

**APPLICATION OF TELEPRESENCE TECHNOLOGY IN PLASTIC SURGERY**

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**Abstract**

Telemedicine has various utilities including Tele education through telepresence technology. While the resident undergoing medical training it is imperative to guide him throughout his training period, this may not be possible practically. Through telepresence technology a teacher presence can be felt anytime. In emergency cases, it may not be possible for consultant to be available but through telepresence technology, consultant can guide from distant. Even in situation where consultant is out of the station, he/she can guide the resident through this technology. With consultant, other residents who are interested in the procedure can also participate and learn simultaneously. This article highlights the importance of telepresence technology in the training of resident in a medical school.

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## INTRODUCTION

Telesurgery is a surgery done by a surgeon at a place away from the patient, is also known as remote surgery. Word 'Tele' means distance and word 'cheirourgia' means surgery. In telepresence the surgical actions are guided by the expert surgeon from a distant site. Laparoscopic surgery provided the doorstep for telesurgery<sup>1</sup>. Telepresence can be made effective by advanced telecommunication methods with high speed transmission of data over distance with minimal delay. With the help of this advance technology surgeon can perform the surgery from a distance and also he can guide the trainees if he is no available at that particular time.

## MATERIALS & METHODS:

The study was conducted in the department of Plastic Surgery, JIPMER, Pondicherry. The operating surgeon is equipped with a GoPro High Definition (HD) Hero3+ camera (figure 1) mounted to the head with a camera strap (figure 2) which was purchased at the cost of INR 25000/-. The visuals received by the camera are recorded and also transmitted via Wi-Fi enabled server to the expert surgeon who can visualize the live relay of surgery being performed. The expert surgeon can communicate and guide the operating surgeon via blue-tooth enabled telephonic conversation. The method was predominately for patients attending JIPMER casualty with upper limb emergencies during the period October 2014 to June 2015. The method was used for elective procedures as well. All six MCh senior residents took part in the study and the technical skills of the resident was assessed by OSATS (Objective structured assessment of technical skill) score (figure 3)<sup>3</sup>. OSATS score

was assessed at the beginning, in the interim stages and at the end.



**Figure 1:** GoPro HD Hero 3 camera with head – band



**Figure 2:** Resident performing telepresence aided surgery

Parameter	Score				
Respect for tissue:	1 Frequently used unnecessary force on tissue or caused damage by inappropriate use of instruments	2	3 Careful handling of tissue but occasionally caused inadvertent damage	4	5 Consistently handled tissues appropriately with minimal damage
Time and motion:	1 Many unnecessary moves	2	3 Efficient time/motion but some unnecessary moves	4	5 Clear economy of movement and maximum efficiency
Knowledge and handling of instrument:	1 Lack of knowledge of instruments	2	3 Competent use of instruments but occasionally appeared stiff or awkward	4	5 Obvious familiarity with instruments
Flow of operation:	1 Frequently stopped procedure and seemed unsure of next move	2	3 Demonstrated some forward planning with reasonable progression of procedure	4	5 Obviously planned course of procedure with effortless flow from one movement to the next
Use of assistants:	1 Consistently placed assistants poorly or failed to use assistants	2	3 Appropriate use of assistants most of the time	4	5 Strategically used assistants to the best advantage at all times
Knowledge of specific procedure:	1 Deficient knowledge. Needed specific instructions at most steps	2	3 Knew all important steps of procedure	4	5 Demonstrated familiarity with all aspects of operation

Figure 3: OSTATS score.<sup>3</sup>

## RESULTS:

The technology was tested for 30 procedures among six residents. After analyzing the OSATS score it was found that majority of the parameters showed an improvement in the

skills of the residents (Table 1). More than fifty percent of candidate had 80 % improvement in the skill. The technology of telepresence was well accepted by the residents as all the residents had basic knowledge about computer and telecommunication technology.

**Table 1:** Comparison of Demographic data between group D and group C.

	Initial OSATS	cases	Interim OSATS	cases	Final OSATS	Improvement
Resident 1	25	4	27	5	28	3
Resident 2	24	5	26	6	28	4
Resident 3	24	6	25	4	27	3
Resident 4	25	5	26	6	27	2
Resident 5	25	6	24	5	27	2
Resident 6	24	6	26	6	27	3

**DISCUSSIONS:**

In the early 2000, several projects investigating the possibility and practicality of telesurgery were successful in performing complete surgical procedures on human patients from remote locations. On September 7, 2001, Operation Lindbergh culminated in the first complete remote surgery on a human patient (a 68-year-old female), performed over a distance of 4300 mi (7000 km)<sup>3</sup>. The patient and surgical system were located in an operating room in Strasbourg, while the surgeon and remote console were situated in a high-rise building in downtown New York.

Potential applications of telepresence include:

Training new surgeons, assisting and training surgeons in developing countries, sharing surgical skill among trainees, treating injured soldiers on or near the battlefield, performing surgical procedures in space, recording surgical procedures and for subsequent demonstration,

collaborating and mentoring during surgery by surgeons around the globe<sup>4</sup>.

Application of telepresence technology in medical field especially for tele-education and training of resident has not been explored much. Through this study we want to highlight the application of telepresence technology in medical field. Though this technology is costly but with widespread use and easy availability of information technology it will become cost effective in near future.

**CONCLUSION**

Telepresence is considered to be an effective means of training residents and young surgeons. Use of GoPro and blue tooth enabled guidance of the operating surgeon is a cost effective, easy and simple way of achieving it.

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