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Editorial

Laparoscopic Surgery by Single Incision: Future of Minimal Access Surgery

Single incision laparoscopic surgery (SILS) is a new technique through which laparoscopic surgery takes place through a single umbilical incision without the need for additional laparoscopic ports. This new method has been used for a variety of laparoscopic operations, including tubal ligation, hysterectomy, appendicectomy, cholecystectomy, sleeve gastrectomy, colectomy and nephrectomy. The single incision, technique has the possible advantages of reduced postoperative pain, faster return to normal function, reduced port site complications and improved cosmesis and patient satisfaction.

The rapid uptake of minimally invasive techniques has affected many areas of surgery, including gynecology, pediatric surgery and urology. The use of SILS has the potential of further reducing postoperative port site complications as well as improving cosmesis and patient satisfaction. SILS is accepted in selected cases of surgery and gynecology. SILS is recommended for uncomplicated cases because of the compromise of ergonomics. Laparoscopic surgery by single incision has been widely adopted in many countries, including Korea, China, Italy, India and the United States. Although, the number of laparoscopic procedures by SILS represents only a tiny fraction of the total for laparoscopy but its acceptance is more than NOTES.

In this issue of WJOLS, we have published many articles of SILS. At our institution, we operated 60 cases by SILS from 2008 to 2010. We have been generally satisfied with the results of SILS at our institute, but conversion rate was definitely high. Single incision laparoscopic surgery has been the subject of recent consensus meetings in the United States and Europe.

Only half a decade has passed since the introduction of SILS, and the concept of this surgery is of even shorter duration. It is too early to reach any definitive conclusions. The etiology, biology, and optimum use of SILS remain largely unknown, and patients should be treated in a minimally invasive and appropriately careful manner.

Initial fears regarding the possibility of increased rates of postoperative complications seem to have been dispelled with improved instrumentation, technique and growing experience both from the surgeon and the ancillary staff.

RK Mishra
Editor-in-Chief

Minimal Access Surgery (Laparoscopic Cardiomyotomy) for Achalasia Cardia

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Abstract

Background: Primary motor disorder of esophagus is achalasia cardia which is progressive in nature and do not have any definitive cure.Esophageal cardiomyotomy is the palliative method of treatment which forms the backbone of the treatment line of management. Over a period of last few years *minimal access surgery* is ganing popularity as the primary modality of management for achalasia.We present our review study of laparoscopic cardiomyotomy and discuss the relevant issues.

Method: A retrospective analysis was carried out of various studies who presented the large series of patients who underwent *Minimal access cardiomyotomy (laparoscopic)* at their respected centers.All patient related factors,the surgical techniques,post-operative course and management including follow-up are discussed.

Results: Minimal access approach showed less postoperative pain, ileus, less requirement of intravenous nutrition ($P < 0.0001$) consequently hospital stay, interval resuming the normal routine activity were also shorter (5 to 15 for minimal access surgery group versus 10 to 20 days for the open heller cardiomyotomy group ($P < 0.0001$).

Conclusion: Minimal access surgery for achalasia is becoming more and more popular over conventional open cardiomyotomy in view of its equal safety and efficacy with added advantage of less morbidity,mortality and better quality of life.

Keywords: Esophagus, achalasia cardia, minimal access surgery, laparoscopy, Heller's cardiomyotomy.

AIMS AND OBJECTIVES

The aim of this study was to compare the effectiveness and safety of minimal access cardiomyotomy and conventional Heller's cardiomyotomy in the treatment of esophageal achalasia cardia.

The following parameters were evaluated for both minimal access and open procedures:

1. Method of patient selection.
2. Operative techniques.
3. Operative time.
4. Intraoperative and postoperative complications.
5. Postoperative pain and amount of narcotics used.
6. Time untill resumption of diet.
7. Postoperative morbidity.
8. Hospital stay.
9. Cost effectiveness and
10. Quality of life analyses.

MATERIAL AND METHODS

A literature search was performed using Pubmed, search engine Google, Springer link and Highwire press.The following search terms was used-minimal access cardiomyotomy, laparoscopic cardiomyotomy, esophageal achalasia cardia and Heller's cardiomyotomy. More than 500 citations found. Selected papers were screened for further references.Criteria for selection of literature were the number of cases (excluded if less than 20), method of analyses (statistical or nonstatistical), operative procedures (only universally accepted procedure were selected)and the institution where the study was done (specialized institution for minimal access surgery).

INTRODUCTION

Achalasia cardia is one of the most commonly diagnosed motor and functional disorder of the esophagus. Failure of relaxation of lower esophageal sphincter, poor body peristalsis and a high pressure zone at lower sphincter are the characteristic findings. Decreased number or absence of ganglionic cells in the Aurbach's plexus results in the major pathophysiological changes including uncoordinated peristalsis, esophageal stasis resulting into dilatation and elongation of the esophagus. Diagnosis can be done by Barium swallow, upper GI endoscopy with biopsy. Esophageal manometry and 24 hours pH study requires for decision of surgery.

CONTENT

He was Heller, who performed first esophagomyotomy in 1913. He described both anterior and posterior myotomy. In 1923 Zaaiger modified it by doing single anterior myotomy and proposed the same results. Laparoscopic era started with Pellegrini who performed the first minimal access surgery of cardiomyotomy by thoracoscopic approach in 1991. Since then various studies performed at various institutions to compare or too prove the efficacy of the minimal access surgery.

Hajdu Z et al[3] in their studies 21 patients evaluated the results which states that laparoscopic approach leeds to good functional results and seems effective and safe procedure in

the treatment of esophageal achalasia. A 3.3 years follow-up study by Yasser-Youssef, et al[13] after laparoscopic Heller's myotomy proved that minimal access approach via laparoscopy offers a excellent long-term relief of the symptoms namely dysphagia and also stated that their was significant improvement in the quality of life and patient satisfaction.

Large single center study of 226 patients done by Palanivelu C et al[14] suggested that average operative time for laparoscopic myotomy was 96 minutes. Mean postoperative hospital stay was 2.2 days. The overall morbidity was 4.4% and nil mortality was observed over mean follow-up 4.3 years. They concluded the study suggesting that minimal access surgery is a safe and effective treatment for achalasia cardia. 106 patients were studied by M Robert, et al[15] proving that the morbidity rate with average follow-up of 55 months was very less. They stressed the importance of the minimal access cardiomyotomy which gives good functional results.

One of the oldest study done by Ancona E el al[1] compared the open cardiomyotomy with laparoscopic cardiomyotomy. Laparoscopic approach took longer time then open procedure (mean 178 versus 125 minutes). No major morbidity or mortality was observed in any group. But when compared the post-operative pain, ileus and IV nutrition the minimal access technique was much superior ($P < 0.001$).

Minimal access approach through thoracoscopy and laparoscopy was also compared by Cade R[2] which also mentioned that minimal access approach are very safe. Laparoscopic Heller's myotomy has comparable success to open Heller's myotomy and causes less early detriment in the quality of life and should be the primary treatment in all fit patients was the conclusion of the study by Katillus M, Velanonvich V[4] 62 patients underwent minimal access esophagomyotomy in a study done by Luketich el al[5] at their institute also proved that laparoscopic approach offers very good results. Abir et al[6] in their review of current status and controversies of management for achalasia stated that laparoscopic Heller's myotomy is generally accepted as the procedure of choice for esophageal achalasia.

Another study done by Desai KM, Soper NJ[7] from USA supported that the laparoscopic myotomy provides good symptomatic relief. If we considered the safety factor, minimal access approach is very safe in elderly as shown by Kilic A et al[16] also in pregnancy, study by Palanivelu C et al.[17] Minimal access approach is advancing day by day. Now even the cardiomyotomy can be performed with the help of Robot – study by Chaer RA et al[8] and study by Undre S et al.[9] Satisfactory clinicoradiological results were obtained by Tello E et al[10] in their study of 20 initial cases. Laparoscopic approach had the advantage of reduced cardiopulmonary compromise, less pain, less morbidity and shorter hospital stay as per Wang QS et al.[11] Minimal access surgery has replaced other modality of treatment for achalasia quoted by Bonavina L.[12]

DISCUSSION

Minimal access cardiomyotomy (laparoscopic cardiomyotomy) has got lot of attention around the world. Several controlled trials have been conducted, some are in favour of laparoscopy others not.The goal of this review was to ascertain that if minimal access cardiomyotomy is superior to conventional and if so, what are the benefits and how it could be instituted more widely.There is also divercity in the quality of randomized trials.The main variable in these trials are following parameters:

1. Number of patients in trial
2. Withdrawal of cases
3. Exclusion of cases
4. Blinding
5. Intention to treat analysis
6. Publication biases
7. Local practice variations
8. Prophylaxis, antibiotics used
9. Follow-up failure.

CONCLUSION

The advent and the success of minimal access surgery have changed the treatment algorithm of the esophageal achalasia. Minimal access cardiomyotomy for achalasia is becoming more and more popular over conventional open cardiomyotomy in view of its equal safety and efficacy with added advantage of less morbidity,mortality and better quality of life.

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Amnioscopy Revival as a Fetal Surveillance Tool

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Abstract

Background: This study was carried out to explore whether amnioscopy could help us to management of the uncertain date fetus to differ the prematurity from growth-restriction and assessment of post-term pregnancies as well. Notify the meconium staining of amniotic fluid is another aspect of amnioscopy, too.

Study design: This was a descriptive study of 80 pregnant women from 2007 to 2008 at a university hospital, Tehran, Iran. The characteristics of amniotic fluid were documented on admission by inspection with transcervical amnioscopy, in all singleton pregnancies. Data were analyzed statistically.

Results: Eighty women were admitted in labor during the study period and fulfilled the study inclusion criteria and had amniotic fluid evaluation available. Three pregnancies were uncertain date that managed according to amnioscope findings. Amniotic fluid were meconium stain in 22.5% (n = 18) and were clear 58.7% (n = 47) at amnioscopy and it was confirmed after delivery.

Conclusion: This study suggests that amnioscopy is an easy and safe procedure for assessment of amniotic fluid characteristics. It could help us to differ prematurity (with vernix) from growth restriction(with yellowish or meconium staining) . Further analysis will determine its role in the perinatal outcome.

Keywords: Amnioscopy, amniotic fluid, perinatal outcome.

INTRODUCTION

Prediction and diagnosis of antepartum hazards threaten the life of fetus, is the major obstacle in obstetrics. Nowadays, the fetus' health is evaluated by assessment of the fetal heart-rate (FHR), nonstress test(NST), stress test, ultrasonography, biophysical profile (BPP) and Doppler velocimetry, etc. There is no evidence from comparative trials on which to base a recommendation for use of one method of fetal assessment over another.[1-3]

Traditionally, amnioscopy that was proposed by Saling in 1962, had been used as a first line intervention for detection of meconium passage.[1-5] Amnioscopy is a form of obstetric endoscopy employed to visualise the forebag of the amniotic sac and to determine the characteristics of amniotic fluid such as color, consistency, presence of meconium, etc.[1,4,5] The accuracy and reliability of amnioscopy in predicting fetal distress is uncertain.The precise incidence of usage and indications of amnioscopy is unknown. Although it is still apply in some of the obstetric units, there is controversy surrounding this method.[1-3]

Serial amnioscopy can be used to monitor the fetus in the last weeks of pregnancy.[6,7] Levran et al, evaluated the value of amnioscopy in surveillance of 289 postdate pregnancies. They showed that amnioscopy failed to detect the presence of meconium antenatally in most cases (57%), and positive amnioscopy for meconium was unrelated to the incidence of fetal distress.[8] Raboni in Italy, suggested that amnioscopy is an invasive exam with many limitation such as rupture of membranes in 1.4% and serious infections that maybe leading to fetal death.[9] Although, amnioscopy is not popular in modern obstetrics, the goal of this study is to define it as a safe method to recognize fetuses in whom timely intervention will prevent perinatal morbidity and mortality.

We conducted present study to show more light to the significance of amnioscopy in labor. Todays, scopies have been utilized to improve our vision in the field of gynecology such as hysteroscopy, vaginoscopy, … so we can restore and expand amnioscopy for evaluation of amniotic fluid details as well.

Therefore present study has been conducted to show more light to assess this method at the field of obstetrics.

MATERIAL AND METHODS

A descriptive study was carried out during 2007-2008 at Taleghani teaching hospital in Iran.

The study protocol was approved by the institutional ethics advisory committee. Eighty women with a singleton cephalic

pregnancy with no predefined risk factor were recruited into the study. All women signed consent forms before participation. Pregnant women with premature rupture of membranes, fetal anomaly, closed cervix, unexplained vaginal bleeding and active labor were excluded. Patient information, demographics, and clinical data were then extracted from the chart. Amnioscopy was done for was performed for cases with uncertain date pregnancy to estimate whether they have vernix within clear amniotic fluid at sufficiently forbag or they have meconium staining with scanty fluid. Selection of the cases was by convenience nonrandomized method all of cases with instrument (Amnioscope, Light protector 4000, 220 volt, 50 Hz,German) (Fig. 1) as follows:

The patient is placed in the lithotomy position. According to the state of the cervix, the largest suitable amnioscope is selected. The external diameters of the amnioscope tubes available being 12, 20 and 25 mm. The suitable speculum applied, then, the selected tube is guided into the cervical canal. The obturator is removed and a light source is inserted, so that the amnion sac could be inspected through the intact forewaters. Patients were classified as amniotic fluid characteristics as follows: group A: clear, group B: emulsification of vernix (indicate prematurity), group C: green or yellow, scanty that are signs of threatened danger to the fetus.

SPSS Statistical programs(SPSS, software 11.0, Chicago, USA) were used to analyze results.

