

The Technique of Inguinal Hernia, Compare of Time, Post-Operative Complication in Tertiary Care Center, Chhatisgarh

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Abstract

Objective-The main objective of the present study to investigate the average time required for the procedure of inguinal hernia and postoperative complications.

Method- The present study contained 3 bilateral, 17 right-sided and 7 left-sided herniae in the laparoscopic group and 2 bilateral, 19 right-sided and 6 left-sided inguinal hernia in open mesh repair group. A total of 54 patients had a primary inguinal hernia, 27 underwent open repair and 27 underwent laparoscopic to open repair. *Result*- The patients were selected from the age group of 18-65 years in both the study and control groups. The mean duration of time in open repair for open U/L -47 min, for open B/L- 90min whereas for laparoscopic repair was laparoscopic U/L - 85 min, lap B/L-136.67 min. patients in the open repair show wound infection, seroma formation, haematoma formation, cord oedema while in laparoscopic repair only 2 patients show seroma formation, while open repair 1 patients show wound infection, and 3 patients were shows cord oedema. *Conclusion*-Conclude the present findings theoperative time is prolonged in laparoscopic TEP repair as compared to open due to the learning curve in our institution. It has a statistical advantage in relation to wound infection, seroma, haematoma only in 2 patients in the laparoscopic hernia repair however statistically significant.

Keywords: Post Operative complication; Laparoscopic Surgery; Open Repair Surgery.

Introduction

The word Hernia is derived from a Latin term meaning a rupture,¹ it is a condition which involves abnormal bulging of contents of the abdominal cavity through a weakness in the wall of the cavity that contains it,² while Inguinal Hernia is bulging of part of contents of abdominal cavity through weakness in the wall of inguinal canal.

Inguinal Hernia is one of the most common surgical conditions in the world which is especially more common in developing countries due to occupational exposure associated with heavy weight lifting. Its diagnosis is made mostly by clinical examination and if needed ultrasound scan can be done.

Incidence of inguinal hernia in India is around 18 % with 70 percent male predominance mostly due to their occupation and lesser occurrence in the female. However, world literature suggests higher incidence of inguinal hernias are common, with a lifetime risk of 27% in men and 3% in women.³ Inguinal hernia repair is one of the most common operations in general surgery. Surgeons and patients face many decisions when it comes to inguinal hernias: repair or no repair, mesh or no mesh, what kind of mesh, open or laparoscopic, extra-peritoneal or trans-abdominal, and so

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forth. Inguinal hernia repairs have morbidity and recurrence rates that are not inconsequential.⁴

Long-term recurrence rate remains the most important outcome parameter after the repair of inguinal hernias. Therefore, at present, the use of prosthetic material has replaced traditional tissue repairs such as the Shouldice-2 technique. Tension-free mesh repair is now the standard of care for inguinal hernia repair in adults.⁵

The use of preformed mesh to repair inguinal hernias is gaining wide acceptance⁶ and is replacing suture repairs such as the Shouldice repair⁷ or Maloney darn repair.⁸ Within the last few years, the use of minimal access surgery has expanded to encompass most procedures in general surgery. The use of endoscopic techniques in the repair of groin hernias, however, remains controversial.⁹

Laparoscopic hernia repair is similar to the open pre-peritoneal approaches and is performed trans-abdominally or totally extraperitoneal. Unlike laparoscopic cholecystectomy, this procedure has been slow to gain acceptance. This reluctance is mainly because of reports of rare serious complications during and after surgery which include visceral, vascular, and nerve injury, and small bowel obstruction. A further drawback has been the long learning curve associated with these techniques and a high rate of failure to repair the hernia in this transitional learning period for the surgeon.¹⁰

The laparoscopic technique has replaced the open approach in many surgical procedures. This development has largely taken place without desirable preceding studies proving the safety and benefit to the patient. Inguinal hernias are common, and although the results of surgical repair are often satisfactory, postoperative recovery may be slow, and the hernia may recur.¹⁰ Laparoscopic techniques for the repair of inguinal hernias have recently been introduced^{11,12} and in several small trials, these techniques have been shown to be superior to open repair in terms of postoperative pain and recovery.^{13,14} These studies were too small, however, to detect differences in recurrence rates.^{15,16}

Objectives

The main objective of the present study to investigate the average time required for the procedure of inguinal hernia and postoperative complications.

