



Spinal Fitness

Physics Demonstration of Shear Stabilization by Fixed Means

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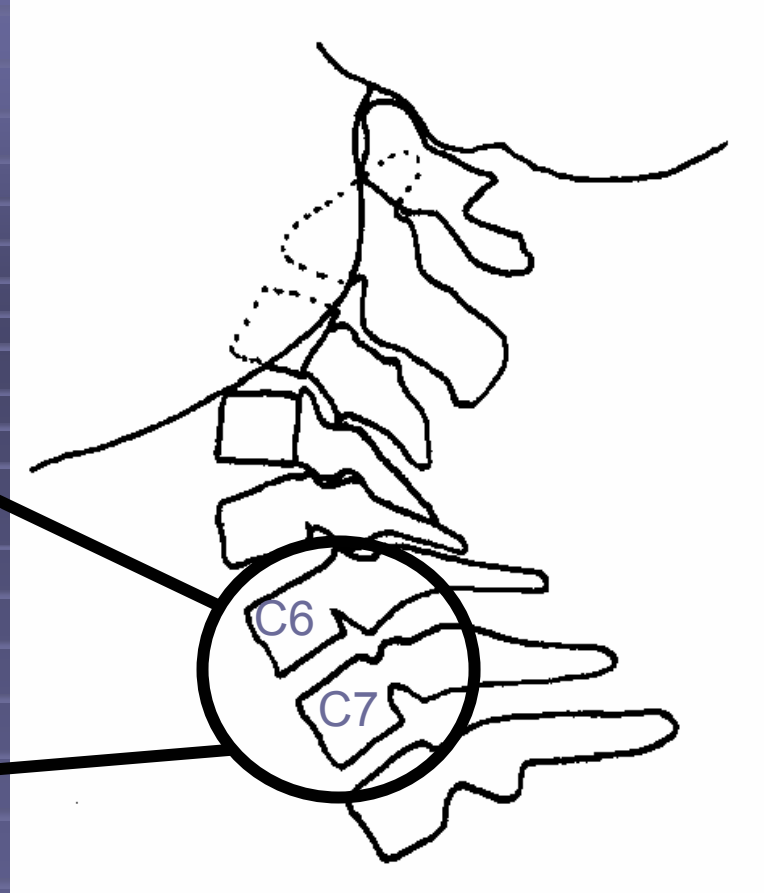
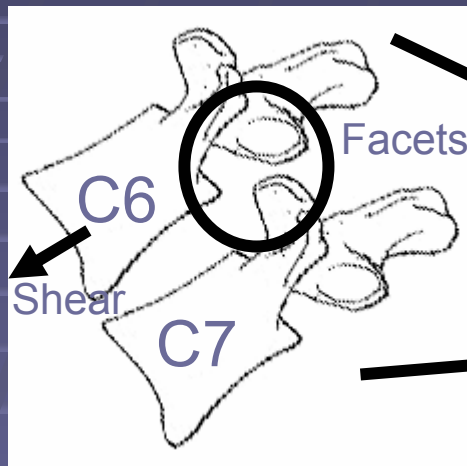
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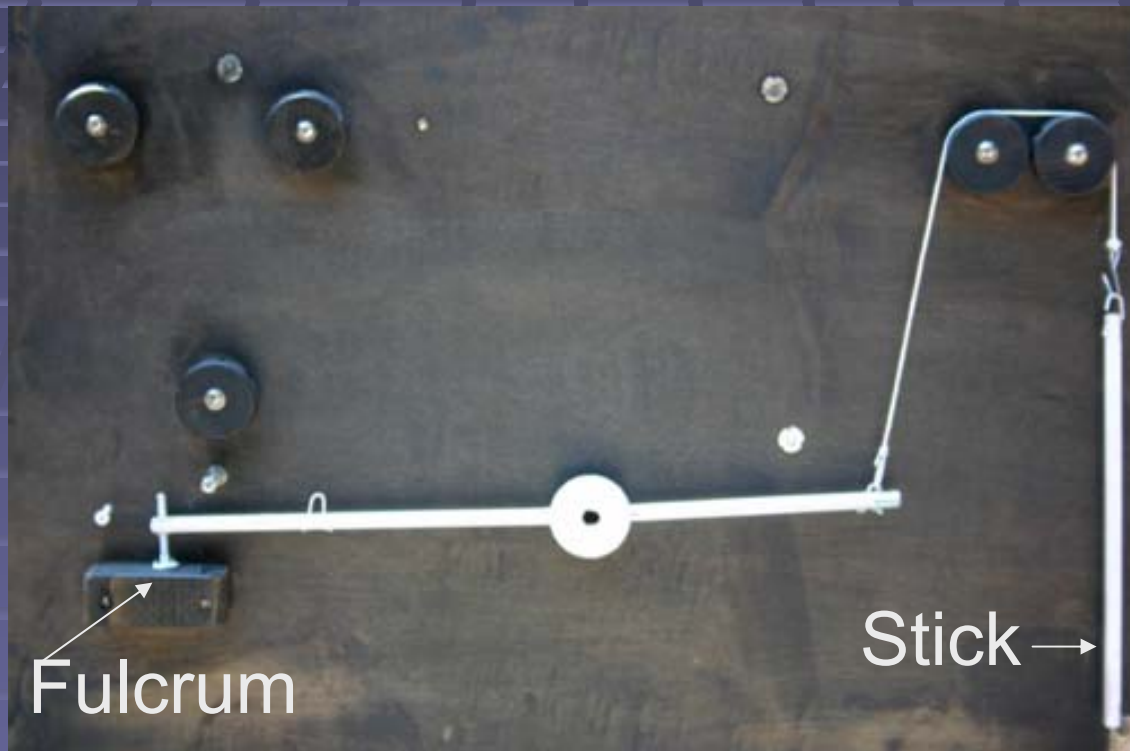
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We are looking at this joint/fulcrum.