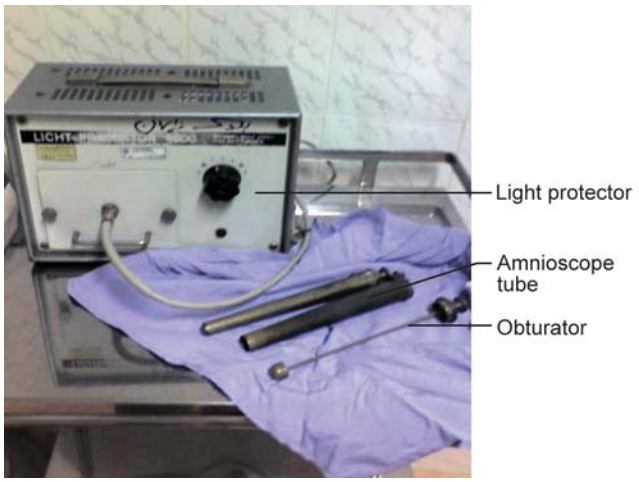

Fig. 1: Instruments for amnioscopy

RESULTS

Eighty pregnant women were evaluated. The mean maternal age was 26.06 ± 3.36 years, gestational age at admission was 38.3 ± 2.6 weeks. The mean birth-weight of the pregnancies that were terminated was 3108.12 ± 257.96 gm. Three pregnancies were uncertain date. One of these deliverd premature and another was full term. The third, deliverd at one week later that was appropriate for gestational age. The randomization sequence placed 47 patients in the A-group, 15 in the B-group and 18 in the C-group. Table 1 illustrates that maternal demographics were equivalent between the groups. 7(8.75%) of the 80 patients experienced intrauterine growth restriction that all of them were in group-C except two that were clear at amnioscope (Fig. 2). There were no perinatal deaths in the series. There was no significant difference in maternal length of stay. We did not have any incidence of postpartum morbidity in patients subjected to amnioscopy and no incidence of inadvertent rupture of the membranes.

Table 1: Maternal demographic data

	A (n=56)	*B (n=10)*	*C (n=14)*	*D value***
Age(y)*	25.9 ± 3.0	25.7 ± 4.2	26.3 ± 2.7	0.129
Gravidity*	3.66 ± 1.29	2.86 ± 1.61	4.13 ± 1.76	0.101
Parity*	1.73 ± 1.10	1.2 ± 1.3	2.2 ± 1.52	0.137

*Results are mean ± standard deviation **Data analyzed using *Bonferroni t-test* or X^2, as appropriate.

DISCUSSION

This study demonstrated that amnioscopy is an easy performing and safe procedure for detection of amniotic fluid quality including color, presence of vernix or meconium passage and may improve accuracy in the evaluation of fetal well-being, as well. Saling believed that amnioscopy is basically a supervisory tool, but other indications include its usefulness as a safe method for artificial rupturing of membranes; differentiation of the type of premature rupture of membranes; antepartum

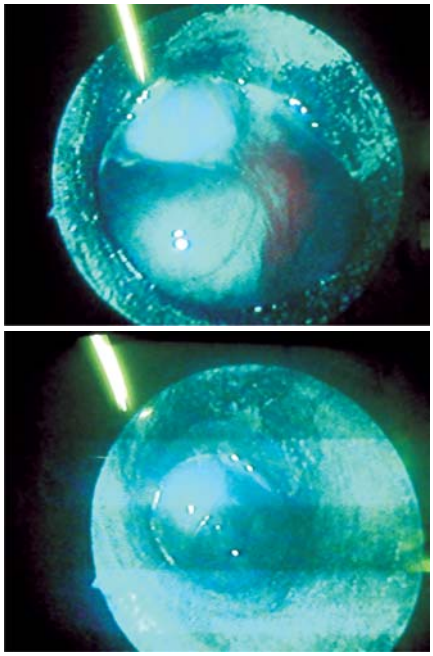

Fig. 2: Clear amniotic fluid via amnioscope

hemorrage differentiation; and suspicion of intrauterine death.[1,2] Later,Raboni and Levran describe the amnioscopy with many limitations such as rupture of membranes and serious infections and failed to detect the presence of meconium antenatally in most cases.[8,9] Postmaturity was the most frequent causes of amnioscopy in all studies. In addition to detect the presence of meconium antenatally, we could make a decision for cases with uncertain gestational age according to amnioscope findings, whether spontaneous delivery can be safely awaited, or whether any intervention is preferable. This was conceived as a pilot study because there were no previous literature with this idea. Without a doubt, part of our motivation for performing this study was to increase our obstetricians exposure to amnioscopy. We believe that this technique should be taught in residency training programs. Under the conditions of our study, we suggest that careful targeted amnioscopy should be performed for pregnancy with uncertain gestational age to identify the time of termination. Options of termination and continuation of the pregnancy should be discussed with the patient. Antenatal fetal well-being assessments such as biophysical profile or nonstress test, etc should be performed for suspected cases to support our decision.

Therefore, further comparative studies with a larger number of patients would have permitted for a greater degree of certainty regarding our findings. In order to achieving visual findings via an unripe or even closed cervix, amnioscopy can be developed as a fine fiberoptic technique.

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Clinical Evaluation for Reduction of Adhesions by a Viscoelastic Gel in Gynecological Laparoscopic Surgery

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Abstract

In laparoscopy, the usual adhesion prevention techniques cannot be applied or are difficult to use. As a result, a viscoelastic gel was developed.

Methods: In third party-blinded, randomized, four center studies, patients from 18-46 years underwent surgical laparoscopy in which adnexa and adjacent tissues were coated with viscoelastic gel. They underwent for a second look 6-10 weeks later. Adhesion scores of American fertility society were quantified with the blinded reviews of videotapes.

Result: For 25 patients, surgery was done on 45 adnexa .Surgical sites with risk of adhesion was covered with approximately 15 ml of viscoelastic gel in approximately 90 seconds. For 24 control patients, surgery alone was done on 41 adnexa. Decrease in AFS score (11.9-9.1) was seen in treated adnexa. In control adnexa increase in AFS score (8.8-15.8) seen. The difference (42% reduction) seen in second look AFS score is significant ($p < 0.01$).

Conclusion: Laparoscopic administration of viscoelastic gel was easy and had significant reduction in adnexal adhesions. The patients undergoing gynecological surgeries were benefited.

Keywords: Laparoscopy, viscoelastic gel, adnexal adhesions, adhesion prevention, Oxiplex/AP Gel.

AIMS AND OBJECTIVES

The aim of this study was to compare the effectiveness and safety of viscoelastic gel as an adhesion preventive device. The following parameters such as safety, complications, adverse events and time for administration were evaluated.

MATERIAL AND METHODS

A literature search was performed using medline and the search engine Google, Springer link and Highwire press. The following search terms were used: *Laparoscopy*, *Adhesion*, *Viscoelastic gel* and *Oxiplex*. Selected papers were screened for further references. Criteria for selection of literature were the number of cases (excluded if less than 20), methods of analysis (statistical or nonstatistical) and operative procedure (only universally accepted procedures were selected).

The study was conducted in 4 centers in Europe. It was randomized, third party blinded and parallel group design. At each study center, a relevant committee approved the study plan for human evaluation. Patients included were of 18-46 years old and willing to undergo a second look of laparoscopy after 6-10 weeks as part of the treatment plan after their initial surgery. The patients included received either Oxiplex/AP Gel to prevent the adhesion, or no additional therapy after surgery (control).

Patients excluded were (a) With either history of diabetes, hepatic or renal disorders.(b) With pelvic or abdominal infection.(c) Those who received systemic corticosteroids within 30 days of the initial surgery or postoperative hydrotubation.(d) If any adhesion preventive adjuvant such as seprafilm, intergel, interceed or spray gel, or peritoneal instillates containing non steroidal anti-inflammatory agents, corticosteroids, Hyskon, or any absorbable hemostat.(e) If pregnant, ectopic pregnancy or reversal of surgical sterilizations.(f) No evidence of endometriosis or any adnexal diseases.(g) Bowel perforation or conversion to laparotomy.

INTRODUCTION

In conservative gynecological surgeries, the use of adhesion preventive adjuvant has become significant.[1] Increased rates of reoperation,[2] chronic pelvic pain,[3] postoperative bowel obstruction and infertility[4] are the clinical consequences of adhesions after peritoneal cavity surgery. This markedly increases health care costs. This makes adhesion prevention, a major contributor in the outcome of a successful surgery.

As early as 1990, adhesion preventive adjuvant was available for gynecologists. Gynecare, USA produced interceed absorbable adhesion barrier. This was followed by site specific barriers like Preclude (Gore-Tex, USA) and Seprafilm bioabsorbable membrane (Genzyme, USA). It was challenging to use these first generation adhesion preventive devices commonly used in laparotomy to be used in laparoscopy. In 2001 food and drugs agency (FDA) approved Integral adhesion prevention solution to be used for laparotomy.[5] Many gynecologists found that integral administration was easy in

laparoscopy. Integral was withdrawn from market in 2003. In Europe the only instillate available during that time for reduction in postoperative adhesion formation was Adept.[6] Clinical studies showed that about 300 ml of N,O–carboxymethyl-chitosan was having clinical benefit.[7] Spray gel conducted several clinical studies for the development of site specific adhesion prevention devices that could be delivered easily during laparoscopy.[8] Oxiplex/SP is used recently by spinal surgeons for reducing pain and weakness due to adhesion formation following laminectomy.[9] Viscoelastic gel, a similar formulation of Oxiplex was found to be most effective in reducing adhesions to peritoneal surface following surgery.[10] The results of the first clinical study using viscoelastic gel, a single component adhesion preventive device that can be administered easily to the pelvic sites during operative surgery is reported in this paper.

CONTENT

Like any surgical device for maximum patient benefit, careful attention to the details of application is important. For the application of Oxiplex/ AP Gel, the following procedures were done in the subjects. At the end of surgery, to facilitate the collection of residual fluid to the cul-de-sac, the subjects were placed in reverse Trendelenberg position. From cul-de-sac the residual fluid was aspirated until it was less than 10 ml. Through a 30.5 cm long ×5 mm canula applicator, a single layer of gel was applied in sufficient volume to coat the surgical site completely with a viscous layer of gel. The surgical sites included fallopian tube including mesosalpinx, surface of the ampulla, lateral part of uterus that could come in contact with adnexa, anterior and posterior surface of ovary, the surfaces between the fallopian tube and the ovary, and adjacent pelvic side wall including the ovarian fossa. To coat the adnexa, it did not exceed more than 30 ml of gel. Following this, the surgical instruments were removed and the pneumoperitoneum was evacuated.

A second look laparoscopic procedure was performed 6-10 weeks after the initial surgery. This time the adnexa were evaluated in a similar manner to the initial laparoscopic surgery. The image was recorded on videotape. By the method of the American fertility society (AFS, 1988), blinded reviews of the videotapes were performed to quantify the adhesion scores. AFS adnexal adhesion score is determined by the severity (severe: If the adhesion requires cutting to remove or tears peritoneal surface on blunt removal or if hemostasis is required; not severe: if filmy) and extent (area of adnexal organ covered by adhesions) of the adhesions of the ovary and fallopian tube.

Summing the scores up for the ovary and fallopian tube provided a clinical category for the adhesion score. Minimum 0-5; mild 6-10; moderate 11-20; severe 21-32. Safety evaluation was based on the patient's recovery, postoperative condition and severity of adverse events recorded throughout the study.

STATISTICAL ANALYSIS

Using Student's t-test for continuous variables and Fischer's exact test of categorical variables, the treatment and control groups were compared. Using Student's t-test, the number and proportion of sites with adhesion were compared. Wilcoxon rank-sum test was used to compare adhesion scores. Shift tables were analyzed by the Cochran-Mantel-Haenszel test with the treatment scores which is based on the order of adhesion score categories.

RESULTS

Forty-nine female patients in total between 18-46 years of age received treatment at four centers. Treatment patients were 25. In these patients surgery was performed on 45 adnexa and Oxiplex/AP Gel was applied on those adnexal sites. Control patients were 24. In these patients surgery was performed on 41 adnexa. There were no unusual postoperative complications and all the patients did well after the surgery. After 6-10 weeks, patients returned for second look laparoscopy. For all 86 adnexa, efficacy analyses are presented. For both the groups, the type and frequency of the surgical procedures were similar. Adhesiolysis was done in 12 treatment and 8 control patients. By cystectomy removal of ovarian.

Endometriosis was done in 6 treatment and 3 control patients. 33 treatment and 33 control patients had endometriosis involving parietal and visceral peritoneum. 6 treatment and 6 control patients had stage four endometriosis. No patient had prolonged hospital stay, premature readmission, prolonged constipation, fever, postoperative pain requiring evaluation on hospitalization. During this study there was no discontinuation due to any adverse event and no death occurred.

A single layer of gel was applied to the adnexa with an Oxiplex applicator consisting of 30.5 cm long × 5 mm cannula. Approximately 94 ± 21 seconds was taken for gel application and approximately 15 ml of gel was applied on each adnexa.

