MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2025.4.76.81

OPEN ACCESS

Key Words
Laproscopic hernioplasty, inguinal hernia

Corresponding Author
Alex Arthur Edwards,
Department of General Surgery, Sree Mookambika Institute of Medical Sciences Kanyakumari, Tamil Nadu, India

Author Designation
[1]Professor
[2]Junior Resident

Received: 17th March 2025
Accepted: 11th April 2025
Published: 27th May 2025

Citation: Alex Arthur Edwards and S.S. Adithya, 2025. Comparative Study of Complications Following Laparoscopic TEP Versus Tapp Versus Open Hernioplasty in Inguinal Hernia Repair. Res. J. Med. Sci., 19: 76-81, doi: 10.36478/ makrjms.2025.4.76.81

Comparative Study of Complications Following Laparoscopic TEP Versus Tapp Versus Open Hernioplasty in Inguinal Hernia Repair

[1]Alex Arthur Edwards and [2]S.S. Adithya
[1,2]Department of General Surgery, Sree Mookambika Institute of Medical Sciences Kanyakumari, Tamil Nadu, India

Abstract
Over the last 5 years, the field of hernia surgery has had a significant transformation thanks to many new and innovative surgical techniques as well as an exponential growth in mesh and mesh technology. Increased focus on hernia surgery has led to improved research and outcomes data and has provided strategies to treat both simple and complex hernias. This is a prospective study encountered in sree mookambika institute of medical sciences at urology department from marchn 2023 to dec 2024. The most scientific way to come to conclusion over superiority of one method over other is based on evidence-based medicine. I hereby share our experience regarding the safety of the three widely practiced methods of inguinal hernia repair to decide on the best method in terms of complication rates. The age distribution of the subjects ranged from 24 to 70 years. The mean age of patients subjected to TEP and TAPP group were similar around 48 years. However, the mean age for Lichtenstein repair was 49 years. The cumulative prevalence of inguinal hernia in males aged 25-34 years is 5 %, rising to 10 % for age 35-44 years, 18 % for age 45-54 years, 24 % for age 55- 64 years, 31 % for age 65-74 years and finally 45 % for males of age 75 years or more. Inguinal hernias occur eight times as often in men as in women and consequently approximately 90 % of all inguinal hernia repairs are performed in male patients. study TEP is the best method of hernioplasty for a primary inguinal hernia. However, large scale studies and long-term follow-up studies are required to evaluate for the chronic pain, recurrence rates and learning curve in laparoscopic hernia repair.

INTRODUCTION

Hernia repairs, both inguinal and ventral/incisional, are some of the most common surgeries performed in the world. Over the last 5 years, the field of hernia surgery has had a significant transformation thanks to many new and innovative surgical techniques as well as an exponential growth in mesh and mesh technology. Increased focus on hernia surgery has led to improved research and outcomes data and has provided strategies to treat both simple and complex hernias. Secondary to the increased complexity of patients and new techniques and mesh products available, there has been a renewed interest in hernia surgery amongst the general and plastic surgery community. Inguinal hernia was repaired laparoscopically soon after the establishment of laparoscopic cholecystectomy as gold standard for cholelithiasis. However, unlike laparoscopic cholecystectomy, which was very quickly accepted by the surgical community, laparoscopic hernia repair has remained a contentious issue since its inception. The early laparoscopic techniques of plugging the internal ring with mesh or simply closing the ring with staples were surgically unsound and were quickly abandoned when early trends showed a high recurrence rate[4-5]. The later technique of reinforcing the inguinal floor with a mesh placed pre-peritoneally was based on the open procedure introduced by Stoppa. It was in 1984 that Lichtenstein et al coined the term "Tension-Free Hernioplasty" and broke the convention by advocating routine use of mesh for hernia repair, thereby making tissue repair a thing of the past. The laparoscopic method of tension-free mesh repair appeared to be gaining in popularity in the early 1990s among the enthusiasts. Early uncontrolled studies claimed that laparoscopic repair was superior to the conventional open repairs regarding postoperative pain, resumption of normal activities, and return to work, Real controversy started in 1990, when laparoscopic Tension-Free repair came in to vogue and was routinely advocated and aggressively marketed by promising less pain and shorter recovery period, but the things in the small prints were completely ignored. The most scientific way to come to conclusion over superiority of one method over other is evidence-based medicine. Laparoscopic mesh repair cannot be compared with open tissue repair. So, the comparison should be between laparoscopic mesh repair and open mesh repairs. Few of the initial trials (Liem[1], Stoker[2] and Grant[3]) compared laparoscopic mesh repair with open tissue repair and came to conclusions, which are not valid. Here we compare Lichtenstein tension free open hernioplasty with TEP and TAPP comparing the intra operative and early postoperative complications of the three.

