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BIOL F111X

Hip Dysplasia

Developmental dysplasia of the hip is a musculoskeletal condition where the hip joint does not develop properly and causes problems for the femoral head bone. The objectives I will be covering are from unit four. My objectives I cover are on how bone development is hormonally regulated, the stages of bone development and repair, and lastly describing the movements of bones. Through this paper and my project I will describe and explain how hip dysplasia affects the function of bones, future health conditions, and overall homeostasis.

To start, what causes developmental hip dysplasia (DDH). Hip dysplasia can develop either prenatally or postnatally, that is before birth or after birth (Krauss et al., 2025). Developmental hip dysplasia is the most common kind of hip pathology in infants. There is not any known single cause of developmental hip dysplasia. There are, however, many factors believed to cause this condition, hormonal, mechanical, and genetic factors. Hormones play an important role in regulating bone growth. In hip dysplasia, the hormone estrogen and the growth hormone are affected. During labor, the mother produces a relaxing hormone that is used to prepare the pelvis for labor. This hormone is directly transferred through the placenta to the fetus which causes laxity in the fetus. This laxity affects the femoral ligament by mediating progesterone and estrogen concentrations in the connective tissues (Ayanoglu et al., 2021). The extra estrogen from the mother can induce extra laxity in the infant which causes the femoral head to have a discrepancy with the socket. Another hormone that can lead to hip dysplasia is the growth hormone. The growth hormone is important in stimulating the epiphyseal plate activity in infancy and throughout childhood. If there is a deficiency in the growth hormone it can cause abnormalities in the shape of the femoral head. The second factor leading to hip dysplasia is mechanical issues, with the main issue being breech presentation. When in labor, if the fetus is feet first instead of head first this can cause trauma on the hip socket and joints. The legs are in a fixed position with the knees extended which causes sustained hamstring forces on the hip. This can cause a shallow hip socket and increased pressure on the hip joint, reducing movement. After giving birth to a breech infant, the shallow hip socket makes it difficult for the femoral head to adequately fit and grow into the socket. This inability to align the femoral head with the socket causes mechanical instability and can also lead to bone deformities. The last known cause for DDH is genetics. Family history of hip dysplasia and being female leads to higher risks of developing DDH (Krauss et al., 2025). Females are more prone to developing DDH because they are more sensitive to the hormone estrogen. All these factors lead to bone growth and repair deformities caused by hormone changes, mechanical issues, and genetics.

Those who develop hip dysplasia in utero or in infancy often are seen to have hip dysplasia in their adolescent years. Borderline hip dysplasia emerges in adolescence. Warning signs of this condition include sharp hip pain, often when sitting, standing or walking for long periods of time. In order to diagnose hip dysplasia in both infants and adolescents a physical exam is required. The physical exam consists of doing different ranges of motion tests on the hip joint. Further testing includes radiographs. These specialized scans are used to measure the lateral center edge angle of the hip (Asturias et al., 2025). The scans show how well the hip

socket covers the femoral head. It is important to diagnose hip dyslipsia early as it can lead to many future health conditions. If untreated, DDH increases the risk of gait issues, prolonged pain, and osteoarthritis. DDH causes about 30% of all total hip arthroplasties in adults of ages 40 and older (Jacobsen et al., 2024). Without treatment, joint degeneration increases. Due to the shallow hip sockets in hip dysplasia, there ends up being extra pressure on the cartilage surrounding the femoral head. This cartilage, over time, goes through extreme wear and tear causing it to break down. This breakdown of cartilage is what can lead to osteoarthritis. In order to prevent this there are many treatments used depending on the severity. Surgical intervention, physical therapy to strengthen the surrounding muscles, and injections are some of the treatment options.

My art project showcases what the radiographs scan for. Through the use of paint as my media, I have painted out what a radiograph shows when scanning a patient with hip dysplasia. The hip socket can be seen not fully covering the femoral head on both the right and left hip. I've outlined in red on the right hip where on the femoral head and hip the two areas clash. This red area also demonstrates how little space there is between the femoral head and the pelvis. In the small gap cartilage is found there. With over use and pressure due to the reduced angle of the hip, this cartilage breaks down much quicker than normal. This again leads to things like osteoarthritis in the hip. On the left hip is illustrated the lateral center edge angle. The angle starts at the center of the femoral head and measures the amount the femoral head is covered by the socket. In my art, the head isn't fully covered by the socket so the lines show where the socket should be covering. If the angle is less than 20 degrees, it is diagnosable as hip dysplasia. Overall, my art illustrates how shallow sockets can affect the alignment of the femoral head. Hip dysplasia can harm bone growth, mobility, and quality of life.

In conclusion, hip dysplasia is a condition that affects the quality of life. It can happen before or after birth and can have life long effects. Although there is not one cause, there are many factors contributing to the condition. I’ve covered how hormones can affect bone growth, how mechanical stressors can contribute to the condition, and the mobility an individual has with hip dysplasia. Hip dysplasia is a condition that can cause many life long problems, but there is hope yet with the advancements in medicine and treatment options.

References

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