EFFICACY

As in Figure 1, the mean adnexal adhesion score for the control adnexa was 8.8 and for the Oxiplex/AP Gel treated adnexa was 11.9. During the second look laparoscopy, the controlled adnexa showed an increase in adnexal adhesion score from 8.8 to 15.8. In contrast, the adnexa that were covered with Oxiplex/AP Gel showed a decrease in mean adnexal adhesion score from 11.9 to 9.1. In second look AFS scores, the difference (42% reduction; $p < 0.01$) was significant statistically. For the patient groups without (Fig. 2A) and with (Fig. 2B) endometriosis, the same directional difference in mean adnexal adhesion score was seen. A reduction in adnexal adhesion score in the Oxiplex/ AP Gel treated group compared to controls (Fig. 2C) was seen for patients with grade one to three endometriosis. In patients with

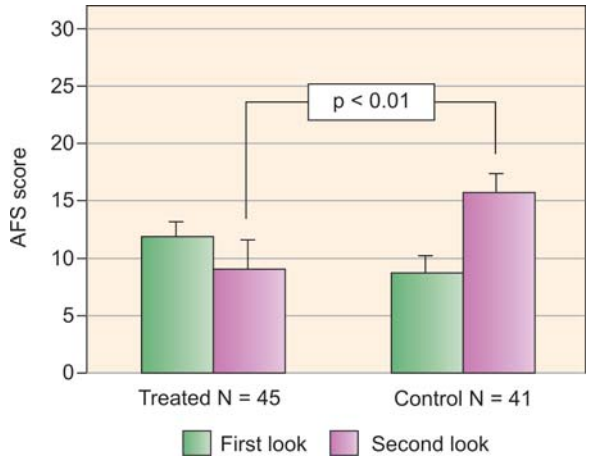
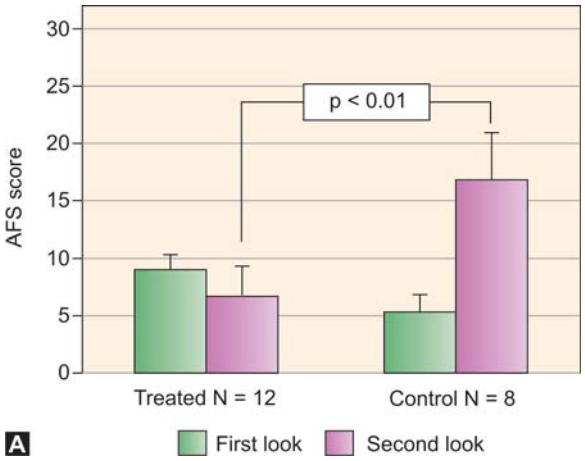
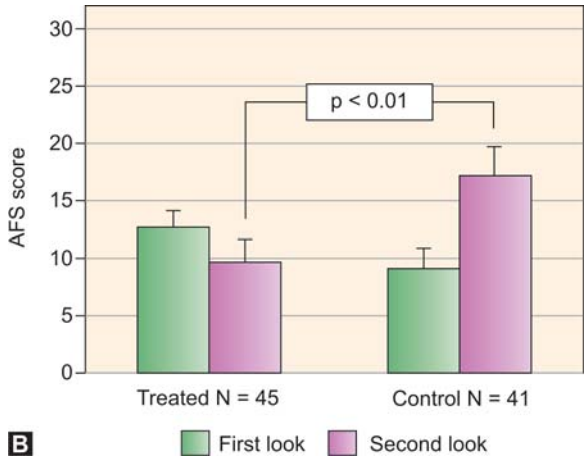
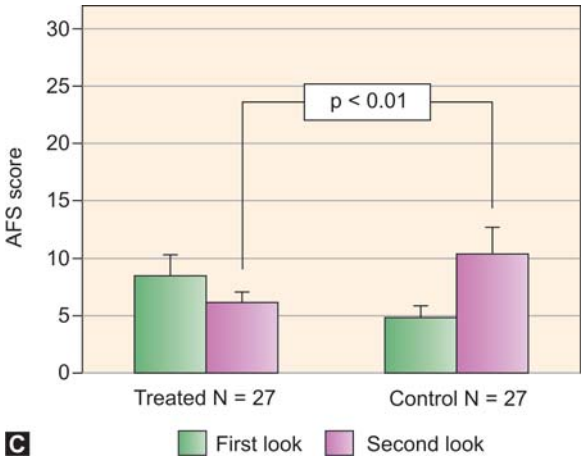


Fig. 1: Reduction of AFS adnexal adhesion score by using Oxiplex/AP Gel via laparoscopy. Patients undergoing conservative laparoscopic surgery had their adnexa covered with Oxiplex/AP Gel (15 ml) or served as surgery-only control. At the time of second look laparoscopy 6-10 weeks later, the adnexa coated with Oxiplex/AP Gel (n ¼ 45) had a significantly (mean ^ SEM; P, 0.01). Lower adnexal AFS score to control adnexa (n ¼ 41)







Figs 2A to C (A) Reduction of American Fertility Society (AFS) adnexal adhesion score in patients without endometriosis. (**B**, insert) Patients with stage I–IV endometriosis. (**C**, insert) Patients with stage I–III endometriosis. Adnexa from patients undergoing conservative gynecological surgery were coated with Oxiplex/AP Gel (15 ml) or served as surgery-only controls. Adnexal AFS adhesion scores were determined at the time of initial surgery as well as at second-look laparoscopy 6-10 weeks later (mean ^ SEM). Adnexa from patients undergoing adhesiolysis only who had no endometriosis (A), patients with AFS stage I–IV endometriosis (B), as well as from those patients with stage I–III endometriosis (excluding stage IV, C) coated with Oxiplex/AP Gel showed a significant improvement in adnexal AFS score compared to controls (P< 0.01)

endometriosis, Oxiplex/AP Gel worked well to prevent an increase in adhesion score. Oxiplex/AP Gel did not appear to provide that benefit to patients with grade four endometriosis (Data not shown).

Seeing the number of patients whose adhesion score shift to a better category of adnexal adhesion score after surgery, the individual patient benefit can be demonstrated.[11] For patients, the prognosis is worse if there is increase in adnexal adhesion score.

As shown in Table 1, the prognostic categories for minimal (0-5), mild (6-10), moderate (11-20) and severe (21-32) scores are provided for each of the patient group. 23 adnexa had a minimal base line adhesion score (Row-1) in the AP Gel/ Oxiplex treatment group. 22 of these remained in the minimal group. One of them shifted to mild at second look. In this one patient, review of gel application showed that adnexal surgical sites were not covered by the gel at the end of the surgery. Hence it is not known what would have been in the second look adhesion score, if the adnexum was covered with gel in a similar manner to the other 22 adnexa of this category. In control population, at the initial surgery, 23 adnexa were in the minimal category. During second look, 13 remained unchanged, 7 mild, 1 moderate and 2 severe. All together 10 had shifted to higher category. These differences in shift analysis are significant ($p < 0.01$).

The significant benefit of Oxiplex/AP Gel in reducing adhesions was shown by both a reduction in average AFS score as well as reduction in AFS prognostic category as a result of treatment ($P < 0.01$ for both).

Four adnexa in the control group and 5 adnexa in the treatment group had adhesion scores in the mild category at the initial surgery. In the Oxiplex/AP Gel treated group, 1 had a worse score (moderate) at second look and 2 had a better adhesion score (minimal). In contrast to this, in the control group, all the four had worse adhesion category at the second look. 3 were moderate and 1 was severe. In the moderate group at initial surgery, out of 5 adnexa that received Oxiplex/AP Gel, 3 had a better adhesion score at second look (2 minimal and 1 mild) and 1 had a worse score. In control group, in moderate category at first surgery, out of 5, 4 adnexa had worse adhesion scores at second look (1 moderate and 4 severe).

In the treated adnexa with severe adhesion scores at first look, 2 had stage three and 6 had stage four endometriosis. At second look all these remained in severe category. At second look, of the 4 adnexa in the severe category that did not have endometriosis, 2 were in moderate group, 1 in mild and 1 in minimal group. At initial surgery in the control patients, 9 adnexa were in the severe group. Of these, 6 had stage four endometriosis and they remained in severe category at second look. The other 3 adnexa that were severe at the initial surgery and were not in patients with stage four endometriosis, better adhesion score in the second look was seen only in 1. The other 2 adnexa stayed severe. In the shift table, these changes were statistically significant ($p < 0.01$).

From the use of Oxiplex/AP Gel, the number of individual adnexal adhesion scores (Table 2) that improved or stayed the same from first to second look laparoscopy versus those that

Table 1: Shift analysis (Cochran-Mantel-Haenszel statistic)

Baseline American Fertility Society (AFS) category		Total	Second-look AFS scores			
			Minimal (0-5)	Mild (6-10)	Moderate (11-20)	Severe (21-32)
Treatment surgery + Oxiplex/AP Gel						
Minimal	(0-5)	23	22	1	0	0
Mild	(6-10)	5	2	2	1	0
Moderate	(11-20)	5	2	1	1	1
Severe	(21-32)	12	1	1	2	8
Total		45	27	5	4	9
Control: surgery only						
Minimal	(0-5)	23	13	7	1	2
Mild	(6-10)	4	0	0	3	1
Moderate	(11-20)	5	0	0	1	4
Severe	(21-32)	9	0	0	1	8
Total		41	13	7	6	15

Table 2: Outcome of clinical trials using the adnexal adhesion score of the American Fertility Society (AFS) as established in 1988

	Individual AFS scores			AFS category		
	Improved or unchanged	Worsened	Total	improved or unchanged	Worsened	Total
Oxiplex	87% (39)	13% (6)	45	93%(42)	6% (3)	45
Control	32% (13)	68% (28)	41	56% (23)	44% (18)	41

worsened reveals a significant treatment benefit. At the time of second look, 87% of Oxiplex/AP Gel applied adnexa did not have a worse adhesion score in contrast to 32% of the control adnexa. Even when the individual adnexal adhesion scores are grouped by prognostic category (Table 2) , the number of adnexa that improved or stayed the same from first look to second look laparoscopy versus those that shifted to a worse category also shows a significant treatment effect of Oxiplex/AP Gel. For example—During second look, 93% of the adnexa that received Oxiplex/AP Gel did not have a worse score in contrast to 56% of the control adnexa.

DISCUSSION

During minimally invasive surgery, the most commonly used adhesion preventive devices cannot be applied or are difficult to apply. So in many surgical procedures, prophylaxis for adhesion prevention is not used. As a result Oxiplex/AP Gel was developed specifically for the needs of surgeons performing procedures that result in adhesion formation leading to failed surgical therapy.[12] For a gynecological surgeon, the challenges facing for an adhesion preventive device include ease of use and retention of the device at the site of application. To address these needs Oxiplex/ AP Gel was specifically developed.

The polyethylene glycol and carboxymethylcellulose formulation is a transparent viscoelastic gel that is readily administered to the specific anatomical sites where there is concern for adhesion formation. The ease of use of viscoelastic gel includes single unit packaging stored at room temperature, which when opened delivers the sterile gel and applicator directly into the field of operation. The viscosity of the gel allows the surgeon to control directly the rate of Oxiplex/AP Gel delivery to the operation site. The flow of gel is automatically stopped by depressing the syringe. The gel which is residing within the applicator tube doesn't harden. This allows for the continued application of the viscoelastic gel at the convenience of the surgeon.

To maximise tissue adherence, Oxiplex/AP Gel was developed by complex of two polymers. The gel remains in its place due to its mucoadherent property.[13] This property allows the gel to remain in place even in gravitational dependent areas such as the anterior abdominal wall after removal of an omental adhesion, or even at the posterior surface of the uterus in case of myomectomy. In preclinical studies, a similar formulation of Oxiplex (Oxiplex/ SP Gel) showed to be safe and effective in reducing adhesions to dura following spinal surgery.[14] Another clinical study done recently showed that patients with severe back pain and lower extremity weakness who had Oxiplex/AP Gel applied over their nerve roots following laminectomy or laminotomy had significantly reduced symptoms compared to surgery only(controls).[15] Oxiplex/AP Gel, which is specifically designed for use in the peritoneal cavity[16] was evaluated in women undergoing conservative gynecological surgery. In this case, the principle investigators found that, with experience, a single layer of gel was sufficient enough to cover the adnexal surface and adjacent sites. In some cases, when multiple layers of gel were coated over one another, the weight of the excess gel overcame the innate tissue adherence resulting in falling of the gel from the surgical site. Typical volume of gel required to cover an adnexum was approximately 15 ml which was administered in approximately 90 seconds. It was easy to apply Oxiplex/AP Gel to adnexal surfaces including the ovarian fossa and between the ovary and mesosalpinx. The gel coverage facilitated the cessation of vascular oozing and thereby helping to prevent adhesion.

To protect the tissue during postsurgical repair, only a single layer of gel was sufficient. Within six weeks, prior to the second look laparoscopy, the gel was absorbed from the peritoneal cavity. In 4 cases, small collections (approximately 5×5 mm) of gelatinous material (presumably residual gel) were noted in areas deep in the cul-de-sac where intraperitoneal clearance have been affected particularly in cases of grade four endometriosis, or in areas where multiple layers of gel had been applied. In 2 cases, biopsies of these sites where consistent with the residual gel. There was no clinical significance of the residual gel. The residuum did not interconnect the tissue surfaces. It was not associated with any adhesions. It did not obstruct organ mobility.

ADHESION REDUCTION

The reduction in postoperative adnexal adhesions demonstrates a clinically significant benefit of Oxiplex/AP Gel, a categorical reduction in adnexal adhesion and has been associated with better clinical outcomes.[17] Adhesion scoring is not only used for prognosis, but also to determine the therapy.[18] The US food and drug administration recently recommended that the AFS adnexal adhesion classification can be used as a clinical outcome measure in clinical studies of devices intended to reduce the postsurgical adhesion formation.

CONCLUSION

Laparoscopic administration of viscoelastic gel was easy and had significant reduction in adnexal adhesions. The patients undergoing gynecological surgeries were benefited. Although it is reassuring to see gel persisting at the site of application, it is recommended to avoid excess gel application.

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Herniotomy in Infants, Children and Adolescents without Disruption of External Ring

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Abstract

Inguinal hernia is one of the commonest pediatric surgical problems and when treated early and appropriately is associated with negligible morbidity and very rarely any mortality. In our prospective study we introduce a new method for repair of hernia in infants, children and adolescences without disruption of external ring. Our study involves 252 patients with inguinal hernia, the ages ranging from 7 days to 15 years, 8 female and the remaining male. We apply the principles of minimal access surgery but without laparoscope that's to say the smallest incision, a short stay in hospital, a rapid recovery, the least cost and fewer complications with no recurrence. So we can say that it is nonlaparoscope minimal access surgery.

Keywords: Herniotomy, hernia repair in children.

INTRODUCTION

Inguinal hernia is a common finding in infants and children and represents the condition most frequently requiring surgical repair in the pediatric age group.[1] The incidence of inguinal hernia ranges from 1 to 4.4% and is higher in infants, commensurate with the higher rate of patent processus vaginalis.[2] Boys are six times more affected than girls. Hernias can be life-threatening or can result in the loss of a testis, an ovary or a portion of the bowel if incarceration, strangulation or operative complications occur. For these complications to be avoided, timely diagnosis and operative technique are important.[3]

The risk of incarceration of inguinal hernia is higher in the neonatal period and early infancy and is easily prevented by early diagnosis and treatment.[4, 5] Inguinal hernia results from a hole or defect in the muscles where the peritoneum protrudes from the sac[6] or is due to a congenital patent processus vaginalis.[7] No disease belonging to the province of surgeons needs accurate anatomical knowledge and good surgical skill more than hernia in all its varieties.[8] Early reduction of the hernia followed by elective herniotomy is the standard treatment if there is incarceration. Emergency surgical intervention is, however, required in case of suspected or established strangulation. A very rare complication of incarcerated inguinal hernia in infancy is the development of spontaneous bowel necrosis with enteroscrotal cutaneous fistula.[9-12]

METHOD

From June 2005 till March 2007, 252 patients with inguinal hernia were collected in Baquba general hospital-Diayla-Iraq and managed surgically with nonlaparoscopic minimum access surgery. These cases were followed up for one year for detection of recurrence rate. The sex and age distribution of these cases are illustrated in Table 1. From the total number, two cases only were recurrent hernia and the remaining 250 cases were primary hernia. These cases were classified into two groups; group A which included patients below 6 years while group B included patients above 6 years.