Aims and Objectives of the Study:

- To compare the intra operative and early post-operative complications of laparoscopic hernioplasty TAPP versus TEP versus Lichtenstein tension free open hernioplasty.
- To compare the intra operative complications of TEP vs TAPP vs open hernioplasty in terms of operative time, major visceral or vessel injury and conversion rates.
- To compare the post-operative complications of TEP vs TAPP vs open hernioplasty in terms of post-operative pain, urinary retention, wound seroma, hematoma, infection, bowel complications.
- To decide which is the best method of inguinal hernia repair among the three in terms of rate of complications.

MATERIALS AND METHODS

This is a prospective study encountered in sree mookambika institute of medical sciences at urology department from marchn 2023 to dec 2024 . The most scientific way to come to conclusion over superiority of one method over other is based on evidence-based medicine. I hereby share our experience regarding the safety of the three widely practiced methods of inguinal hernia repair to decide on the best method in terms of complication rates. All cases operated in elective theatre at sree mookamnbika Medical College were included in the study. Totaly 75 patients participated in this study. Study duration from the period of 10 months from june 2023 to may 2024. Inclusion criteria are All cases of primary uncomplicated unilateral direct or indirect inguinal hernia operated in elective theatre . Exclusion criteria are Patients who had an irreducible, obstructed or strangulated hernia, Patients with bilateral hernia, sliding hernia, Patients with recurrent hernia. Method of collection of clinical sample and data are All cases of uncomplicated primary unilateral inguinal hernia operated in Stanley medical college were considered for the study, Intra operative complications were seen and recorded, Post-operative pain was recorded based on Visual Analog Scale and requirement of analgesics, Post-operative complications like urinary retention, wound seroma, wound hematoma, wound infection, port site infection, recurrence, mesh. Statistical analysis was done using the statistical package for social sciences (SPSS). Different statistical methods were used as appropriate. Mean±SD was determined for quantitative data and frequency for categorical variables. The independent t-test was performed on all continuous variables. The normal distribution data was checked before any t-test. The Chi-Square test was

used to analyze group difference for categorical variables. A p-value<0.05 was considered significant.

RESULTS AND DISCUSSIONS

Table 1: The Mean Std. Deviation Minimum and Maximum

	N	Mean	Std. Deviation	Minimum	Maximum
Lichtenstein	25	49.72	10.632	25	70
TEP	25	48.24	10.818	24	62
TAPP	25	48.88	9.884	31	62
Total	75	48.95	10.328	24	70

The age distribution of the subjects ranged from 24-70 years. The mean age of patients subjected to TEP and TAPP group were similar around 48 years. However, the mean age for Lichtenstein repair was 49 years. Elderly patients were preferred for Lichtenstein tension due to risks of subjecting to general anaesthesia.

Table 2: The Mean Age of Patients Subjected to TEP and TAPP Group

Groups			L	TEP	TAPP	Total
Urinary retention	No	Count %	23	25	25	73
		within Groups	92.0%	100.0%	100.0%	97.3%
	Yes	Count %	2	0	0	2
		within Groups	8.0%	0.0%	0.0%	2.7%
Total		Count %	25	25	25	75
		within Groups	100.0%	100.0%	100.0%	100.0%

Post-operative urinary retention was found only in a two cases of Lichtenstein tension free open hernioplasty and this required bladder catherization. All cases of laparoscopic hernioplasty were catheterized intraoperatively and catheter retained till post-operative day 1, hence urinary retention could not be assessed.

