

How Scissors Work

Video Transcript

Most surgeons favor scissors over scalpels when cutting flaccid tissue or when dissecting close to important structures. The reason behind this preference is that scissors are good at stabilizing tissue, allowing for a more accurate cut. To understand why this is so, let's take a closer look at the physics behind how scissors work.

Scissors are designed so that three force vectors are simultaneously used in cutting. The three forces include closing, shearing, and torque. The closing force is the force that brings the blades together. The shearing force pushes the one blade flat against the other while closing. Torque is the force that rolls the leading edge of each blade inward to touch the other. It is the shear and torque between the scissor blades that allow clean effective cutting. The forces are transferred from the surgeon's hand to the shanks, then through the fulcrum (or hinge) to the cutting edges of the blades.

Right-handed scissors are constructed to maximize shear and torque. With the palm down, the thumb ring is hinged beneath the finger ring. This blade arrangement allows the natural pushing with the thumb and pulling with the finger, analogous to the gripping motion of the right hand, and directs maximal shear and torque through the blades. As most surgical standard packs contain only right-handed instruments, surgeons recommend that left-handed individuals consider learning to use scissors with their less dominant, right hands. To use right-handed scissors in the left hand, pull with the left thumb and push with the left ring finger in their respective finger rings. Such motion will achieve shear and torque between the blades. At first, it is awkward to learn this technique; however, it can be mastered with practice.

When scissors are used for cutting, both direction control and accuracy depend upon the stability of the tissue between the scissor blades and the operator's grip. Tissue stability is related to how far the scissors are opened during cutting. When scissors are opened widely, tissue is closer to the hinge and the blades tend to push the tissue away, bunching it ahead of the shearing action of the blades. Cutting closer to the tips of the scissors provides less closing force on the tissue, but this stabilizes the tissue more securely between the scissor blades, resulting in a more accurate cut.

