A comparative study of the incidence of postoperative meralgia paraesthetica after open inguinal hernioplasty and after laparoscopic transabdominal preperitoneal approach repair for recurrent inguinal hernia

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Objective
The aim of this prospective study was to compare the postoperative incidence and the intensity of pain and meralgia paraesthesia in both the laparoscopic transabdominal preperitoneal approach (TAPP) and the open approach for patients with recurrent inguinal hernia.

Patients and methods
A total of 80 patients with recurrent inguinal hernia were selected and operated in the same surgical unit from December 2011 to January 2014. About 40 patients were operated by TAPP and 40 patients with the open surgical technique. We compared the two techniques in terms of the postoperative pain and paraesthesia using the quality of life and the time to return to normal activity. We evaluated postoperative paraesthesia and pain using the visual analog scale.

Results
Our results revealed the superiority of the laparoscopic approach over the open technique in generality, with less incidence of pain and paraesthesia. During the early postoperative period, pain had been abolished completely on the sixth to the seventh day in 37 patients in the laparoscopic (LAP) group, whereas in the open approach (OPEN), it was achieved in only 25 patients. During the late postoperative period, only three patients in the LAP group continued to complain after the first week, whereas in OPEN group, 15 patients continued to complain of pain. In the OPEN group, there were five patients with severe paraesthesia persisting for more than 6 months, whereas in the LAP group, all patients improved before the sixth month.

Conclusion
Postoperative pain and paraesthesia are an important issue in inguinal hernia surgery; hence, long-term follow-up is important. The best approach for recurrent inguinal hernia repair with the least postoperative pain and paraesthesia are the TAPP, with superiority over the open approach.

Keywords:
laparoscopic inguinal hernia, posthernioplasty groin pain, recurrent inguinal hernia

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Introduction

Recurrent inguinal hernia accounted for 10% of hernia repair, in general [1]. The most popular approaches for inguinal hernia repair are the Lichtenstein tension-free repair and it is still popular as a standard for recurrent cases [2]. The laparoscopic approach [transabdominal preperitoneal approach (TAPP)] is described as an ideal approach for recurrent inguinal hernia as the key to repair by the TAPP technique is the familiarity with the intra-abdominal view [3]. Anatomical entities of the inguinal region in the transabdominal approach are approached and hernia repair performed from the interior instead of the classical open external access, thus avoiding postoperative adhesions [4].

Chronic pain is a recognized complication after inguinal hernia repair, but it should subside within an expected time interval of about 2–3 months. For many patients, some degree of pain persists, and some patients develop moderate to severe-intensity pain that can be disabling or may interfere with sexual function [5]. A presumptive diagnosis of postherniorrhaphy neuralgia can be made when the pain persists for more than 3 months after hernia repair and is not related to other causes; the incidence of nerve injury is more common in recurrent cases than in primary cases due to the disturbed anatomy, and the incidence of injury is increasing in recurrent cases compared with primary inguinal hernia due to the disturbed anatomy that makes its injury in open approach more remarkable than laparoscopic approach [6].

The lateral femoral cutaneous nerve (LCNT) originates from L2 and L3 and emerges from the lateral margin of the psoas muscle and crosses the iliacus muscle obliquely towards the anterior superior iliac spine. Medial to the latter, it passes below the iliopubic tract to reach the thigh. The innervated area extends from the

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greater trochanter to the midcalf level. It is extremely vulnerable to injury during mesh fixation at the level of the iliopubic tract. The nerve is frequently injured by the malposition of the staples posterolaterally in the region of the anterior superior iliac spine. Injury leads to meralgia parasthetica and a burning sensation in the lateral area of the thigh [7].

Meralgia paraesthetica (Bernhardt-Roth syndrome) is an Australian spelling and is defined as a benign disturbance of a sensory nature localized to the outer thigh, which at best is annoying, but which may become severely painful and occasionally disabling [8]. It occurs in both men and women, usually of middle age. The disturbance involves the LCNT of the thigh, which is formed immediately before it passes through the tunnel in the inguinal fascia adjacent to the anterior superior spine. It is at this point that angulations may occur, giving rise to symptoms [9]. Meralgia is a mononeuropathy and pain may be acute and radiate into the groin, the thigh, or the knee and may be a chronic neurological disorder also known as lateral femoral cutaneous neuralgia. Meralgia or entrapment of LCNT is a recognized and known complication of laparoscopic hernia repair either due to direct injury or due to entrapment by patient strapping during the procedure, and this is known as position-related meralgia [10].