In the present prospective study we applied the principle of minimum access surgery but without a laparoscope. Our surgery in group A included the approach the cord after it passed the external ring, and depending on the short inguinal canal and the superimposing of superficial to deep ring and with slight traction of the cord we can reach the maximal point of the sac´s neck and expose the extraperitoneal fat without disturbing the inguinal canal and its content. The advantage of this which we did as a small incision not exceeding 1 cm, is that we did our surgery via minimal access, keeping the inguinal canal untouched so any recurrence in adulthood can dealt with as a primary hernia.

In group B who are also not needing repair neither tension or tension free so here we can reach the sac from above, because now the inguinal canal is developed or started to develop and applying minimum access we reach the sac just were above the deep ring (one inch above the midpoint of the line between the pubic symphysis and interior superior iliac supine). The incision does not exceed 2-3 cm, then we pick-up the cord just before it

Table 1: Age distribution

	Age groups	*Male*	*Female*	*Total number*
Group A	Below 1 year	76	4	80
	1-3 years	70	2	72
	3-6 years	56	2	58
Group B	6-15 years	42	–	42
	Sum	244	8	252

enters the deep ring and because no need for repair we avoid unnecessary disruption of the external ring and unnecessary exploration of the lower part of the canal.

RESULTS AND DISCUSSION

Both groups, A and B tolerated the surgery very well with no need for strong analgesia postoperatively such as opiate, paracetamol syrup or tablets being simple and we did not give any antibiotics with no incidence of wound infection. The only complication was scrotal edema in about 50% of group A which resolved spontaneously within a few days.

The incidence of hernia in different age groups was illustrated in Figure 1 which clearly shows a higher incidence in children less than 6 years (group A).

One year follow-up shows no recurrence and the wound in group A after 3 weeks cannot be found easily as there is little scaring. The patients in both groups were dealt with as day case surgery and discharged after a few hours with no significant complications.

The surgical technique used in the present study was illustrated in Figures 2A to E. In this study I tried to show that minimal invasive technique is also minimal access surgery although it is nonlaparoscopic. I am not doing a comparative study between open and laparoscopic technique but trying to choose the safest, cheapest, and lowest recurrence technique. So we can use our experience and skill to decrease the cost firstly by depending for the diagnosis on a full history and physical examination without the need for other investigations such as ultrasound, which might mislead us although some studies show that ultrasound in experienced hands, may give an accuracy rate up to 96%.[13] We decrease the cost and the time of operation by doing our surgery without laparoscope. The study also shows zero negative exploration in comparison with laparoscopy which shows in more than 1% of patients no hernial opening is found.[14] Regarding recurrence rate, this still ranges from 0.4 to 4.8% in laparoscopic hernia in pediatrics[15] while in our study there was no recurrence. Also in laparoscopy, there is a chance of abdominal visceral injury especially to the bladder,[16] complications with CO_2 and technical difficulties especially in the early age group.

But still recurrent hernia in the pediatric age group is very difficult doing an interior (open) approach and there is a high risk of damaging the vas deferens and testicular vessels during dissection of a previously opened hernia, so laparoscopic repair[17, 18] is the preferred operation for recurrent inguinal hernia in children after an open repair. Also a laparoscopic approach can show both deep rings and in one study they found that 26% of boys presented with unilateral inguinal hernia. They had also wide open contralateral deep ring and 11% of female also.[19]

So the optimal treatment of inguinal hernia has been controversial for decades since the advent of minimally invasive surgery laparoscopic techniques have added to the controversy. We can say that our method is not superior to any other method but we did the best for our patients with fewer facilities in a very bad security state and in between gushes of emergencies due to explosion, bombs and road traffic accidents. Finally we did this number of cold cases with great care and delicate dealing with patients and tissues.

CONCLUSION

Laparoscopic inguinal hernia repair in children is not the most superior minimal invasive technique. Open surgery can be done in a less invasive manner with less cost, fewer complications, maintaining the tactile sensation of a surgeon with most delicate and pleasurable surgery.

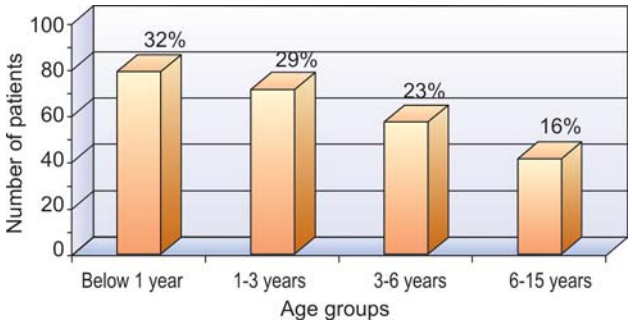
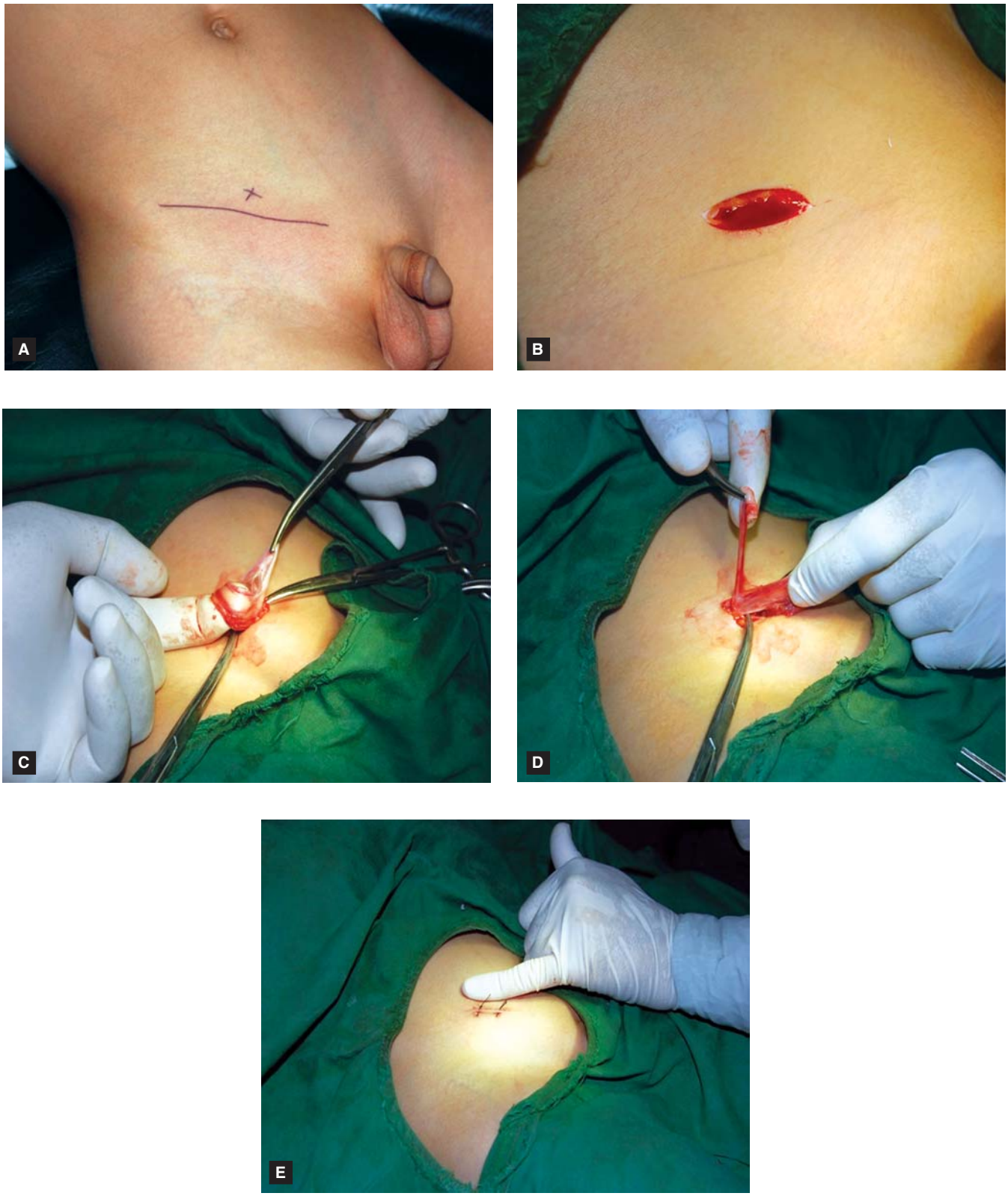


Fig. 1: Incidence of inguinal hernia in infants, child and adolescence



Figs 2A to E: Photos illustrating the surgical technique used (A) The site of incision (B) The skin incision (C) Delivery of the cord with separation of the sac (D) Separation of the sac (E) Closure of the wound

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Analysis of Errors in Laparoscopic Cholecystectomy

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INTRODUCTION

Laparoscopic cholecystectomy (LC), as a standard of care in symptomatic gallstone disease, is the most commonly performed operation of the gastrointestinal tract.[1] However, complication rate of LS is higher than open surgery,[2-4] which is not a matter for discussion only at morbidity and mortality conferences or at meetings: patients are being injured.[5] In surgical practice even a simple error may have profound consequences.

Surgical practice must be effective and safe. One of the most important responsibilities of surgical educators is teaching of safe surgery. Accordingly, one of the main objectives of world association of laparoscopic surgeons (WALS) is education of correct way of minimal access surgery. The aim of this study is to increase the awareness of laparoscopic surgeons about possible errors during laparoscopic procedures.

MATERIAL AND METHODS

In the attached DVD to this issue of world journal of laparoscopic surgery (WJLS), there is a video of LC with several errors. This operation was performed by a general surgery resident postgraduate year 4 in the teaching university hospital without the attending supervision in December 2008. This real-time video was divided into 10 parts. A questionnaire form (both paper-based and computer-based) has been made. It included the demographic data and a table. It is expected that the surgeons see the video carefully and write all errors happened in each parts of the operation. The completed form can be sent to quiz@wals.in. An award and certificate will be given to five surgeons specifying more errors in each parts of video by WALS during the next upcoming WALS meeting at 2010.

RESULTS

After receiving and analyzing the answers, a complete set of errors happened in this video will be published in the next issue of WJLS. This process will increase the awareness of laparoscopic surgeons about different errors in LC and has a great educational impact.

DISCUSSION

Training in error analysis and prevention has been well-established in high-risk activities such as aviation and space travel. There has been little research in why and how errors occur during surgery. Additionally, most of these studies concentrate on postoperative adverse events and do not reflect on surgical technical skill errors and why they may occur. [6] Several studies have indicated that most of the adverse events are preventable.[7,8]

Performing laparoscopic surgery involves a complex cascade of psychomotor skills. While performing such highly technical tasks, it may be very difficult not to commit some errors. Therefore, the recognition and the execution of errors is an important task for surgeons.[6,8-10]

A good method for assessing and improving knowledge is to try to detect errors. Previous studies confirmed that the ability to detect errors is closely correlated with technical performance. By examining the error rather than reading a book or having a verbal explanation may help improve their avoidance.[11,12] In conclusion, this study will try to improve the knowledge and subsequently the skill of laparoscopic surgeons in a novel fashion.

ANALYSIS OF ERRORS IN LAPAROSCOPIC CHOLECYSTECTOMY

One of the main objectives of world association of laparoscopic surgeons (WALS) is education of correct way of minimal access surgery. It has been proved that a good method for assessing and improving knowledge is to try to detect errors. The aim of this study is to increase the awareness of laparoscopic surgeons about possible errors during laparoscopic procedures. There is a video of laparoscopic cholecystectomy with several errors. This real-time video was divided into 10 parts. A questionnaire form (including demographic data and tables) in word format has been made. We request to see the video and write all errors happened in each parts of the operation. The completed form can be sent to quiz@wals.in Deadline for sending the answers will be at the end of the June 2009. An award and certificate will be given to five surgeons specifying more errors in each parts of video by WALS during the next upcoming WALS meeting at 2010.

Please see the video for errors and write in the Table below:
Download the video from http://wals.in/quiz.htm

Questionnaire (1/2)
Analysis of Errors in Laparoscopic Cholecystectomy

Part	*Errors in Section 1*	*Errors in Section 2*	*Errors in Section 3*	*Errors in Section 4*	*Errors in Section 5*
ERRORS					

Questionnaire (2/2)
Analysis of Errors in Laparoscopic Cholecystectomy

Part	*Errors in Section 6*	*Errors in Section 7*	*Errors in Section 8*	*Errors in Section 9*	*Errors in Section 10*
ERRORS					

Please send the completed questionnaire to:
Email: quiz@wals.in
LAPAROSCOPY HOSPITAL, 8/10 Tilak Nagar, New Delhi, 110 018. India.
Phones: +91(0)9811416838, +91(0)9811912768, +91(0)11-42138116

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Evaluation of Risk Factors and Preventive Measures for Deep Vein Thrombosis of Lower Limbs in Minimal Access Surgery

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Abstract

Deep vein thrombosis of lower limbs affects 1-2% of hospitalized patients. Interplay of factors like vessel wall injury, venous pooling, decreased blood flow and state of hypercoagulability predispose to thrombi formation.

In conventional surgery as compared to the minimal access surgery, the prolonged surgery time, longer hospital stay, prolonged immobilization and enhanced tissue disruption favors thrombi formation in lower limbs. However the risk of deep vein thrombosis in laparoscopic surgery is related to the high intra-abdominal pressure and the reverse trendelenburg position causing venous pooling in lower limbs particularly in upper gastrointestinal surgery.

