Robotic System Operates On Beating Heart

The robotic technology predicts the movement of the heart as it beats, enabling surgical tools to move in concert with each beat. This development could be very important in developing less invasive surgical heart procedures, where stopping the heart from beating causes what might be unnecessary risks.

In addition to the heart, this model also accounts for the movement of a patient's chest wall during breathing. Known as the “thin-plate spline deformable model, this new computerized approach allows the robotic arm to continually adjust to heart and chest movements during surgery and relies on a mathematical representation of the heart's surface as it moves in three dimensions during pumping.

Previous efforts have relied on 2D imaging combined with other steps, making them too slow to provide instantaneous feedback during an operation. This new 3D imaging predicts the heart movements in a single step, making it faster in real-life surgical environments. This new computer-generated model makes it possible for the surgeon to focus on suturing or cutting without having to adjust for the moving surface. Ultimately, this breakthrough could have many potential applications, including heart surgery, coronary bypasses and brain surgery.

This is the first successful attempt to effectively isolate the physical movements of the heart and lungs during surgery, which is particularly difficult given the heart's irregular shape, as well as its tendency to expand outward in all directions during beating. The heart's irregular surface also makes it more difficult to use visual tracking in accurately pinpointing movement.

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