

In adults the complex fractures of the ankle joint have been thoroughly discussed and there are several therapeutic schedules proposed. Weber distinguished three types of ankle joint fractures according to the type of fibular fractures. In agreement with this classification we are certain that fibula is an important element of the immature ankle joint. We concentrated on the anatomy of immature ankle joint, especially on the mutual position of the distal fibular physis and the plane of the tibiotalar joint. The results are summarized as follows:

9.1. AUTOPSY

At first we performed autopsy of six ankle joints in stillborns in which there were no orthopaedic and/or neurological lesions. We paid attention to anatomy of the distal tibiofibular junction. Two adult ankles were anatomised for correlation the findings. We ascertained, that in all preparations there was articulation between tibia and fibula, as it is formerly described in the literature. In all six stillborn joints we found well formed ligaments of the distal tibiofibular junction: anterior, posterior and interosseal tibiofibular ligaments. The anterior and posterior tibiofibular ligaments begin at the anterior, respectively posterior surface of the distal tibial epiphysis and terminate at the anterior, respectively posterior surface of the distal fibular epiphysis. We verified, that the interosseous tibiofibular ligament is a strengthened distal part of the interosseous membrane and is stretched between the juxtaphyseal surfaces of the distal tibial, respectively fibular metaphysis. Thus we learned that the anatomy of the ligaments of the distal tibiofibular junction in newborn and adult is the same.

9.2. RADIOLOGICAL STUDY

In the second part of the study we investigated the mutual position of the distal fibular physis and the tibiotalar joint space in the immature skeleton. One hundred and forty radiographs of immature ankle joint without skeletal injury were reviewed (for patients ranging from infants to adolescents treated usually for ankle sprain). The position of the distal fibular physis with respect to the tibiotalar joint space was tested. We found that in about one half of cases the distal fibular physis is located distally from the plane of the tibiotalar joint. In the available published works on this subject the location below the tibiotalar joint space was not considered. Based on the above findings we chose to define three radiological types of immature ankle joint according to the vertical position of the distal fibular physis in the relation to tibiotalar joint space. These three types are: type 1 - distal fibular physis is above the joint space; type 2 - distal fibular physis is on the same level as the joint space; type 3 - distal fibular physis is below the joint space. Data obtained were statistically processed.

9.3. CLINICAL STUDY - MUTUAL POSITION OF THE DISTAL FIBULAR PHYISIS AND THE TIBIOTALAR JOINT LINE

In the third part of the study we reviewed the cohort of thirty children with the skeletal injury of both the distal tibial epiphysis and distal fibula, treated during the a five-year period (1999-2003). The type of the distal fibular injury was evaluated according to mutual position of the distal fibular physis and the tibiotalar joint space. The treatment method was also evaluated. Because of the small number of observations, the Yates-corrected chi-square test was selected for statistical processing. It was found that the position of distal fibular physis in the level of tibiotalar joint space predisposes to physeal fibular injury. On the other hand, the position distally to the tibiotalar joint space predisposes to metaphyseal fibular injury. In case of displaced fibular physeal injury in the radiological type 2 of immature ankle joint (the fibular physis is in the same level as the tibiotalar joint

space) we recommend closed reduction and percutaneous pinning of the fibula because of instability of the ankle joint. In the radiological type 3 of the immature ankle joint (the fibular physis is distally to the tibiotalar joint space) it is not necessary to stabilise the fibular fracture because the fibular part of the ankle joint is stable.

9.4. CLINICAL STUDY - INJURY TO THE TIBIOFIBULAR SYNDESMOSIS

In the latest part of the study we concentrated on the injury to the tibiofibular junction. Two hundred and twenty-two cases of physeal injuries of the distal tibia and/or fibula treated in our department from 1997 to 2001 were reviewed. In all patients the plain X-rays in two basic and both oblique views were performed. In any doubt the stress position or CT scan completed the investigation. All patients after physiological growth cessation were excluded. As an injury to the distal tibiofibular junction all osteofibrous and/or osteochondral physeal or epiphyseal fractures of the Chaput's tubercle of the distal tibia were considered. We preferred non-operative treatment in cases with fragment displacement less than 2 mm. In larger displacement open reduction and internal fixation was performed. All patients were followed up by X-ray from six to twelve month after the injury. Twenty of all two hundred and twenty-two selected patients (9 %) sustained the distal tibiofibular joint injury. The average age was 15 years in boys and 13 years in girls. In 80 % of them (sixteen cases) the Juvenile Tillaux fracture of Salter-Harris type III or the lateral triplane fracture of the distal tibial epiphysis of Salter-Harris type IV was found (9 respectively 7 cases). Reviewing the resting four cases (20 %) three till now unpublished types of this injury were discovered: first intraepiphyseal tibial mortise fracture of Ogden type 7A (visible on X-ray, two cases), second intraepiphyseal tibial mortise fracture of Ogden type 7B (visible on X-ray follow up after healing, one case) and third intraepiphyseal subcortical tibial mortise disruption (detected by CT scan only, one case).