Research Design

To achieve the above aims, a prospective study was conducted at Pt. Jawahar Lal Nehru Memorial

Medical College and associated Dr. Bhim Rao Ambedkar Memorial Hospital, Raipur over a period of one year from July 2017 to July 2018. The purposive research design was done in the present study.

Method

Sample Selection

Patient having bulge/swelling in the inguinal region whether unilateral, bilateral, primary or recurrent resulting in discomfort or dragging pain with positive cough impulse admitted in surgical wards of Dr. Bhim Rao Ambedkar Memorial Hospital, Raipur were included in the study. A total of 54 patients were selected for the purpose of the present study.

Patients having unilateral/ bilateral, direct/ indirect hernias primary or recurrent hernias admitted in surgical wards of Dr. Bhim Rao Ambedkar Memorial Hospital, Raipur were included in the study. Patients were operated in surgical operation theaters of the same hospital. All operated patients were assessed for intra-operative difficulties, intra-operative complications, duration of surgery, post-operative pain, mobilization, postoperative complication and duration of hospital stay. After discharge patients were called for follow up.

- a) After 7 days
- b) For 3 months

They were assessed for the duration for return to normal work, chronic postoperative pain for a period of 3 months, delayed complications like numbness, neuralgia, and recurrence.

Sample Inclusion Criteria-

The present study inclusion criteria were logically and scientifically fit for the study, these patients were between the age group of 18 to 65 years old, patients with direct/indirect inguinal hernia, bilateral inguinal hernia, with primary/ recurrent inguinal hernia, only male patients were involved the present study, patients fit for general anesthesia, and written consent for permission in surgical procedure.

Sample Exclusion Criteria

The present study exclusion criteria were following the minimal criteria logically not fit in the research, the children below the age of 18 years and above the age 65 years were excluded, female

patients, patients with strangulated, irreducible, obstructed inguinal hernia, Huge inguinal-scrotal hernia, patients unfit for general anaesthesia, patients not consenting for the study and Bleeding diasthesis.

Sample Size

The present study contained 3 bilateral, 17 right-sided and 7 left-sided hernia in the laparoscopic group and 2 bilateral, 19 right-sided and 6 left-sided inguinal hernia in open mesh repair group. A total of 54 patients had a primary inguinal hernia, 27 underwent open repair and 27 underwent laparoscopic to open repair.

Procedure of the Study

Patients with direct/indirect, unilateral or bilateral, primary and recurrent hernias were taken into study. A detailed clinical examination of all patients was carried out. Each case was thoroughly investigated and cases were taken up for surgery. Written informed consent was obtained from patients pre-operatively.

Patients were admitted in the surgical wards of Dr. Bhim Rao Ambedkar Memorial Hospital Raipur and the facilities in the wards were utilized. The biochemical laboratory facilities, the radiological, sonographic and ECG facilities of the same were utilized. Patients were operated in surgical theaters of the same hospital. General anaesthesia was given to all patients for laparoscopic hernia repair and Spinal anaesthesia was given to patients of open mesh repair. The instruments used for routine hernia surgeries and laparoscopic facilities available in the same hospital were used. The site of hernia namely right, left or bilateral was also noted.

Procedure of the open Inguinal Hernia Repair¹⁷

Steps 1: incision and exposure

Under spinal anesthesia, the patient is placed in the supine position, after disinfection and draping, an incision is placed 2 fingerbreadths above and parallel to the inguinal ligament. After the skin has been divided the subcutaneous fat is opened in the length of the incision down to the external oblique aponeurosis. Hemostasis is now attained by ligating the superficial pudendal and superior epigastric vessels and smaller vessels by cauterizing.

