Comparative study between anterior and posterior approach in emergent femoral hernia

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Objectives/aims
Emergency surgery is necessary for incarcerated and/or strangulated femoral hernias. With regard to emergency femoral hernia repair, this study attempted to compare between open anterior and open posterior (preperitoneal) techniques.
Methods
Patients who underwent emergency femoral hernia repair between October 2020 and October 2022 were included in this single centre retrospective cohort research. They were divided into two groups based on the surgical incisions: the anterior approach group (19 cases) and the posterior approach group (14 cases). Open anterior and posterior methods were compared using patient demographic information, intraoperative findings, operating time, and postoperative outcomes.
Results
33 patients in total were included in the current study. 19 patients (57.6%) underwent open anterior approach, whereas 14 patients (42.4%) underwent open preperitoneal approach. Patient features indicated a similarity between the two groups. The posterior approach group experienced considerably shorter mean operative time (53.624 7 min vs 77.936 5 min, $P = 0.039$) and recovery time (9.24 1days vs 13.36 6days, $P = 0.049$) before returning to full activity. The posterior approach group had a decreased (7.14%) rate of postoperative complications, such as wound infection, seroma/hematomas, persistent discomfort, and hernia recurrence.
Conclusion
While it can increase the rate of first-stage tension-free repair of incarcerated femoral hernia and with a lower risk of postoperative complications, the open preperitoneal approach for emergency femoral hernia may be preferable to other procedures.

Keywords:
a femoral hernia, a preperitoneal approach, and tension-free repair, incarcerated, strangulated

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Introduction

Less than 5% of abdominal wall hernias are femoral hernias, which affect more women than men (4 : 1) [1]. Due to the femoral canal's short neck, femoral hernias can incarcerate and/or strangulate very easily, necessitating immediate surgery for the patient [2]. It is still debatable whether any surgical procedure is best for repairing an urgent femoral hernia [3]. In certain cases, open anterior, open preperitoneal (posterior), and laparoscopic mesh approaches have been performed [4,5].

The anterior technique through an inguinal incision for incarcerated femoral hernia has been widely adopted, since complications occurred in 10.5-27.8% of patients [6] who needed exploratory laparotomy through an additional abdominal incision. Moreover, traditional healing methods may result in excessive tension, which is linked to acute discomfort and recurrence [7]. There are certain benefits to perform posterior approach repairs through a lower abdominal incision, including a quicker return to full activity and a decreased postoperative complication rate. It also facilitates the quick removal of intestinal blockage and lessens injury or bowel perforation [8].

Though not explicitly for incarcerated and/or strangulated femoral hernias, several studies have examined the short- and long-term effects of preperitoneal repair for intestinal resection in inguinal hernias [9–11]. Hence, the purpose of our study was to assess the short- and long-term results of emergency femoral hernia repair using open anterior and open posterior (preperitoneal) techniques in terms

of postoperative complications, mortality, and recurrence.

Patients and methods

This retrospective single-center cohort analysis was conducted at general surgery department, Menoufia University Hospitals. All adult patients undergoing urgent femoral hernia repair due to incarceration and/or strangulation between October 1, 2020, and October 1, 2022, were included in this study. The International Guidelines for the management of groin hernia [3] defined strangulation as evidence of a limited blood supply to herniated tissues and incarceration as the inability to reduce the hernia mass into the belly. Individuals under the age of 18 and those who had elective surgery after manually or naturally reducing the hernia content were excluded. Clinical and surgical data on the patients were gathered. The data was composed of demographic, clinical, surgical, and short- and long-term outcome measurements. Sex, age, smoking history, body mass index (BMI), anesthetic risk assessment, and related comorbidities were among the demographic and clinical data. An electrocardiogram, chest radiography, abdomen computed tomography, and laboratory tests were all part of the preoperative evaluation, which also looked for signs of preoperative intestinal blockage and the length of incarceration and/or strangulation. The time that passed between the beginning of incarceration or strangulation until surgery was referred as the duration of incarceration or strangulation. The hernia factors included hernia side, hernia sac content, intestinal resection need, operative time, hospital stay duration, postoperative outcomes, and recurrence rates were compared.

