Telesurgical robots: The future of chest traumas

Chest trauma is a leading cause of death occurring in a quarter of all trauma patients. One third of patients with chest injuries die before they reach the hospital and forty percent of the remaining two thirds will require some surgical procedure to help save them from dying. If it were possible to provide specialty care from afar before the patient reached the hospital, the rate of survival would be dramatically increased. This becomes especially important in a military combat setting where optimal hospital care usually is a distance from the injury. The purpose of this study was to evaluate the safety and feasibility of surgery performed by a surgeon who is distant from the patient using a medical robot to evaluate and manage chest trauma. It was hypothesized that a robotic telesurgical approach would be a safe and feasible method.

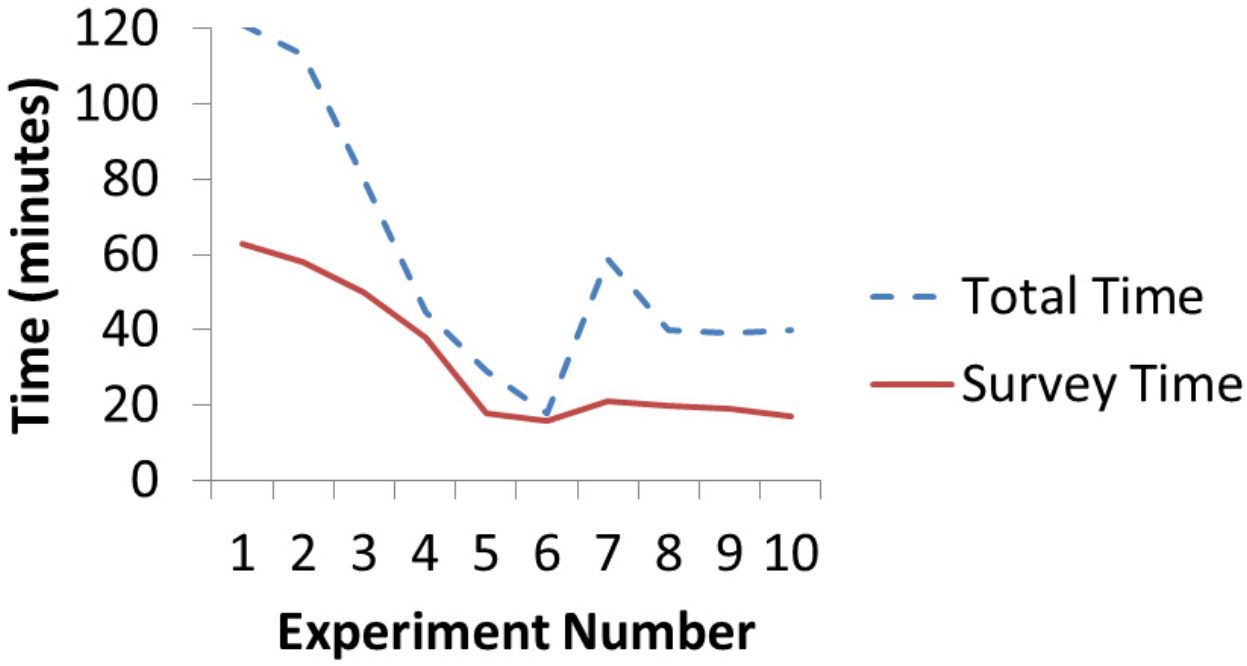

Fig. 1. Experimental Times

This experiment was conducted on ten anesthetized pigs. A random number of planned injuries were created in the animals. The animals were in one room and while the surgeon was in a separate room, communicating with the support staff through video and microphones to mimic a remote setting. Minimally invasive Video Assisted Thoracoscopic (VATS) surgical instruments were used by the surgeon to evaluate the pig's injuries. Once the evaluation was complete, the surgeon attempted to either manage the injuries or if too severe, recommend aborting the assessment in order to "transfer" the patient to a higher level hospital.

Ninety percent of the animals survived their injuries with the only death due to a preexisting lung infection that wasn't identified until after the intervention had already taken place. In addition to this, ninety-five percent of the twenty injuries were properly identified. The only missed injury was a subtle one that was in fact not properly created in the first place. All procedures were completed in an acceptable time frame that reflected the average times the procedures would take had the surgeon been there in person. There was a learning curve at the beginning (Fig. 1), which is expected with any new surgical technique that was quickly overcome after only five experiments. Some injuries were difficult to treat due to the extreme angles reflecting part of the initial learning curve that is needed as to where to insert the robotic arms into the patient. With the fast rate that surgical technology is advancing it is predicted that surgical robots will soon be able to handle even more complex procedures such as this.

Telesurgery has been proven successful in various other surgical procedures but this is the first time it has been used for evaluation and treatment of chest traumas. This study demonstrated that all though a telerobotic system can easily be used to evaluate chest trauma there are limitations to what can safely be repaired from a remote location. In addition to this, learning how to use this system requires surgical expertise and familiarity with the technology. It is predicted that with technical advances, such as making robots more portable and less expensive, they could be easier to adopt and be applicable to many more situations. It was concluded that further comparison studies should be done in order to make these findings more generalizable.

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