Keywords: Deep vein thrombosis, laparoscopic surgery, cholecystectomy, gastric by-pass, gynecological surgery, heparin prophylaxis, preventive measures .

AIMS AND OBJECTIVES

This article aims to focus on the relative risk of deep vein thrombosis in laparoscopic gastrointestinal as well as gynecological surgery with a special focus on the thromboprophylaxis and mechanical therapeutic measures necessary to prevent deep vein thrombosis.

MATERIAL AND METHODS

A literature search was performed using Google search engine Highwire press, Springer link and Pubmed using above mentioned keywords. Selected papers were screened for further references.Criteria for selection were the number of cases (excluded if less than 20) methods of analysis (statistical or nonstatistical), operative procedures (only universally accepted procedures) and the institution where study was performed (reputed for laparoscopic surgery).

Search provided a variety of review articles but only 7 were selected as per the criteria.

CONTENT

1. Systemic coagulation and fibrinolysis after laparoscopic and open gastric by-pass.
   Nguyen NT, Owings JT, Goselin R et al.
   Arch Surg. 2001 Aug; 136 (8): 909-16.
   Seventy patients were randomly assigned to laparoscopic (n = 36) or open (n = 34) gastric by-pass Deep vein thrombosis prophylaxis in form of antiembolism stockings and sequential pneumatic compression devices were given D-dimer, antithrombin III and protein C levels were checked along with venous duplex scan of lower limbs. DVT was found in 1 of 34 patients after open gastric by-pass but nondeveloped in laparoscopic group.
2. Incidence of lower limbs deep vein thrombosis after open and laparoscopic gastric by-pass a prospective study
   Brasiliero AL, Miranda F Jr, Ettinger JE et al.
   Obes Surg 2008; 18(1): 52-57.
   136 patients were included in the study group of which only 126 concluded the protocol. All ewere subjected to RYGBP by laparotomy or laparoscopy using 40 mg/day of enoxaprin for 15 days. 69 under went laparoscopy and 57 underwent open RYGBP. DVT incidence was 0.79% (1/126)
3. Venous stasis and DVT prophylaxis during laparoscopic fundoplication
   Kiudelis M, Enndzinas Z et al.
   Zentralbl Chir. 2002 Nov; 127(11): 944-49.
   Fifty-four patients undergoing elective laparoscopic fundoplication were included in the study and divided into 3 groups first group were given leg bandages, second group were given intermittent pneumatic compression, third group were given intermittent electric calf muscle stimulation.
   Doppler ultrasonography was during operation. DVT and pulmonary embolism incidence after laparoscopic fundoplication was 1.8%.
4. Low frequency of phlebographic DVT after laparoscopic cholecystectomy—A Pilot study
   Fredrik Lindberg MD, PhD
   Clinical and applied thrombosis/hemostasis Vol 12, Nov. 2006;421-25.
   Fifty patients were screened for DVT by bilateral phlebography after laparoscopic cholecystectomy. Frequency was 2%.

5. Incidence of deep vein thrombosis after gynecological laparoscopy.
   Feng L, Song J,Wong F, et al. Chin Med J (Engl) 2001 Jun; 114(6) : 632-35.
   Seventy patients undergoing gynecological laparoscopic surgery were screened by B-mode ultrasound supplemented by Doppler.No DVT was found.
6. ORIGINAL ARTICLE
   The incidence of venous thromboembolism following gynecological laparoscopic—a multicentric, prospective cohort.
   W Ageno, E Manfredi, F Dental, et al.
   J Throm Hemostat 2007 Mar; 5(3):503(6).
   In a prospective cohort patients undergoing gynecological laparoscopic surgery were assessed by compression ultrasonography and clinically for venous thrombosis. CUS WAS DONE ON 7+/–1 AND 14+/– day postoperative Mean duration of procedure was 60.5 minutes. No episodes of CUS detected DVT nor clinical episodes of DVT were seen.
7. Thromboembolism prophylaxis and incidence of thromboembolic complications after laparoscopic surgery.
   Catheline JM , Cappeluto E , Gaillard JL.
   Int J Surg Investing. 2000; 2(1):41-47.
   2384 patients received low molecular weight heparin (LMWH). Eight patients developed DVT, 6 out of 8 were diagnosed after cessation of LMWH.

INTRODUCTION

"Necessity is the Mother of Invention". The pitfalls of conventional surgery paved the way for minimal access surgery. Since its introduction there has been a vast improvement in the techniques and approach of minimal access surgery.

Creation of pneumoperitoneum which is the basis of laparoscopic surgery.

It is associated with reduction in the blood flow of the splanchnic, renal, femoral and venacaval circulation (Fig. 1). This reduction in blood flow associated with venous pooling in lower limbs due to reverse trendelenburg position paramounts to formation of venous thrombi. Migration of venous thrombi to vital organs like brain, lungs heart can prove fatal.

Laparoscopic upper GI surgery are more prone for thrombi formation due to long sugery time, high intraperitoneal pressure and reverse trendelenburg position as compared to gynecological laparoscopic surgery. Even the laparoscopic colorectal surgery are prone for DVT due to extensive dissection, prolonged surgery time, old age and at times associated malignancy.

A variety of risk factors predispose to DVT like previous h/o venous insufficiency, old age, obesity, malignancy, immobilization, hypercoagulable state, varicose veins, surgery more than 2 hours. Hence judicious selection of cases and preoperative work up is necessary in all patients undergoing laparoscopic surgery.

Symptoms and signs of DVT are caused by obstruction to venous outflow, inflammation of the vessel wall or pulmonary embolization (Fig. 2).

Diagnosis is on clinical grounds while the imaging modalities confirm the diagnosis. Noninvasive tests like Duplex ultrasound, color Doppler, MRI, CT while invasive tests include venography.Ultrasound (Fig. 3) has a 96% specificity and sensitivity while color Doppler imaging has 100% sensitivity and specificity for diagnosing DVT.

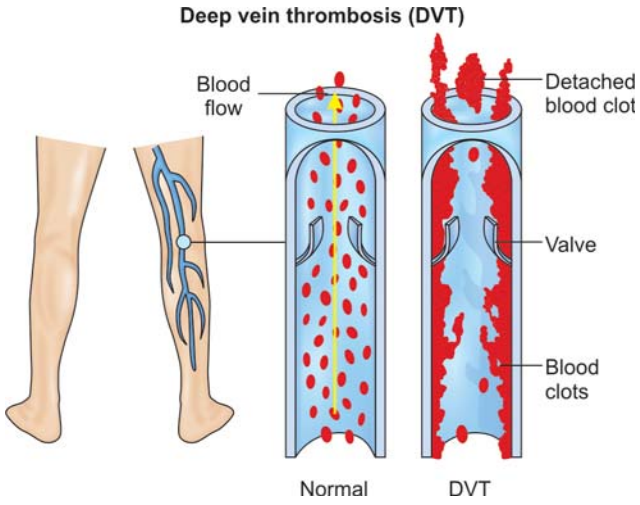

Fig. 1: Defective valve mechanism in DVT

Fig. 2: Patient of deep vein thrombosis

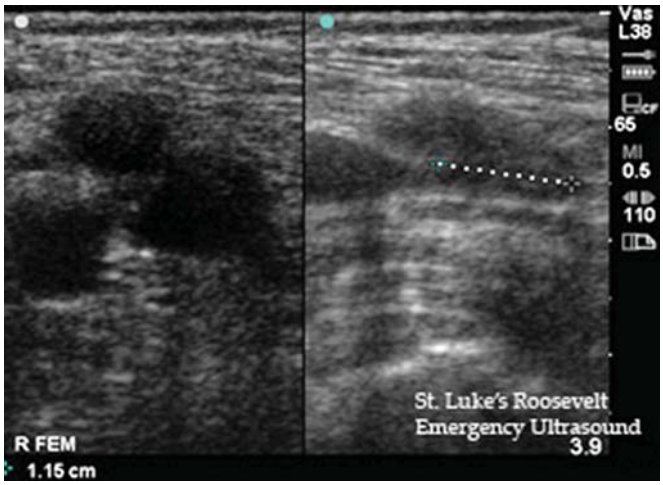

Fig. 3: Ultrasound imaging for deep vein thrombosis

Preventive measures towards thrombosis include use of elastic stockings, intermittent pneumatic compression, electric calf muscle stimulation coupled with thromboprophylaxis in form of LMWH. Heparin prophylaxis is recommended in moderate and high-risk patients hence risk stratification of patients is necessary before surgery to avoid DVT. Recommendations suggest that heparin prophylaxis be started 12-24 hours before surgery and to be continued till discharge of the patient.

Advantages of heparin prophylaxis include cost efficacy, single dose administration and high potency. Adverse effects have been noted with heparin like abdominal hematomas, poor wound healing, bruises, intracranial bleed hence pros and cons should be weighed before using this drug.

DISCUSSION

Laparoscopic surgery specially the upper GI Surgery predispose the patients to DVT as compared to gynecological surgery due patient positioning and high pressure requirements.

Review article 1 shows that open gastric by-pass predisposes to DVT more in comparison to laparoscopic surgery. Mechanical therapeutic measures like elastic stockings, intermittent sequential compression were considered in all patients still 1 patient developed DVT hence these preventive measures seem necessary to prevent a fatal outcome.[1]

Review article 2 reflects the incidence of DVT in lower limbs after gastric by-pass. Study showed that obesity may not be a predisposing factor. However obese patients require extensive preoperative check up as well as intraoperative prophylactic measures to curb the risk of DVT.[2]

Review article 3 was included with a purpose to reflect the role of mechanical therapeutic measures in preventing DVT as well as to study the effect of pneumoperitoneum on femoral veinous blood flow. There was a decrease the venous blood flow and the cross-sectional area of the vein after creation of pneumoperitoneum.Of all the measures Intermittent sequential compression seems to be most effective in combating the adverse effects of pneumoperitoneum.[3]

Review article 4 depicts low incidence of DVT after laparoscopic cholecystectomy.The role of thrombo-prophylaxis in all laparoscopic surgeries seems questionable.[4]

Review articles 5 and 6 were included with a purpose to reflect the low incidence of DVT after gynecological surgery for benign conditions like ovarian cyst, endometrioma, adnexal masses and also in patients with infertility. Negation of factors responsible for DVT in upper GI as well as colorectal surgery might be the cause for low risk.[5, 6]

Review article 7 was included with the prospect of highlighting the need for heparin prophylaxis in moderate and high-risk patients prior to surgery. And to be continued till the day of discharge of the patient. It is important as well to advocate the use of low insufflation pressures, intermittent release of pneumoperitoneum and using the reverse Trendelenburg position for a minimum time to avoid DVT.[7]

CONCLUSION

"An ounce of prevention is worth a pound of cure "

Deep vein thrombosis developing after laparoscopic surgery can be prevented by optimizing the intraperitoneal pressure, intermittent release of pneumoperitoneum and using reverse Trendelenburg position for minimum time. Preoperative risk stratification of patients for heparin prophylaxis and intra-operative use of the intermittent pneumatic compression in prolonged surgery is the key to prevent deep vein thrombosis of lower limbs.

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Laparoscopic Cholecystectomy is Safe in the Elderly Patients

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Abstract

Background: The aim of this review was to evaluate the rate of laparoscopic surgery in elderly patients with gallstones and to compare it with their younger counterparts, also to study the safety and efficacy of laparoscopic cholecystectomy in elderly patients by comparing the results with open cholecystectomy (OC).

The relation between ages, comorbid diseases, mean operative time, hospital stay, the incidence of major postoperative complications and the rate of conversion were also evaluated.

Content: Twenty studies evaluated laparoscopic cholecystectomy in the elderly. Compared with open cholecystectomy, elderly patients undergoing the laparoscopic procedure had a lower incidence of complications and a shorter hospitalization. Advanced age with its concomitant comorbid conditions may be associated with increased postoperative laparoscopic cholecystectomy (LC) complications and more frequent conversion to open cholecystectomy (OC).

Material and methods: An electronic search using the Midline and the search engine Google, Springer link and Highwire press databases was performed using the term *laparoscopy cholecystectomy in elderly patients*. Literature published in the English language in the past 9 years was reviewed. Relevant surgical textbooks were also reviewed.

Methods literature searches were conducted to identify: (1) comparative studies which reported (LC) outcomes in elderly Compared with open cholecystectomy and; (2) Studies comparing outcomes of (LC) in elderly with their younger age group (3) Also comparing the outcome of elderly patients presented electively and urgently.

Conclusions: Underlying cardiopulmonary diseases, individuals older than 65 years tolerate laparoscopic cholecystectomy well. Postoperative complications and hospitalization are lower than in open cholecystectomy. Laparoscopic cholecystectomy is a safe procedure in gall bladder diseases.

Laparoscopic cholecystectomy is a safe procedure for acute Cholecystitis in elderly patients, resulting in fewer complications and shorter hospital stay than open cholecystectomy. Emergency LC surgery in elderly patients have higher rate of morbidity and mortality but less than in OC.

Keywords: Laparoscopic cholecystectomy, open cholecystectomy, elderly, safe.

INTRODUCTION

As our population ages, outcomes analysis of surgical treatment strategies become increasingly important in elderly patients who represent the fastest growing segment.[17] Although they currently comprise only one-eighth of the population, the elderly already account for nearly one-third of surgical patients.

Cholecystectomy is the most commonly performed surgical procedure in elderly individuals.[15] Life expectancy has been progressively increasing during the past few decades.

Improvements in primary prevention, advances in acute medical care, and progress in pharmaceutical and biomedical technology may be the cause for that demographic change.[17]

The term 'elderly' is used in the medical literature to describe people older than 65 years. With an increasing life expectancy of more than 65 years, it is becoming harder to define the real 'old' and therefore 'high-risk' group of patients from the viewpoint of modern medicine.[17]

The advances in minimally invasive surgery over the past decade have benefited patients undergoing a variety of surgical procedures. For the elderly, who often are less able to withstand the trauma and stress of open abdominal surgery, the advantages of a laparoscopic approach may be especially important.[16]

(LC) is now the gold standard treatment of symptomatic gallstones and is the commonest operation performed laparoscopically world-wide.[8]

Our aim was to evaluate the rate of laparoscopic surgery in elderly patients with gallstones and to compare it with their younger counterparts. The relation between age and the rate of conversion, risk factors associated with prolonged postoperative hospitalization were also evaluated, and comparing with the results of (OC).