Step 2: Dissection of inguinal canal

The external oblique is next opened along the direction of the fiber. This incision extends down to the external inguinal ring, the margin of which

is divided with the ring-opened; the upper medial flap of the external oblique is grasped in a hemostat and lifted up off the underlying cremasteric fascia. The aponeurosis is gently freed from underlying structures by gauze dissection up to its fusion into the lateral rectus sheath. The lower lateral leaf of the external oblique is mobilized and freed of the underlying cord coverings up to the upturned deep edge of the inguinal ligament, which is exposed. Thus, the whole inguinal canal is exposed.

Step 3: Dissection of cord

The cremaster muscle or fascia is now divided in its long axis from its proximal origin down to the level of the pubic tubercle. The cremaster flaps are raised of the cord structures. The cremaster is clamped, divide and ligated at the proximal and distal end. The cord and the hernia sac are examined. After the contents of the cord have been adequately visualized they are lifted up and the continuation of the transversal's fascia on to the cord at the deep ring is identified. It is crucial to the subsequent repair operation.

Step 4: Dissection of hernial sac

If an indirect hernial sac is present, it lies in the anterosuperior aspect of the cord structures. If the sac is empty, then it is lifted and freed from the adjacent structures by gauze dissection. It is traced back to its junction with the parietal peritoneum, transfixied and the redundant sac is excised. If intestinal contents are present, then any adhesions are divided and the intestines returned back to the abdominal cavity.

If a direct hernial sac is present, in case of a broad bulge through the transversal's fascia dissection of the peritoneum is not needed- the sac should be pushed back behind the transversal's fascia which is subsequently repaired. Whereas if there is a narrow neck, the sac is cleared, redundant peritoneum excised and the defect is closed.

In the case of a combined direct and indirect sac, the sac is delivered to the lateral side of the deep epigastric vessels and dealt as described for indirect hernial sac.

Step 5: Repair of transversalis fascia

The apposition of the transversals fascia is done with non-absorbable prolene 2-0, to normalize the posterior wall in preparation of the mesh graft.

Step 6: meshplasty

Before inserting the mesh, the most medial border of the inguinal canal is displayed by separating the external oblique from the underlying internal

oblique muscle. The dissection extends beyond, above and medial to the pubic tubercle. The mesh is prepared by cutting it into a shape to fit the posterior wall of the inguinal canal.

Master stitch is taken at pubic tubercle then the lower leaf is fixed along inguinal ligament, then upper lip is fixed to conjoint tendon and at last fish mouth is taken.

Step 7: closure

After the cord is replaced back and hemostasis achieved, the external oblique is closed without tension. Suturing is begun from the lateral end and a new external ring is formed at the medial end of the canal. The subcutaneous tissue is carefully closed with interrupted sutures. Skin is sutured either with interrupted non-absorbable sutures or continuous subcuticular absorbable sutures.

The technique of laparoscopic repair of inguinal hernia (total extraperitoneal approach)

