

## Original Research Article

# The role of laparoscopic approach in bilaterality assessment in patients with unilateral inguinal hernia

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## ABSTRACT

**Background:** Patients presented with unilateral inguinal hernia are at risk for the possibility of contra-lateral occult hernias; small early-developed hernias may be difficult to be elicited by clinical, imaging assessment and during open repair. This study to evaluate laparoscopic identification of contra-lateral occult hernia with regard to the pre-operative clinical and imaging study.

**Methods:** Retrospective analysis of patients presented in the period of March to December 2015 with unilateral inguinal hernia for which medical and ultrasound imaging assessment were done. Laparoscopic trans abdominal pre-peritoneal (TAPP) approach was done with intraoperative evaluation of the presence of contra-lateral occult hernias.

**Results:** During the study period (27) patients (25 Males and 2 females) presented with unilateral inguinal hernia were clinically evaluated, 18 (66.6%) patients had right sided hernia, 9 (33.33%) had left sided, In all the studied patients routine ultrasound assessment was done and no documented cases of presence of contra-lateral hernia, Intraoperative abdominal exploration successfully Identifies bilateral inguinal hernias in 7 cases (25.9%) with mean age (44.14 years, SD 10.99) compared to (34.97 years, SD 10.51) in the Unilateral group, 3 cases on the left side (16.6% of total right side patients) and 4 cases on the right side (44.4% of total left side patients). operative time for unilateral repair was (Mean 85.8 minutes, SD 18.8), and for discovered bilateral cases (Mean 145.9 minutes, SD 46.8).

**Conclusions:** The presence of occult inguinal hernia is a frequent finding specially in older age group of patients, also in our study we found the percentage of occult hernias are more in patients presented with left side disease. Laparoscopic (TAPP) approach is a useful tool for assessment of the presence of such hernias, and gives the privilege of simultaneous repair in same operation with the advantage of avoiding the patient's later surgery together with the laparoscopic surgery benefits of less pain, rapid recovery and shorter hospital stay.

**Keywords:** Inguinal hernia, Occult hernia, TAPP repair

## INTRODUCTION

Groin hernias are quite common surgical disease and most likely have been an illness from the time that humanity existed, with an up to 27% lifetime risk in males and 3% in females.<sup>1,2</sup>

Inguinal hernia repair markedly progressed from tissue repair, tension free mesh repair to laparoscopic repair. Although inguinal hernia repair experience started more 200 years ago, still the search of gold standard of the optimal method of repair is continuing.<sup>3</sup> Even though almost 20 million repairs are done internationally, yet

achieving accepted long-term results with a low recurrence rate and avoidance of chronic groin pain remains difficult when closely reviewed.<sup>4</sup>

In recent studies, laparoscopic repair of inguinal hernia showed significant improvement of patients' recovery with reduction of incidence of post-operative wound related complications such as infection, hematoma, seroma formation as well as marked reduction of pain. In addition, laparoscopic repair was not only beneficial for the patients but also it has a positive impact on many social and financial aspects. In recent recommendations, it has been adopted the first choice for bilateral and recurrent cases.<sup>5</sup>

The first reported endoscopic trial to repair inguinal hernia introduced by applying a clip over the internal ring, followed by the application of laparo-scopic trans abdominal preperitoneal (TAPP) procedure and since that time it started to be one of the frequent repair options with the concept of insertion of a prosthetic mesh in the preperitoneal space extending over the potential myopectineal orifice of Fruchad offering the value of minimally invasive concept laparoscopic (TAPP) technique also help in the assessment of the other side as well.<sup>6,7</sup> The other available lapa-roscopic techniques are totally extra-peritoneal repair (TEP) and intraperitoneal onlay mesh (IPOM).