Patients and methods

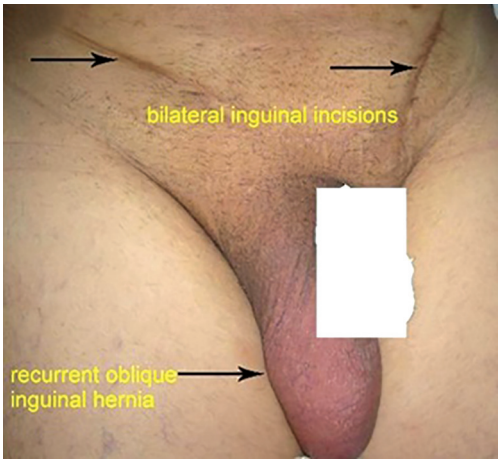
Preoperative assessment

Preoperatively, we obtained the patients' signed consent permitting conversion to open repair if necessary. Patients were informed about the postoperative period. All patients gave their formal consent. The protocol was approved the Ethical committee.

Inclusion criteria included patients with recurrent inguinal hernia (Fig. 1) irrespective of the number of recurrences.

Exclusion criteria were irreducible and incarcerated hernia, diabetes mellitus patients with known peripheral neuritis, all patients with a history of pain and paraesthesia after the previous hernia repair, and patients with any signs of intra-abdominal infection and peritonitis, pregnancy, and organomegaly. The exclusion criteria in general were cardiorespiratory embarrassment, hepatic patients with ascitis, cardiac patients, chronic obstructive pulmonary disease, coagulopathy, obesity with BMI more than 35 and if associated with another sever chronic illness, failure to tolerate general anesthesia, and patient's refusal.

Figure 1



Bilateral recurrent inguinal hernia.

The technique

For both approaches, the patients are strapped to the operating table, especially toward the midthigh, but using an excessive amount of sponge in the strap to avoid compression injury to the lateral cutaneous nerve to avoid postoperative confusion between compression or position-related injury and direct injury during operation.

For the laparoscopic approach

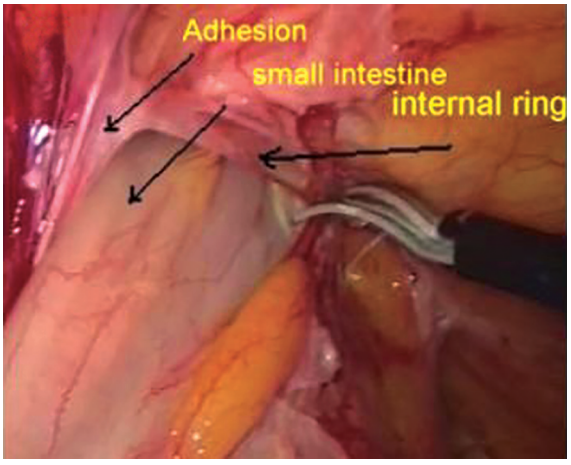
General anesthesia was given, the abdomen was draped and prepared in the ordinary manner, a urinary catheter was always applied and fixed, 0.3 ports were inserted, and the first trocar or the optical trocar was inserted in the umbilicus. The peritoneal cavity was then filled with CO_2 to a maximum pressure of 14 mmHg; the insufflations needle was removed and a 10 mm trocar and a 30° telescope were inserted. The second port was inserted to the right of the rectus sheath (midclavicular) for the surgeon or the assistant. The third port was inserted to the left of the rectus sheath (midclavicular) at the umbilical region. The two operating trocars are 5 mm. The umbilical folds were identified, the defect was seen, visualization of the internal ring was carried out (Fig. 2), and adhesions were lysed (Fig. 3). Then, the sac was mobilized and reduced into the peritoneal cavity. The dissection was started from the internal ring by lifting up a flap of peritoneum, starting by the incision of the peritoneum at or well above the internal inguinal ring by a scissor, medially as far as the median umbilical ligament and laterally toward the anterior superior iliac supine by about 2 or 3 cm from the internal ring to avoid nerve entrapment (Fig. 4). The peritoneal flaps were dissected upward and downward, making the upper flap and the lower flap with sharp and blunt dissection. The cord was dissected. The dissection was continued in the avascular preperitoneal space (Bogros