Operative procedure

The same surgical team operated on all patients while they were either under spinal or general anesthesia. Antibiotics used as preventative measures were frequently given throughout the perioperative period. There were two types of surgical approaches: open anterior and open posterior. An anterior approach was defined as an open transinguinal repair without penetrating the preperitoneal area utilizing a tissue or mesh method. A posterior approach was defined as an open posterior access of the preperitoneal area without accessing the inguinal canal anteriorly to facilitate hernia repair with or without the installation of a prosthesis. According to these definitions, the patients were divided into two groups: open anterior (group I) and open posterior (group II).

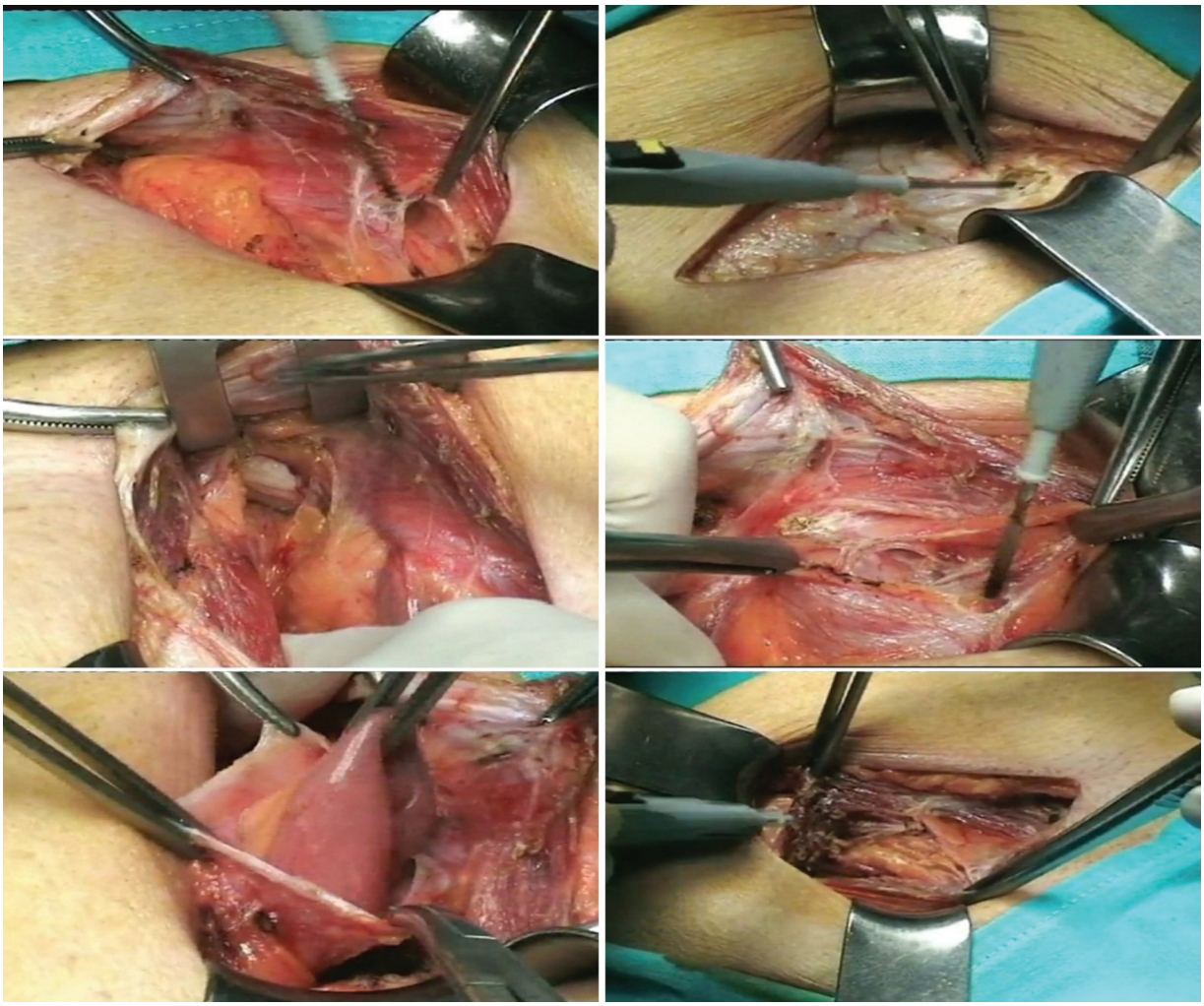
When an open posterior approach (group II) was chosen by the surgeon, a lower horizontal abdominal incision (4-6 cm in length) was made two finger breadths above the symphysis pubis. The rectus abdominis anterior sheath, subcutaneous tissue, skin, and aponeurosis of the oblique muscles were all incised. The extraperitoneal area between the peritoneum and transversalis fascia was revealed after the rectus muscle was retracted medially and the transverse fascia was incised. Using this method, the hernia sac might be immediately examined (Fig. 1). The inguinal ligament was cut to widen the femoral ring for reduction if the hernia could not be reduced by pulling the hernia sac. Hernia contents that were healthy while incarcerated were reduced. Intestinal resection and anastomosis as well as omental resection might be necessary if the strangulated intestines and/or omentum were necrotic. Dissection of the vas and vessels from the hernia sac was followed by closure of the peritoneum (Fig. 2). To stop recurrence, the mesh (11 cm 14 cm, Bard USA) was inserted into the preperitoneal area and covered all of the facial flaws in the groyne. To avoid wrinkling and displacement, the mesh was bonded to the rectus abdominis sheath. Layers were anatomically closed after mesh prosthesis spread (Fig. 3).

