Knowing your click from your clunk: Is current DDH screening fit for purpose?

It's almost 20 years since we published an editorial about screening for Developmental Dysplasia of the Hip (DDH), which was based on expert opinion from the UK and Sweden[1]. It considered the effectiveness of clinical examination and ultrasound imaging in the screening for pathological DDH. The conclusion was that there were concerns related to the effectiveness of hip screening policies for the diagnosis and treatment of DDH. A recent editorial[2] in a paediatric journal has again raised similar concerns on the efficacy of the DDH screening programme.

In recent years, the Bone and Joint Journal has published several long-term observational studies which have casted doubt on the association of pathological DDH with many 'traditional' risk factors; asymmetrical skin creases, foot abnormalities and 'clicky' hips[3,4,5],. The Newborn Infant Physical Examination (NIPE) committee is now again reviewing the screening guidelines for diagnosing DDH in England[6].

What has changed in the last twenty years? The Cochrane review of 2013[7] stated that levels of evidence for the effectiveness of screening in DDH is poor, highlighting no improvement in the numbers of late diagnosed DDH requiring surgery since the introduction of screening. In 2014 the AAOS[8] published a systematic review stated that there was moderate evidence to reject universal ultrasound screening, recommending some form of imaging in children under 6 months of age in cases of positive family history, breech presentation or a history of clinical instability. The AAOS noted that of 4026 papers that they reviewed, only 32 had sufficient quality to be used in the guidance.

Why the uncertainty about screening? Between 70% and 90% of clinically unstable hips of infants will stabilise spontaneously between 2 and 4 weeks postnatally[9,10]. There is no agreement on what constitutes pathological DDH either clinically or sonographically. Some research groups consider the majority of Graf Type II hips to be pathological, whilst others consider only more severe types of sonographic abnormality[11]. Furthermore, there is no robust evidence to confirm that the splinting of hip joints in early pathological DDH, is an effective treatment i.e. Pavlik harness [1,8].

Should we screen everyone with Ultrasound? Universal ultrasound screening has been suggested as a solution, though is controversial. The delayed open reduction rate appears more favourable than clinical screening alone or selective screening, though this may not be statistically significant (i.e. targeted sonographic hip screening combined with universal clinical hip examination)[17],[7,8]. However, universal sonographic screening results in significant over diagnosis of minor forms are DDH that are unlikely to be clinically important. Over-diagnosis primarily arises from the absence of agreement of what constitutes true clinical or sonographic DDH. The resultant over treatment may result in long-term complications such as avascular necrosis of the femoral head[1], in addition to impeding early bonding between mother and child In some studies of universal

ultrasound screening up to 7.0% of the population may be treated, compared to 0.34% in traditional screening; a potential over treatment rate of 20 times [14, 21,18,] .

What screening does the best current evidence favour? The most effective clinical screening programmes, resulting in the lowest rates of late irreducible hip dislocation, appear to be delivered by focused clinical screening undertaken by a small group of well-trained professionals. Studies in Scotland and Sweden[12,13] have shown improved outcomes when clinical screening is undertaken by a small task-force of professionals with hip screening as their key role. However, the model used in other countries, including England, Wales and Northern Ireland, involves clinical screening by a broad group of examiners with variable experience. Many of these examiners are inexperienced, and are unlikely to identify the subtle clinical signs of hip instability, especially given the rarity of DDH, and the rarity of positive instability tests (Ortolani & Barlow manoeuvres)[9,11,14].

What is the current NIPE DDH screening policy[19], and what are the uncertainties in the screening guidelines?

1. **Clinical examination of the hips should be undertaken on all neonates within 48 hours of birth (Ortolani & Barlow manoeuvres), with a subsequent sonographic assessment of positive cases within 2 weeks.** *This relies on the skills/experience of clinical examiners who generally have little training or experience to detect such abnormalities. Nevertheless, many hips abnormal at this age will also resolve without the need for treatment by 4 weeks.*

2. '**At risk' children with a family history from a first degree relative, or a breech presentation should be sonographically examined by 6 weeks.** *This identifies few cases of pathological DDH, and almost none in males[11]. There is limited evidence supporting this arm of screening [8].*

3. **All children should have a General Practitioner clinically examine the hips at 6 weeks of age.** *The majority of positive Ortolani/Barlow hip instability manoeuvres typically resolve by 4 weeks, but unilateral limitation of abduction does not develop until after 3 months of age. The timing of the current examination is therefore unlikely to have a significant yield, and recent studies dispute the effectiveness[20].*

4. **Screening for "clicky hips" should be a matter for local policy.** This is a rather vague recommendation, with any association of clicky hips with true instability causing considerable debate [4,15]. The evidence base on the importance of clicky hips, is poor, with some groups dismissing isolated clicky hips as unimportant and others identifying a possible link with clinically stable but sonographically abnormal hips (possible over diagnosis). This debate emerges as it is probable that some primary examiners may not know, or cannot differentiate between instability and physiological clicking. True clinical signs of pathological DDH are positive Ortolani/Barlow manoeuvres[9,14] and unilateral limitation of hip abduction[16]: not isolated 'clicky' hips or asymmetrical skin creases [3,4].

There is a real risk that the current screening regime for DDH is ineffective. It is already well accepted that it fails to meet the criteria of an effective screening programme, and at best should be regarded as hip surveillance[11].. Recommendations of the NIPE committee are an Expert Based Consensus, using the current sub-optimum evidence base. There is no evidence that the current NIPE guidelines have reduced the number of dislocated hips requiring surgical intervention. Neonatal units now almost universally use a database to record details of the neonatal screening examination – called 'NIPE Smart'. We advocate that this database is embraced to efficiently study models of hip screening, by incorporating hip-specific outcomes, to effectively investigate the efficacy of screening programmes, and investigate the optimal treatment for neonatal DDH.

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