space) by pushing the peritoneum with its surrounding preperitoneal fibrofatty tissue away from the fascia transversalis and the rectus muscle. The dissection continued to the middle of the symphysis as far as the median umbilical ligament (Fig. 5), creating a large enough space for wrinkle-free placement of the mesh. In the inferior direction, the medial compartment was dissected as far as the triangle of Doom, avoiding the iliac vessels in the floor of the triangle (Figs. 6–8). A large 15 cm × 10 cm mesh (Fig. 9) was inserted and placed sufficiently to overlap all the hernial orifices by at least 3 cm and covered the triangle of Doom. The endotacker (5 mm and 30 staples; Covidien, Tyco Healthcare, Middletown Ave., USA) was prepared and inserted through the 5-mm port. Fixation was carried out by the protack, which fired circular staples (Fig. 10) that have the advantage of reposition; staples were not placed below the level of the iliopubic tract to avoid neuralgia involving the lateral cutaneous nerve of the thigh or the femoral branch of the genitofemoral nerve and they were not placed in the area of the triangle of Doom. After the completion of mesh fixation, the peritoneal flap was closed carefully over the mesh, avoiding buttonholes within the peritoneum that might allow adhesions or herniation of the bowel; this was achieved by stapling and suturing (Fig. 11).

For the open conventional approach

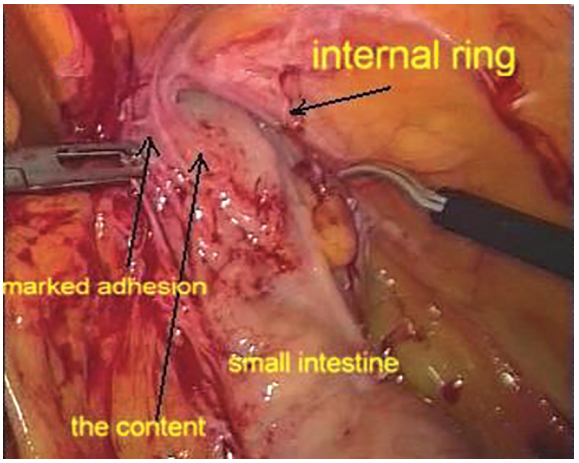
The abdomen was draped and prepped in the ordinary manner, inguinal incision was performed involving the old scar and the plane of the external oblique appeneurosis, and the external ring was identified; the external ring was marked with a silk suture due to adhesions, the sheath was opened, adhesiolysis was performed using sharp and blunt dissection, the cord structure was identified, the sac was identified, skelotinization of the sac was performed, the neck of the sac was identified by the extraperitoneal fat and

Figure 2



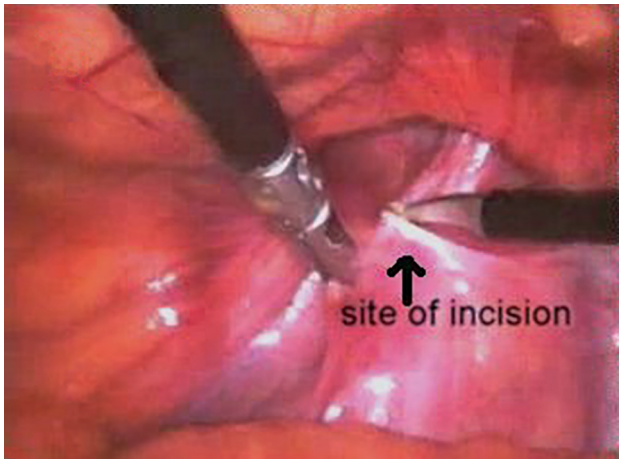
The internal ring: the anatomical landmark.

Figure 3



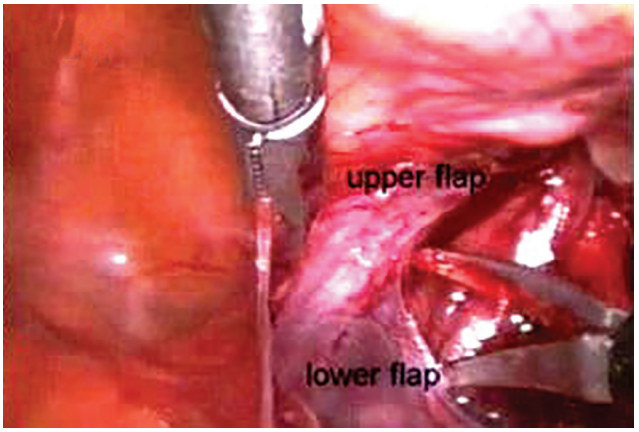
Adhesions from previous hernia repair.

