



Editorial

Remote Robotic Spine Surgery



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See the article "Telerobotic Spinal Surgery Based on 5G Network: The First 12 Cases" via <https://doi.org/10.14245/ns.1938454.227>.



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With each passing year, robotics is making ever deeper inroads within all surgical disciplines, but especially in orthopedics and spinal surgery. By tightly coupling image guidance with specialized mechanical effectors, robotic spine surgery promises more accurate placement of implanted hardware while simultaneously shortening the operating time required for this portion of spinal operations. The present article demonstrates for the first time how surgical robotics when combined with fast (5th generation wireless system, 5G) wireless network connections can even enable remote spinal surgery. This small pilot study, conducted at Beijing Jishuitan Hospital and 4 outlying hospitals, nicely illustrates in 12 patients needing spinal fusions how such remote surgery can be done successfully. The limited size of this study and the narrow scope of success (only accuracy of pedicle screw placement) precludes too broad an extrapolation to the wider universe of spinal surgery. Nevertheless, in the emerging world of 5G connectivity, the overall approach would seem feasible, and with a little imagination all types of futuristic applications seem possible. For that, I congratulate the authors.

Despite the relative surgical success being reported from this pilot study, it is safe to say that the truly hard work now lies ahead. What the field of spine surgical robotics and in particular remote surgery needs now is a demonstration that such procedures solve real-world practical problems. Yes, relative to freehand operations, surgical robots can guide the more accurate placement of surgical instrumentation, but it has not been demonstrated that such an approach is any better than simpler image-guided targeting alone. Remote surgery seems like a wonder, but one still needs a near fully trained surgeon (and probably a surgical assistant as well) to be in the operating room with the patient. While the accurate placement of spinal screws is a specialized and critical task by itself, properly anesthetizing, positioning and monitoring a patient for intricate spinal surgery as well as surgically exposing, inserting hardware and then wound closure are significantly more complex intellectual and mechanical challenges!! Moreover, the downsides of ever more elaborate operations should be clear to all. Robotics coupled with 5G network connectivity may well soon enable the simplest operative tasks to be performed but does this really extrapolate to infinitely more sophisticated surgical procedures, such as those needed to support surgery in space or deep at sea? Who has not lost a Wi-Fi signal at some point even when "terrestrial" coverage is near ideal? When dealing with nearly any commonplace surgical procedures in the future, there will need to a zero tolerance for dropped Wi-Fi connectivity. In itself, the need for such perfection requires a leap of faith about remotely controlled operations becoming a reality someday.

A futuristic world of surgical robotics conjures up an exciting universe of error-free and less invasive surgeries, and as the authors suggest, maybe even conducted during space flight to Mars or beyond. However, let me caution all readers to not get seduced by too much hype lest the inevitable ensuing disappointment will also engender progress-impeding cynicism. Meanwhile, lest I remind the current audience, a practical autonomous surgical robotic has

been performing surgery on patients for more than 2 decades, likely operating on more than 100,000 spine patients to date. This surgical robot in question is the CyberKnife! Each and every day, the lives of dozens of spinal patients are transformed by

this surgical robot. The greater message I seek to make is that robots, marvelous or not, will likely require us to question the very nature of surgery, and in doing so, require us as surgeons, to redefine ourselves and our profession.



Title: Acrobat
Artist: Pablo Picasso
Year: 1930

In this painting, The Acrobat, Picasso depicted the human figure with the cube of the frame despite the apparent freedom of movement. The figure is also maintained by the colors, which controls the motion of the body. It seems the body shape is locked within a white form and then pinioned against the implied stasis of the black background. This painting is a good proof of the paradox of movement and rigidity.

More Information: <https://www.pablocicasso.org/acrobat.jsp>

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