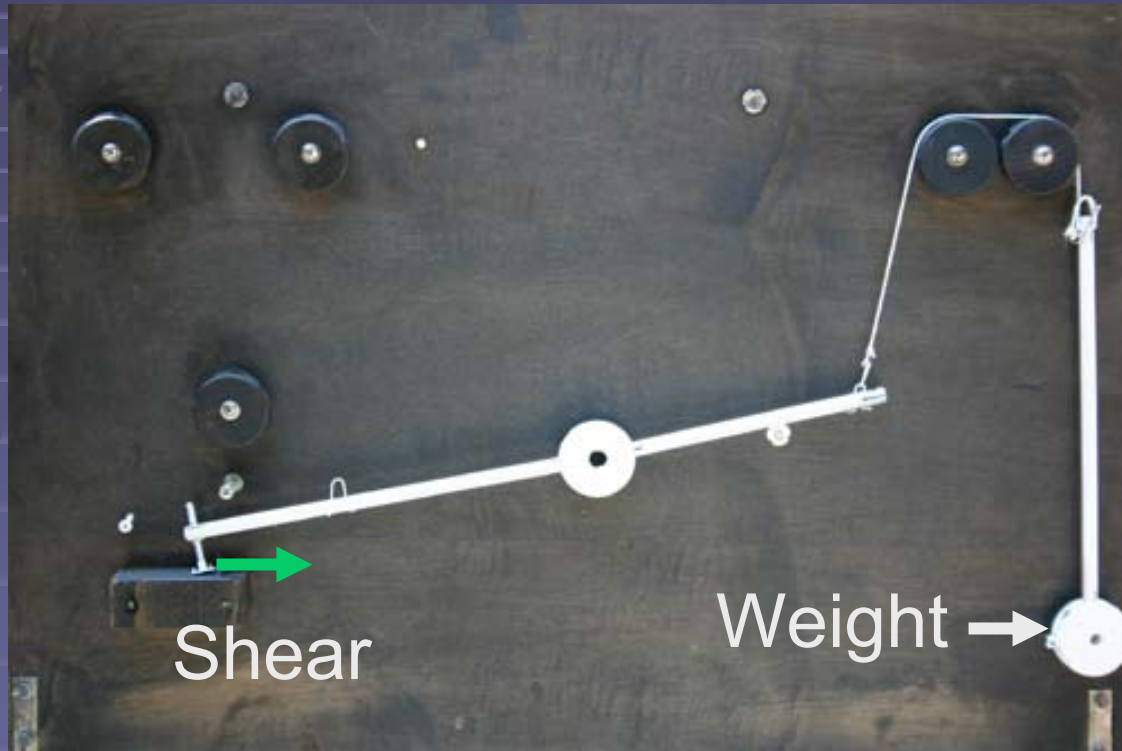
The facets between vertebrae function as fixed (bone-to-bone) shear stabilization mechanisms. As seen above, C6 does not dislocate as shear pushes it forward because its inferior facet would be stopped by the superior facet of C7.