Table 3: The Mean Std. Deviation Minimum and Maximum

		N	Mean	Std. Deviation	Minimum	Maximum
Duration of surgery	L	25	55.00	8.416	40	70
	TEP	25	101.20	11.662	80	120
	TAPP	25	106.40	11.504	80	120
	Total	75	87.53	25.513	40	120

Table 4: The Mean Std. Deviation Minimum and Maximum

		N	Mean	Std. Deviation	Minimum	Maximum
Post OP Pain	L	25	7	.645	6	8
	TEP	25	7	.961	4	8
	TAPP	25	7	.802	4	8
	Total	75	6.88	.885	4	8

The post-operative pain was measured using Visual Analog Scale (VAS) 6 hours after the surgery. The patient was given a dose of Injection Tramadol 100mg in after the surgery. The next dose of analgesic was given based on the VAS score. The pain scores were analysed with Chi square and the difference found to be statistically significant. Lichtenstein tension free open hernioplasty was found to have increased post-operative pain when compared to laparoscopic repair. Among the laparoscopic repair TAPP was found to have increased post-operative compared to TEP.

Table 5: The Mean Age of Patients Subjected to TEP and TAPP Group

Groups			L	TEP	TAPP	Total
Seroma	No	Count %	18	25	25	68
		within Groups	72.0%	100.0%	100.0%	90.7%
	Yes	Count %	7	0	0	7
		within Groups	28.0%	0.0%	0.0%	9.3%
Total		Count %	25	25	25	75
		within Groups	100.0%	100.0%	100.0%	100.0%

Post-operative seroma was observed only in Lichtenstein tension free open hernioplasty. 28% of cases developed seroma which required drainage. This caused prolonged hospital stay and wound infections.

Table 6: The Mean Age of Patients Subjected to TEP and TAPP Group

Groups			L	TEP	TAPP	Total
Wound infection	No	Count %	23	25	25	73
		within Groups	92.0%	100.0%	100.0%	97.3%
	Yes	Count %	2	0	0	2
		within Groups	8.0%	0.0%	0.0%	2.7%
Total		Count %	25	25	25	75
		within Groups	100.0%	100.0%	100.0%	100.0%

Wound infection was also observed only in cases of open hernioplasty procedure. Wound culture and sensitivity shoved Staph. aureus, managed with antibiotic and drainage.

Table 7: The Mean Std. Deviation Minimum and Maximum

		N	Mean	Std. Deviation	Minimum	Maximum
Time of discharge	L	25	5	1.222	4	9
	TEP	25	3	.611	2	5
	TAPP	25	4	1.915	2	12
	Total	75	4.00	1.610	2	12

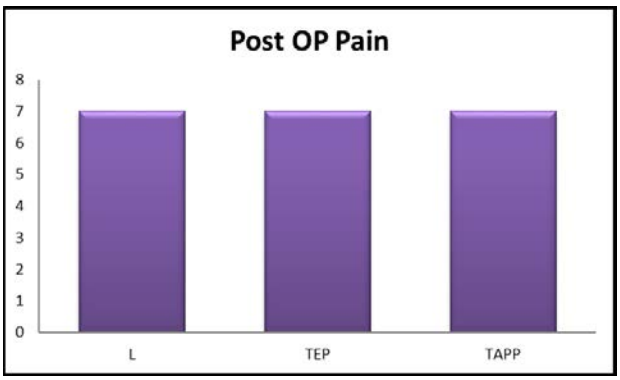

Fig. 1: Post of Pain

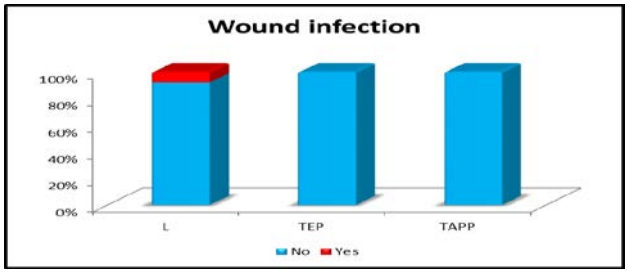

Fig. 2: Wound Infection

The cumulative prevalence of inguinal hernia in males aged 25-34 years is 5%, rising to 10% for age 35-44 years, 18% for age 45-54 years, 24% for age 55-64