Figure 4



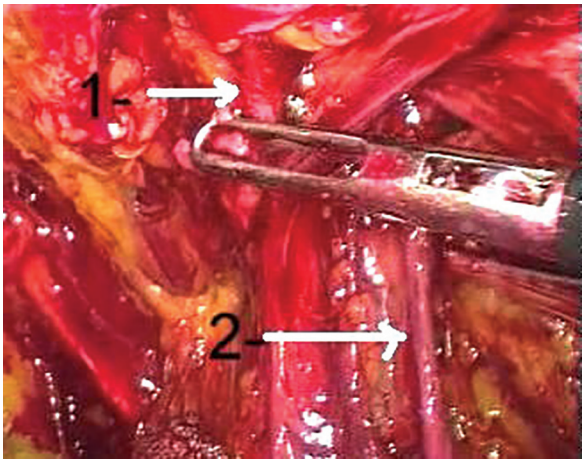
The site of incision to create flaps.

Figure 5



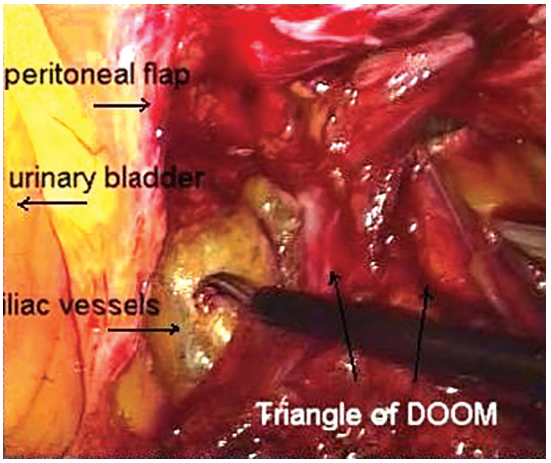
Medial dissection and flaps.

Figure 6



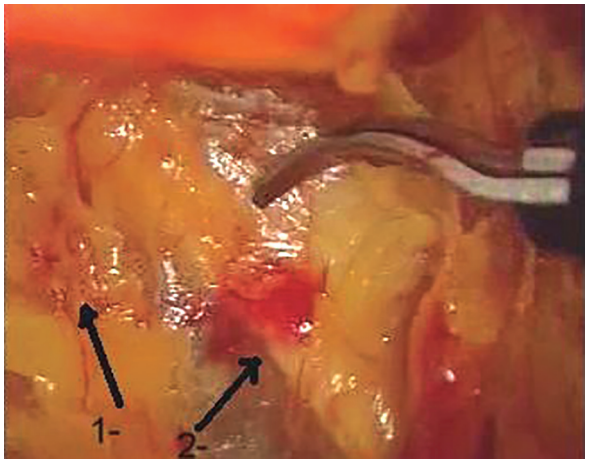
(a) Inferior epigastric and (b) spermatic vessels.

Figure 7



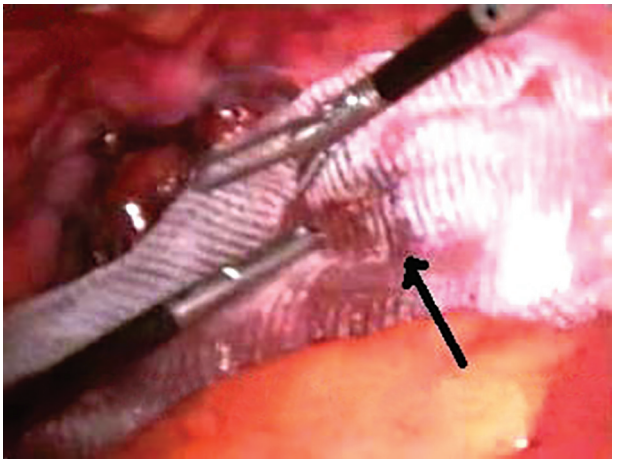
The triangle of Doom and its content.