MATERIAL AND METHODS

A literature search was performed using the Midline and the search engine Google, Springer link and Highwire press databases was performed using the term laparoscopy in elderly patients. Literature published in the English language in the past 10 years was reviewed. Relevant surgical textbooks were also reviewed.

965 citation found in total, selected papers were screened for further references.

Criteria for selection of literatures were the number of cases (excluded if less than 20), method of analysis (statistical or non-

statistical), operative procedure (only universal accepted procedures were selected) and the institution where the study was done (specialized institution for laparoscopic surgery).

CONTENT

The Incidence of Cholelithiasis

The incidence of cholelithiasis increases with age, and among those *80 years of age, rates as high as 38 to 53%* are reported with 50% of women and 15% of men.[10,14]

LC is the treatment of choice for elderly patients with symptomatic cholelithiasis since the outcomes are better than those of OC in terms of lower morbidity rate and shorter hospital stay.[11,17]

Patients older than 70 years had a 2-fold increase in complicated biliary tract disease.[4]

Patient > 80 years have higher gall bladder cancer than younger age group.

Laparoscopic versus Open Cholecystectomy

For the elderly, who are generally considered to have diminished cardiopulmonary reserves and are therefore often less able to withstand the trauma and stress of open abdominal surgery, the advantages of a laparoscopic approach are obvious.

Morbidity in LC in elderly patients demonstrated from 5-15% ,while in OC 23 -28%.

Mortality in LC in elderly patients demonstrated from 0-1% while in OC 1.5-2%.[11]

There was only a 14% incidence of cardiopulmonary complications in those undergoing LC compared with 43% in patients who underwent OC although both procedures were completed in a similar operative time.

Hospital Stay

The average hospital stay was 3 to 4 days.[5,10] The laparoscopic approach was associated with a *shorter hospitalization and fewer* postoperative complications than the open procedure.[16] However, elderly patients may have an increased risk for conversion.[10, 14-17, 20]

Urgent or Emergent LC

In extremely elderly age group presentations with urgent or emergent surgery more common than younger age group.[15,16]

Emergency surgery on older patients with gallstones may have fatal outcome due to increased co morbidities and decreased functional reserve.[10,16]

Major postoperative complications may occur in emergency surgery in elderly patients.

Conversion rate 8% less than 65 years, and reach 22%in more than 65 years due to increased inflammation and fibrosis.

In acute cholecystitis, higher rate of morbidity and mortality unrelated to surgical site when compared with younger age group, so stronger selection of elderly patients for surgery is needed.[19]

Pulmonary disease is associated with increased risk of major complication.[18]The management of acute cholecystitis in the extremely elderly should be considered for laparoscopic approach (except contraindication) before the development of complications.[5,16]

Conversion Rates

The conversion rate to open cholecystectomy varies from 3-22% and is higher in extremely elderly patients (more than 80 years) than in younger age group (between 65-79 years old).[5,10,11,14]

Conversion in complicated gall stone is 22% while 2.5% in chronic cholecystitis.[4]

Thus, elective surgery with acceptable morbidity and mortality should be the preferred choice over emergency procedures.[10,16]

The main surgical reasons for this conversion in the selected articles are acutely inflamed gallbladder with evidence of perforation, gangrene, chronic inflammation around the gallbladder with fibrosis and adhesions; unclear anatomical features; previous abdominal surgery, bleeding; and unexpected CBD stones.[10, 16, 19] But the higher incidence of co-morbidities, and acute cholecystitis are the main reasons for the poorer outcome in elderly patients.

Risk of Anesthesia

The extremely elderly patients had a significantly higher mean American society of anesthesiology (ASA) class as compared with younger age group, and a much greater percentage of extremely elderly patients were ASA class 3 or 4.[4 ,7,9,11,15]

42% of elderly patients have already cardiopulmonary diseases.[12,19]

For LC for patients with an ASA 3 and 4 risk for anesthesia, no significant adverse effects could be attributed to CO_2 pneumoperitoneum.[10,12,13]

Gradual abdominal insufflations to 12 mm Hg followed by 10° head up tilt associated with cardiovascular stability in elderly ASA III patients.[2,12]

For high-risk patients, preoperative preparation and active perioperative monitoring are essential for safe anesthesia for LC with or without CO_2PP.[13]

Regional and international variation in the practice of LC for acute cholecystitis.[17] The use of LC for elderly patients with acute cholecystitis in New England, US, varies widely from 30.3 to 75.5%.[6] Reflection of the technical difficulty of the procedure, concern about increased risks. The likelihood of elderly patients with acute cholecystitis receiving LC depends strongly on where they live.[1]

DISCUSSION

Laparoscopic cholecystectomy has gained a lot of attention around the world. However, the role of (LC) in elderly, remain controversial.

Several controlled trials have been conducted, some are in favour of laparoscopy, others not .The goal of this review was to as certain that if the (LC) in elderly is safe and superior to the conventional, and if so what are the benefit and how it could it be instituted more widely.

Emergency surgery on older patients with gallstones may have fatal outcome due to increased co morbidities and decreased functional reserve. Thus, elective surgery with acceptable morbidity and mortality should be the preferred choice over emergency procedures.[16]

LC in elderly patients suffering from acute cholecystitis is feasible and effective. It is associated with a higher rate of morbidity unrelated to the surgical site and mortality in elderly compared with younger patients. Stronger selection of elderly patients for surgery is needed.[3,16]

Increased technical experience with LC favorably affected outcomes over time. Early diagnosis and treatment prior to onset of complications are necessary for further improvement in the outcomes of elderly patients undergoing LC.[4,6]

Cardiovascular stability in elderly ASA III patients can be maintained by gradual abdominal insufflations to 12 mm Hg followed by 10° head up tilt.

For LC for patients with an ASA 3 and 4 risk for anesthesia, no significant adverse effects could be attributed to CO_2 pneumoperitoneum.[10,12,13] For high-risk patients, preoperative preparation and active perioperative monitoring are essential for safe anesthesia for LC with or without CO_2PP.[13]

For safe LC in this high-risk population and to reduce regional variation, Efforts should be focused on disseminating techniques.

CONCLUSION

Even elderly patients are more likely to present with disease in more advanced state, LC is safe and should be regarded gold stander for elderly patients with cholelithiasis.

Early elective LC should be encouraged. Emergency surgery in elderly group carries more morbidity than younger age group. For high-risk patients, good preoperative preparation and perioperative monitoring are essential for safe anesthesia.

Surgeons need to inform primary care physicians of the excellent result of laparoscopic procedures in the elderly to encourage earlier referrals.

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Trocar Site Hernia

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Abstract

Aims and objectives: The aim of the study was to review relationship of pathogenesis and clinical manifestations of the hernias at the trocar site, for confirmation of the definition by classification of hernia at trocar site. The following parameters were evaluated.

The operations were limited to cholecystectomy, rectal and colon surgery fundoplication and gastric surgery; getting 44 reports. Of these 18 original articles, 19 case report and 7 how to do it technical notes were gathered. We also obtained 19 additional references. Thus we reviewed a total of 63 reports.

Material and methods: Material search was performed using Google, Medline-Highwire press, and also Springer link. The following terms were used *hernia*, *trocar*, *laparoscopy*, *complication* and *Port*. 1000 citations were found in all. The selected papers were screened for further reference. Selection criteria of literature were the number of cases (excluded if less than 20), analysis method (statistical or nonstatistical), operative procedure (only universally accepted procedures were taken into consideration) and the institution where the study was conducted (Specialized laparoscopy institute).

Conclusion: This is useful to classify clearly the trocar site hernias and to improve the management of laparoscopic procedures.

Keywords: Hernia, trocar, laparoscopy, complication, port.

INTRODUCTION

As reported by Rosen and Ponsky.[1] Mourat did the first laparoscopy cholecystectomy change the surgical practice dramatically. Abdominal laparoscopy surgery increased and spread wide by 1990's.[2] This resulted in emergence of new technique with new specific complications due to surgery. Trocar site hernia becomes serious complication as most of these need further surgery.

Fear,[5] reported trocar site hernia in a series of gynecological diagnostic laparoscopy. Many recognize this as first report of trocar site hernia.[2,6,8] Maio and Ruchman's reported,[9] trocar site hernia with obstruction of small bowel immediately after cholecystectomy. This is report in digestive surgery. Many reports are published about cholecystectomy since then and recently on gastrointestinal surgery. In all this published reports there is wide variation in the clinical aspect of hernia and trocar site, so much that we became concerned about the meaning of medical term trocar site hernia, as it was not defined.

CONTENTS

Trocar site hernias were classified into three different types:

1. Early onset type, which occurred immediately following operation, having small boil obstruction like the Richter hernia (Figs 1A and B).
2. Late onset type, which occurred several months after surgery, with local abdominal bulge and no bowel obstruction (Fig. 1C).
3. Special type, which occur with the protrusion of omentum and/or intestine (Fig. 1D).

Trocar site with 10 mm fascial defect or bigger should be closed, with peritoneum. The opinion differed if the 5 mm trocar defect needs to be closed.

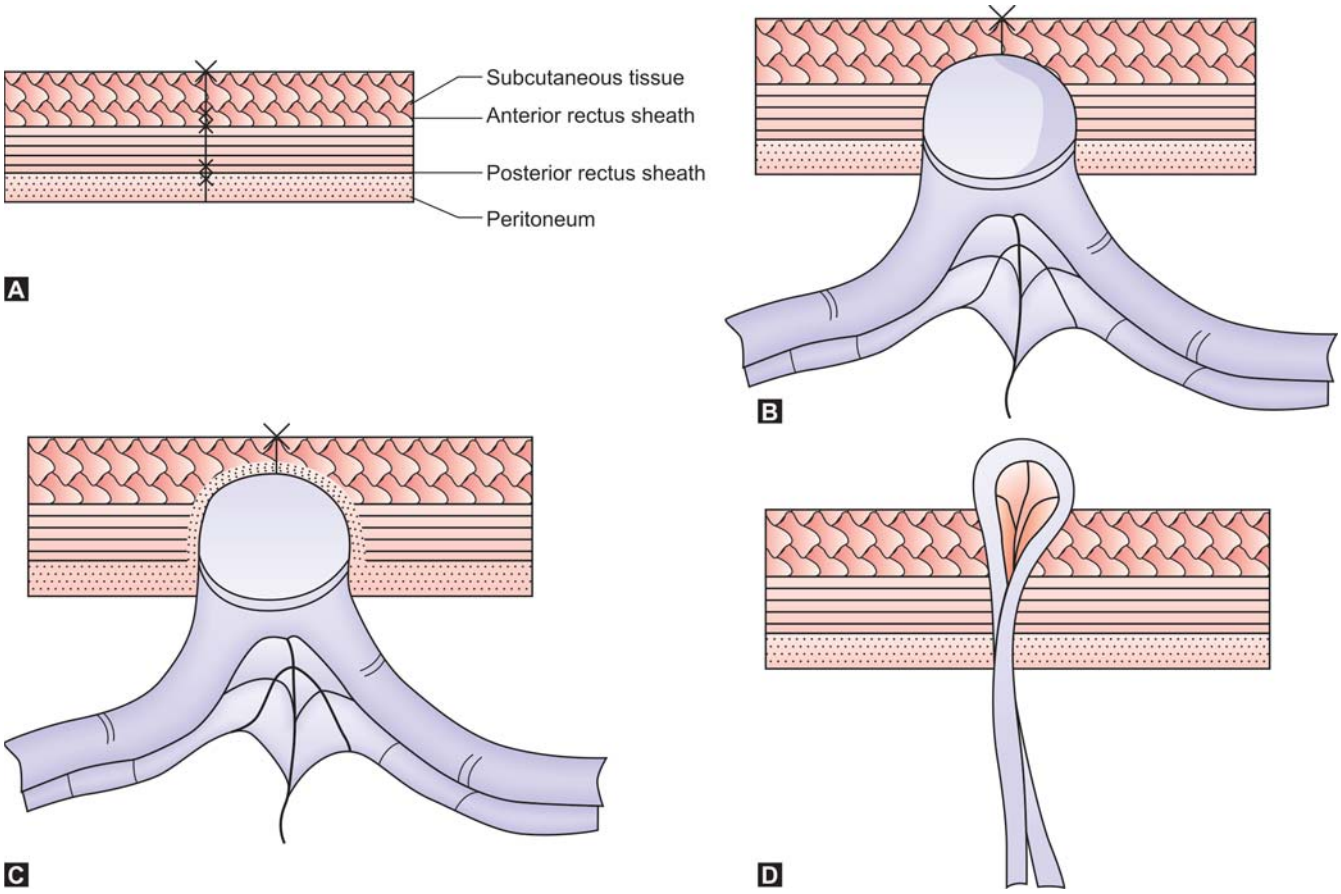
It is helpful to classify clearly the trocar site hernias for better management of laparoscopic procedures.

INCIDENCE

Large series are reported related to complication of laparoscopic cholecystectomy where incidence of trocar site hernia was 1in 500 cases, 3 in 1983 cases, 1 in 800, 11 in 1300 cases, and 10 in 1453 cases. Callery et al.[3] stated that overall incidence is very low. Mayol et al, stated that the figure only represent the early results of gynecological laparoscopy. Moreover the actual incidence may be much high then the reported figures as the unknown percentage of patients who are asymptomatic may not seek medical advice.[6,8] Coda et al noticed that onset trocar site hernia is rather late then immediately after surgery in many surveys recently the incidence of trocar site hernia is written

Clinical character according to classification

Classification	Interval between the laparoscopic surgery and the onset of trocar site hernia	Main manifestation	Incidence of Richter hernia
Early onset type	A few days	SBO	Frequent
Late onset type	Several months	Hernia without SBO	Rare
Special type	A few days to 10 days	Protrusion of intestine/omentum	None



Figs 1A to D: Classification of the 3 trocar site hernias. (A) Normal stab wound of trocar site. (B) Early-onset type: dehiscence of anterior and posterior fascial plane and peritoneum. (C) Late-onset type: dehiscence of anterior and posterior fascial plane. Peritoneum constitutes hernia sac. (D) Special type: dehiscence of whole abdominal wall. Protrusion on intestine and/or omentum

about postoperative complication in GI surgery. The incidence of trocar site hernia is shown to be 0.65 to 2.80%, Mayol et al, and Nassar et al, studied based on data collected prospectively and follow of patient for minimum of several months. So it is supposed that the report made by them of the incidence (1.50 to 1.80%) could be standard reasonably.