years, 31% for age 65-74 years and finally 45% for males of age 75 years or more[6]. Inguinal hernias occur eight times as often in men as in women, and consequently approximately 90 % of all inguinal hernia repairs are performed in male patients[7]. Our study the mean age was 49 and 95% of cases were between age group of 39-59. All cases selected were males. Several comorbidities, some of which are associated with altered collagen metabolism, have been proposed to be associated with inguinal hernia formation. It has been suggested that patients diagnosed with aortic abdominal aneurism or thoracic aortic disease are predisposed to inguinal hernia formation, but the evidence on this is inadequate[8,9]. Ehlers-Danlos syndrome, characterized by altered collagen metabolism, increases the risk of inguinal hernia by a factor 4-5 depending on gender[10]. Prostatic hypertrophy, diagnosed by physical examination, proposedly increases the risk of inguinal hernia in men[11]. In one study chronic obstructive pulmonary disease is a risk factor for direct inguinal hernia[12] and in another, that chronic coughing is associated with a higher risk of inguinal hernia[13]. It is, however, still unclear whether coughing and chronic obstructive pulmonary disease associates with inguinal hernia, due to conflicting published results. In our study diabetes, hypertension and COPD was evaluated. It was found that preoperative diabetes was associated with in increased post-operative complications. Also in presence of cardiopulmonary comorbid patients were preferably subjected to open hernioplasty. Cases of hernia with prostatic hyperplasia were referred to Urology department and were excluded from the study. Laparoscopic inguinal hernia repair takes longer than open mesh repair. In technology appraisal guidance 83 by National Institute for clinical excellence, Sept. 2004, it was stated that laparoscopic surgery was associated with a statistically significant increase in operation time compared with open methods of hernia repair. Meta-analysis of 16 randomized control trials of Trans abdominal pre-peritoneal (TAPP) repair demonstrated on overall increase of 13.33 minutes compared with open repair. Meta-analysis of eight randomized control trial of trans extraperitoneal (TEP) repair demonstrated an overall increase of 7.89 minutes compared with open repair. Memon and colleagues reviewed the data from 29 published randomized clinical trials and concluded that patients who underwent laparoscopic repair of inguinal hernia took longer time for surgery. In a Bringman[13] trial operating time was found to be 5 minutes shorter in open mesh repair in comparison to laparoscopic group. The average time taken for TAPP/TEP (65.7 min) was significantly longer than that for the Lichtenstein repair (55.5 min) in a meta-analysis published by Schmidt[14] in 2005 involving 34 trials. In our study, the mean duration for a Lichtenstein tension free open hernioplasty was 55 minutes. Whereas mean operating time for TEP was 101 minutes and TAPP was 106 minutes. This is due to the prolonged learning curve required for laparoscopic repair compared to open repair Some degree of postoperative pain is common and expected following surgery. However, persistent pain becomes a problem. Chronic pain has been defined as surgical site pain persisting beyond 3 months[15]. The incidence of chronic pain following open inguinal hernia repair has been reported at 18 %.Meanwhile the incidence following laparoscopic repair is 6%[16]. Sajid *et al*. notes that the aetiology of chronic pain is unclear, but is thought to include inguinal nerve irritation by suture or mesh, inflammatory reaction to mesh and foreign material, scaring incorporating inguinal nerves and abdominal wall compliance reduction[17]. In a 2014 update to the European Hernia Society (EHS) guidelines based on meta-analysis data there was no difference in chronic pain after Lichtenstein when compared to TEP hernia repair[18]. However, a review of prospectively collected data with 17,388 patients demonstrated worse pain on exertion in the Lichtenstein group (OR 1.420., CI 1.264-1.596) at 1 year postoperatively with a rate of 9.23 % compared to 7.90% in the TEP group and overall prevalence of 8.7%[19]. Hence, laparoscopy seems to reduce chronic postoperative pain compared to open repair. In our study although the mean pain score in the post-operative period was 7, open hernioplasty patients had a statistically significant pain increased postoperative pain. Surgical complications lead to undesired morbidity and potential mortality. Köckerling *et al.* demonstrated a higher postoperative complication rate following Lichtenstein repair in comparison to TEP repair in their review of prospectively collected data on 17,388 patients (OR 2.152, CI 734-2.672) and a prevalence rate of 3.2%[20]. When comparing TEP versus Lichtenstein repair, the data demonstrated a postoperative bleeding rate of 1.16% versus 2.46%, a seroma rate of 0.51% versus 1.48%, wound infection rate of 0.06% versus 0.26%, and wound healing disorders of 0.07% versus 0.35%, respectively. The above study failed to demonstrate a difference in intraoperative complication rates when assessing for vascular injury, bowel injury, and bladder injury, with overall rates <0.28%. However, intraoperative bleeding was higher in the TEP repair group (0.76%) compared to 0.41% in the Lichtenstein repair group. When comparing TEP to TAPP complications, data has largely been of limited quality and suggests overall similarities in outcomes. A recent small prospective randomized trial of 60 patients failed to show a difference in 30-day postoperative outcomes (urinary retention, hematoma, seroma, wound infection, pain, return to normal activity and

