# Peer-Reviewed Studies on Intuitive's Force Feedback Technology Demonstrate its Potential to Reduce Force on Tissue and Enhance Surgeon Performance

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SUNNYVALE, Calif., March 27, 2025 (GLOBE NEWSWIRE) -- Intuitive (NASDAQ: ISRG), a global leader in minimally invasive care and the pioneer of robotic-assisted surgery, announced the publication of two peer-reviewed studies in *Surgical Endoscopy*, on its first-of-its-kind Force Feedback technology incorporated in the da Vinci 5 surgical system.

Force Feedback technology allows surgeons to feel the forces applied to tissue during surgery, such as pushing and pulling. These studies - conducted in the pre-clinical setting using tissue models - demonstrate its potential to reduce the amount of force placed on tissue during surgery and enhance surgeon performance.

The first study, led by a team including Michael M. Awad MD, PhD, Professor of Surgery at Washington University School of Medicine in St. Louis, showed that using Force Feedback technology can lead to a reduction in force on tissue by up to 43 percent, irrespective of the surgeon's experience level. The study evaluated the forces applied to surgical models by 28 surgeons who had varying levels of experience when using Force Feedback technology during retraction, dissection, and suturing tasks.

"The lack of a way to measure the forces applied to tissue may result in excessive force exerted, leading to unintentional tissue damage during surgery, which could have a negative clinical impact on patients including pain and recovery time," said Dr. Awad.

"Our findings suggest that Force Feedback technology using the da Vinci 5 system could enable gentler robotic surgery. While there's more to learn about how this technology might translate to clinical outcomes, it's a strong step toward improvement in robotic procedures."

During robotic-assisted surgery, surgeons operate instruments through the da Vinci surgeon console and rely on visual cues to determine the force they are applying to tissue. Even during open surgery, where surgeons have access to their sense of touch, they still have no way of measuring the amount of force applied to tissue during the procedure.

The second study, led by a team including Andrew J. Hung, MD, Associate Professor of Urology and Computational Biomedicine, at Cedars-Sinai Medical Center, in Los Angeles, showed that Force Feedback technology has the potential to improve novice surgeon performance by significantly reducing tissue trauma and errors during suturing, and time to complete suturing.

"Suturing can be a unique challenge during robotic surgery because excessive force can break delicate sutures or injure healthy tissue, while insufficient forces might cause slippage or loose sutures," said Dr. Hung. "Force Feedback could enhance the performance of surgeons and their suturing proficiency during robotic surgery. Now that we have seen how Force Feedback has enabled novice surgeons in the pre-clinical setting, we look forward to better understanding the impact on surgical performance and potential patient benefits."

The study evaluated the impact of Force Feedback technology on the suturing performance of 29 novice surgeons in a randomized pre-clinical study.

"These studies show early, pre-clinical and compelling evidence of the potential impact of Force Feedback technology across all surgeon experience levels," said Intuitive Chief Medical Officer, Dr. Myriam Curet.

Force Feedback technology is currently in use by a limited number of hospitals in the United States. Intuitive continues to study its use with customers and grow availability through 2025 and beyond.

Links and citations to both articles can be found below.

**Evaluation of forces applied to tissues during robotic-assisted surgical tasks using a novel force feedback technology**

Awad MM, Raynor MC, Padmanabhan-Kabana M, Schumacher LY, Blatnik JA. Evaluation of forces applied to tissues during robotic-assisted surgical tasks using a novel force feedback technology. *Surg Endosc* **38**, 6193–6202 (2024). https://link.springer.com/article/10.1007/s00464-024-11131-z

**Novel force feedback technology improves suturing in robotic-assisted surgery: a pre-clinical study**

Servais EL, Rashidi L, Porwal P, Garibaldi M, Hung AJ. Novel force feedback technology improves suturing in robotic-assisted surgery: a pre-clinical study. *Surg Endosc*. 2025;39(2):1217-1226. https://link.springer.com/article/10.1007/s00464-024-11472-9

**About Intuitive**
Intuitive (NASDAQ:ISRG), headquartered in Sunnyvale, California, is a global leader in minimally invasive care and the pioneer of robotic surgery. Our technologies include the da Vinci surgical system and the Ion endoluminal system. By uniting advanced systems, progressive learning, and value-enhancing services, we help physicians and their teams optimize care delivery to support the best outcomes possible. At Intuitive, we envision a future of care that is less invasive and profoundly better, where disease is identified early and treated quickly, so that patients can get back to what matters most.

**About da Vinci Surgical Systems**
There are several models of the da Vinci Surgical System. The da Vinci surgical systems are designed to help surgeons perform minimally invasive surgery and offer surgeons high-definition 3D vision, a magnified view, and robotic and computer assistance. They use specialized instrumentation, including a miniaturized surgical camera and wristed instruments (i.e., scissors, scalpels, and forceps) that are designed to help with precise dissection and reconstruction deep inside the body.

For more information, please visit the company's website at www.intuitive.com.

**Important Safety Information**
For product intended use and/or indications for use, risks, cautions, and warnings and full prescribing information, visit https://manuals.intuitivesurgical.com/market. For summary of the risks associated with surgery refer to www.intuitive.com/safety.

**Forward-Looking Statements**
This press release contains forward-looking statements which relate to expectations concerning matters that are not historical facts. Statements using words such as “estimates,” “projects,” “believes,” “anticipates,” “plans,” “expects,” “intends,” “may,” “will,” “can,” “could,” “should,” “would,” “targeted,” “potential,” and similar words and expressions are intended to identify forward-looking statements. These forward-looking statements are necessarily estimates reflecting the judgment of Intuitive’s management and involve a number of risks and uncertainties that could cause actual results or impacts on its operations, financial performance, and business position to differ materially from those suggested by the forward-looking statements. These forward-looking statements include, but are not limited to, statements related to research and development of products and services, manufacturing of products, obtaining of regulatory approvals, technical and other performance of products and services, and making products and services available to more patients and health care professionals. These forward-looking statements should be considered in light of various important factors and involve known and unknown risks, uncertainties, and other factors, which may cause the actual results, performance, or achievements of Intuitive, or industry results, to be materially different from any future results, performance, or achievements expressed or implied by such forward-looking statements. Important factors that could cause actual results to differ materially from those anticipated in the forward-looking statements include, among others, economic conditions in the geographic markets in which we operate, changes in governmental regulations, regulatory approval priorities, resources, and timelines, regulatory enforcement priorities, governmental investigations and civil litigation, and other factors discussed in Intuitive’s Annual Reports and other filings with relevant securities regulators.

Readers are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date of this press release and which are based on current expectations and are subject to risks, uncertainties, and assumptions that are difficult to predict, including those risk factors identified under the heading “Risk Factors” in Intuitive’s Annual Report on Form 10-K for the year ended December 31, 2024, as updated by its other filings with the U.S. Securities and Exchange Commission. Intuitive’s actual results may differ materially and adversely from those expressed in any forward-looking statements, and it undertakes no obligation to publicly update or release any revisions to these forward-looking statements, except as required by law.

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