Figure 8



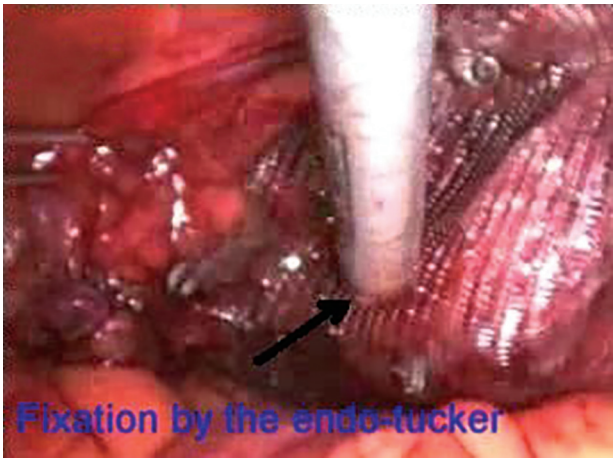
(a) Fibrofatty tissues and (b) External iliac vessels

Figure 9



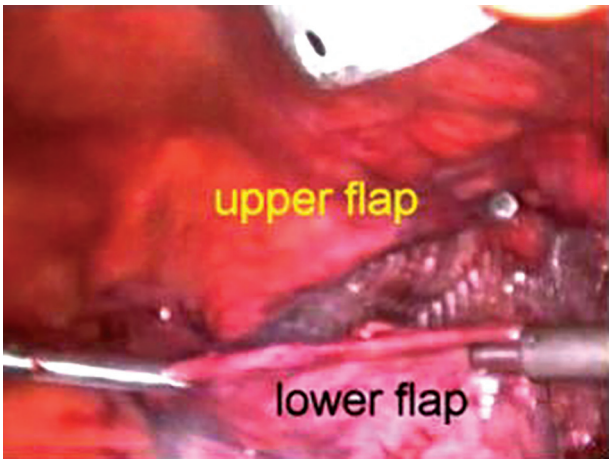
Preparing the mesh for fixation.

Figure 10



Mesh fixation with a tacker.

Figure 11



Closure of flaps.

the inferior epigastric artery, the sac was opened, and then, the content was reduced, and transfixion with a polygalactin suture was performed. In cases with a wide internal ring, narrowing of the ring was performed.

In patients with direct hernia, the sac was identified, dissected, and inverted by a series of sutures.

The polypropylene mesh is fashioned to include the cord, its size ~16 × 8 cm (tailored to the individual patient's requirements). The mesh lies anterior to the posterior wall, overlapping it generously in all directions, including medially over the pubic tubercle, where the mesh was fixed to the periosteum. The mesh was anchored by a tacker using four to five staples, taking care to avoid tacking near the ASIS to preserve the LCNT. The external opening was sutured directly, leaving a new external ring to accommodate the tip of a finger, and lastly, closure was performed without a drain.

Data collection, parameters measured, and follow-up

Standardized data collection was performed on a prospective database; the data were collected by the attending resident and our surgeon team, and each patient was evaluated at the hospital outpatient clinic monthly by a physician.

Before discharge and before giving the patient the sick leave, the patients were requested to return to the outpatient clinic at 1, 4 weeks, 3, and 6 months, and at 1 year for a standardized history taking and physical examination by a resident and, in most cases, by the surgeon team that had performed the surgery.

Information about early postoperative pain and paraesthesia was collected and documented on the day of operation and at the first postoperative visit (at 1 week) using the visual analog scale.

Patients were asked to assess the intensity of pain severity at the site of operation and at the thigh every day for the first week with the help of a 100 mm visual analog scale (scores ranged from 0, for no pain, to 100, for unbearable pain). Oral analgesia, initially ketoprofen, or other NSAIDs were given on request. Chronic pain was defined as pain in the groin, the scrotum, or the medial part of the thigh that was serious enough for the patient to mention at 6 months.

The length of hospitalization, defined as the number of days in the hospital after the day of surgery, was also recorded. Patients were discharged from the hospital if there was no serious infection or bleeding, the patient was able to walk, and only oral analgesic therapy was required to manage pain.

Statistical analysis

Categorical qualitative variables were expressed as absolute frequencies (n) and relative frequencies (%). The percent of categorical variables was compared using the Pearson χ^2-test; also, the trend of change in the distribution of absolute frequencies between ordinal data was compared using the χ^2-test for trend. All tests were two sided; *P* value less than 0.05 was considered significant. All statistics were performed using SPSS, 22.0 for windows (SPSS Inc., Chicago, Illinois, USA) and MedCalc, 13 for windows (MedCalc Software bvba, Ostend, Belgium).

