Minimally Invasive Surgery: The Development of Surgical Endoscopy in Iraq

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Abstract: Laparoscopic intervention in the abdomen, or even the kidney, ureter, uterus, or knee. This procedure reduces risks, improves recovery, and speeds up the recovery process after surgery, allowing patients to return to normal activity and function normally. In Iraq, laparoscopy is performed in government or private hospitals using laparoscopic towers. These towers consist of a screen, a CCU, a light source, and a camera connected to a processor and a lens specific to the type of surgery being performed. There are lenses for general surgery, urology, gynecology, and others, along with precise surgical instruments inserted into the abdomen through special incisions, or with a lens in the case of urological surgery. Laparoscopic surgery in Iraq involves the surgeon using a 30-degree lens and inserting three incisions: one for injecting carbon dioxide gas, another for the lens, and a third for the instruments (the gas is injected to expand the space in which he is working and obtain a clear image). Staining applications, or the use of indocyanine green (ICG), have recently been introduced into laparoscopy, significantly improving the image, especially when dealing with cancerous tumors.

Areas like hernia repair proved early how standardizing minimally invasive approaches lowers costs compared to traditional open surgery through reduced time off work and quicker recovery. This allows minimally invasive options to benefit more individuals, whether for acute conditions or managing chronic illnesses preferring ambulatory treatments. In the latter context, researchers explore applications improving preventative and longitudinal care delivery. Examples include natural orifice translumenal endoscopic surgeries performing operations via the mouth or vagina, minimizing visible scarring. Other concepts envision performing future colonoscopies with swallowable robotic capsules transmitting live mucosal imagery, reducing invasiveness. Beyond singular innovations, collaborations accelerate progress.

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I. INTRODUCTION

The evolution of minimally invasive surgery, particularly through the development of surgical endoscopy, has significantly transformed clinical practices globally, with Iraq increasingly adopting these advancements. The integration of sophisticated techniques not only enhances patient outcomes but also minimizes recovery times, making earlier discharge a common practice. Such advancements are particularly relevant in the context of complex biliary surgeries, where complications such as biomass can arise procedures following like endoscopic retrograde precise cholangiopancreatography, necessitating and minimally invasive interventions for resolution.[11] Furthermore, modern imaging techniques such as multiplanar multislice computed tomography (MDCT) are being employed to improve preoperative assessments and surgical planning in cases of hiatal hernias, underscoring the multifaceted approach in contemporary surgical practices.[1] As the landscape of healthcare in Iraq continues to evolve, the emphasis on minimally invasive techniques stands as a testament to improving surgical efficacy and patient care. Doctors like Dr. Mohammed Al-Ameedi in the city of Diwaniyah, Iraq, have played a significant role in developing the skills of many Iraqi medical students. This has created a generation of urologists with valuable skills and knowledge that has helped develop and diversify surgical procedures in Iraq, with the availability of advanced and modern equipment in both public and private hospitals. We may note that Urology laparoscopic surgery in Iraq is divided into two types: access to the urethra or kidneys using semi-rigid or rigid instruments, and the other type is the use of flexible access.

II. OVERVIEW OF MINIMALLY INVASIVE SURGERY

In recent years, minimally invasive surgery (MIS) has revolutionized the field of medicine, offering patients less traumatic alternatives to traditional surgical approaches. This paradigm shift is particularly significant, as MIS techniques, such as laparoscopic procedures and endoscopic

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surgeries, reduce recovery times, minimize postoperative pain, and improve surgical outcomes. For instance, research indicates that advanced imaging techniques, such as MDCT scans, provide critical preoperative measurements that enhance surgical planning for procedures like hiatus repair, thereby optimizing patient care.[1] In Iraq, diagnostic ultrasound devices, C-Arm X-ray devices, in addition to MRI and CT scans are used to diagnose cases before heading to the operating room. Similarly, novel approaches to postoperative care, such as the use of indomethacin suppositories, have been demonstrated to effectively reduce the incidence of nausea and vomiting following laparoscopic cholecystectomy, further underlining the importance of these evolving methodologies. [13, 16] The continuous development of surgical endoscopy in Iraq thus exemplifies the broader significance of MIS in enhancing healthcare quality and accessibility on a global scale.