Patients presented with unilateral inguinal hernia (UIH) are at risk for the possibility of contralateral occult hernias (COH) specially if contralateral inguinal pain is exist, small early-developed hernias may be difficult to be elicited by clinical, imaging assessment and during open repair. Up to 22% of patients presented with (UIH) may have (COH) which in turn may indicate the need of contralateral exploration specially in manifested patients.<sup>8</sup> During laparoscopic repair 10-25% of patients were reported to have a (COH) with the advantage of repair both sides in same operative settings without the need for of extra incisions.<sup>5,9</sup>

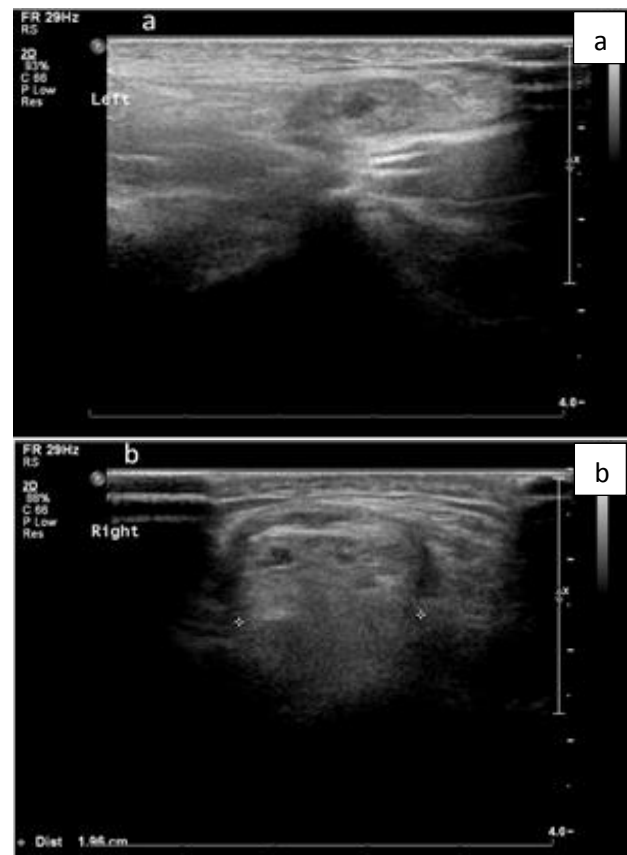
Despite the recent advances of preoperative imaging using ultrasound (US) and computed tomography (CT) which are considered adequate to roll out (CIH), however false negative results are still present.<sup>10</sup>

This study is to assess the advantage of intraoperative laparoscopic exploration of contra-lateral occult hernia during (TAPP) technique, with regard to the pre-operative clinical and imaging study.

## METHODS

Retrospective analysis of patients presented to Faculty of medicine Cairo University hospital and private work with (UIH) and were included for laparoscopic (TAPP) repair in the period of March to December 2015. Unilateral inguinal hernia was evident by clinically unpalpable contralateral reducible swelling, defect or impulse on

cough or Valsalva manoeuvre together with preoperative imaging evaluation using high resolution (US) was done for all the patients with negative clue for (COH) presence (Figure 1).



**Figure 1: Pre-operative inguinal ultrasound Pre-operative inguinal ultrasound assessment showing (a) no hernia defect left side and (b) hernia defect on right side.**

Being done under general anaesthesia and pneumoperitoneum is needed, inclusion criteria for laparoscopic Inguinal hernia repair is based on patient's fitness for laparoscopic surgery. Exclusion criteria for laparoscopic inguinal hernia repair are medically contraindicated patients for general anaesthesia and pneumoperitoneum as cardiac or COPD patients, patients with previous history of lower abdominal surgery, pregnancy, in this study we excluded patients of recurrent and bilateral inguinal hernia patients in addition to the previous mentioned exclusions.

Preoperative clinical assessment in form of complete medical history, predisposing factors, comorbidity assessment and past medical and surgical history, in addition to a throughout clinical examination for both inguinal regions with documentation of the size, type, reducibility, contents of the hernia.

