Biomechanics
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Lecture - 12
Sagittal Plane Movements

Welcome to this video on biomechanics. We have been looking at the terminologies within biomechanics and discussing how the human body can be considered to be a biomechanical system.

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In the last video we saw some terminologies, we defined some planes and some axis. In this video we will be looking at some specific moments that happen in one of the three planes that we discussed last time. In this video, we will be focusing on movements within the sagittal plane. What is the sagittal plane?

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We saw what this is the sagittal plane is the one that divides the body into a left side and the right side. Remember not necessarily a left half and a right half. That sagittal plane which divides the body into a left half and the right half is called as a mid-sagittal plane here. We are only focusing on some sagittal plane. A sagittal plane that divides it into two parts not necessarily two halves two parts a left side and the right side it is like this.

Now what are the moments that happen within this plane? First of all, are human movements restricted to a single plane? This is a critical question, because it seems to us like when you are really moving it seems like the moments are not restricted to a single plane. Almost all the moments are 3D. But here I am discussing up planar moment. What are these moments? The reason why I am doing that is because we can assume that most of the moments can be planar.

So, we discuss or we approximate these moments as planar. So, now considering that what are those moments that happen within a sagittal plane or parallel to the sagittal plane. Any moment that has to happen in the sagittal plane will have to happen about that axis which is going from the left side to the right side or from the right side to the left side or the from the middle to the side. The mediolateral axis the moment the rotation will happen about the mediolateral axis.

So, one such moment is flexion, now I am having my elbow like this I am doing this this is elbow flexion. Now we watch here, I am having my elbow like this, I am closing my elbow. This

is a decrease in this angle in the angle between my humerus and the radius alone. When that angle decreases it is called flexion. Now I am keeping my hand like this, my arm like this and I am opening it up. Now this angle is increasing is going up.

This increase in this angle is called extension. Now this movement is happening in this plane for me. Remember the plane when I am looking at you or when I am turning around is always sagittal to me. It is with reference to the particular organism that is moving, it is with reference to the particular human being who is moving. So, when I am turning around my sagittal plane is this.

So, when I am doing flexion or extension the movement is happening about the mediolateral axis that is passing through the elbow joint here. So, flexion, extension flexion is reduction in the joint angle between body parts. Of course, this is a simple example there are some cases in which it is not so clear. Now I am having the wrist I am doing that; it is flexion or extension. Flexion how do you say that?

Because I am measuring this with reference to the anatomical reference position. This is the anatomical reference position now I am reducing the wrist angle. This is called wrist flexion and this is called extension. What about the leg? What happens at the ankle?

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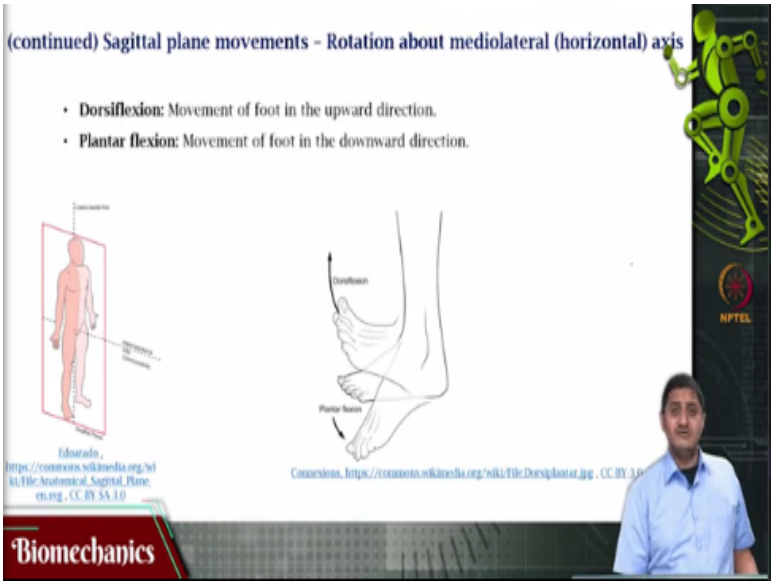

For example, in this case I am this movement also can be called as flexion and extension. Let us consider this hand to be the foot, I am doing that would be normally called because the feet are like this not like this. Remember I can keep my hand in anatomical reference position such that the palm faces outside but if I am keeping the feet such that the sole of the foot is visible, I cannot stand is it not. So, in the anatomical reference position itself my feet are facing down.

So, that is anatomical reference position. Now that means this is the sole of the foot, this is the top of the foot and this can be considered to be an ankle. I can consider like this. Let us consider my hand is my foot. So, I am moving my leg I am moving my foot such that the toe is coming closer to the shank. When that is happening you would normally call that as flexion. But biology is so special that exception is the rule in biology.

Here we do not call it as flexion rather we call it as dorsiflexion. So, that is called a dorsiflexion that is a movement of the foot upward that is called as dorsiflexion. Then you have a situation in which you are trying to stand up on your toes like that you are trying to do that. When your toes are going down and your ankle is lifting up when you do something like that is called plantar flexion.

Normally you would call this as extension but here this is called as plantar friction. Remember in biology exception is the rule.

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So, in this video we have seen sagittal plane movements that are flexion and extension and dorsiflexion and plantar flexion. Thank you very much for your attention.