In order to produce a better aesthetic outcome, the treatment was carried out in the anterior approach group (group I) with an oblique incision above the lateral third of the inguinal ligament. It was decided if the contents of the femoral hernia sac were viable once it was opened. The intraoperative findings were taken into consideration by the surgeon while choosing the repair technique. Modified Kugel mesh, mesh plug, and tissue healing were some of these techniques (McVay method, only hernia sac ligation, hernia sac resection). A midline infraumbilical laparotomy incision was made in situations involving bowel resection.

The main long-term outcomes (recurrence, chronic pain and mortality) were compared, along with surgical details such as the hernia sac's contents, the time of the operation, the length of hospitalization, and perioperative complications (wound infection, acute pain, seroma/hematomas).

A follow-up appointment was typically held one week following surgery, and further outpatient clinic visits were planned if there were any postoperative issues. Telephone interviews were undertaken at the course of this study to determine long-term results.

Figure 1



Lower transverse abdominal incision, Skin, subcutaneous tissue, rectus abdominis anterior sheath, and aponeurosis of the oblique muscles were all incised, The extraperitoneal area between the peritoneum and transversalis fascia was revealed after the rectus muscle was retracted medially and the transverse fascia was incised, The hernia sac was examined.

Ethical Approval: The Menoufia University Faculty of Medicine's ethics committee gave its blessing to the study (Approval number: 2/2023SURG28-2), and it was carried out in conformity with the Helsinki Declaration. According to the patients' right to informed consent, each patient's written consent was acquired prior to surgery.

Statistical analysis

The IBM SPSS software programmed version 20.0 was used to examine the data once they were fed into the computer. (USA: IBM Corp., Armonk, NY). Data that can be categorized was represented using numbers and percentages. To compare two groups, the χ^2test was used. Means and standard deviations (SDs) were used to represent the continuous data of the two groups, and independent-samples *t*-tests were used to analyze the differences between the groups. At the 5% level, significance of the results was determined.

Results

A total of 33 patients underwent emergent femoral hernia repair at our hospital were included in this study. All the operations were done through an open approach, of which 19 patients underwent the anterior approach (group I) and 14 patients preperitoneal approach (group II). The mean age in both groups was 75.1±10.7 years, and 20 of them (60.6%) were female. A nonsignificant difference was found in terms of age, sex, BMI, smoking and comorbid diseases except cardiovascular diseases as displayed in Table 1. The differences in ASA score, location of the femoral hernia, contents of hernia sac, duration of femoral hernia, duration of incarceration

Figure 2

Dissection of the vas and vessels from the femoral hernia sac.

and/or strangulation, and preoperative intestinal obstruction were statistically insignificant (P value $<$ 0.05).

Preperitoneal tension-free hernia repair was performed in 11 cases (78.6%) and femoral canal suture closure in three cases (21.4%) for the posterior approach group. While, in the anterior approach group, 12 patients (63.2%) underwent tension-free repair and seven patients underwent conventional repair (36.8%). As regards the management of hernia contents in anterior approach group, intestinal resection was performed in 4 patients (21.1%), omental resection in 1 patient (5.3%) and both in 2 patients (10.5%), while hernia contents reduction was done in 12 cases (63.2%). However, in preperitoneal approach group, only two patients underwent intestinal resection (14.3%), other 2 patients' omental resection (14.3%), 1 patient did both and hernia contents reduction was performed in 9 patients (64.3%). In terms of type of anesthesia, there was a statistical insignificant difference between the two groups ($P=0.495$) Table 2.