III. A SIMPLIFIED HISTORICAL OVERVIEW (IN IRAQ)

The evolution of surgical endoscopy in Iraq has been significantly shaped by both historical and socio-political contexts, underscoring the remarkable adaptability of medical practices in response to national challenges. In the conflicts of that disrupted healthcare aftermath infrastructure, the introduction of minimally invasive techniques, particularly through endoscopy, has offered a critical solution to meet the increasing demand for effective surgical interventions in limited-resource settings.[5] As Iraq sought to rebuild its medical capabilities, the implementation of endoscopic procedures provided a pathway to improve patient outcomes, reduce recovery times, and conserve resources, aligning with global trends in surgical practice. Studies have demonstrated the effectiveness of various pre-operative measures, such as the of indomethacin suppositories, use to minimize postoperative complications in laparoscopic surgeries, reflecting the potential benefits of adopting advanced surgical methodologies in Iraq .[13,16] Furthermore, the emergence of nurse-surgeons highlights the innovative responses aimed at addressing surgical access challenges in the region.[14] Improvement in the number of surgical cases that were performed and improved outcomes throughout Iraq with an increase in the number of doctors on scholarship or working in scientifically advanced hospitals.

IV. DEVELOPMENT AND PRACTICE OF LAPAROSCOPIC SURGERY IN IRAQ

The evolution of surgical practices in Iraq has undergone significant transformation, particularly with the adoption of endoscopy as a minimally invasive technique. Historically, surgical interventions in Iraq were primarily limited to open procedures. As a result of the political situation and the deterioration of the scientific situation and health services which often resulted in prolonged recovery times and higher complication rates. However, as access to advanced medical training and technologies improved, the integration of endoscopic techniques began to take shape. The beginning of surgical endoscopy in Iraq at the hands of well-known doctors in the Medical City in Baghdad and it spread to the rest of the governorates to be used in government teaching hospitals in all Iraqi governorates, starting with the specialty of general surgery and then urology. The emergence of nurse-surgeons in this context exemplifies innovative adaptations to address surgical care shortages, underscoring the collaborative role of various healthcare professionals (14). Furthermore, as Iraqi surgeons gained access to enhanced training programs focused on the anatomy and physiology pertinent to endoscopic procedures, such as those involving the colon and rectum, their proficiency in the field advanced significantly [10]. Consequently, the shift towards endoscopy symbolizes a broader movement towards modern, efficient surgical practices in Iraq, catering to the growing needs of the population.

V. TECHNOLOGICAL ADVANCEMENTS IN ENDOSCOPIC TECHNIQUES

The evolution of endoscopic techniques has been significantly influenced by technological advancements that enhance surgical precision and efficiency. In May 1996, after long negotiations with the United Nations Secretariat, Iraq signed a memorandum of understanding in which Iraq obtained anesthesia devices, medications, and equipment that would enable Iraqi doctors to perform limited operations using surgical endoscopes. This was the beginning of the development of the use of surgical endoscopy techniques, as well as anesthesia for surgical patients. particularly within the context of minimally invasive procedures in Iraq. Recent innovations include the development of ergonomic tools that improve the surgeon's interaction with instruments, allowing for more dexterous manipulation during complex procedures. Research has highlighted the importance of micro-ergonomics in surgical instrument design, suggesting that optimizing the fit of tools to a surgeon's hand can facilitate better performance and reduce fatigue [3, 4]. Furthermore, advances in sensor technology have fostered objective assessments of surgical skills, moving beyond traditional subjective evaluations. By integrating machine learning methods capable of analyzing motion and time series data, these technologies assist in the training and competency evaluation of surgeons, ultimately enhancing patient safety and outcomes [6, 7]. These advancements collectively contribute to the burgeoning field of endoscopic surgery in Iraq, promising to elevate standards of care. [3, 6, 7]