1. An infraumbilical 1.5 cm incision made using 15 knife blade.
2. The subcutaneous tissues are dissected bluntly and the umbilical stalk is grasped with Kocher clamp and retracted upward.
3. The anterior rectus sheath is incised and the ipsilateral rectus abdominal muscle is retracted.
4. A balloon trocar is inserted into the space between the rectus abdominis muscle anteriorly and the posterior rectus sheath posteriorly. The balloon is inflated by using saline and the preperitoneal space is created.
5. Insertion of 10 mm trocar-The balloon is removed and a blunt tip 10 mm trocar is introduced into the preperitoneal space thus created. CO_2 gas is insufflated to the cannula and the preperitoneal space is created further.
6. Insertion of 30-degree telescope-A 10 mm telescope attached to the light source and camera is introduced through the sub umbilical cannula. Further creation of the preperitoneal space may be achieved by blunt dissection using the telescope.
7. Placement of subsequent ports- Placement of two more 5 mm port is required. One 5 mm port is inserted in the midline under direct vision about 1cm above the symphysis pubis. Another 5 mm port is inserted in the midline midway between the suprapubic and sub umbilical trocar. The patient is placed in the Trendelenburg position with the side of the hernia being tilted up.
8. The inferior epigastric vessels are identified and retracted.
9. Dissection of hernia sac- The Cooper ligament is identified later to the symphysis pubis and cleared of any preperitoneal fat. If the direct hernia is present the sac will be readily identified during this dissection and reduced.
10. Dissection of indirect sac-The lateral dissection is done by using a Maryland grasper. The indirect hernia sac lies lateral to the inferior epigastric vessels and anterolateral to the cord structures. The hernia sac is dissected off from the cord structures taking care not to injure the testicular vessels and the vas deferens.
11. Paritalization of cord structures-For ease of placement of the mesh the cord structures are dissected from the preperitoneal loose areolar tissue till the point of divergence of the vas deferens and the testicular vessels.
12. During dissection of the preperitoneal space if the peritoneum is opened inadvertently there will be loss of preperitoneal space due to the creation of pneumoperitoneum. In this situation, the option will be to close the peritoneal rent, insert a Veress needle into the peritoneal cavity for deflation or convert this to an open procedure.
13. Placement and fixation of mesh in preperitoneal space, A Propylene mesh size of 12 cm *15 cm is ideal for inguinal hernia the mesh is rolled and a suture is placed in the middle of the rolled mesh which helped in better placement and unrolling. The rolled mesh is inserted into the peritoneal cavity through the 10 mm trocar the mesh is placed in the preperitoneal space. Medially the mesh is placed up to the symphysis pubis and laterally 2 cm medial to the anterior superior iliac spine. Below the mesh is placed along the Cooper's ligament and lateral to the deep ring along the inguinal ligament. The mesh is unrolled and spread to cover the deep inguinal ring and the Hesselbach's triangle. Mesh is fixed by end suture to the Cooper's ligament medially above the anterior abdominal wall. Desufflation of the peritoneal space in a slow and controlled manner and the trocars are removed.

Closure a 10 mm port site anterior rectus sheath opposed by 2-0 vicryl suture and skin with monofilament polyamide suture.

Statistical analyses-

The present study was used in the descriptive analyses purposefully.

Result and Discussion

Findings of the result in the present study were showing below the tables-

The mean operative time in the study done was as follows. It was calculated from the time of skin incision till the time of wound closure. The mean duration of time in open repair for open U/L -47 min, for open B/L-90min whereas for laparoscopic repair was laparoscopic U/L -85 min, lap B/L-136.67 min.

Thus the overall operative time for laparoscopic repair was relatively more than the open hernioplasty with respect to both numbers of hernias and number of patients.

The result was statistically significant in the correlation between duration of surgery favoring open inguinal hernia repair.

Reveal the table no. 2, some patients in the open repair show wound infection, seroma formation, haematoma formation, cord oedema while in laparoscopic repair only 2 patients show seroma formation, while open repair 1 patients show wound infection, and 3 patients were shows cord oedema.

The pneumoperitoneum, vascular injury, densely adherent sac was seen among twelve patients of laparoscopic repair. Among Twenty-seven patients laparoscopic repair twelve required open hemioplasty due to the above reasons.

Table 1: Shows the mean of time and t-value.

Side of hernia repair	Hernia repair Techniques	Mean	t-value	Level of sig.
Unilateral	Open repair	47.00	1.407	0.05
	Laparoscopic repair	85.00		
Bilateral	Open repair	90.00	1.703	0.05
	Laparoscopic repair	136.00		

Table 2 Shows the postoperative complication of open and laparoscopic hernia repair.

Name of Complication	Number and percentage of cases				P-value
	Open repair		Laparoscopic repair		
	Number of cases	%	Number of cases	%	
Seroma	0	0	2	7.41	0.0004
Hematoma	0	0	0	0	0.15
Wound infection	1	3.7	0	0	0.31
Cord oedema	3	11.11	0	0	0.074
Recurrence	0	0	0	0	

Table 3: Shows the intraoperative complications for the conversion of laparoscopic to open repair.

Laparoscopic repair		
1) pneumoperitoneum	4	14.80
2) vascular injury	2	7.40
3) Densely adherent sac	6	22.20

Discussion

Hernias have been a subject of interest since the dawn of surgical history. The ideal repair should allow a patient a rapid gain to normal work,

leisure and recreation at a reasonable cost to the patient. The laparoscopic technique has replaced the open approach in many surgical procedures. This development has largely taken place without desirable proceeding studies providing safety and benefit to the patient.