PATHOGENESIS

Trocar Size

Crist and Gadacz, regarded large trocar used as predisposing factor for development of hernia.

Closing Fascial Defects or Leaving them Open

Duoron et al[2] said that fascia closer of trocar site may preclude or decrease the incidence of obstructions. And indicate that adhesions can occur after fascial closure. Incomplete closure may lead to trocar site hernia. Many surgeons advised fascial closure.[3,4]

We think fascial defect open can be clearly correlated with the trocar site hernia. Insufficient closure will also increase the trocar site hernia risks.

Open/Closed Laparoscopy

Pneumoperitoneum is established by Veress needle or by Hasson trocar. Trocar site hernia in closed method by Veress needle was more than in open method by Hasson trocar. Mayol et al commented that in infection of wound may be more common in close type which in turn increases the incidence of trocar site hernia. Wallace and O'Dwyer 52 did open laparoscopy in 568 patients where no hernia was reported.

Location

Many authors stated that most hernia occurred at midland trocar and umbilical sites were more common.[2,4,6,8] In American association of gynecological laparoscopists, umbilical hernia was found to be more common (75.70%), lateral hernias were 23.70% of 152 trocar site hernias.

Stretching the Port Site for Retrieval

Enlargement of umbilical wound for retrieving this specimen may be the cause of trocar site hernia. It is certain that forced dilation of fascial layer is considered to be cause for herniation.

Effects of CO_2

CO_2 may push the omentum/intestine through the insertion point in the fascia. These structures of may be trapped by abdominal contractions.[6,8] Duoron et al[2] stated said that partial vacuum is created with the withdrawal of port, thus drawing intestine/omentum in the fascial defect.

Host Problem

Azurin et al,[4,7] stated that trocar site hernia occur in patient with comorbidity as wound infection, obesity, diabetics mellitus, although these did not reach statistical significance with obesity and nutrition was also one of the factor of trocar site hernia.

Infection

Port site infection is the predisposing factor for the development of the hernia. Callery et al,[3] reported that often umbilical insertion gets infected. Late onset hernia may be related to infection from stab wound.

DISCUSSION

Laparoscopic surgery has gained a lot of attention around the world. However this is associated with few of the postoperative complication. The goal of this review was to ascertain the classification of trocar site hernia and to know the cause, predisposing factor and to enable more clinical identification and thus improving the care of patient.

Three types of trocar hernia were reported:

1. Early onset type, which occurred immediately following operation, having small bowel obstruction like the Richter hernia. This indicates anterior fascial plane, posterior fascial plane and peritoneum dehiscence.
2. Late onset type, which occurred several months after surgery, with local abdominal bulge and no bowel obstruction. This indicates anterior fascial plane, and posterior fascial plane dehiscence. The hernia sac here is the peritoneum. It is related in many cases to the complication of trocar insertion.
3. Special type indicates whole abdominal wall dehiscence, which occur with the protrusion of omentum and/or intestine. The first case was of special type reported by Fear[5] in which a loop of bowel herniated through the defect when the scope and sheath were taken out.

Following were the predisposing factors affecting the trocar site hernia:

1. Trocar size: Bigger the size of trocar more the chance of trocar site hernia.
2. Closing trocar site/leaving open: Hernia was reported more when the trocar site was left open.
3. Open/closed laparoscopy: Open method by Hasson's trocar has shown less chance of trocar site hernia when compare to closed method by Veress needle, by Mayol, et al.[22]
4. Location: Most hernia appeared at midline trocar and umbilical sites were found to be commonest.
5. Stretching portsite for retrieval of tissue was another cause for trocar site hernia.
6. Effect of compressed CO_2.
7. Obesity and nutrition.
8. Infection of port site was the important predisposing factor for development of trocar site hernia.

CONCLUSION

In this review article, classification of trocar site hernia was done by various study reports. We believe that a more clinical accurate identification is available from this classification. This may be useful for preventing complications in laparoscopy surgery if the surgeon is aware of the correlation between the types of trocar site hernia and clinical manifestation before the surgery.

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Laparoscopic Adjustable Silicon Gastric Banding versus Sleeve Gastrectomy

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Abstract

Background and purpose: Obesity now forms one of the leading public health concerns globally. Several surgical options including sleeve gastrectomy exist for its treatment. Recently, laparoscopic gastric banding has been developed with the aim of providing a laparoscopically placed device that is safe and effective in generating substantial weight loss. The goal of this review is to compare the effectiveness and safety of laparoscopic adjustable silicon gastric banding (LASGB) and laparoscopic sleeve gastrectomy (LSG) in the treatment of morbid obesity by reviewing the methods of patient selection, operative time, conversion rate, complications, blood loss, postoperative morbidity and mortality, hospital stay, and quality of life.

Material and methods: A systematic literature search was performed using Highwire press, Springer link, Medline, Medscape and Google, and article bibliographies to identify relevant evidence. Included studies must have reported outcome data for more than 40 patients aged 20 years and above with a minimum of one 1-year follow-up. The operating time, complications, blood loss, hospital stay, morbidity and mortality, and quality of life were reviewed.

Results: The total number of patients enrolled was 4,519; the specific procedure totals were 3,714 for LAGB and 805 for LSG. The age range of the population studied was 13-79 years for LSG and 18-65 years for LAGB. The sex distribution had a male:female ratio of 1:4 for LAGB and 1:3 for LSG. The overall complication rate in this review varied from 1.7-11. 80% for LSG and 0.2-24% for LAGB.

Conclusion: Laparoscopic sleeve gastrectomy though, forms a safe surgical option for weight loss treatment particularly in the very-very-obese patients (BMI > 60 kg/m^2). LASGB gives satisfactory results and coupled with reversibility and low cost, it is an important tool in the long-term management of patients with morbid obesity.

Keywords: Laparoscopic adjustable silicon gastric banding, laparoscopic sleeve gastrectomy, bariatric surgery.

INTRODUCTION

The health and economic impact of obesity remain a global dilemma.[1-10] This has resulted in excallating research modalities to combate the disease. It has been shown that surgery provides a long-term solution to the problem of obesity by reducing mortality by 31.6% compared with nonoperative methods.[11] The advent of minimal access surgery has revolutionized patient acceptability and the physicians' dilemma. Laparoscopic adjustable silicone gastric banding (LASGB) and laparoscopic sleeve gastrectomy are emerging surgical procedures for the treatment of morbid obesity. Their main advantage is comparable reduction in complication rates.[12,13] Laparoscopic adjustable gastric banding (LAGB) was introduced in the early 1990s to serve as a minimally invasive, potentially safe, reversible and controllable method to achieve significant weight loss by using a gastric band incorporating an adjustable silicone balloon for open placement.

Laparoscopic sleeve gastrectomy (LSG) was introduced as a multipurpose restrictive procedure for obese patients.[14-17] It is now becoming more common as a single-stage operation for the treatment of morbid obesity. It however appears that the volume of gastric tissue excised greatly affects weight loss. Hence it is said that a removed gastric volume of < 500 cc might be a predictor of failure in treatment or early weight regain, though a safe and effective restrictive bariatric procedure.[16,17]

Both LASGB and LSG have their drawbacks and the current literature is scarce concerning which approach is superior. The goal of this review is to compare the effectiveness and safety of LASGB and LSG in the treatment of morbid obesity by reviewing the methods of patient selection, operative time, conversion rate, complications, blood loss, postoperative morbidity and mortality, hospital stay, and quality of life.

MATERIAL AND METHODS

A systematic literature search of articles published between January 1, 2000 and March 24, 2009 was performed using Highwire press, Springerlink, Medline and Google. Further articles were identified from the reference lists of retrieved literature. A meta-analysis was impossible because of inconsistencies in the various reports. A simple percentage was therefore used as recorded in the various articles.

ARTICLE INCLUSION CRITERIA

All patients must have been age more than 20 years at the time of surgery. The study must have appeared in a peer-reviewed

journal as an English language article. The study must have presented a universally accepted procedure in a specialized laparoscopic institution with statistical case analysis and reported data on more than 40 patients. For weight or BMI data, only data at least one year after surgery were considered. No minimum follow-up for other outcomes was considered. For quality-of-life outcomes, the study should have measured quality of life before and after surgery. Data on comparative studies where only included if values on LASGB and LSG were clearly indicated and randomized. In cases of multiple reports from the same surgical center, double-counting of patients was avoided by including data and outcomes that were based on the largest number of patients and still meeting the other inclusion criteria.

RESULTS

A total of 703 articles where found. Twelve articles met the inclusion criteria (Table 1). Five investigated LASGB. Six investigated LSG. Only one prospective randomized study was found comparing laparoscopic gastric banding and laparoscopic sleeve gastrectomy. The total number of patients enrolled was 4,519; the specific procedure totals were 3,714 for LASGB and 805 for LSG. The age range of the population studied was 13-79 years for LSG and 18-65 years for LASGB. The sex distribution had a male : female ratio of 1:4 for LASGB and 1:3 for LSG. Two of the reports are from the United States, two from Germany, three from France, one from Belgium, one from the UK, one from South Korea, one from Australia, and one from Switzerland.

PATIENT SELECTION

In a prospective randomized study between laparoscopic gastric banding and laparoscopic sleeve gastrectomy, Himpens et al studied 80 patients with a mean age of 36 (20-61) years for LASGB (83% women) and 40 (22-65) years for LSG (77% women).[18] Nocca et al studied 163 patients (68% women) with an average age of 41.57 years who underwent LSG.[19] Turker et al studied LSG patients with a mean age of 42 (13-79) years and Weiner R et al studied 984 LASGB patients with a mean age of 37.9 (18-65) years.[12,17] Other studies in the LASGB and LSG group had patients with similar age group.[18-22]

MEAN BODY MASS INDEX

The mean BMI in both study groups were similar. Himpens worked on patients with a mean BMI of 37 (30-47) for LASGB and 39 (30-53) for LSG (Not significant).[18] Uglioni reported on 70 patients with a mean BMI of 46 (35-61) kg/m^2 in SLG study group in an attempt to find out the early and midterm results of laparoscopic sleeve gastrectomy (LSG) as an isolated primary and secondary operation after failed gastric banding.[22] Similarly, Nocca et al reported on LSG patients whose indications for this procedure in their study, were morbid obese [body mass index (BMI) > 40 kg/m^2] or severe obese patients (BMI > 35 kg/m^2) with severe comorbidities (diabetes, sleep apnea, hypertension) together with high-volume eating disorders and super-obese patients (BMI > 50 kg/m^2).[19] Fuks et al reported on the data of 135 consecutive patients undergoing LSG between July 2004 and October 2007 prospectively. In this study, LSG was indicated only for weight reduction with a body mass index (BMI) > 40 or > 35 kg/m^2 associated with severe comorbidity.[23] Their aim was to evaluate the efficacy of LSG procedure on weight loss, and short-term outcome. Preoperative mean body weight was 120.7 kg and mean body mass index (BMI) was 44.3 kg/m^2 in the study of Zinzindohoue et al.[21]

OPERATIVE TIME, HOSPITAL STAY AND MORTALITY

Only three of the 12 articles reported the details of the operative time. Two of these were in the LSG and one in the LASGB group. Fuks et al reported a mean operating time of 103 minutes

Table 1: Results of articles studied

Study	*Date of surgery*	*LASGB*	*LSG*	*No receiving surgery*	*Mean age*	*Mean BMI*
Weiner et al[20]	1994-2002	Yes	–	984	Not indicated	46.8 ± 7.2
Weiner et al[17]	Not reported	–	Yes	120	Not indicated	Not indicated
Nocca et al[19]	2003-2006	–	Yes	163	41.57	45.9
Tucker et al[12]	2004-2007	–	Yes	147	42 (13-79)	43.4
Himpens et al[18]	Jan-Dec 2002	Yes	Yes	80	LAGB 36 (20-61) LSG 40 (22-65)	37 (30-47) 39 (30-53)
Fuks et al[23]	July 2004-Oct 2007	–	Yes	135	40 (18-65)	48.8 (37-72)
Chevallier et al[24]	1996-2003	Yes	–	1,000	40.4 (16.3-66.3)	44.3
Zinzindohoue et al[106]	April 1997-June 2001	Yes	–	500	40.4	44.3
Singhal et al[13]	April 2003-June 2007	Yes	–	1140	Not indicated	44.3 (35-88)
Sang Moon Han[26]	Jan 2003- May 2004	–	Yes	130	Not indicated	Not indicated
Uglioni et al[22]	May 2004-Oct 2007	–	Yes	70	43 (21-65)	46 (35-61)
Dixon et al[25]	Not indicated	Yes	–	50	Not indicated	Not indicated

(range, 30-550) for LSG.[23] This report was similar to that of Turker et al whose mean operating time was 60 minutes (58-190) in a retrospective study of 148 post LSG patients in the United States between 2004 and 2007 with the view to finding out if LSG could be a one-stage primary restrictive procedure.[12] The only LASGB study that gave details of operative time was that of Zinzindohoue et al that reported a mean operative time of 105 minutes in 500 patients who underwent laparoscopic surgery for morbid obesity between 1997 and 2001 with application of an adjustable gastric band in order to evaluate the early and late morbidity of laparoscopic adjustable gastric banding for morbid obesity and to assess the efficacy of this procedure.[21]

Four of the articles studied documented the duration of hospital stay postsurgery. The average hospital stay for patients who underwent LSG was 2.7 (2-25) days but one patient who had gastric fistula stayed for 47 days.[12,23] The mean stay for LASGB patients was 2.7 (0-30) days.[13,21] Five of the articles reviewed reported on mortalities in their studies. The overall mortality rate following LSG was 0-0.8%[12,19,20,22] while that of LASGB was 0%.[21]

