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Blood Supply to the Proximal Femur

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Abstract: Tooth-jaw anomalies and deformations in children with delayed physical development appearance to be their development only due to endo- or exogenous factors to be possible no, this of the disease multifactorial the base shows . It should be noted that some of the identified risk factors are of an integrative nature and are the result of a combination of many antecedent causes. Only by eliminating the most important factors influencing the occurrence of dental and maxillofacial anomalies and deformations can their prevalence be reduced.

Keywords: *Indicators, Dental, Backwards.*

Introduction

According to the WHO Center for Demography and Human Ecology, the number of fractures of the proximal femur is continuously increasing worldwide, especially in developed countries with increasing life expectancy. Many scientists consider the increase in the number of fractures of the proximal femur to be a real epidemic with high (up to 10-20%) primary mortality, treatment difficulties and progressive mortality in the near future. Concomitant diseases that worsen due to traumatic injuries and stress dramatically increase the risk of surgical treatment. Correction of concomitant diseases in patients with fractures of the proximal femur is associated with prolonged immobilization (bed rest, skeletal traction, derotation boot), which, in turn, is fraught with even more serious complications, such as circulatory disorders in the femoral head followed by aseptic necrosis, hypostatic pneumonia, pressure sores, and various thromboembolic complications. It is the combination of complications that determines the appropriate requirements for the surgical treatment of this category of patients: the use of minimally invasive metallosteosynthesis in the first hours upon admission to the hospital, on the one hand, and the creation of stable osteosynthesis, which makes it possible to activate patients in the early postoperative period, on the other hand. Most authors believe that fractures of the proximal femur have the most unfavorable prognosis. According to foreign authors, the mortality rate for fractures of the proximal femur within 1 year is 12-24%, 50% of patients need outside help due to limited physical activity, 25% become severely disabled. In Russia, the mortality rate for conservative treatment of femoral neck fractures is 40-80%. According to other data, the mortality rate for fractures of the proximal femur 6 months after the injury is 32.2%, after 12 months it increases to 43.7%, and after 24 months it is 54%. Some researchers claim that within a year after a fracture of the proximal femur, more than 24% of patients die due to its negative impact on their somatic status, and 50% of survivors become severely disabled. According to retrospective studies conducted in the United States between 1928 and 1992, there was a fivefold increase in the number of fractures of the proximal femur per 100,000 population.

Fractures of the proximal femur, according to WHO, place osteoporosis in fourth place among all causes of disability and mortality. According to WHO experts, the incidence of osteoporosis is constantly increasing. It is predicted that by 2020, about 50% of women will have some kind of fracture, of which 15% will have fractures of the proximal femur. According to Russian authors, fractures of the proximal femur are observed annually in 100.9 cases per 100,000 population. With age, the risk of getting a fracture of the proximal femur increases: at the age of 50 it is 1.8%, at the age of 60 it is 4%, at the age of 70 it is 18%, and at the age of 90 it is 24%. In fractures of the proximal femur, especially the femoral neck without stable osteosynthesis, consolidation of bone fragments occurs extremely rarely. A long period of immobilization is required, which is accompanied by an exacerbation of chronic diseases and the development of complications due to physical inactivity. It is generally accepted that femoral neck fractures are subject to surgical treatment for vital reasons, which is not always possible. Operations on the proximal femur are classified as severe surgical procedures. Many authors point out that fractures of the proximal femur are an important social and medical problem that has needed to be addressed for decades. This problem tends to worsen so much that the entire world community is concerned about the rate of development of osteoporosis, which is commonly believed to underlie most fractures of the proximal femur in people not only the elderly, but also young people. In recent years, hip fractures have been observed at a young age, they occur during intense sports and as a result of traffic accidents. Also, according to Russian authors, there is currently a clear trend towards an increase in the incidence of fractures due to osteoporosis in the age group of 40-60 years.

Unsatisfactory results in osteosynthesis of the femoral neck in young patients, especially with subcapital femoral fractures, encourage surgeons to abandon traditional types of surgical interventions and push for the development of new methods that allow for more stable osteosynthesis. And if the patient's condition allows, then apply a more radical and more reliable method - hip replacement. However, it should be noted that the presence of metal structures in the body, including an endoprosthesis, is a contraindication for many patients to recover at their previous place of work. It is extremely difficult for patients of 40-50 years of age to acquire another profession for physical labor patients. At the same time, the removal of a number of metal structures after the consolidation of bone fragments presents certain technical difficulties. On the other hand, removal of the retainer is accompanied by significant damage to the bone tissue and the intraosseous vascular network of the proximal femur. Controversial and unresolved issues of blood circulation in the proximal femur with the development of aseptic head necrosis after subcapital femoral fracture; unspecified timing of emergency metallosteosynthesis of subcapital femoral neck fractures; lack of a single, well-proven metal structure for osteosynthesis of fractures of the proximal femur; the absence of a metal structure, which is removed after consolidation of bone fragments without technical difficulties and is not accompanied by damage to bone tissue and the intraosseous vascular network of the proximal femur; an increase in the number of fractures of the proximal femur in young patients of working age was the reason for our clinical and experimental study.