In contrast to various criticisms, many favors using laparoscopic repair for a hernia which is more desirable for the patients. The postoperative recovery period, postoperative pain and rapid return to normal occupational activity are considerably less in laparoscopic hernia repair than to comparable postoperative characteristics

following the classical open/ approaches in hernia repair.

In the present study, the mean operative time was open U/L-47 min, for open B/L-90 min in open hernia repair and lap U/L-85 min, for lap B/L-136.67 min in laparoscopic hernia repair.

The overall mean operative time was less in open repair than in laparoscopic repair. This is in accordance with the beginning of the learning curve in our institution. The operative time in various studies for laparoscopic total extraperitoneal repair versus open hernia repair is as follows.

Study	Operative time (in minutes)	
	Laparoscopic	Open repair
Wellwood J. et. al. ¹⁸	46.6	46.8
Pagamini AM et. al. ¹⁹	66.6	48.2
Picchio M et. al. ²⁰	49.6	33.9

From the above table, it is clear that operative time is higher in the present study for both laparoscopic and open hernia repair. In the present study, laparoscopic hernia repair was at the beginning of the learning curve. Hence it is expected to take more time to complete the procedure.

Felix *et. al.*²¹ in a multicentric retrospective review examined the factors beyond the learning curve that could lead to recurrence after laparoscopic hernia repair. Of the 10,053 hernias repaired by TAPP or TEP, 35 patients developed a recurrence. Inadequate lateral or medial fixation was found to be a cause of recurrence in 19 of these cases. Thus, adequate fixation of the mesh has been always considered an important factor in reducing the likelihood of recurrence.

Two prospective randomized studies have examined the issue of fixation of the mesh - one in TAPP and the other in TEP. Smith *et. al.*²² randomized 502 consecutive patients undergoing elective TAPP to having stapled or non-stapled hernia repairs. A total of 263 non-stapled and 273 stapled repairs were performed and the median follow-up was 16 months. There was no statistical difference in the incidence of recurrence (0 out of 263 in the non-stapled group, 3 out of 273 in the stapled group). Also, there was no significant difference in the operative time, port-site hernia and chronic groin pain between the two groups. The authors concluded that it was not necessary to secure the mesh during laparoscopic TAPP inguinal hernia repair. Similarly, Ferzli *et. al.* undertook a prospective randomized study to assess the necessity of stapling in 100 TEPs in 92 patients.²³ There were no complications in either group and

no recurrences at the end of 12 months. The authors pointed out that in the US, hernia repairs performed without staples translated into a cost-saving of \$120 per patient.

The placement of mesh in the preperitoneal space without fixation, however, needs to be put in proper perspective. If fixation is to be omitted, it is absolutely mandatory that a wide enough preperitoneal space be created to accommodate a mesh no smaller than 15 × 12 cm in size. The mesh should overlap the edges of the appearance as well as the sites of all potential defects by at least 3–4 cm on all sides. Also, the mesh should neither be slit nor allowed to fold up in the preperitoneal space during the release of pneumoperitoneum / pneumopreperitoneum. Also, in large hernias, particularly of the direct variety, it may be prudent to obtain an adequate overlap around the edges of the defect as well as fix the mesh at least two points superiorly to prevent migration of the mesh.

MacFayden²⁴ presented a report on 359 hernias submitted to surgery in 328 patients using the TAPP technique. Postoperative complications included hematomas (11 cases), pain in the thigh (eight cases), scrotal emphysema (eight cases), and urinary retention (seven cases), with a total 10.3% morbidity. This result was to be repeated in subsequent studies, leading us to think that the learning curve would always present us with these rates in early analyses. Arregui²⁵ had 8.4% postoperative complications and Geis²⁶ revealed 5.2% in his study of 450 herniorrhaphies in 364 patients. The following year, literature reported rates of 4.7 to 15.9%.