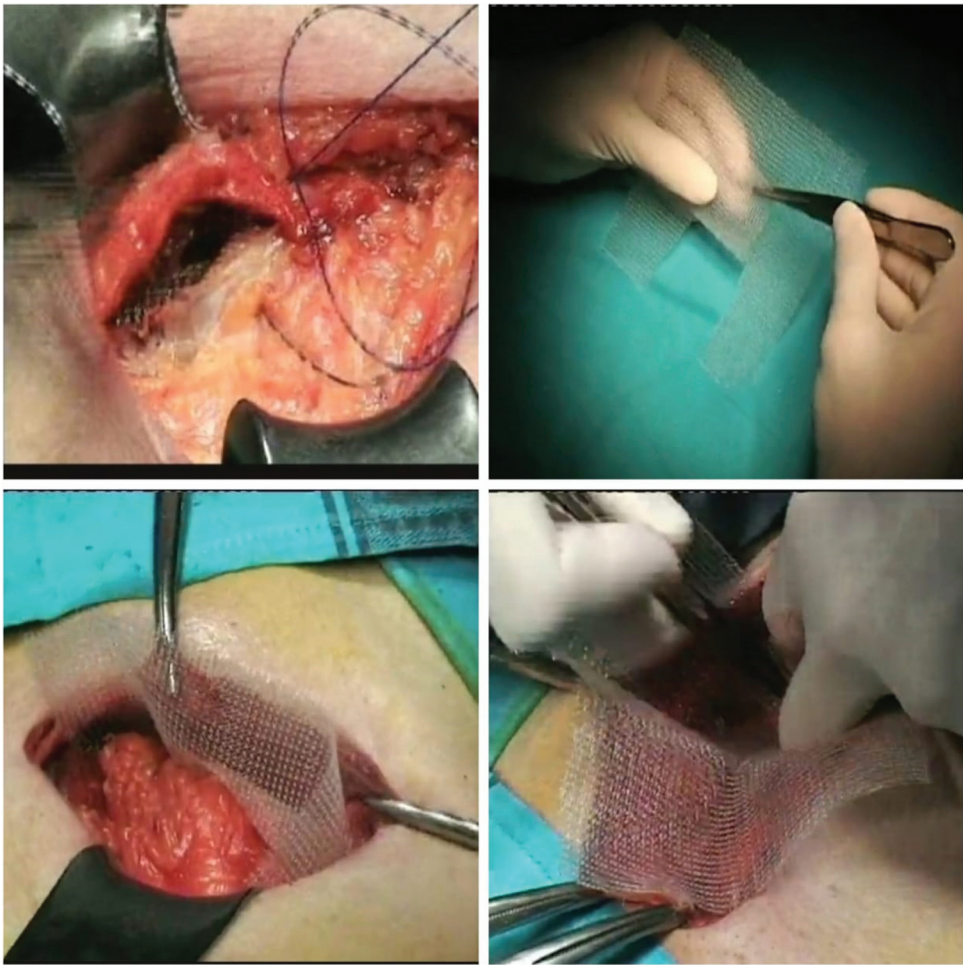
The mean operative time in posterior approach was less than anterior approach, with a statistically significant difference (53.6±24.7 min vs 77.9±36.5 min, P=0.039). Analogously, the time for return of patients to full activity was significantly shorter in preperitoneal approach (9.2±4.1 days) compared with anterior approach (13.3±6.6 days) ($P=0.049$). The length of hospital stay, not withstanding, did not differ significantly between the two groups ($P=0.064$) as demonstrated in Table 2.

In the posterior approach group, the overall incidence of postoperative complications was lower than in the anterior approach group (1/14 7.14% vs 10/19 52.63%), including wound infection, seroma/hematomas, chronic discomfort, and hernia recurrence. No mesh-related infection was seen while the hematoma and wound infection were treated conservatively. Only one patient in the anterior approach group experienced a recurrence of a femoral hernia, which was treated with a mesh plug repair. Table 2 lists two fatalities in the anterior approach group not related to hernia operation.