Results

This study included 80 patients with recurrent inguinal hernias, referred to the Department of General Surgery in Zagazig University Hospitals from December 2011 to January 2014 and an extra 1 year of follow-up ended in January 2015.

All the patients were male, with recurrent inguinal hernia: 40 patients were operated by the laparoscopic TAPP and 40 patients with the open approach.

The age of the patients ranged from 25 to 51 years, with a mean age of 33.4 years in the LAP group and a mean age of 35.6 years in the OPEN group. Regarding the type and the size of the hernia, in 80% of the cases in our study, the hernia was not large, and we recorded seven patients (17.5%) with a huge right-sided recurrent inguinal hernia in the OPEN group and no patients with huge hernia in the LAP group. About 80% of the cases had complete (scrotal) hernia in both groups.

In the LAP group, the hernia was bilateral in six patients (15%), and 34 patients (85%) had a unilateral hernia.

Early postoperative pain and paraesthesia in the LAP group revealed that pain and paraesthesia were abolished completely on the sixth to the seventh day in 37 patients. In the LAP group, we recorded mild-intensity pain in most patients on the first (30 patient), the second (29 patients), the third (21 patients), the fourth (16 patients), the fifth (six patients), and on the sixth and the seventh day (three patients). Nine patients developed moderate-intensity pain on the first day, which decreased to one patient on the fourth day. Lastly, only one patient developed severe early postoperative pain up to the third day, which was then abolished completely. In the OPEN group, the results of postoperative pain and paraesthesia were different from that in the LAP group, as we recorded only 25 patients (Table 1).

Follow-up of patients in the outpatient clinic for late pain and parasthesia, revealed that in the LAP

group. After the first week, they described as two separate synonyms as pain persisted in two patients and paraesthesia in one patient, which improved around the third month postoperatively. Of the other two patients with pain, one improved after the first month and the other after the third month. In the OPEN group, 15 patients had persistent pain and paraesthesia after the first week; the nine patients with pain decreased to five patients at the sixth month, and the six patients with paraesthesia decreased to five patients at the sixth month. The five patients with pain continued to complain up to the end of the first year and continued follow-up in the pain clinic; of the five patients with paraesthesia in the OPEN group, only one patient improved spontaneously and the other four patients continued follow-up in the neurology clinic for medical treatment (Table 2).

There was a significant difference between both the studied groups with regard to the postoperative hospital stay, wherein most of the patients (90%) who underwent laparoscopic operation were discharged within 2 days of operation in comparison with 45% in the OPEN group (Table 3).

Discussion

Regarding the evaluation of postoperative pain and meralgia paraesthetica, in the early postoperative period, there was a significant difference between the two groups, in which the LAP group was associated with less early postoperative pain and paraesthesia. This was in accordance with studies of Simons et al. [11] and in contrast to the studies of Tantia et al. [12], who recorded no difference between the two groups, especially in the early postoperative period. In addition, the fact is that in the early postoperative period, both pain and paraesthesia if occurred were described by patients as pain only [13].

However, in the late postoperative period from the first month to the end of the first year, there was still a difference between the two groups in the form of less pain and less paraesthesia in the LAP group, as the number of complaining patients in the OPEN group was more than the number in the LAP group; this matched with other studies [14], especially when the author attributed the lower pain and paraesthesia to the advantage of using a light-weight mesh.

No patients in the LAP group had persistent paraesthesia for more than 6 months, but in the

Table 1: Analysis of early postoperative pain intensity

Day	Lap group				Open group				*P**
	Pain & parathesia				Pain & parathesia				
	No	Mild (%)	Moderate (%)	Severe (%)	No (%)	Mild (%)	Moderate (%)	Severe (%)	
1st day	0 (0)	30 (75)	9 (22.5)	1 (2.5)	0 (0)	36 (90)	2 (5)	2 (5)	0.174
2nd day	8 (20)	29 (72.5)	2 (5)	1 (2.5)	0 (0)	36 (90)	2 (5)	2 (5)	0.041
3rd day	16 (40)	21 (52.5)	2 (5)	1 (2.5)	2 (5)	34 (85)	2 (5)	2 (5)	0.005
4th day	23 (57.5)	16 (40)	1 (2.5)	0 (0)	4 (10)	34 (85)	1 (2.5)	2 (5)	<0.001
5th day	34 (85)	6 (15)	0 (0)	0 (0)	14 (35)	23 (57.5)	1 (2.5)	2 (5)	<0.001
6th & 7th day	37 (92.5)	3 (7.5)	0 (0)	0 (0)	25 (62.5)	13 (32.5)	1 (2.5)	1 (2.5)	0.002
P‡	<0.001				<0.001				