Phillips²⁷ published a multicentric study with 3,229 laparoscopic herniorrhaphies in 2,559 patients, revealing 336 (10%) complications and two deaths (0.06%). The TAPP technique (1,944 hernias) had 19 recurrences (1%) and 141 (7%) complications, similar to the rates in our cases, which had 0.9% recurrences and 8.2% complications. Using the same approach, Geis²⁶ reported 0.6% recurrences.

In open repairs of inguinal hernias, complications appear at rates around 10%, according to Nyhus.²⁸ Urinary retention occurs in 0.2% to 15%, testicular atrophy in 0.03% to 0.65%, and ilioinguinal and genitofemoral neuromas in less than 1%; infections of the surgical wound in primary repair occur in 1%, and in recurrences, 3%.

In studies by MacFayden²⁴ and Phillips,²⁷ laparoscopic inguinal herniorrhaphies with intraperitoneal mesh presented 7% to 14% postoperative complications. However, early

recurrences occurred in 2% to 3% of the cases. The fully extraperitoneal technique had 7.7% to 10% complications, with a low recurrence rate.²⁵ Due to the use of mesh in laparoscopic herniorrhaphies, all recurrences involve technical errors, folds in the mesh, non-coverage of the defect or flaws in fixation. Early recurrences do not appear only after laparoscopic corrections. Obney²⁹ found 13% of hernias had not been diagnosed clinically; if undetected during surgery they result in early recurrence. According to Nyhus,²⁸ recurrences of open surgery are seen in 1% to 7% of the indirect hernias, 4% to 10% of the direct hernias, 0% to 7% of the femoral ones, and 1.7% to 35% of the recurred ones. Other sources reveal even higher rates: approximately 10% of the primary hernias and 30% to 50% of the recurring ones.^{30,31} The TAPP technique had a 0.1% recurrence in this study.

The intraoperative complication in the study group leads laparoscopic hernia repair for conversion to open repair, which was done in 12 patients (44%). Perhaps the most relevant postoperative complication is the recurrence of the inguinal hernia. Large series have reported recurrence rates of TAPP at 1.0% to 2.9% (minimum follow-up of 26 months).^{32,34} The serious complication of mesh infection occurs rarely, with Litwin et. al.³⁵ reporting one out of 535 patients and Leibl et. al.³⁴ reporting three out of 2700 patients. The ironic complication of port site herniation, the substitution of one hernia for another, also occurs infrequently. Litwin et. al.³⁵ reported three-port site hernias occurring in 535 patients who underwent TAPP. Urinary retention occurs in 3% to 7% of patients^{33,37} postoperatively. Other postoperative complications include hematoma/seroma and neuralgia.

Wellwood et. al.³⁶ conducted a large (200 patients in each arm) randomized prospective trial comparing TAPP to Lichtenstein tension-free mesh repair. They concluded that TAPP led to a lower rate of wound infection, groin/thigh pain, genital swelling, local numbness, and constipation. Urinary retention did occur in a greater percentage of the patients undergoing TAPP. Finally, TAPP costs significantly more than the Lichtenstein repair per patient.

Laparoscopic surgery has some side effects which may be detrimental. Carbon dioxide pneumoperitoneum causes respiratory acidosis, presumably from the absorption of the gas. Patel et. al.³⁸ found that patients undergoing laparoscopic cholecystectomy were at high risk for developing deep venous thrombosis (DVT), with 40% having

calf DVT and 15% having axial vein DVT on follow-up screening.

Conclusion

This is a prospective study conducted in the department of general surgery in Dr. B. R. A. M. hospital, Raipur and was performed in a restricted period of time (12 months) comprising of total 54 patients with unilateral or bilateral hernia selected randomly in two groups-laparoscopic TEP group study group and control open mesh repair hernioplasty group.

However,operative time is prolonged in laparoscopic TEP repair as compared to open due to the learning curve in our institution. It has a statistically advantage in relation to wound infection,seroma,haematoma only in 2 patients in the laparoscopic hernia repair however statistically not significant. Hence laparoscopic hernia repair is a safe, effective method available at a lower cost and it produces fewer complications than conventional open methods.

There is certainly reason in continuing to use the laparoscopic technique for hernia repair. It is clear that the technique offers advantages and these should be expanded and the technique should be offered on a wider basis.