Discussion

High morbidity and fatality rates make incarcerated and/or strangulated femoral hernia a major surgical emergency. In order to lower morbidity and mortality, the goal of surgery for an emergency femoral hernia may be to swiftly clear an intestinal blockage, remove necrotic tissue, and repair the hernia Derici and colleagues [12]. In the current study, we discovered that the anterior technique had considerable disadvantages over open preperitoneal surgery for the urgent repair of femoral hernias, including higher postoperative outcomes and recurrence. Preperitoneal approach decreased operative time (53.624.7 min vs 77.936.5 min, $P=0.039$) and aided in a speedier return to full activity (9.24.1days vs 13.36.6days, $P=0.049$) without worsening perioperative acute discomfort and wound infection. Preperitoneal repair reduced operating time and time to resume full activity, according to a retrospective study on the Chinese population and these findings are similar to our study Jiang and colleagues [13]. No instances in the preperitoneal approach group in our research required a midline laparotomy since the patients were operated on utilizing a thorough preperitoneal approach. A prior research showed similar findings Chihara and colleagues [5]. Where necessary, comfortable intestinal resections were carried out thanks to the broad posterior approach's ability to provide access to the peritoneal cavity for peritoneal cavity

Figure 3



The mesh insertion into the preperitoneal area, Layers were anatomically closed after mesh prosthesis spread.

assessment of the hernia contents Pans and colleagues [10]. For patients with a strangulated femoral hernia who underwent open surgery using the anterior approach, intestinal resection and anastomosis through the sac contributed to operation challenges, local tissue damage, and contamination. Additionally, patients who required an exploratory laparotomy through a second incision would experience complications of some kind Nieuwenhuizen and colleagues [14]. In this research, the posterior method had fewer overall postoperative problems than the anterior approach. These results were consistent with earlier research's Romain and colleagues, Kjaergaard and colleagues, Dai and colleagues [6,15,16]. Regarding the immediate postoperative outcomes, we discovered that just one patient in the posterior approach group had seroma, which the ultrasound scan indicated was effectively absorbed throughout the follow-up. Throughout the literature, there have been studies of similar incidents Bessa and colleagues [17]. Seroma is a typical side effect following emergency hernia surgery Emile [18]. Additionally, there were no cases of postoperative chronic inguinal pain in the posterior approach group in the current study because this approach reduced postoperative chronic pain by lowering the risk of injury to the genitofemoral nerve by posterior dissection and the Ili hypogastric nerve, ilioinguinal nerve, and inguinal nerve Lei and colleagues [19]. If the surgical field was not contaminated by intestinal contents, a preperitoneal approach may be secure with a reasonably low risk of morbidity Hentati and colleagues [20]. This was in line with our findings because there were no wound infection cases reported in the group using the posterior technique. Regarding long-term results and patient follow-up, there were no incidences of death or recurrence in the posterior approach group. With this method, a broad mesh may be placed to cover the femoral triangle in the groyne. As a result, there would be a lower chance of recurrence Dahlstrand and colleagues [21]. In a retrospective research, the authors included 146

Table 1 Comparison between the studied groups according to patients' characteristics

Variables	Anterior approach group *n*=19 (57.6%)	Posterior approach group *n*=14 (42.4%)	Test	*P* value
Sex				
Male	8 (42.1)	5 (35.7)	χ^2 0.000	0.991
Female	11 (57.9)	9 (64.3)		
Age (years)	73.3±10.8	76.6±10.5	**t** –0.878	0.387
BMI	21.4±1.5	22.4±2.2	**t** –1.554	0.130
Smoking	6 (31.6)	4 (28.6)	χ^2 0.039	0.844
Comorbidity				
Chronic nephropathy	3 (15.8)	4 (28.6)	χ^2 0.209	0.648
COPD	2 (10.5)	3 (21.4)	0.138	0.710
Cardiovascular disease	0 (0.0)	4 (28.6)	3.786	0.052*
Diabetes	6 (31.6)	0	3.489	0.062
Hypertension	4 (21.1)	4 (28.6)	0.008	0.931
Liver cirrhosis	2 (10.5)	3 (21.4)	0.138	0.710
Ascites	1(5.3)	2 (14.3)	0.078	0.781
Malnutrition	5 (26.3)	4 (28.6)	0.063	0.801
ASA score				
I	3 (15.8)	4 (28.6)		
II	9 (47.4)	7 (50.0)	χ^2 1.674	0.643
III	6 (31.6)	3 (21.4)		
IV	1(5.3)	0		
Location of the hernia				
Left	8 (42.1)	6 (42.9)	χ^2 0.098	0.754
Right	11 (57.9)	8 (57.1)		
Duration of FH (months)	47.9 ±101.4	54.6±81.8	**t** –0.203	0.840
Duration of incarceration or strangulation (days)	5.0 ±5.1	5.0±4.1	**t** 0.000	1.000
Contents of hernia sac				
Intestine	10 (52.6)	9 (64.3)		
Intestine and omentum	6 (31.6)	1 (7.1)		
Omentum	2 (10.5)	3 (21.4)	χ^2 5.186	0.269
Ileocecum	1 (5.3)	0 (0.0)		
Others	0 (0.0)	1 (7.1)		
Preoperative Intestinal obstruction	3 (15.8)	2 (14.3)	χ^2 0.138	0.710