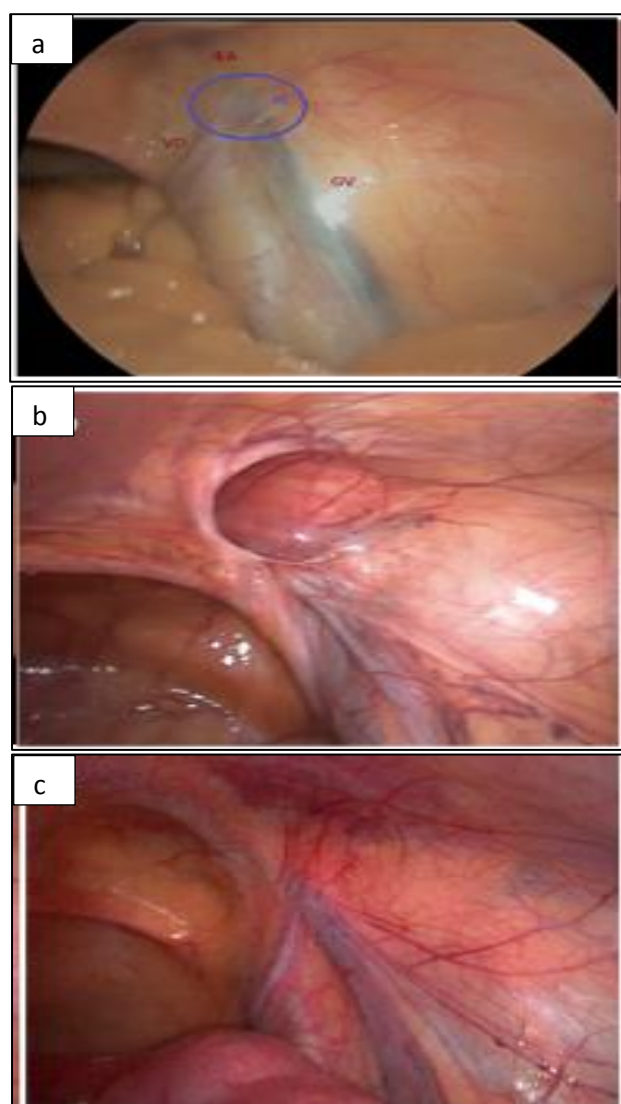
Preoperative laboratory tests in form of complete blood picture, coagulation profile, random blood sugar and

screening for liver and kidney functions. For all the patients, a routine inguinoscrotal ultrasound is done as a part of diagnosis documentations and exclusion of concomitant pathology.

In present practice, laparoscopic inguinal hernia is routinely done as a day surgery procedure, patients are admitted in the planned day for the procedure after pre-anesthesia check-up regarding the fitness for surgery.

An informed consent is always obtained with detailed surgical steps, possible intra and post-operative complications, conversion to open surgery, overnight stay if needed as well as repair of the contralateral side if discovered intraoperative.

### Operative steps

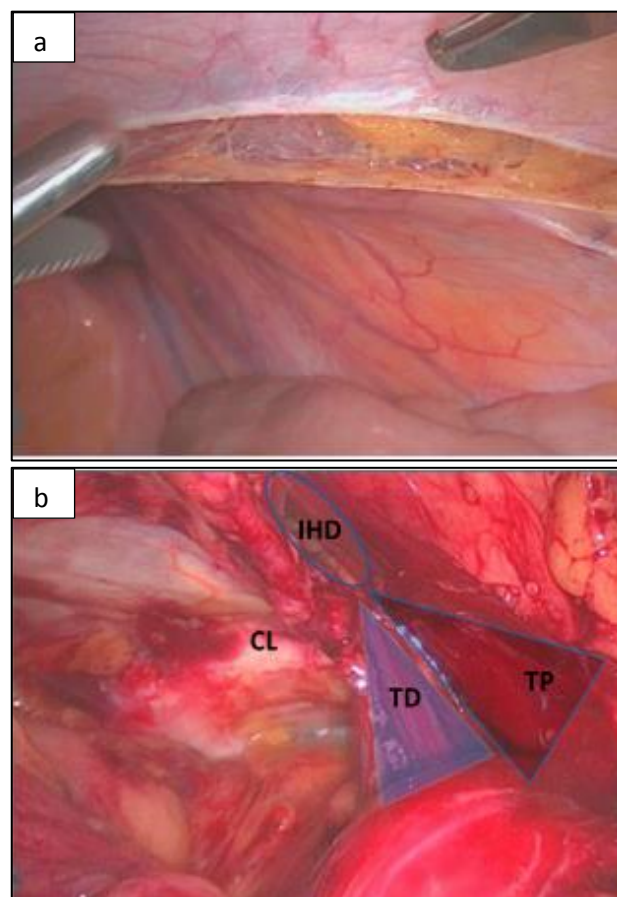


**Figure 2:** a) Normal trans-abdominal right inguinal anatomy [IEA= Inferior epigastric artery, GV= Gonadal vessels, VD= Vas deferens, IR= Internal ring]; b) right indirect inguinal hernia defect lateral to IEA; c) Direct inguinal hernia defect medial to IEA.

