

Analysis of orbital strain and stress caused by multidirectional forces generated during a ball impact

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Abstract: Head injuries, due to the presence of the brain and sense organs, especially of the sense of sight, constitute a very serious threat to the health, and sometimes even life. The main causes of these injuries are road traffic accidents, physical violence, as well as different sport activities. The article presents a study on the effects of dynamic forces, acting on the bones of the skull around the eye socket, while hit by a baseball, golf or tennis ball. In the research the variability in the force magnitude during the strike, as well as its various action pathways have been taken into account. For determination of deformations and stresses arising in bone structures of the skull in the vicinity of the operations, the finite element method has been used. The effect of numerical simulations is an indication of the places with the highest fracture probability, as well as the moment of occurrence of the biggest stresses. The results obtained during the investigations can be useful for the development of the construction of the specialized skull protectors, dedicated for people participating in different sport activities.

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