ASA, American Society of Anesthesiology score; BMI, body mass index; *BMI*, body mass index; COPD, chronic obstructive pulmonary disease; FH, femoral hernia; t, *T*-test; χ^2, Chi-Square.

patients and found that, with a median follow-up of 26 months, a total of 15 patients (10.3%) experienced difficulties with the posterior approach, no mesh was removed, and 2 patients experienced recurrence Liu and colleagues [22]. Preperitoneal repair can increase the incidence of first-stage tension-free repair in emergent femoral hernia with a decreased complication rate, according to Humes and colleagues [23]. Karatepe and colleagues, however, published the sole randomized trial comparing open posterior vs open anterior approach with mesh, found that decreased incidence of second incisions in the posterior approach was the only notable difference. Moreover, he stated that using a posterior technique might find additional hernia that were missed during a preoperative physical examination and prevent adhesions from earlier inguinal surgery [9]. The open preperitoneal method is not restricted to specific individuals, in contrast to the laparoscopic posterior approach in incarcerated and/or strangulated femoral hernia. The open posterior technique reduces the risk of visceral harm from manipulation, and the presence of bowel distention has no negative effects on how well it works Rodrigues-Goncalves and colleagues [24].

This study does have some limitations. First off, there were just a limited number of patients, and it was a single-center retrospective analysis. Second, the therapeutic option was determined by the preference of either the patient or the treating doctor, which might have influenced the outcomes and led to some selection bias. Finally, the reported rates of recurrence and postoperative chronic inguinal pain may be understated since not all of the patients could be reached by phone for follow-up. The surgical impact

Table 2 Operative data, complications and follow-up outcomes

Variables	Anterior approach group *n*=19 (57.6%)	Posterior approach group *n*=14 (42.4%)	Test	*P* value
Type of anesthesia				
General	12 (63.2)	8 (57.1)	χ^2 1.408	0.495
Spinal	7 (36.8)	5 (35.7)		
Local alone	0	1 (7.1)		
Management of hernia contents				
Intestinal resection	4 (21.1)	2 (14.3)		
Omental resection	1 (5.3)	2 (14.3)	χ^2 1.028	0.795
Intestinal and omental resection	2 (10.5)	1 (7.1)		
Hernia contents reduction	12 (63.2)	9 (64.3)		
Operation time (min)	77.9±36.5	53.6±24.7	**t** 2.150	0.039*
Length of hospital stay (days)	10.3±6.9	6.3±4.2	**t** 1.918	0.064
Time to return to full activity (days)	13.3±6.6	9.2±4.1	**t** 2.047	0.049*
Tension-free repair	12 (63.2)	11 (78.6)	χ^2 0.324	0.569
Complications				
Required midline laparotomy	2 (10.5)	0	χ^2 0.265	0.607
Wound infection	3 (15.8)	0	χ^2 0.896	0.344
Seroma/hematoma	2 (10.5)	1 (7.1)	χ^2 0.078	0.781
Postoperative chronic pain	4 (21.1)	0	χ^2 1.669	0.196
Recurrence	1 (5.3)	0	χ^2 0.024	0.876
90-day mortality	2 (10.5)	0	χ^2 0.265	0.607

χ^2 Chi-Square, t *T*-test.

of the posterior approach for urgent femoral hernias must thus be assessed in a multicenter, prospective randomized controlled research.

Conclusion

Preperitoneal approach is a practical and efficient procedure for incarcerated and/or strangulated femoral hernia. It could improve the rate of first-stage tension-free repair of emergent femoral hernia and reduce the incidence of postoperative outcomes. It is appropriate for use in clinical settings and is a viable option in the management of urgent femoral hernias.

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Disclosure

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Conflicts of interest

Competing interests: The authors declare that they have no competing interests.

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