Values are a number (percentage); *Chi-square test for trend; ‡Chi-square test; $P < 0.05$ is significant

Table 2: Late Postoperative pain & meralgia parasthetica follow up

Time after operation	Pain			Meralgia parasthetica		
	Lap group (%)	Open group (%)	*P*‡	Lap group (%)	Open group (%)	*P*‡
After 1 week	2 (5)	9 (22.5)	0.023	1 (2.5)	6 (15)	0.048
After 1 month	1 (2.5)	7 (17.5)	0.025	1 (2.5)	6 (15)	0.048
After 3 month	1 (2.5)	6 (15)	0.048	1 (2.5)	6 (15)	0.048
After 6 month	0 (0)	5 (12.5)	0.021	0 (0)	5 (12.5)	0.021
After 1 year	0 (0)	5 (12.5)	0.021	0 (0)	4 (10)	0.040
P‡	0.467	0.720	—	0.730	0.953	—

Values are a number (percentage); ‡Chi-square test; $P < 0.05$ is significant

Table 3: Postoperative hospital stay

Hospital stay	Lap group (%)	Open group (%)	$P^{\ddagger}$
<2 days	36 (90)	18 (45)	<0.001
2–3 days	2 (5)	16 (40)	<0.001
>3 days	2 (5)	6 (15)	0.263

Values are a number (percentage); ‡Chi-square test; $P < 0.05$ is significant

other group, we recorded five patients with persistent pain and five patients with persistent paraesthesia around the sixth month; this was comparable to other studies, [15,16] but the number of patients was more than the patients included in the study, but the end result is that the OPEN group usually has a number of complaining patients that is significantly higher than the number in the LAP group.

The requirement for analgesia was less in the LAP group. NSAIDs were used and were enough to abolish pain in most of the LAP patients, who recorded a lower number of NSAID tablets than in the OPEN group, This was in accordance with many international multicentre studies [17,18].

We followed our patients for 1 year. With regard to the number of patients in our study and our results of follow-up, this period was enough for our study. Other authors considered it as not enough time to follow the patient, [19] but their study concerned mainly with the treatment of meralgia, and not the incidence.

The results of this study indicate that patients with inguinal hernias recover more rapidly and have fewer recurrences after laparoscopic repair than after open repair [20]. This is completely compatible with our results.

In our study, patients in the LAP group were discharged from the hospital earlier than the OPEN group. This result matched completely with results of the study by Kirshtein et al. [21], who used the TAPP approach for large recurrent and bilateral inguinal hernia, but a smaller number of patients were included in that study.

All the patients included in the study were strapped intraoperatively to the table near the midthigh using excessive sponge in the strap to avoid compression injury or position-related injury to the LCNT; this was comparable to other studies [22] as the maneuver used in many laparoscopic procedures for nerve preservation, but most procedures were for gynecological laparoscopy

Conclusion and recommendations

As postoperative pain and parasthesia are a recognized complication after inguinal hernioplasty in many patients, it is of utmost importance to follow all patients with operated inguinal hernia for a long period regardless of the technique used; a long follow-up is merely a major factor in detecting the incidence of postoperative meralgia parasthetica.

Meralgia parasthetica is a neurological disorder that can be severe enough to disable patient activity and even return to work, and so significant concern for these patients is very important in both selecting the best operation and the follow-up. Entrapment of LCNT can occur due to patient strapping or may be position related; hence, strapping should be performed using excessive sponge.

The TAPP approach is the ideal approach for the repair of recurrent inguinal hernia and the key to TAPP is the familiarity with the intra-abdominal view and away from previous adhesions, which can be dissected easily if present intraperitoneally.

The advantage of laparoscopic TAPP hernia repair for recurrent cases include less postoperative pain, a reduced recovery time, reduced use of analgesics by patients, fewer wound complications, less hematoma, easier operation in recurrent inguinal hernia, a lower incidence of chronic groin symptoms, and identification of additional hernia that might be missed at open surgery.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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