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INNOVATIONS IN LAPAROSCOPIC HERNIOPLASTY OF VENTRAL HERNIAS

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Summary

Ventral hernias remain a pressing issue in surgical practice, particularly in the context of postoperative ventral hernias. Traditional open hernioplasty is a standard treatment method; however, modern advancements in endovideosurgical techniques may significantly enhance surgical efficacy, reduce postoperative complications, and expedite patient recovery.

The purpose of the study. *To assess the outcomes of laparoscopic prosthetic hernioplasty in ventral hernia repair and perform a comparative analysis with the conventional open approach. The study evaluated 228 patients who underwent surgical treatment for ventral hernias between 2011 and 2024.*

Materials and methods of research. *The study enrolled 228 patients with ventral hernias treated at the surgical department of a multidisciplinary clinic of Samarkand State Medical University. Patients were divided into two groups: a control group (n=106) undergoing open hernioplasty and a main group (n=122) undergoing laparoscopic prosthetic hernioplasty.*

Results. *Postoperative complications occurred in 43 patients, including 35 cases in the control group and 8 in the main group. Complications comprised bronchopulmonary (n=4), cardiovascular (n=5), and one fatal case following laparotomy hernioplasty.*

Conclusions. *Comparative analysis demonstrated significant advantages of laparoscopic hernioplasty over the open approach, including reduced postoperative pain duration and earlier patient mobilization.*

Keywords: *Ventral Hernias, Open Hernioplasty, Laparoscopic Hernioplasty, Complication, Recurrence.*

Introduction

Ventral hernias remain a significant challenge in surgical practice, particularly in the context of postoperative ventral hernias [1-4]. Traditional open hernioplasty is a standard treatment method; however, modern advancements in endovideosurgical techniques can significantly improve surgical efficacy, reduce postoperative complications, and accelerate patient recovery [5-7].

Laparoscopic hernioplasty for ventral hernias is a contemporary and effective surgical approach that is gaining widespread acceptance due to its advantages [8-10]. Ventral hernias develop in the area of the anterior abdominal wall, often following prior surgery or due to weaknesses in the musculofascial structure [11,12]. Conventional open procedures are associated with prolonged recovery and higher complication rates, whereas the laparoscopic technique minimizes tissue trauma and enhances patient rehabilitation [13-15].

The fundamental principle of laparoscopic hernioplasty involves the use of small incisions for the insertion of specialized instruments and a camera [16-18]. This allows for optimal visualization of the hernia defect and adjacent anatomical structures, facilitating precise and atraumatic reduction of the hernial sac and reinforcement of the abdominal wall. Mesh implants are typically employed to strengthen the weakened area and reduce recurrence risk [19-22]. This approach ensures high treatment efficacy with minimal cosmetic impact.

The benefits of laparoscopic hernioplasty include reduced hospitalization duration, lower postoperative pain, faster return to normal activity, and decreased risk of infectious complications [23,24]. Additionally, smaller incisions minimize the likelihood of postoperative hematomas and other adverse effects. This is particularly advantageous for patients with multiple hernias or contraindications to open surgery [25,26].

Despite its advantages, laparoscopic hernioplasty demands high surgical expertise and advanced equipment. In certain cases, such as large hernias or extensive adhesions, a hybrid approach or open surgery may be necessary [27-29]. Nevertheless, minimally invasive techniques demonstrate excellent outcomes in most cases, significantly improving patients' quality of life.

In summary, laparoscopic hernioplasty for ventral hernias represents a modern treatment standard, ensuring effective defect repair with minimal risks and rapid recovery. Ongoing technological advancements and refinements in surgical methods continue to enhance patient safety and postoperative comfort, further improving long-term outcomes.

The purpose of our research was to evaluate the outcomes of laparoscopic prosthetic hernioplasty for ventral hernias and compare them with those of the traditional open approach. A total of 228 patients who underwent surgical repair for ventral hernias between 2011 and 2024 were analyzed.

Materials and research methods

The study included 228 patients with ventral hernias treated at the surgical department of Samarkand State Medical University's multidisciplinary clinic. Participants were divided into two groups: a control group (n=106) undergoing open hernioplasty and a study group (n=122) undergoing laparoscopic prosthetic hernioplasty.

Patient selection for the study group considered constitutional characteristics and factors potentially affecting postoperative outcomes. Laparoscopic prosthetic hernioplasty was performed in 103 patients (45.2% of total cases), primarily for small-to-medium hernias with aponeurotic defects ≤10 cm.

The laparoscopic procedure comprised several sequential stages. Initial access involved first trocar placement using intraoperative ultrasound guidance (Fig. 1) for precise

anatomical marking and pneumoperitoneum establishment. For cases with suspected adhesions with postoperative

ventral hernias, the Hasson technique ensured safe abdominal entry (Fig. 2).



