Cooling Technique for Robotic Surgery Performed on Difficult Kidney Stone

Henry Ford Health System

A first-ever technique using ice slush and minimally invasive robotic surgery to remove a particularly large type of kidney stone has been reported by urologists at Henry Ford Hospital.

Dubbed RANL, for robotic anatrophic nephrolithotomy, the technique was devised to remove staghorn calculi – large kidney stones with sharp, craggy branches – that can cause disease and sometimes death if left untreated.

In a study to be published in the Journal of Endourology, researchers at Henry Ford's Vattikuti Urology Institute and Muljibhai Patel Urological Hospital (MPUH) in Gujarat, India, described their new technique as "a safe, minimally invasive option that may be considered in patients with staghorn stones."

"The shape and size of these stones make them difficult to remove even using conventional percutaneous surgery techniques," says Khurshid R. Ghani, M.D., of the Vattikuti Urology Institute at Henry Ford Hospital.

Percutaneous, or minimally invasive procedures performed through small incisions in the skin, offer their own challenges in trying to remove all of the stone during a single operation. Sometimes multiple operations spaced over weeks or months may be needed to remove all of the stone from the kidney.

Icing the kidney can protect it from deterioration and provide a longer surgical window during blood flow stoppage, called ischemia. Earlier Henry Ford research led to a cooling method to protect kidneys during minimally invasive robotic surgery. That procedure, ICE (Intracorporeal Cooling and Extraction), was used to robotically remove the diseased portion of a cancerous kidney in several patients. To protect the kidney during its ischemic "down time," a sterile ice slurry was passed through special delivery syringes and a small surgical port to cover the organ.

Craig G. Rogers, M.D., of the Vattikuti Urology Institute at Henry Ford, previously described the ICE technique and is a co-author of this study.

"We developed the ICE procedure to provide kidney protection during ischemia to allow time to perform increasingly complex robotic kidney cancer surgeries. This study extends that technique to allow for complex kidney stone surgeries," says Dr. Rogers.

Dr. Ghani says, "Removing large stones from the kidney requires a bloodless field and longer ischemic times than when removing kidney tumors. This can now be achieved with the ICE procedure during robotic surgery. The hope is that all of the

stone can be removed during a single operation."

Using ice-cold ischemia for the robotic removal of staghorn kidney stones had never been done before, but the Henry Ford and MPUH teams succeeded in performing it on three patients, without complications, as described in the new research study.

This breakthrough was possible by combining the robotic surgery expertise of the Henry Ford team with the expertise of doctors from MPUH, which has the world's largest experience in staghorn stone surgery.

The researchers cautioned that while their work showed the feasibility of using the technique, more research is needed to refine the procedure while developing new robotic instrumentation and equipment adapted for the specific purpose.

For more information, visit Henry Ford Health System [1].

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