In this study (TAPP) procedure was done for all the patients, following general anaesthesia induction, an open pneumo-peritoneum is routinely done through a supra umbilical incision with introduction of (11mm) Hasson trocar, 2 (5mm) trocars in bilateral midclavicular line infra-umbilical.

Using 30o laparoscopic lens while patient position in an anti-Trendelenburg position inspection of both inguinal regions searching for the defect site and presence of bilateral involvement, in this step documented identification of the presence of the (COH) is done if present.

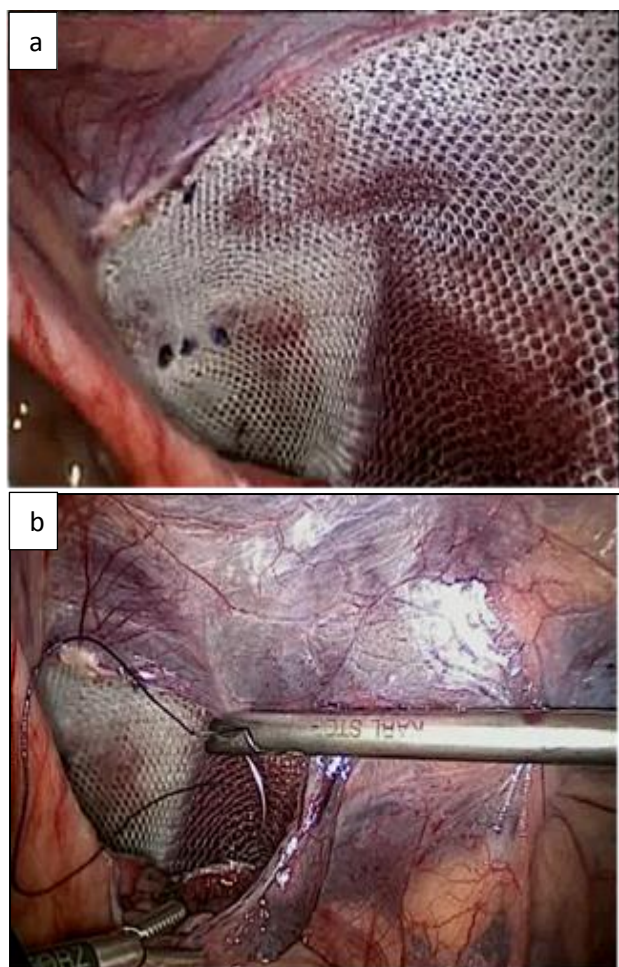
Peritoneal opening starting from the level corresponding to anterior superior iliac spine (ASIS) and extending transversely above the level of the internal inguinal opening which is identified by the meeting point of gonadal vessels, vas deferens and Inferior epigastric artery (IEA), peritoneal dissection is continued transversely till the level of medial umbilical ligament. Indirect inguinal hernia defect is lateral to (IEA), and direct inguinal hernia defect is medial to (IEA) (Figure 2).



**Figure 3:** a) Peritoneal flaps creation; b) preperitoneal space after peritoneal dissection [IHD= Indirect hernia defect, CL= Cooper's ligament, TD= triangle of doom, TP= Triangle of pain].



Pre-peritoneal space is dissected by creating lower and upper peritoneal flaps with dissection and reduction of the peritoneal sac, medial and lateral dissection is done exposing pubic bone and the myopectineal orifice of Fruchad which includes the potential indirect and direct inguinal defects as well as the femoral hernia defect, with identification of triangles of doom (bounded by gonadal vessels laterally and vas deferens medially) which contain iliac vessels, and triangle of pain (bounded by gonadal vessels and inguinal ligament) which contain important sensory nerves supplying inguinal region and the lower limb (Figure 3).



**Figure 4: a) Mesh fixation; b) Peritoneal flaps closure.**

After creating the pre-peritoneal space a 10X15 Cm non-absorbable mesh is inserted to cover the myopectineal orifice of Fruchad. In our practice, we use tracks (absorbable or non-absorbable) for the mesh fixation in the cooper's ligament, rectus muscle and transversus muscle. Finally, peritoneal closure is done using absorbable 3/0 sutures (Figure 4). If during the initial exploration (COH) is detected we repair it by repeating the same steps in the other side. We always remove ports under vision with fascial closure of the umbilical port.

