

## COMPUTER ENHANCED MITRAL VALVE SURGERY: AN ANIMAL MODEL

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**Introduction:** Over a short time, computer-assisted robotic devices have been shown to enable less invasive cardiac surgery. We studied the feasibility of performing mitral valve repairs using the da Vinci™ robotic surgical system (Intuitive Surgical, Mountain View, CA).

**Methods:** Nine sheep weighing 50-60kg were euthanized. A five cm right mini-thoracotomy incision was made, and the fourth intercostal space was entered. A zero degree three-dimensional videoscope was inserted through the incision. Posterior to the incision and through the same intercostal space, two 10 mm port incisions were made for insertion of the two robotic arms. A left atriotomy provided access to the mitral valve. The surgeon worked at the master console located 10 feet from the operating table. A flexible annuloplasty ring was sutured between fibrous trigones along the posterior annulus using six cm double armed 3-0 Ticron suture. Parameters studied included: set-up time, time for individual suture placement, number of sutures used, and total repair time.

**Results:** Set-up time for the robotic system averaged  $9.0 \pm 0.5$  minutes (mean  $\pm$  s.d.). Time for individual suture placement was  $4.0 \pm 1.6$  minutes, and the number of sutures required for each repair was  $8.4 \pm 0.5$ . The total time for annuloplasty ring placement was  $39.7 \pm 7.6$  minutes.

**Conclusions:** Length of time for mitral valve repair is similar to historical controls. Computer enhanced telemanipulative surgery adds precision and dexterity, enabling complex procedures via minimally invasive approaches. The wrist-like two mm instrument tips provide seven degrees of freedom, enabling access to subvalvular structures and facilitate suture placement in difficult anatomic positions. Robotic technology may prove beneficial toward enabling complex intracardiac procedures using less invasive approaches. A short video clip will be presented.