In spite of the fact that most hernia repairs are performed as open procedures, there is room for an expansion of laparoscopic hernia. The bilateral and recurrent hernia is a well-accepted indication. Laparoscopic TEP hernioplasty is associated with early recovery and reduced hospital stay, lesser analgesic dose requirement, early resumption of normal activity and better quality of life.

References

1. Maingot's Abdominal Operations 12th ed, P-123
2. Bailey & Love's short Practice of Surgery 26th ed, P -948
3. Primatesta P, Goldacre MJ. Inguinal hernia repair: incidence of elective and emergency surgery, readmission and mortality. *Int J Epidemiol.*1996; 25(4):835-839
4. French Associations for Surgical Research,Oberlin P, Boudet MJ, et. al. Recurrenceafter inguinal hernia repair: prognosticfacts in a prospective study of 1706

- hernias. *Br J Surg.* 1995; 82:65.
5. Jacobs D. O. Mesh repair of inguinal hernias – Redux. *N Engl J Med.* 2004; 350:1895-1897.
 6. Amid PK, Shulman AG, Lichtenstein IL. Critical scrutiny of the open–tension free Hernioplasty. *Am J Surg.* 1993; 165:369-371
 7. Devlin HB, Gillen PHA, Waxman BP, MacNay RA. Short stay surgery for inguinal hernia: experience of the Shouldice operation 1970-82. *Br J Surg.* 1986; 73:123-124
 8. Maloney GE, Gill WG, Barclay RC. Operations for hernia – technique of nylon darn. *Lancet.* 1948; 2:45–48.
 9. MacLean LD. The repair of inguinal hernias. *Ann Surg.* 1995; 221:1-
 10. Liem MSL, Van der Graaf Y, Van Steensel CJ, et. al. Comparison of conventional anterior surgery and laparoscopic surgery for inguinal hernia repair. *N Engl J Med* 1997; 336:1541-47.
 11. Ji Hyae Park, Yoon Young Choi, Kyung Yul Hur. The Feasibility of Laparoscopic Total Extra peritoneal Hernioplasty after Previous Lower Abdominal Surgery. *Journal of the Korean Surgical Society.* 2010; 78:6, 405.
 12. Mark Berner Hansen, Kenneth Geving Andersen, Michael Edward Crawford. Pain following the repair of an abdominal hernia. *Surgery Today.* 2010; 40:1, 8-21.
 13. M. P. Simons, T. Aufenacker, M. Bay-Nielsen, J. L. Bouillot, G. Campanelli, J. Conze, D. Lange, R. Fortelny, T. Heikkinen, A. Kingsnorth, J. Kukleta, S. Morales-Conde, P. Nordin, V. Schumpelick, S. Smedberg, M. Smietanski, G. Weber, M. Miserez. European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. *Hernia.* 2009; 13:4,343-403.
 14. Pankaj Garg, Mahesh Rajagopal, Vino Varghese, Mohamed Ismail. Laparoscopic total extra peritoneal inguinal hernia repair with nonfixation of the mesh for 1,692 hernias. *Surgical Endoscopy.* 2009; 23:6, 1241-1245.
 15. M. Ismail, P. Garg. Laparoscopic inguinal total extra peritoneal hernia repair under spinal anesthesia without mesh fixation in 1,220 hernia repairs. *Hernia.* 2009; 13:2,115-119.
 16. Om Tantia, Mayank Jain, Shashi Khanna, Bimalendu Sen. Laparoscopic repair of recurrent groin hernia: results of a prospective study. *Surgical Endoscopy.* 2009; 23:4,734-738.
 17. H. Brendan Devlin, In Sir David Carter, R C G Rusell, Henry A. Pitt, Hugh Dudley, Atlas of General Surgery, Vol 1, 3rd ed, Edward Arnold Publishers 2007, Inguinal hernia in Adults, pp40-48.
 18. Wellwood J, Randomised controlled trial of laparoscopic versus openmesh repair for inguinal hernia: outcome and cost. *BMJ.* 1998 Jul11;317(7151):10310
 19. Champault GG, Risk N, Catheline JM, Turner, Boutelier P (1997) inguinal hernia repair: totally preperitoneal laparoscopic approach versus stoppa operation: randomized trial of 100 cases. *surg.laparosc endosc* 7:445-450
 20. Picchio M, Tensionfree laparoscopic and open hernia repair; randomized controlled trial of early results, *World J Surg* 1999;23:1004-7; discussion 1008-9.
 21. Felix E, Scott S, Crafton B, Geis P, Duncan T, Sewell R, et. al. Causes of recurrence after laparoscopic hernioplasty. A multicenter study. *Surg Endosc.* 1998;12:226–31.
 22. Smith AI, Royston CM, Sedman PC. Stapled and nonstapled laparoscopic transabdominal preperitoneal (TAPP) inguinal hernia repair. A prospective randomized trial. *Surg Endosc.* 1999;13:804–6.
 23. Ferzli GS, Frezza EE, Pecoraro AM, Jr, Ahern KD. Prospective randomized study of stapled versus unstapled mesh in a laparoscopic preperitoneal inguinal hernia repair. *J Am Coll Surg.* 1999;188:461–5.
 24. MacFayden BV, Jr, Arregui ME, Corbitt JD, et. al. Complications of laparoscopic herniorrhaphy. *Surg Endosc.* 1993;7:155–159
 25. Arregui ME, Davis CD, Yucel O, et. al. Laparoscopic mesh repair of inguinal hernia using a preperitoneal approach: a preliminary report. *Surg Laparosc Endosc.* 1992;2:53–58
 26. Geis WP, Crafton WB, Novak MJ. Laparoscopic herniorrhaphy: results and technical aspects in 450 consecutive procedures. *Surg.* 1993:765–773
 27. Phillips EH. Complications of laparoscopic herniorrhaphy. In Ben-David R, editor. ed. *Prosthesis and Abdominal Wall Hernia Surgery.* Austin, TX: RG Landes Company; 1995
 28. Nyhus LM, Condon RE. *Hernia.* Fourth edition. Philadelphia: Lippincott; 1995:253–268
 29. Obney N. Hydroceles of the testicle complicating inguinal hernias. *Can Med Assoc J.* 1956;75:733–736
 30. Rand Corporation Conceptualization and measurement of physiologic health for adults,