Here we see the weight of the stick, applied at this portion of the fixed lever arm, is keeping the entire lever system resting here at the fulcrum in equilibrium.



At the fulcrum, all force from the lever arm is directed downward in compression and the block is providing enough force upward to stop any downward translation.

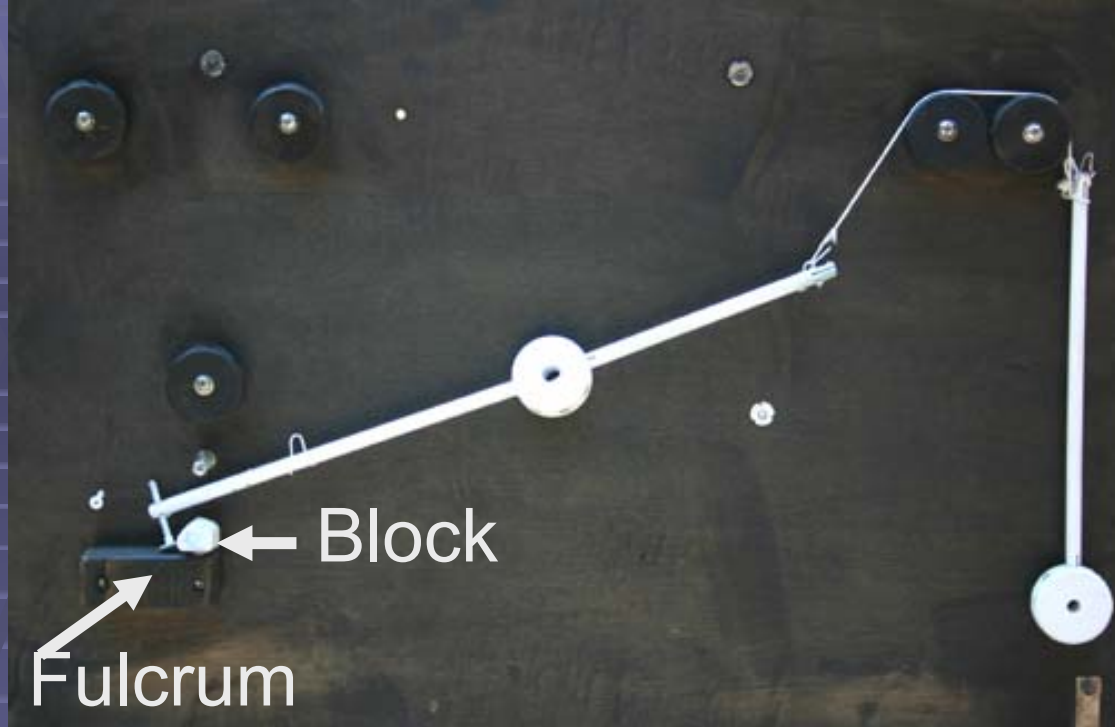
Here we have added a weight. Notice at the fulcrum, the portion of the lever system as it sits at the fulcrum is moving to the right.



This movement to the right is caused by the shear force now produced in that direction in addition to the existing downward compression force.



This shear force, not stopped by any shear stabilization mechanism, will cause dislocation at the fulcrum. As we see here, the lever arm is dislocating from the fulcrum.



Now we have added a fixed block that is pushing backwards in the opposite direction of the shear force stopping dislocation. Whenever shear exists at the fulcrum (muscular skeletal joint), dislocation would occur unless a shear stabilization mechanism is in place. This mechanism could be bone-to-bone (fixed), ligament (passive) or muscle (active). In the future these mechanisms will be identified and that information will be supplied with any exercise so people will know what is taking place at their joints.