recurrence) between the two techniques . However, in a large prospective review of 17,587 patients, Köckerling *et al.* demonstrated that the overall surgical complication rates were higher for TAPP (3.97%) when compared to TEP (1.70%) The noted difference was largely secondary to a higher seroma rate in the TAPP group (3.06%) versus 0.51% in the TEP group. In their discussion, the difference could be explained by the higher number of large defects and scrotal hernias in the TAPP group. The study also suggested a higher postoperative bleeding rate in the TEP group (1.18%) compared to the TAPP group (0.82%). Overall, it appears laparoscopic techniques have lower postoperative complications relative to open techniques, while TEP and TAPP outcomes are largely comparable. In our study the surgical site complications like seroma, hematoma and wound infection were unique to Lichtenstein tension free open hernioplasty due to the larger incision. The incidence rates were compared using Chi square test and found to be statistically significant. There was a single case of recurrence following TAPP which was detected in the immediate post-operative period. Majority of patients can perform normal activities at one week whether after open or laparoscopic surgery. Data regarding time to return to activity are rather subjective. Type of employment or profession, to which patient is returning will influence how long he needs to be away from work. Patient who is doing desk job in office will return to work earlier than a patent with a job that entails heavy lifting. Some patients will be getting paid sick leave, so they will have less incentive to go back to work early. Time to return to daily activities was found to be one day shorter for laparoscopic group than those undergoing open repair of hernia in a VA hernia trial group, but the time to resumption of sexual activity was similar in the two groups. However, at 3 months of follow up, there was no difference in the activity level between the laparoscopic and open group. Lawrence[18] did not find any significant difference in return to normal activities in two groups. Because of the unreliability in accurately measuring the time of return to normal activity, we have taken the time of discharge as a parameter. The mean time of discharge was found to be 5 days in Lichtenstein tension free open hernioplasty, 3 days for laparoscopic TEP repair and 4 days for laparoscopic TAPP repair.

CONCLUSION

Primary unilateral inguinal hernia without complications can be treated with Lichtenstein tension free open hernioplasty or laparoscopic trans abdominal preperitoneal hernioplasty or laparoscopic totally extraperitoneal hernioplasty. Lichtenstein open hernioplasty has advantage over laparoscopic repair in terms of shorter duration of surgery and learning curve. Although no major intra operative complications were noticed in the present study, literature shows evidence of major vessel and organ damage, even mortality following laparoscopic procedures. But laparoscopic hernia repair outscores Lichtenstein repair in terms of post-operative complications and early discharge of the patient. Among the laparoscopic hernia repair, between TEP and TAPP, TEP has statistically significant lesser complication rates and time of discharge. But these are surgeon dependent factors and varies between studies. Hence according to the present study TEP is the best method of hernioplasty for a primary inguinal hernia. However, large scale studies and long-term follow-up studies are required to evaluate for the chronic pain, recurrence rates and learning curve in laparoscopic hernia repair.

REFERENCES

1. Liem M.S.L., D. van, Y. Graaf, and C.J. Steensel., 1997. Comparison of conventional anterior surgery and laparoscopic surgery for inguinal -hernia repair. N Eng J Med., 336: 1541-1547.
2. Stoker D.L., D.J. Spiegelhalter, R. Singh and J.M. Wellwood., 1994. Laparoscopic versus open inguinal hernia repair: Randomised prospective trial. The Lancet, Vol. 343: 10.1016/s0140-6736 (94)92148-2.
3. Grant A., 2000. Laparoscopic compared with open methods of inguinal hernia repair: Systematic review of randomized controlled trials. Br J Surg., Vol. 87: 10.1046/j.1365-2168.2000.01540.x.
4. Rutkow I.M. and A.W. Robbins., 1993. Demographic, Classificatory, and Socioeconomic Aspects of Hernia Repair in the United States. Surg. Clin. North Am., Vol. 73: 10.1016/s0039-6109(16)46027-5.
5. Hair A., C. Paterson, D. Wright, J.N. Baxter and P.J. O'Dwyer., 2001. What Effect Does The Duration of An Inguinal Hernia Have on Patient Symptoms? J. Am. Coll. Surgeons, Vol. 193: 10.1016/s1072-7515 (01)00983-8.
6. Abramson J.H., J. Gofin, C. Hopp, A. Makler and L.M. Epstein., 1978. The epidemiology of inguinal hernia. A survey in western Jerusalem. J. Epidemiol. and Community Health, Vol. 32: 10.1136/jech.32.1.59.
7. Ruhl C.E. and J.E. Everhart., 2007. Risk Factors for Inguinal Hernia among Adults in the US Population. Am. J. Epidemiol., Vol. 165: 10.1093/aje/kwm011.
8. Pleumeekers H.J.C.M., A. de Gruijl, A. Hofman, A.J. van Beek and A.W. Hoes., 1999. Prevalence of aortic aneurysm in men with a history of inguinal hernia repair. J. Br. Surg., Vol. 86: 10.1046/j.1365-2168.1999.01213.x.

