

Hip fractures can be predicted using numerical models

Frida Bengtsson, Biomedical Engineering, Lund University, Sweden

You probably know at least one older person who broke their hip. Hip fractures most often affect older people and it is both painful, takes time to heal and is expensive for the society. If there was a way to predict and prevent fractures, a lot of suffering, time and money could be saved.

The thigh bone is the largest bone in the human body and one of the bones which are often affected by fractures. Fractures of the upper part of the thigh bone, a hip fracture, are the most severe type of fracture for elderly. When you get older, your bones are getting weaker, and are more easily fractured. In addition to that, osteoporosis, a medical conditions which also weakens the bones, affects approximately 29% of all women and 18% of all men over 45 years. This means, that the risk for a hip fracture is quite high for a large part of the people in the world.

To prevent fractures from happening, we need a good way of determining who will suffer from a fracture and to predict how that fracture will look like. One way of doing that is to use a numerical models. Today there are methods to obtain the 3D-shape and material parameter of a bone from computed tomography (CT)-images. This can be used to make a numerical model of that bone and by performing calculations, it is possible to predict where, and at what load, a fracture will happen.

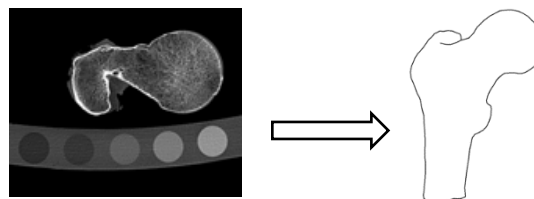


Figure 1 – CT-images can be used to make numerical models of bones

Although the numerical models we have today can predict the location of a fracture, it can in most cases not predict how that fracture will look like. In this project, a new type of numerical models have been used to predict both fracture location and the path that the fracture will take through the bone. By also including the shape from CT-images, the models in this project can say where and how a fracture will appear in *an individual case*. This is the main advantages of the models produced in this project compared with existing one and therefore can these results be used to gain a better understanding of how bone fractures.

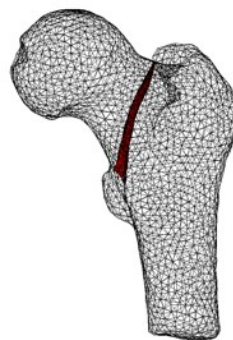


Figure 2 - The fracture prediction in a thigh bone