Developmental Dysplasia of the Hip

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The hip joint because of its anatomical structure (a ball and socket joint) is very stable and some effort is needed to dislocate it. However, this is not so in children with the condition called developmental dysplasia of the hip (DDH). It can be described as an abnormal development of the hip. The presentation of this condition can vary from the joint that is subluxatable, to a joint that is subluxated or outright dislocated. Dislocation means that the articulating surfaces of the joint, in this case the femoral head and acetabulum are not in contact. Subluxation means that there is still partial contact between the articulating surfaces and subluxatable means that the joint is reduced but can be induced to subluxate. The spectrum of presentation also includes the much later in life presentation called acetabular dysplasia. In this, the femoral head is reduced but the acetabulum fails to develop normally. The femoral head is inadequately or poorly covered by the acetabulum.

The most commonly quoted incidence of DDH is 1 case in every 1,000 live births. However, this is not true for some races or groups of people. For instance, DDH is more frequent among North American natives and Laplanders while it is less frequent in some races like blacks and Asians. Having a relative with DDH increases the risk. Girls are more frequently involved. These findings point to the role of genetics in its etiology. Joint laxity has also been pinpointed as a contributor to DDH. It is more frequently seen if the mother is primigravid. Infants born in breech presentation were noted to have a higher incidence of DDH. Oligohydramnios and being first born are similarly linked to higher DDH incidence. The left side is more commonly involved since in majority of pregnancies, the fetus' left hip rest on the sacrum and the hip is pushed to a position of adduction. All these can be lumped together as instances of malposition and cramped intrauterine environment for the developing fetus. These can be conveniently called 'packaging' issues. Other deformities like torticollis and metatarsus adductus that are also due to 'packaging' issues. It must be noted that these two conditions are associated with DDH.

The natural history of DDH points to the likelihood of hip pain and hip arthritis later in life. Thus, it is clearly important that the hip must be reduced back to its proper position. The normal development of the hip joint can only proceed unimpeded if the femoral head is in its proper location. By the age of around 8 years, the acetabulum no longer has enough growth remaining to properly develop to contain a just relocated femoral head. Beyond this age, (though some Orthopaedic surgeons would go up to 10 years of age especially if bilateral DDH) it is no longer advisable to put back the dislocated femoral head. The outcomes are no longer good at this point and some salvage procedures may sometimes be resorted to. Often it is more prudent to just wait when symptoms are no longer tolerable. Eventually, joint replacement would be the last option. With this knowledge, it is important to diagnose DDH really early. The prognosis is much better if treatment is started early.

It is important that all newborns must be screened for DDH. Screening can be done in many ways. This can be done purely by physical examination, by physical examination with universal ultrasound examination of the hips of all newborns or physical examination with selective ultrasound examination only for those infants with positive physical examination findings and/or if risk factors are present. There is no clear consensus yet on how the ultrasound

examination should be used since no significant benefit has been noted between the last two methods of newborn screening.

Not all the bones in newborns are ossified and visible on x-rays. As a child grows, different ossification centers sequentially appear. Without the femoral head ossification center visible yet, x-ray examination would have limited use. Ultrasound examination provides a good picture of the soft and hard anatomical structures of hip in the very young. The ultrasound examination can provide a static image of the hip (as in Graf's method) or video of a moving hip as it is moved and stressed (like in Barlow's maneuver). At around 4 – 6 months of age, the femoral head ossification center appears. By this time, the regular x-ray becomes useful.

Proper screening of the newborn starts with a thorough inspection of the child. Asymmetries must be searched for. Findings like unequal skin folds in the thigh and unequal leg lengths should raise one's suspicion. Other musculoskeletal abnormalities like torticollis, metatarsus adductus must be noted. One's index of suspicion should be raised in the presence of other musculoskeletal abnormalities. The range of hip motion must be assessed with particular attention to hip abduction. There are two simple tests that should be done. The first is the Ortolani maneuver. This test is done for one hip at a time. First the pelvis is stabilized then the knees and hips on the side being examined are flexed. The examining hand grabs the thigh with the index finger at the greater trochanter area and thumb near the inguinal area. From a flexed and adducted position, the hip is abducted with a simultaneous gentle push up. A positive finding is when a sensation of the hip clunking in is felt. A 'clicking' sound does not constitute a positive finding. The clunking senation signifies a dislocated hip getting reduced. The second maneuver is the Barlow's test. The hand holds the thighs in a similar fashion as in the Ortolani test. This time though, the starting position is the hip in abduction. As the hip is adducted a gentle push down is made. A sensation of something giving way is a positive finding. This signifies a hip that is in reduced position getting dislocated. These two findings remain useful only up to 4-6 weeks in many children (can extend to several months in a few). The moment the soft tissues get contracted, these tests are no longer reliable. In some cases, the hips are fixed in dislocation and cannot be reduced even at birth. This is often true in the teratologic type (often associated with some syndromic conditions). In these cases, the Ortolani's and Barlow's cannot be used. The Klisic test may be useful at this stage. The Klisic test is positive for hip dislocation if a line drawn from the greater trochanter to the anterior superior iliac spine does not point to the navel. For older infants or children, the most useful physical sign is limitation of hip abduction.

In countries where no organized DDH screening program is in place, children are often brought for consultation due to a limp. This is a painless limp. The child can be seen running and jumping with no discomfort at all. In unilateral cases, one can see the unaffected side of the pelvis dip down when the child is standing on the dislocated side. The contraction of the hip abductor muscles on the affected side cannot effectively lift the pelvis. This lifting of the pelvis (when standing on one leg only) is necessary in order to shift the center of gravity of the body towards the standing leg side. If this is not done, then the person will fall down. The person will not be able to stand on one leg. The compensatory movement is to sway the trunk towards the standing side because this shifts the center of gravity. This type of gait (pelvis not lifting and trunk swinging to the side) is called a Trendelenburg gait. A child's hip not lifting up can sometimes be difficult to discern. The easier way would be to check if the shoulder swings from side to side (a sign of trunk's compensatory sway). Signs of limb shortening like foot equinus may also be noted. In

cases wherein the dislocation is bilateral, the child would manifest a ‘waddling gait’. An exaggeration of the lumbar spine lordosis can also be noted and the belly very prominent.

The aim of treatment is to stably reduce the femoral head in the acetabulum. The approach to treatment varies as the child becomes older. In the very young, up to 6 months of age, the Pavlik Harness is the treatment of choice. This keeps the hip reduced as it allows motion only within the ‘safe zones’ of motion arc. Through the adjustment of the straps, the position of the hip and range of motion allowed are controlled. If the hip cannot be reduced, then open surgical reduction is resorted to. At toddler stage and beyond, open reduction is often supplemented by shortening of the femur, redirection of the femoral head or by redirecting and reshaping the acetabulum. Other ‘salvage procedures’ have been described if hip reduction is not successful. If the hip dislocation persists into adulthood and pain and disability worsen, total hip arthroplasty or hip joint replacement may be resorted to.

References:

Tachdjian’s Pediatric Orthopaedics. John Anthony Herring. Ed. Fifth Edition. Elsevier Saunders. Philadelphia. 2014.

Junichi Tamai, MD. Developmentatl Dysplasia of the Hip. E Medicine Medscape.com. Updated February 2020.