- vol. 15 Santa Monica, CA: Rand Corporation: May 1983
31. Theim TE. Recurrent inguinal hernia. *Arch Surg.* 1971;103:238-241
 32. Voitk A. The learning curve in laparoscopic inguinal hernia repair for the community general surgeon. *Can J Surg.* (1998);41(6):446-450.
 33. Kiruparan P, Pettit S H. Prospective audit of 200 patients undergoing laparoscopic inguinal hernia repair with follow-up from 1 to 4 years. *J Royal Coll Surg Edinb.* (1998);43:13-16.
 34. Leibl BJ, Schmedt C G, Schwarz J, Daubler P, Kraft K, Schlossnickel B, Bittner R. A single institution's experience with transperitoneal laparoscopic hernia repair. *Am J Surg.* (1998);175(6):446-451.
 35. Litwin D E M, Pham Q N, Oleniuk F H, Klufftinger A M, Rossi L. Laparoscopic groin hernia surgery: the TAPP procedure. *Can J Surg.* (1997);40(3):192-198.
 36. Wellwood J, Sculpher M J, Stoker D, Nichills G J, Geddes C, Whitehead A, Singh R, Spiegelhalter D. Randomized controlled trial of laparoscopic versus open mesh repair for inguinal hernia: outcome and cost. *Br Med J.* (1998);317(7151):103-110.
 37. Zieren J, Zieren H U, Jacobi C A, Wenger F A, Muller J M. Prospective randomized study comparing laparoscopic and open tension-free inguinal hernia repair with Shouldice's operation. *Am J Surg.* (1998);175(4):330-333.
 38. Patel M I, Hardman D T A, Nicholls D, Fisher C M, Appleberg M. The incidence of deep venous thrombosis after laparoscopic cholecystectomy. *Med J Austral.* (1996);164:652-656.
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