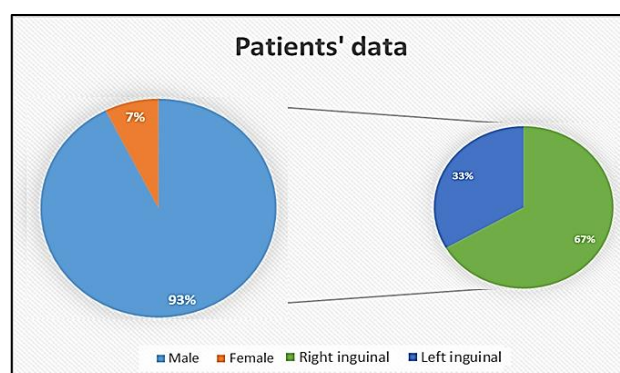
Post-operative we usually apply compression bandage at the groin area and scrotal suspender to reduce incidence

of post-operative seroma formation and subcutaneous emphysema which is present due to the trapped air from the pneumoperitoneum during the dissection of the preperitoneal space and may cause patients discomfort post-operative.

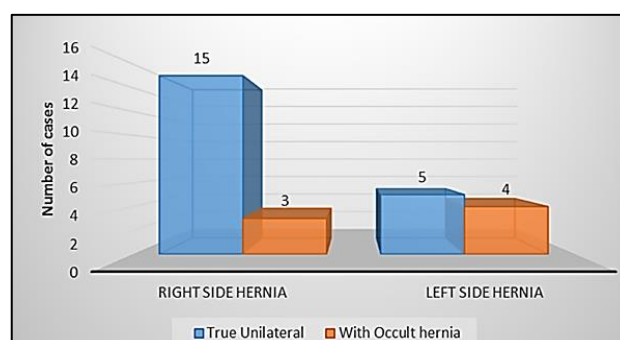
In this study, an assessment of the presence of (COH), operative duration, intraoperative complications, hospital stay was done. Review of preoperative risk factors was done with assessment of correlation with cases had (COH). All collected data revised for completeness and accuracy with statistical analysis using version 20 (SPSS). Data was summarized using Mean and SD for quantitative variables and number and percent for qualitative variable. Comparison between qualitative variables done using chi square. P value less than 0.05 was considered of statistically significant.

## RESULTS

During the study period (27) patients (25 Males and 2 females), age of patients was (18-75 years, mean 38.1, SD 12.78) presented with unilateral inguinal hernia were clinically evaluated, 18 (66.6%) patients had right sided hernia, 9 (33.33%) had left sided (Figure 5).



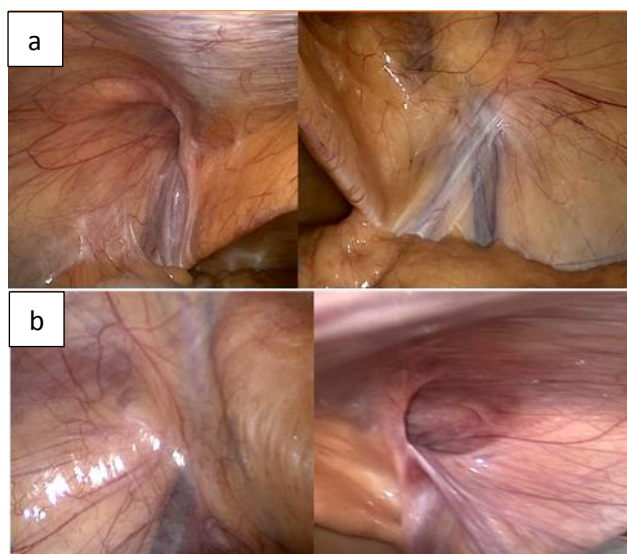
**Figure 5: Patients' data, side of the inguinal hernia.**



