maneuvers

Note. Translated from: “Monitoring children’s health in primary health care”. In: Antoniadou-Koumatou I, Panagiotopoloulos T, Attilakos A, editors. Athens: Institute of Child Health, 2015. (<https://www.moh.gov.gr/articles/health/dieythynsh-prwtobathmias-frontidas-ygeias/draseis-kai-programmata-agwghs-ygeias/oikogeneiakos-programmatismos/5256-paidiatrikes-kateythynthries-odhgies>). Greek.

The above-mentioned screening strategy may be summarized in the following statements:

- Universal clinical screening.
- Selective (based on clinical findings or risk factors) sonographic screening.

Risk factors, according to the recommendations, are included in Table 2 [9].

Table 2. Risk factors for DDH [9]

Risk factors for DDH	
Female sex	Other musculoskeletal disorders (metatarsus adductus, calcaneovalgus foot, talipes, torticollis)
Breech presentation	Oligohydramnios
Positive family history	Birth weight > 4 kgr
Persistent “click” at clinical examination	Delivery after 42 weeks
Multiple gestation	Firstborn
Swaddling	Left hip

DDH: developmental dysplasia of the hip

DDH screening and clinical management in Greece

True incidence of DDH in Greece has not been officially estimated. This is partly due to the fact that there is always a problem with the definition of the disorder, depending on the utilized diagnostic method (clinical examination, radiography, ultrasonography) and the diagnostic criteria (immaturity, dysplasia, dislocation), and partly due to the absence of a long-standing, unified, formally designed screening policy. As a result, epidemiological data are very limited.

Clinical examination is mainly performed by neonatologists who normally examine the babies before discharge from the maternity unit and by paediatricians who perform clinical assessment of the infant’s development during visits for vaccinations, according to the national scheme. Examination results are recorded in the baby’s Health Book.

Referral to a (paediatric) orthopaedic surgeon is performed in the case of a suspicious (a sonographic examination may also be requested) or positive clinical examination. Treatment, when needed, is performed by (paediatric) orthopaedic surgeons. All popular types of abduction devices are used (Pavlik, Tubingen), as well as plaster cast (hip spica), which is commonly used in older babies.

There are no official guidelines over the selection of the sonographic method of choice for screening, however, publications originating from Greek screening locations indicate that the mostly used technique is Graf’s [10–13]. To our knowledge, there is no audit or evaluation of the efficacy of the operators, of treatment performance or of benefits of screening using the aforementioned policy, in Greece.

Training of operators on the sonographic technique is carried out during radiology residency, depending on hospital availability/expertise, through seminars with hands-on workshops and/or during fellowships in national and international institutions. Only radiologists and certified paediatric orthopaedic

surgeons are legally permitted to perform hip sonography in Greece. Structured training has been offered since 2009, through a series of training seminars, organized by the 2nd Orthopaedic Department of the Aghia Sofia Paediatric Hospital in Athens (Chair: Dr. Ioannis Anastasopoulos) and moderated by Professor Reinhard Graf. Since 2011, the Radiological Society of Crete, supported by the Radiology Department of the University of Crete (Chair: Professor Apostolos Karantanas), has offered five training courses in Heraklion, Crete. Notably, the first two have been moderated by Professor Reinhard Graf, himself. Training courses have also been organized under the auspices of the Radiological Society of Crete, in Chios and in Thessaloniki (Trainers: Dr. Konstantinos Chlapoutakis, Radiologist and Dr. Stylianos Kolovos, Orthopaedic Surgeon). The latest course has been held in Heraklion (2023), under the auspices of ICODE (International Interdisciplinary Consensus Committee on DDH Evaluation—<http://icode.expert>). Training courses have already been planned for 2024.

Tracing the future

Despite the fact that the benefits of universal screening have been thoroughly recorded, tested and verified [14–20], there is still an ongoing debate about the selection of the appropriate method to perform DDH screening [5, 21, 22].

Structured training has heavily affected attitudes on screening in certain geographic regions in Greece. A tendency towards universal sonographic screening is observed during the last few years in places where structured training has repeatedly taken place (including Crete and Chios), with promising results, thus promoting implementation of standardized performance of hip ultrasonography. Crete belongs to the geographic areas in Greece which have been considered to carry an increased incidence of DDH [10]. Consequently, paediatricians are inclined to refer neonates and infants for universal screening. There are no official data to support this regional practice, however, there is a strong possibility that a number of neonates/infants with negative or equivocal results from clinical examination have been successfully diagnosed and effectively treated.

We are currently not aware of details about adherence to the national guidelines, current practices, and training on hip ultrasonography in several areas of Greece, especially the central and western parts of the country. More training courses, with the additional aid of a commercially available training phantom, have already been planned and are expected to further enhance the quality of practice, by increasing the number of trained operators/examiners. Furthermore, an effort to upgrade the screening policy to universal sonographic screening has been initiated, by communicating the literature updates to the scientific communities. These steps may eventually influence the decision-making process and standardize the performance of hip sonography within the next few years.

Conclusion

Screening for DDH in Greece currently includes universal clinical screening and selective (risk-based) sonographic screening. Emphasis on the benefits of universal screening and standardized technique are increasingly taught and repeated, which may eventually influence the decision-making process and standardize the performance of hip sonography within the next few years.

Abbreviations

DDH: developmental dysplasia of the hip

Declarations

Author contributions

KC: Conceptualization, Investigation, Writing—original draft, Writing—review & editing. SK: Investigation, Writing—original draft, Writing—review & editing. EP and NS: Validation, Writing—review & editing. RD and MR: Writing—original draft, Writing—review & editing, Validation, Supervision. All authors read and approved the submitted version.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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