VI. EQUIPMENT, ENDOSCOPY TOWERS, AND PROCEDURES THAT HAVE IMPROVED SURGICAL OUTCOMES.

In recent years, significant innovations in surgical equipment and procedures have transformed the landscape of minimally invasive surgery, particularly through advancements in surgical endoscopy. Many companies entered Iraq, such as Karl Storz, Arthrex, the American company Stryker, and other European, Japanese, and Chinese companies, and competed in providing endoscopic surgery services, such as surgical instruments and devices ISSN No:-2456-2165

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(endoscopic towers). These innovations include the introduction of high-definition imaging systems that enhance the visualization of internal structures, facilitating more precise interventions and improving patient outcomes. Robotic-assisted surgical systems have also emerged as a game-changer, allowing surgeons to perform complex procedures with greater dexterity and control, thus minimizing surgical trauma and recovery time for patients [7]. Additionally, the integration of nurse-surgeons into surgical teams has broadened the capacity for patient care, particularly in resource-limited settings like Iraq, where traditional surgical access is hindered [14, 15, 16]. By leveraging these technological advancements and workforce innovations, surgical practices are increasingly addressing both operational efficiencies and patient-centered outcomes in minimally invasive procedures. [4, 5, 10]

VII. CONCLUSION

In conclusion, the progress of endoscopic surgery in Iraq reflects significant developments in minimally invasive and advanced laparoscopic surgical techniques across all specialties, highlighting the challenges and opportunities inherent in this field. As the healthcare landscape continues to evolve in Baghdad, the capital of Iraq, and other governorates such as Karbala, Basra, Mosul, and Ramadi, the integration of ergonomic designs and microsurgical instruments will play a crucial role in enhancing surgical precision and reducing surgical complications. This requires the presence of strong and reputable companies that provide surgical materials, instruments, and endoscopic towers, such as the German company Karl Storz or the American Stryker. Research indicates company that the implementation of ergonomic microsurgical interventions can improve instrument design, enabling surgeons to perform their work with greater efficiency and comfort [3, 4, 8, 9]. Furthermore, the ongoing study of various treatment methods emphasizes the importance of adopting tailored approaches to reduce the recurrence of conditions such as hydatid disease, highlighting the need for a comprehensive understanding of patient needs and resource availability [4]. Therefore, continued investment in education, technology, and research is essential to promote the sustainable development of endoscopic surgery practices. Iraq and its doctors need continuous development, as do engineers and nurses working in the public and private sectors. Iraq also needs to develop and open health institutions and training and development centers in the unions of engineers, doctors and nurses to ensure the development and progress of laparoscopic surgery in Iraq. [11,12,16]

VIII. THE FUTURE OF MINIMALLY INVASIVE SURGERY AND ITS POTENTIAL IMPACT ON HEALTHCARE IN IRAQ

The future of minimally invasive surgery (MIS) in Iraq represents revolutionary potential in healthcare, especially with the opening of new hospitals in Iraq, equipped with state-of-the-art technology and equipment, such as Al-Shaab Hospital in Baghdad and Turkish and German hospitals in Karbala, Babil, Najaf, and Nasiriyah, as well as the reconstruction and opening of new hospitals in war-affected governorates from 2014 to 2018. This promise promises improved surgical outcomes, reduced patient recovery times, and rapid disappearance of surgical deformities and incisions, especially with the development of the cosmetic and post-laparoscopic healthcare sector in Iraq. As technological advances continue to shape surgical practices, the integration of virtual reality simulation, as recent research has demonstrated, can provide significant training benefits for medical professionals in Iraq, facilitating the development of the fundamental skills needed to perform complex surgical procedures. It improves the surgical approach to conditions such as hiatal hernia by providing objective measurements to achieve better procedural outcomes [1]. Additionally, the ability to recreate high-risk medical scenarios in virtual environments can foster a collaborative climate among multidisciplinary medical teams, ultimately improving patient care and safety in outpatient facilities [2]. As Iraq embraces these developments, the adoption of minimally invasive surgery could contribute to raising healthcare standards and patient satisfaction across the country.[16]

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