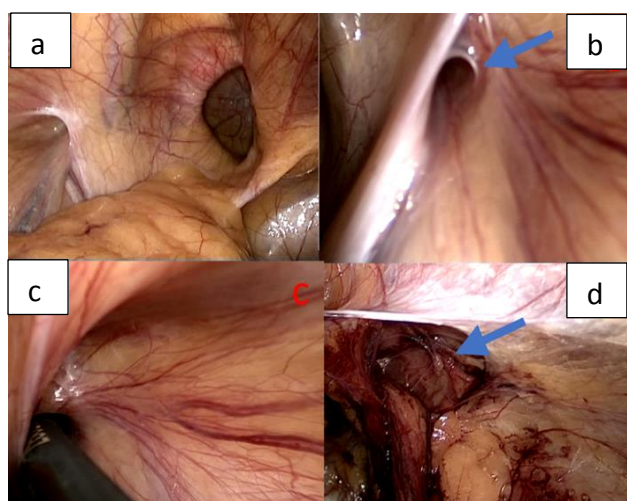
**Figure 6: Bar chart illustrating number of detected COH in patients included in the study.**

Intraoperative abdominal exploration successfully Identifies (COH) in 7 male patients (25.9%) with mean age (44.14 years, SD 10.99) compared to (34.97 years, SD 10.51) in the unilateral group, 3 cases on the left side

(16.6% of total right side patients) and 4 cases on the right side (44.4% of total left side patients) (Figure 6-8).



**Figure 7: Patient with a) left; b) right inguinal hernia with negative COH.**

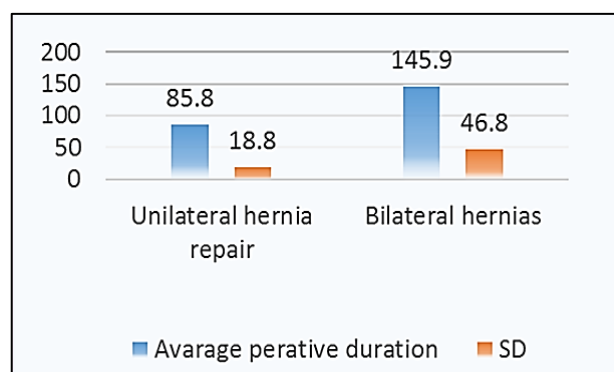


**Figure 8: Patient with left direct and indirect hernias a) on examination of the right side small indirect inguinal hernia detected; (b and c), with dissection of the preperitoneal space a clear wide internal ring with inguinal sac were detected (arrowed).**

Operative time assessment in patients who had unilateral repair with no detected (COH) was (Mean 85.8 minutes, SD 18.8), and for those patients who were discovered to have (COH) was (Mean 145.9 minutes, SD 46.8). All Patients were operated as day care procedures with no reported hospital stay extension (Figure 9).

On assessment of preoperative risk factors, four main risk factors were identified: Age, work nature, smoking and Diabetes mellitus (DM). Mean Age was slightly higher in those patients presented with COH was 41.14 years, while in patients who had no COH was 37.05 years (P

value 0.477). Strenuous work nature was evident in 9 patients (45%) of those patients who had no (COH), and in 4 patients (57.1%) of those patients who had (COH). 11 patients out of the included patients were smokers, 9 of them had no COH (45%) and 2 had COH (28.5%), Finally only 2 patients had history of (DM), and both had (COH). Despite the apparent relation of age, type of work These findings were not statistically significant, while history of chronic illness was statistically significant on the presence of (COH) (Table 1).



**Figure 9: Bar chart illustrating operative time assessment in patients without and with (COH).**

**Table 1: Risk factors associated with included patients.**

	Negative COH 20/27	Positive COH 7/27	P value
Age (Mean)	37.05 years	41.14 years	0.477
Strenuous work	9 (45%)	4 (57.1%)	0.597
Smoking	9 (45%)	2 (28.5%)	0.147
DM	0	2 (28.5%)	0.012*

\* Significant: P-value < 0.05; Non-significant: P-value > 0.05 (NS).