Fig. 1. Veress needle insertion under intraoperative ultrasound guidance with pneumoperitoneum establishment

The second stage involved placement of two or three working trocars based on surgical ergonomics and safety considerations. In the third stage, adhesiolysis between the hernial sac, anterior abdominal wall, and adjacent organs was performed using electrocautery. The fourth stage consisted in the aponeurosis defect identification and appropriate mesh selection. Subsequently, the implant was



Fig. 2. Hasson open laparoscopy technique demonstrating peritoneal opening with scissors, showing potential risk of the singed loop of the small intestine injury during dissection.

cut out, modeled and installed using ligatures for intra-abdominal straightening.

At subsequent stages, the mesh prosthesis was introduced folded through a trocar, then unfolded and positioned within a created preperitoneal pocket. Fixation to the abdominal wall utilized a modified Endo Close needle (Fig. 3), optimizing implant stabilization.

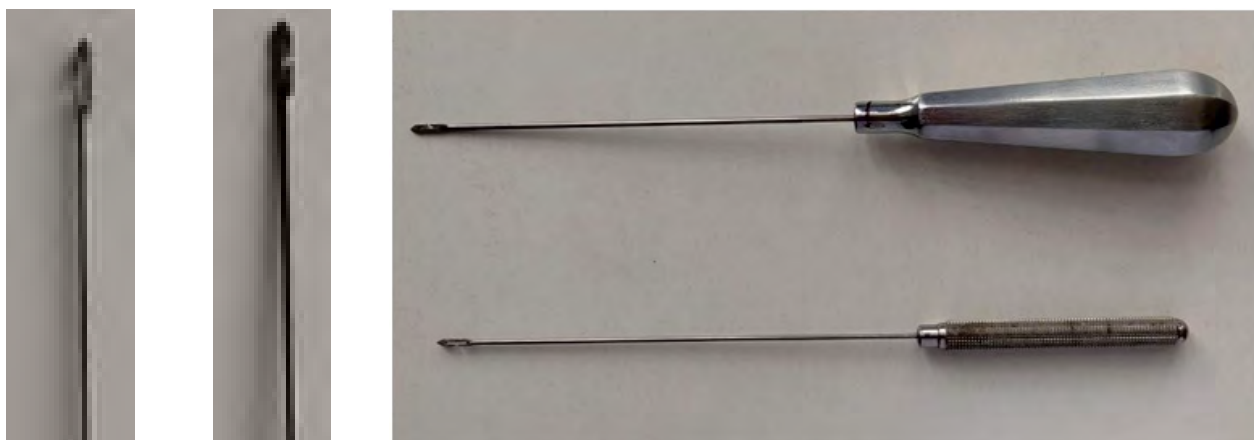


Fig. 3. Modified Endo Close needle for suture fixation of the implant to the anterior abdominal wall.

As previously noted, hernial defects were predominantly infraumbilical (M3-M4; 67.9%) or iliac (L3; 7.8%) according to the Cyruvel-Rath classification (1999). In this regard, there was a risk of perforation and damage to the bladder wall during its emptying. To prevent this complication, the bladder lumen was filled with saline solution through a Foley catheter.

Thus, for infraumbilical defects, the caudal part of the endoprosthesis was carefully positioned to avoid the bottom of the bladder contact, preventing organ injury during visual inspection and endoprosthesis fixation to the anterior abdominal wall. Figure 4 illustrates the modified technique for endovideosurgical preperitoneal hernioplasty in postoperative ventral hernias.

This developed technique is protected by invention patent (No. IAP 07205) issued by the Intellectual Property Agency of the Republic of Uzbekistan.

Results and Discussion

Postoperative complications occurred in 43 patients (18.8%). Of these, the control group experienced 35 complications (28.0%) compared to 8 cases (7.8%) in the study group. Bronchopulmonary complications were observed in 4 (1.7%) cases, cardiovascular complications in 5 (2.2%), with one fatal case (0.4%) following laparotomy hernioplasty.

Local complications included seroma, hematoma, and wound infiltration, with significantly lower incidence in the laparoscopic group. Hematoma occurred in 1 case (0.9%) versus 4 (3.2%) in controls. Seroma developed in 7 control patients (5.6%) versus 1 study patient (0.9%).

Long-term follow-up revealed lower recurrence rates in the study group (2.2%, n=2) compared to controls (13.3%, n=13). Primary recurrence causes involved underestimation of defect size and inadequate mesh fixation leading to displacement.