9. Henriksen N.A., L.T. Sorensen, L.N. Jorgensen and J.S. Lindholt., 2013. Lack of association between inguinal hernia and abdominal aortic aneurysm in a population-based male cohort. Br. J. Surg., Vol. 100: 10.1002/bjs.9257.
10. Liem M.S.L., Y.V. Graaf, F.A. Beemer and T.J.M.V. van Vroonhoven., 1997. Increased risk for inguinal hernia in patients with Ehlers-Danlos syndrome. Surgery, Vol. 122: 10.1016/s0039-6060 (97)90273-7.
11. Lau H., C. Fang, W.K. Yuen and N.G. Patil., 2007. Risk factors for inguinal hernia in adult males: A case-control study. Surgery, Vol. 141: 10.1016/ j.surg.2006.04.014.
12. Carbonell J.F., J.L. Sanchez, R.T. Peris, J.C. Ivorra, M.J. Del Bano, C.S. Sanchez, J.I. Arraez and P.C. Greus., 1993. Risk factors associated with inguinal hernias: a case control study. Eur J Surg., 159: 481-486.
13. Schmedt C.G., S. Sauerland and R. Bittner., 2005. Comparison of endoscopic procedures vs Lichtenstein and other open mesh techniques for inguinal hernia repair: A meta-analysis of randomized controlled trials. Surg. Endoscopy, Vol. 19: 10.1007/s00464-004-9126-0.
14. Poobalan A.S., J. Bruce, P.M. King, W.A. Chambers, Z.H. Krukowski and W.C. Smith., 2001. Chronic pain and quality of life following open inguinal hernia repair. Br J Surg., 8: 1122-1126.
15. Aasvang E. and H. Kehlet., 2005. Chronic postoperative pain: The case of inguinal herniorrhaphy. Br. J. Anaesth., Vol. 95: 10.1093/bja/aei019.
16. Sajid M.S., L. Craciunas, K.K. Singh, P. Sains and M.K. Baig., 2013. Open transinguinal preperitoneal mesh repair of inguinal hernia: A targeted systematic review and meta-analysis of published randomized controlled trials. Gastroenterol. Rep., Vol. 1: 10.1093/gastro/got002.
17. Miserez M., E. Peeters, T. Aufenacker, J.L. Bouillot and G. Campanelli *et al.,* 2014. Update with level 1 studies of the European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. Hernia, Vol. 18: 10.1007/s10029-014-1236-6.
18. Köckerling F., B. Stechemesser, M. Hukauf, A. Kuthe and C. Schug-Pass., 2015. TEP versus Lichtenstein: Which technique is better for the repair of primary unilateral inguinal hernias in men? Surg. Endoscopy, Vol. 30: 10.1007/s00464-015-4603-1.
19. Sharma D., K. Yadav, P. Hazrah, S. Borgharia, R. Lal and S. Thomas., 2015. Prospective randomized trial comparing laparoscopic transabdominal preperitoneal (TAPP) and laparoscopic totally extra peritoneal (TEP) approach for bilateral inguinal hernias. Int. J. Surg., Vol. 22: 10.1016/j.ijsu.2015.07.713.
20. Köckerling F., R. Bittner, D.A. Jacob, L. Seidelmann and T. Keller *et al.,* 2015. TEP versus TAPP: Comparison of the perioperative outcome in 17, 587 patients with a primary unilateral inguinal hernia. Surg. Endoscopy, Vol. 29: 10.1007/s00464-015-4150-9.