

Analysis of Transitioning from Traditional Surgery Procedures to Medical Robotics Integrated Surgery

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Abstract

The study is based on many aspects of the technological implementation in the medical sciences. In this study the significance of robotics has been evaluated as the medical science has progressed a lot with the support of it. The transition from the conventional methods of surgeries has evolved with the help of such implementation as it has changed the procedures of surgeries through time. With the help of robotics and surgical assistance of technological tools surgeons have gained more capability that ensures accurate results and has increased the possibility of success.

Keywords

Robotics in medical science, Surgical assistance, Transition of surgeries.

INTRODUCTION

Across the world as science has advanced, an evolution has happened in several sectors of medical procedures including surgery. The progress of technology has changed many aspects of surgical procedures in recent times while the methods of surgeries have evolved as well. A transition has happened since the innovation of robotics has been implemented in the modern surgical methods. Surgeries in several aspects have been developed quite a lot as the scientific advancements have invented new technologies that have made the process of surgery quite easier. Through the process of **image guided surgery** in recent times, medical science has made a revolutionary change in the sectors of neurosurgery along with many other aspects.

The orthopaedic division of surgeries has made progress through scientific advancements as it has incorporated many technologies. With the help of **compact robots for image guided orthopaedic surgery (CRIGOS)** the orthopaedic sector has developed quite significantly as the procedure of surgery has become more elegant in nature [1]. As the implementation of robots has happened in the orthopaedic sector of medical science primarily, it has moved forward in other parts of medical science eventually. The implementation of robotics has made progress in the neurosurgery division as well along with many other aspects of medical science, such as ocular surgery [2]. In the aspect of patient satisfaction, scientific advancements have made a massive breakthrough as it has enabled medical science to reach another level of accuracy and proficiency.



Figure 1: Image guided surgery
(Source: [1])

EVALUATION ROBOTIC SYSTEM IN SURGERY

In recent times as science keeps evolving the medical sector has advanced along with the help of it. The innovation of robotics has made many changes in medical science as the implementation of this has made the surgical methods more sustainable and efficient. Implementation of robotics and image guided surgeries has made the sector of orthopaedic treatment more reliable. As the **compact robots for image guided orthopaedic surgery (CRIGOS)** have increased its accuracy level it has been able to provide therapeutic effects to the patients. The system of modulation of the **CRIGOS** consists of a compact and parallel robot along with a software system that can help to prepare for the surgery [3]. For the purpose of supervision in the time of the surgery the technology of robotics makes it easier to identify the sensitive aspects. Though only the support of robotics and technology requires efficient guidelines to follow in order to maintain the accuracy as it needs supervision to be

directed effectively.

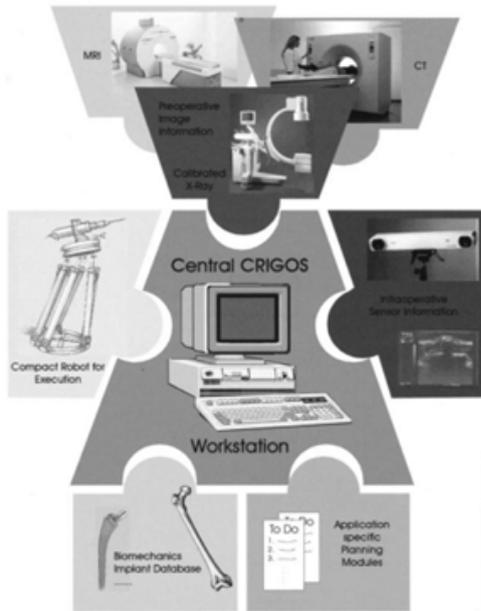


Figure 2: The CRIGOS system
(Source: [3])

Though the incorporation of robotics in surgery has enhanced the quality of procedures of surgery, it has elaborated the system design concept that includes definition of components along with functionalities and interfaces. With the approach of the acquisition of the process of calibrated x-rays along with the design of human and computer interface has evolved the medical science to another extent [4]. For better understanding and more efficient results the technology of robotics has been adopted by many sectors of medical science as it helps the surgeon with its subtle technical skills. The robotics facility provides surgeons with more accurate details about the patient requirements as it can be considered as a helping tool for executing the planning and precise procedures of the surgery [5]. Along with the post-operative verification the technology of robotics helps with the follow-up of the situational condition of the patient.

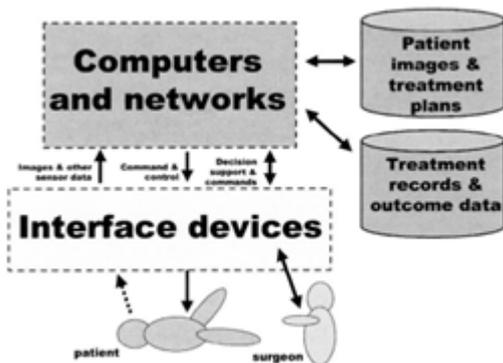


Figure 3: Components of robotics in surgery
(Source: [4])

As science has advanced, the progress of medical surgeries has become more versatile in plenty of aspects.