## DISCUSSION

On review of international records inguinal hernia repair is a common general surgical procedure all-over the world, it has not only effect on the patients' level but also it represents a socioeconomic aspect by affecting the health care funds.<sup>11</sup>

Despite no clear consensus for the ideal surgical option for inguinal hernia repair, nowadays laparoscopic repair of inguinal hernia is considerably done owing to faster recovery, lesser pain, hospital stay and wound related complications.<sup>12</sup>

In literature, 10-20% of the inguinal hernia cases have occult contralateral hernia and it has been mentioned that up to 30% of patients underwent open inguinal repair could have a contralateral hernia later, reports of open contralateral side exploration in symptomatic patients shown possibility of complications such as wound related



complications, seromas, hematoma and urine retention.<sup>13</sup> So, in addition to the previous mentioned benefits, laparoscopic repair helps in assessment of bilateral groin anatomy which helps in identification of undisclosed hernia defects and repair them to decrease future consequences.<sup>14</sup>

With review of the available laparoscopic type of repairs, although TEPP technique is preferred to avoid possible TAPP repair associated intra-abdominal visceral trauma in addition to peritoneal closure issues, it necessitates extensive dissection to discover the presence of the occult hernias with in turn possible false positive findings, TAPP repair is easy to learn together with better assessment of the potential hernia defects.<sup>15</sup> In 2011, International Endo hernia Society (IEHS) published the guide-lines of laparoscopic TAPP and TEPP and update in 2015 showed that no upper hand to any of both techniques over the other, however COH were better identifiable with TAPP technique.<sup>11,16</sup>

Although the detailed preoperative examination and imaging studies in form of inguinal US and CT scans, still doubts are there for negative symptomatic patients with possible use of much expensive imaging studies like magnetic resonance imaging (MRI) study to roll out COH.<sup>10</sup>

In this study, we retrospectively evaluated the advantage of laparoscopic TAPP repair for patients presented with unilateral inguinal hernia with no preoperative clinical or radiological diagnosis of contralateral side hernia in intraoperative detection of the presence of COH. In 27 patients included in this study, 7 patients (25.9%) had evident COH and subsequent bilateral repair was done in the same setting. Mean operative duration was (145.9 minutes, SD 46.8) in comparison to patients with no (COH) (Mean 85.8 minutes, SD 18.8). All Patients were operated as day care procedures with no reported hospital stay extension.

Although we found that the rate of (COH) is more in those patients had initial left inguinal hernia side (44.4%) when compared to (16.6%) in patients with initial right sided hernia, on revision of literature we did not find a strong significant importance. Only one review has mentioned the right-side predominance of inguinal hernia occurrence explained by the possible musculature physiological difference between both abdominal wall sides.<sup>17</sup>

Despite some authors find confusion of the ideal definition of occult hernia and argue that it may be just patent process vaginalis (PPV) and not a true hernia which may be not in need for repair, however, in other studies mentioned that there is no clear difference in between occult hernia and (PPV) and the natural history is same in both entities with risk of future symptomatic hernia which advocates repair of occult hernias once it is

encountered in same settings without concern about its size.<sup>14,15,18</sup>

In this study, routinely repaired the (COH) if present and during preperitoneal space dissection we noticed that even in small occult hernias there were always a muscular hernia defect which is in fact in the side of concomitant repair of the (COH) repair if it is found intraoperative, with no reported intra or post-operative significant complications or extended hospital stay.

In present study practice, we adopted laparoscopic TAPP repair in our practice as the primary option to repair inguinal hernia as day surgery procedure specially in patients with recurrent and bilateral inguinal hernia, we found this technique is easy to learn with better visualization of bilateral potential sites of groin hernias.

On assessment of potential risk factors of (COH) we identified age, smoking, type of work and (DM) as risk factors that in literature beside other causes of increased abdominal pressure including chronic obstructive pulmonary diseases (COPD) cardiac disorders, prostatic enlargement in old patients may contribute in the presence of (COH) in addition to family history of inguinal hernia, however in our study no reported family history association beside the fact that exclusion of those patients who will not tolerated general anesthesia and laparoscopic surgery may be the cause that we did not record any of these risk factors in this study.<sup>19</sup>

## CONCLUSION

Laparoscopic (TAPP) approach is a useful tool for assessment of the presence of (COH), added to the advantages of laparoscopic repair in form of fast recovery, reduction of pain and recurrence. It also gives the privilege of simultaneous repair of (COH) and avoiding the patient's later surgery with rapid learning curve and reduction of possible side effects of unnecessary contralateral side exploration in other modes of repair.

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*Ethical approval: The study was approved by the institutional ethics committee*

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