Histological studies on experimental animals have confirmed the development of ischemic and dystrophic processes in the femoral head in the early stages after subcapital fracture of the femoral neck. Based on the tetracycline label, the peculiarity of blood supply to the head in the early stages after subcapital fracture of the femoral neck and after damage to the arteries of the circular ligament and the arteries of the hip capsule (mesh arteries) was studied. A working classification of fractures of the proximal femur has been developed, where for the first time an accurate boundary between basal and transversal fractures has been drawn; zones of transversal and intertrochanteric fractures have been identified. For the first time, it was determined that all transvertebral fractures are oblique, and all intervertebral fractures are transverse. The approach to surgical treatment of fractures of the proximal femur has been optimized, based on reducing the duration of fracture exposure in combination with accurate and gentle bone fragment reposition. The proposed technique makes it possible to reduce material costs when performing metallosteosynthesis, and reduce the length of hospital stay. After consolidation of bone fragments, it remains possible to remove the metal structure without any special difficulties, damage to bone tissue and the intraosseous circulatory network, which makes it possible to shorten the recovery period in the postoperative period and preserve the profession for able-bodied patients. The femoral neck in an adult has a cylindrical shape, it is somewhat compressed in the frontal plane. The anteroposterior diameter of the middle of the femoral neck in an adult is on average 20-30 mm, the upper diameter is 25-42 mm, and the circumference in the middle section is 70-120 mm. The femoral neck consists mainly of spongy bone covered with compact bone substance (1-1.5 mm thick).

Inside the femoral neck there is a strong trabecular section of bone tissue called the Merkel spur. It starts from the cortical layer of the subcutaneous region, goes from bottom to top and medially and is embedded in the cortical layer of the upper part of the femoral neck. In the distal direction, the femoral neck expands and at the base passes into the trochanter array, on which the large and small skewers are located. The upper part of the large trochanter and the upper part of the base of the femoral neck form the trochanteric fossa. On the large spit, the medial and lateral surfaces, the anterior and posterior edges, the apex and the base are distinguished. The small trochanter is located on the medial surface of the upper third of the thigh and is represented by a cone-shaped protrusion measuring 1.5-2 cm. There is an intertrochanteric line at the base of the neck on the anterior surface, and an intertrochanteric ridge at the back.

The length of the head with the femoral neck is, on average, 10.5-11 cm. The cervical-diaphyseal angle is formed by the axis of the head and neck with the axis of the hip diaphysis and averages 126-1270. According to various authors, the cervical-diaphyseal angle varies from 125 to 1340 depending on age and gender. The femoral head articulates with the peripheral part of the acetabulum, the semilunar surface. The capsule of the hip joint is fixed along the edge of the acetabulum. On the neck of the femur, it is attached from the front along the intertrochanteric line, from behind on the border of the middle and outer third. The articular capsule consists of synovial and fibrous layers. The transverse fibers of the fibrous layer form a dense ring around the neck, a circular ligament that holds the head in the articular cavity.

The capsule of the hip joint is reinforced with ligaments: lig iliofemoralis, lig pubofemoral, lig ischiofemoral. There are three groups of vessels involved in the blood supply to the neck and head of the femur: 1 - reticular arteries; 2 - arteries of the round ligament of the femoral head; 3 - intraosseous arteries [85, 153]. The vessels of the first group originate from the medial and lateral arteries that encircle the thigh. At the level of the small trochanter, a. circumflexa femori lateralis departs from the deep artery of the femur, runs along the anterior surface of the neck upward parallel to the intertrochanteric line. A. circumflexa femori lateralis. circumflexa femori medialis departs from the deep femoral artery at the level of the lesser trochanter and runs along the posterior surface of the femoral neck upward and anastomoses in the trochanteric fossa with A. circumflexa femori lateralis. Each of the arteries gives branches to an array of the trochanteric region. The branches of A. circumflexa femori lateralis pass through the thickness of the synovial membrane of the joint capsule, which forms the upper lateral Savvin fold and enter the femoral head 0.5 cm laterally to the articular cartilage with 2-6 branches.

Branches of a. circumflexa femori medialis run along the posterior surface of the femoral neck and penetrate through the Amantini fold into the femoral head. The question of the role of the vessels of the second group, passing through the circular ligament of the thigh, is still controversial. Blood supply can be carried out by loose or main types. In the first case, the arteries usually do not penetrate into the femoral head. In the second case, the arteries branch in a small area directly adjacent to the ligament attachment site. In only 1/3 of the examined patients, the arteries of the circular ligament participated in the blood supply to the femoral head. The strength properties of bone, including the proximal femur, are determined by the integration of two main characteristics: bone mineral density (bone mass) and a certain structure of spongy and compact bone substance (architectonics). The main structures (factors) determining the strength properties of the "healthy" femoral head and neck bones were studied in the works of Ward (1838) and Merkel (1874). They identified the lateral and medial trabecular bundles, Ward's triangle and Merkel's spur, called "calcar" in modern literature, and the cruciform substance. The head and neck of the femur consist of spongy bone tissue covered with a thin layer of compact substance. The layer of compact bone substance of the lower surface of the neck is significantly thickened and is called the Adams arc. The bony beams of the femoral neck have the appearance of an arch. The spongy tissue of the neck and femoral head consists of a system of thin crossbars arranged in the form of arches, which allows the gravity of the body to be transferred to the walls of the bone tube. According to the doctrine of the resistance of materials, the proximal femur is a "rod" with a pivotally supported top and a fixed lower end bent at an angle of an average of 128 degrees.

Conclusion. In the vertical position of the body, this "rod" is loaded eccentrically from top to bottom. The "loading" axis passes through the top of the femoral head and the center of the knee joint, which forms an angle with the longitudinal axis of the femur, on average equal to. Under the influence of external forces, the proximal femur is exposed to stretching, compression, torsion, bending and shear. Under axial load, compression deformations occur along the lower contour of the neck, and stretching deformations occur along the upper contour. The margin of strength of the femoral neck under static load ranges from 13 to 7.9 times, depending on age. Under dynamic loads (falling on a flat, hard surface), the safety margin decreases from 2.2 to 1 with the threat of fracture. When walking on a flat surface, this indicator decreases by 1.5-2 times.

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