The **computer integrated surgery (CIS)** has made the procedures of the surgery more efficient as it makes the surgeon to gain more accurate results related to the surgery [6]. Assistance of the computer guided medical surgery increases the chances of success as it provides the surgeon with efficient assistance. The computer integrated facilities have made the procedures of surgery more precise as it can be modified along with the requirements of the particular patient [7]. Modification of the system of **computer integrated surgery** services helps the patient with preoperative state as it has a massive impact on planning the surgery in an appropriate manner. The intra-operative stage of the patients requires more attention and care as the **CIS** system takes responsibility of that with the supervision of the surgeon [8]. Along with all of this, the **CIS** supports patients with their post-operative stage as well, while helping the surgeon with its assistance as per the requirements of the patients.

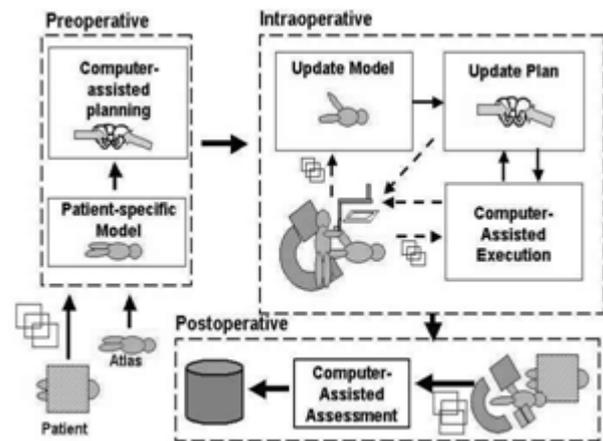


Figure 4: The Computer Integrated Surgery system
(Source: [8])

With the help of these technological supports the field of medical science has gained more reliability as it can be modified according to the situation of the patient. Through the help of image guided medical surgeries the execution of critical surgery plans has become more viable for the surgeons [9]. As this kind of surgery plans requires efficient assistance the technological tools provide the helping hand to the patients along with the surgeons while increasing the rate of success for the operation [10]. The calibrated x-ray services that have been implemented quite recently in the field of medical sciences have improved the results as it produces accurate reports of the tests. As the implementation of modern technologies has made its way into the field of medical sciences it has increased the success rate of surgeries in several aspects along with increment of profits.

The implementation of new technologies has enhanced the efficiency and success of surgery in the field of ocular surgeries as well. With the help of the technological tools critical eye tests have become possible that can be opted with accuracy [11]. Examining a patient with the support of

technological assistance has improved the quality of results as in this manner even critical tests that require more subtle attention have become easier than before. In the aspect of neurosurgery along with ocular treatments that require critical tools, the implementation of the modern technologies such as computerised machinery have provided the assistance to surgeons. In the orthopaedic sector the surgeries require accuracy and precision as it deals with the bone structure of the human body [12]. As the technological tools have provided the surgeons with assistance, the patients get to be satisfied along with it. Though the implementation of such technological advancements has made progress in the medical field, it still requires supervision and specific guidelines for it to work in the estimated manner.

RESULTS AND DISCUSSION

The technological tools may have increased the success rate of critical operations; it still needs to be attended to on a regular basis. As technology requires to be updated in order to produce accurate results the surgical tools along with the assistance equipment needs to be under supervision [13]. Designing these tools and machines sometimes come with faulty structures as it produces inaccurate results while creating difficulties for the surgeons. Whether the tools and machines produce different results it makes the procedure of the surgery more difficult and dangerous for the patients. With the innovation of modern technologies and tools though the surgeries have become easier to opt for, it can become a life risking factor for critical patients in some aspects [14]. The conventional procedures of surgeries have been evolving for quite a long time while the implementation of technological machinery has come along with it.

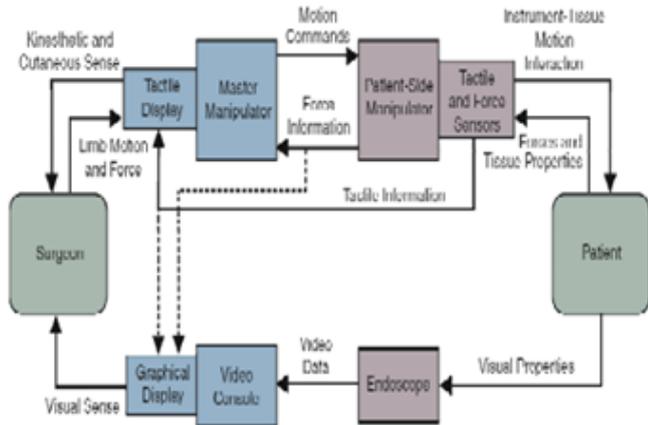


Figure 5: Procedure of Tele-surgery
(Source: [14])

Though several structures of machines have been designed with the purpose of improving the medical and surgical procedures, it requires more upgrades.