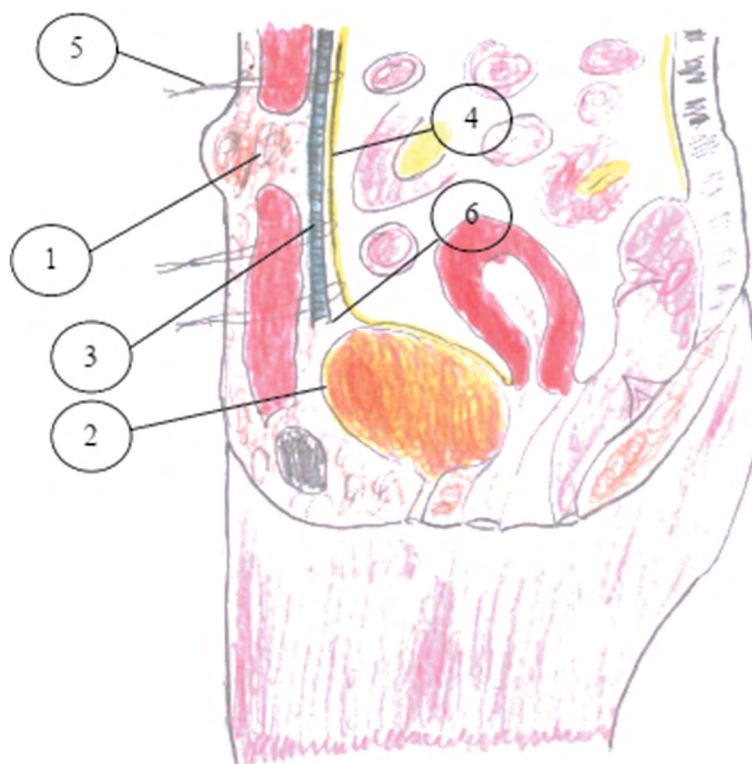


Fig. 4. The proposed laparoscopic ventral hernia repair technique:

1 – hernial defect; 2 – full bladder; 3 – non-composite (standard) mesh implant; 4 – peritoneum; 5 – preplaced U-shaped sutures; 6- pocket between peritoneum and musculoaponeurotic layer extending from hernial defect to full bladder bottom.

Our findings demonstrate laparoscopic prosthetic hernioplasty's superior efficacy versus conventional open repair. The minimally invasive approach reduced postoperative complications, particularly wound-related issues, and accelerated recovery through reduced tissue trauma, decreased pain, and earlier mobilization.

Technical refinements, including the Hasson technique for adhesiolysis and modified Endo Close needle application, contributed to improved outcomes and complication prevention.

Conclusions

1. Laparoscopic hernioplasty represents an effective treatment modality for small-to-medium ventral hernias.

2. Implementation of refined technical approaches in laparoscopic repair significantly reduces postoperative complications, including wound issues and recurrences.

3. Comparative analysis demonstrates laparoscopic hernioplasty's advantages over open repair, particularly regarding shorter pain duration and faster postoperative recovery.

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ІННОВАЦІЇ В ЛАПАРОСКОПІЧНІЙ ГЕРНІОПЛАСТИЦІ ВЕНТРАЛЬНИХ ГЕРНІЙ

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Резюме.

Вентральні грижі залишаються актуальною проблемою в хірургічній практиці, особливо в контексті післяопераційних вентральних гриж. Традиційна відкрита герніопластика є стандартним методом лікування, проте сучасні досягнення в області ендовідеохірургічних технік можуть значно підвищити ефективність хірургічного втручання, зменшити післяопераційні ускладнення та прискорити одужання пацієнтів.

Мета дослідження. Оцінити результати лапароскопічної протезної герніопластики при лікуванні вентральних гриж та провести порівняльний аналіз із традиційним відкритим методом. У дослідженні було оцінено 228 пацієнтів, які пройшли хірургічне лікування вентральних гриж у період з 2011 по 2024 рік.

Матеріали та методи дослідження. У дослідженні взяли участь 228 пацієнтів з черевними грижами, які лікувалися в хірургічному відділенні багатoproфільної клініки Самаркандського державного медичного університету. Пацієнтів було розділено на дві групи: контрольну групу (n=106), якій проводили відкриту герніопластику, та основну групу (n=122), якій проводили лапароскопічну протезну герніопластику.

Результати. Післяопераційні ускладнення виникли у 43 пацієнтів, у тому числі 35 випадків у контрольній групі та 8 у основній групі. Ускладнення включали бронхолегеневі (n=4), серцево-судинні (n=5) та один летальний випадок після лапаротомічної герніопластики.

Висновки. Порівняльний аналіз продемонстрував значні переваги лапароскопічної герніопластики над відкритим методом, включаючи скорочення тривалості післяопераційного болю та більш ранню мобілізацію пацієнтів.

Ключові слова: черевні грижі, відкрита герніопластика, лапароскопічна герніопластика, ускладнення, рецидив.

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