Machines that have been used for industrial purposes and have not been updated for a long while have the potential to

produce great support systems in the field of medical sciences. Robots are still under evaluation for the purposes of industrial usage as they are considered to be validation tools that are meant for research purposes only [15]. The modern machines and robots have made life changing contributions to the medical field while making difficult examinations and procedures of surgeries easier. As the modern technology of robotics has helped the field of medical science in many aspects it still needs to be evaluated appropriately in order to produce accurate reports. Providing a quality amount of assistance to the surgeons of several sectors the robotics technology needs to be designed with precision. Considering more compact designs for the robotics that can provide guidance during a critical surgery has to be checked regularly [16]. Surgical robots that have been developed throughout the years require being quite precise and prepared for the operation theatre as it has to be compatible in the atmosphere. For better performance the surgical robots need to be checked and updated as it requires being fast and efficient in the time of surgery.

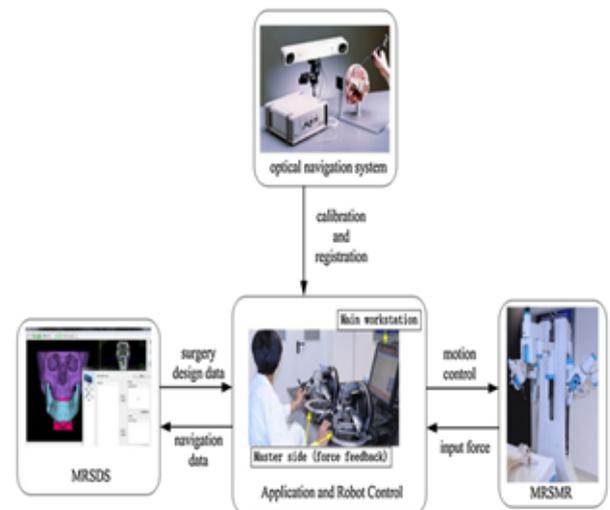


Figure 6: Robotic control
(Source: [16])

Consideration of the general design for the surgical tools has to be placed in an appropriate position for it to work and assist surgeons during a surgery. They need to be compact enough that they can be fit into small spaces such as surgical theatres in order to guide the surgeon and produce accurate results [17]. Whether contacted with the patient or the operation table the surgical robots need to be removed as it increases the possibility of contaminating the place. The process of sterilization gets to be used for the purpose of removing the contamination from the area as such machines with modern technologies can be considered as threats in some aspects. Surgical assistants are another part of medical robotics that has contributed to the field of medical science immensely [18]. The purpose of using such technology is to provide the surgeon with a set of tools that are professionally made and designed for surgeries and compatible for the surgical theatres.

In recent times the implementation of such tools in the medical field has increased a lot as it has made the procedures of surgeries easier and less complicated. The assistance of surgical robots can be divided in two sectors as it has different categories of expertise. In the first category there are the *surgeon extenders* that are meant to enhance the ability of the surgeon and eliminate the probable threats that can occur during a surgery [19]. These machines are primarily directed by the surgeons as the machines provide better assistance to the surgeons and make them more capable and efficient of themselves.

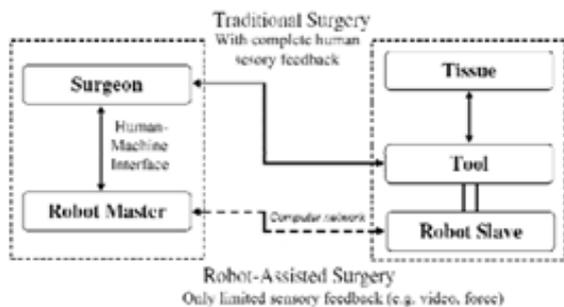


Figure 7: Transition from traditional to robot assisted surgery
(Source: [19])

The second category is *auxiliary surgical supports* as the purpose of these tools of technology is to provide secondary help to the surgeon along with the patients [20]. It is evident that the implementation of such tools has made the field of medical science evolve faster while increasing its profitability and viability.

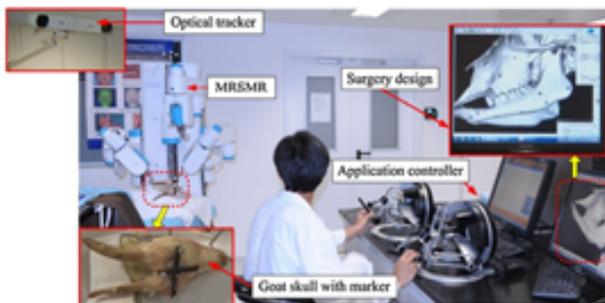


Figure 8: Auxiliary surgical support
(Source: [20])

CONCLUSION

During the study plenty of data has been found in the aspect of the surgical assistance of the modern generation that has been developed with the help of technology. The technological implementation has made medical science more advanced and accurate as the support of the modern tools has enhanced the ability of the surgeons. In this study the many aspects of the transition of the history of surgeries have been evaluated as it has contributed a lot to the medical sciences. The discussion has also been done on the subject of robotics systems in the aspect of critical surgeries. Results of such implementations along with its advantages

and disadvantages have been discussed here as well. The study has also established many aspects of medical sciences as the incorporation of these technological tools has increased the efficiency level to another extent along with the success rate of surgeries.

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