Blood loss, Complications, Conversion to Open Surgery and Reoperation

The overall complication rate in this review varied from 1.7-11.80%[12,19,22] for LSG and 0.2-24% for LAGB.[12,17,19,20,22,24,25] The highest reported complication rate following LASGB was due to slippage of the adjustable band while the highest rate following LSG was secondary to esophageal reflux symptoms.[22,24] The other complications reported in the LSG studies include early leak (1.7%),[17] gastric fistula (1.7-5.1%).[13,14,19,26] Gastric prolapse (20%), incisional hernia (0.6%), reconnection of catheter (0.6%) and wound infection (4%) were also reported as complications resulting from LASGB.[21,25] Other life-threatening complications reported by Chevallier et al and accounting for 1.2% of their study population of 1,000 LASGB patients include gastric perforation (0.4%), acute respiratory distress (0.2%), pulmonary embolism (0.2%), migration (0.3%), and gastric necrosis (0.1%).[24] Chevallier et al in this 7-year study, had 11.1% of their patients undergoing an abdominal reoperation for perforation (0.2%), band slippage (0.78%), migration (0.3%), gastric necrosis (0.1%), esophageal dilatation (0.2%), incisional hernias (0.4%) and port problems (0.21%). Similar conversion and reoperation rates were reported by Zinzindohoue et al.[21] In their study, twelve patients (2.4%) were converted to open surgery and a patient reoperation rate of 10.4% was reported as a result of abdominal complications. There were no reports of conversions in the LSG group but reoperation rates ranged from 4.9-11.4%.[12,19] Tucker et al reported a mean blood loss of 60 ml (range, 0-300 ml) for LSG.[12]

Effect of Surgical Procedure on Weight, BMI, Diabetes and Quality of Life

The study of Nocca et al on LSG showed a percentage of excessive body weight loss of 59.45% at 1 year and 61.52% at 2 years.[19] No statistical difference was noticed in weight loss between obese and extreme obese patients in this study.[19] In a related retrospective study of 130 patients between 2003 and 2004, Han et al reported a median weight loss of 24.6 ±10.0 kg and 83.3 ±28.3% while decrease in BMI was 9.2 ±3.7 kg/m^2 .[13] A reduction of BMI from *44.3 to 34.2, 32.8 and 31.9 at 1, 2 and 3 years with a mean percent excess weight loss (%EWL) of 42.8%, 52% and 54.8% respectively were similarly reported by* Zinzindohoue et al in the LASGB study group.[21] Similar results were reported by Singhal et al in 2008 in a study population of 1,140 who had gone through LASGB.[13] This study showed an excess percent BMI loss at 1, 2 and years of *38.3%, 43.7%, and 58.9%.*[13] Excess percent BMI loss was persistent for 8 years in the only study where patients were followed up for this duration of time.[20] *The* BMI dropped from 46.8 to 32.3 kg/m^2 over the 8 years period. The observations in loss of weight and BMI were similar in the LSG group. A drop in the BMI after 1 year of 65% (9-127%), after 2 years 63% (13-123%), and after 3 years 60% (9-111%) was observed by Uglioni et al.[22] Similarly, Han reported that at 12 months after LSG, the BMI decrease was 9.2 ±3.7 kg/m^2, and median weight loss was 24.6 ±10.0 kg.[26]

Metabolic changes where also observed. Han et al reported that dyslipidemia resolved in 75% of their patients within 12 months, diabetes resolved in 100% of patients within 6 months of operation, and hypertension resolved in 92.9% and improved in 100% of the patients.[26] Joint pain resolved in 100% within 12 months. Weight loss plateaued at 12 months in the majority of patients.[26] *Comparative results were reported by Dixon and O'Brien who studied the* health outcomes of severely obese Type 2 diabetic subjects 1 year after laparoscopic adjustable gastric banding in 50 patients prospectively.[25] In their report, there was significant improvement in all measures of glucose metabolism. Remission of diabetes occurred in 64% of the patients, and major improvement of glucose control occurred in 26% of them; glucose metabolism was unchanged in 10%. HbA_{1c} was 7.8 ± 3.2% preoperatively and 6.2 ± 2.7% at 1 year ($P < 0.001$). Remission of diabetes was predicted by greater weight loss and a shorter history of diabetes (pseudo $r^2 = 0.44$, $P < 0.001$). Improvement in diabetes was related to increased insulin sensitivity and β-cell function. Weight loss was associated with significant improvements in fasting triglyceride level, HDL cholesterol level, hypertension, sleep, depression, appearance evaluation, and health-related quality of life.[25] Additionally, statistically significant improved health status and quality of life were registered for all groups studied under LSG by Weiner et al.[17] In a separate 8 years review of 984 LASGB patients, Weiner et al found 82% improvement in the quality of life.[20] This was similar to the findings of Zinzindohoue

et al in a study of 500 patients who underwent LASGB. They observed improved quality of life in obese patients and reported that half of the excess body weight can be effortlessly lost within 2 years.[21, 28]

DISCUSSION

Obesity is associated with several complications and comorbidities that lead to both physical and psychologic problems. Over 400 000 deaths are attributable to obesity in the United States alone each year, and obesity is identified as the second most common cause of death after smoking from modifiable behavioral risk factors.[6] Unfortunately, the conservative weight loss approach consisting of diet, exercise, and medication generally achieves only 5 to 10% reduction in body weight, and recidivism after such weight loss exceeds 90% within 5 years.[27,29] These disappointing results have triggered interest in bariatric surgery.[29] Bariatric surgical procedures are grouped fundamentally into restrictive procedures that limit caloric intake by downsizing the stomach's reservoir capacity and malabsorptive procedures thereby decreasing the length of the small intestine. Examples of restrictive procedures include laparoscopic adjustable gastric banding (LASGB) and sleeve gastroplasty (LSG).[30-33] In both cases a small gastric pouch is created, which then empties through a narrow outlet to the remainder of the stomach.

Bariatric surgery is fundamentally considered appropriate for adult patients with body mass index (BMI) greater than 40 or a BMI between 35 and 40 with an obesity-related comorbidity. These selection criteria were developed by the National Institutes of Health Consensus Development Panel in March 1991 and have since then been adopted by all major surgical and nonsurgical societies.[34] In the older patients with low morbidity and mortality, bariatric surgery can be safely performed.[35-37] In spite of an extensive bariatric surgery literature, there are several unanswered questions such as: what is the long-term impact of bariatric surgery on effective weight loss, what is the impact of bariatric surgery on obesity-related comorbidities such as diabetes, hyperlipidemia, hypertension, and obstructive sleep apnea on long-term basis? The most commonly used criterion for effective weight loss after bariatric surgery is the difference between actual weight and the ideal body weight for a given height. The estimation of ideal body weight can be obtained from the Metropolitan Life tables.[38]

Laparoscopic adjustable silicon gastric banding and laparoscopic sleeve gastrectomy have gained a lot of attention around the world. However, the role of LASGB and LSG for the management of obesity remains in doubt. Several studies have been conducted, some in favor and others not. The goal of this review was to ascertain if LASGB was superior to LSG, and if so what are the benefits and how it could be instituted more widely. There is also diversity in the quality of the randomized controlled trials. The main variable in these trials are the following parameters: number of patients, withdrawal of cases, exclusion of cases, blinding, intention to treat analysis, publication biasis, local practice variation, prophylactic antibiotics used and follow-up failure.

CONCLUSION

Laparoscopic sleeve gastrectomy though, forms a safe surgical option for weight loss treatment particularly in the very-very-obese patients (BMI > 60 kg/m^2). LASGB gives satisfactory results and coupled with reversibility and low cost, it is an important tool in the long-term management of patients with morbid obesity.

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Laparoscopic Treatment of Hepatic Hydatid Disease

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Abstract

The rapid development of laparoscopic techniques revolutionized the optimum surgical intervention in Echinococcus granulosus disease. The procedure was shown to be feasible and safe, offering the advantages of laparoscopic surgery. Sience the first report on the long-term follow-up of this operation in a large group of patients.[1]

Background: Echinococcal disease is still a serious health problem in certain parts of the world.

In the human being the liver is the most frequent organ affected. The natural history of liver hydatidosis in humans till now is poorly understood and Different morphological appearances was observed.[2]

Over recent decades, various reports have been published comparing standard surgical and more conservative modalities for the treatment of the disease. Although Hand-assisted laparoscopic surgery (HALS) has been proposed as a useful alternative to conventional open or laparoscopic surgery and seems to be a promising technique in laparoscopic treatment of hydatid cyst which has been applied with success as well as with a wide range of digestive tract–related surgical procedures.[3] Gasless laparoscopy also had been introduced in the treatment of liver hydrated and has the advantage of permitting the use of conventional instruments during minimally invasive procedures with a promising results. With many advantages regarding technique.[4]

Keywords: Laparoscopic management of liver hydatid cysts, Echinococcus granulosus.

Aims and objectives: Many review articles was written all over the worlds regarding precautions, accessibility, operative risks, remote satisfaction in operative results and duration of free disease following prolonged regular follow-up.

The aims of this study was to compare the effectiveness and safety of laparoscopic intervention and conventional open surgery that practiced decades of years ago and regarded as standard modality treatment of hepatic *Echinococcus granulosus* disease. The following parameters were evaluated for both laparoscopic and open procedures modalities.

Methods of patients selection, operative technique, operating time, intraoperative and postoperative complications, postoperative pain and amount of pain killers. Time until resumption of diet, post-operative morbidity, hospital stay, cost effectiveness, and quality of life analyses.

Material and methods: A literature search was performed using Medline and the search engine Google, Springer link and Highwire press. The following search terms used: laparoscopic management of liver hydatid cysts *Echinococcus granulosus*. There were over thousand of literatures and papers published discussing this subject. Most recent (2000-2008) and universally widely accepted and recognized was selected. The selected papers were screened for further references. criteria for selection of literatures were the number of cases (more than 50 cases). Methods of analyses whether statistical or nonoperative procedures only universally accepted chosen and the institution where the study was done in specialized institutions for laparoscopic surgery.

During this study we observed that patient response to surgical trauma, hospital hostility, rapid turn over of hospital beds, cost effectiveness, less morbidity, no mortality, early resuming normal usual activity, minimal postoperative complication, reduced operative time, early recovery from general anesthesia, decreasing risk of surgery, access to certain locations difficult to be approached in open surgery all these parameters are better in minimally access surgery than in open conventional surgery.

INTRODUCTION

Hydatid cyst is zoonotic disease with a worldwide distribution and is endemic in many cattle-raising regions of the Mediterranean, middle and far east, South America, Australia, and in certain areas in North America.[5] Most cases are caused by the cestode tapeworm *Echinococcus granulosus* that is found in the small bowel of carnivores.[6,7] In this disease the human is intermediate host. The parasite exists only in its larval form, other species *Echinococcus* multilocularis is rare occurrence and not include in the study .

Complications include cyst rupture with intraperitoneal dissemination of disease, anaphylactic reaction, pressure on contiguous organs, secondary infection, and intrabiliary tree rupture of cyst causing obstructive jaundice.[6,8] The old standard approach in the treatment of liver cysts is open surgery; the principles and various techniques have been extensively reviewed,[6,9,10] whoever laparoscopic surgical techniques to treat hydatid cysts of the liver have been gradually introduced.[11,12] Although reported to be successful, the series are still in going, no one of the both methods has been reported to be out of risk from above mentioned complications.

In the last decade laparoscopic treatment of hepatic hydatid disease has been increasingly popular and has undergone a revolution parallel to the progress in laparoscopic surgery. There are encouraging preliminary results; however, there have been limited reports concerning long-term results of this technique.[13]

There were many modalities and suggestions in the treatment and management of liver hydatid disease (scollicidal injection and controlled rupturing, reaspiration of cyst). PAIR (injection with scollicidal and percutaneous reaspiration under ultrasound guide) but controlled rupturing injection. Reaspiration remain the option of choice whether it is open or laparoscopic safely performed.

The open conservative surgical approach is the most accepted approach for recurrent giant cysts and on the same principles, the laparoscopic approach developed which based on the creation of an isolated hypobaric system, through which the cysts can be managed without spillage of their content[5] there were many studies was done to evaluate and combines the effectiveness of open surgery with the advantages of the laparoscopic approach with different techniques and theoretically solving the problems of access and preventing spillage of cyst content following controlled rupturing of cyst to get rid from acute setting of anaphylaxis during cyst control rupturing laparoscopically if spillage occur. As well as in open, surgery these studies was done in a specialized institutions for laparoscopic surgery.

CONTENT

Treatment of liver hydatid disease via laparoscopic approach, based on the creation of an isolated hypobaric system, the initial attempts at 1994[16] then the first report of laparoscopic treatment of hydrated cyst of the liver was published in 1994[17] and was followed soon thereafter by the first report of anaphylactic shock complicating laparoscopic treatment of hydatid cysts of liver.[17] In fact, an exaggerated fear of anaphylaxis seemed to discourage surgeons from more widely adopting minimal access techniques for the treatment of hydatid cysts.[16,18] However, gradually reports started appearing in the world literature detailing laparoscopic management of liver hydatid disease through which the cysts can be managed without spillage of their content[14,15] the technique combines the effectiveness of open surgery with the advantages of the laparoscopic approach. The chosen patients with no selection criteria underwent consecutive laparoscopic operations for symptomatic liver hydatid cyst.

METHOD OF INTERVENTIONS

The main surgical maneuvers are: (injection, control rupture reaspiration) were performed through an assembled transparent cannula, in which a vacuum was created, while its tip adhered firmly to the cyst wall. Following evacuation of the cyst contents and deal with the procedure of the drainage accordingly.[5] In one study the procedures performed urgently in nearly halves of the patients and in more than half of the patients the procedure done on an elective basis.

All patients were treated with albendazole (400 mg twice a day, or 12 mg/kg when weight was < 60 kg) prior to operation (1-4 weeks), as well as postoperative and with preoperative antibiotics (usually third-generation cephalosporins). *While in other study* after the cysts were identified. Three to four trocars were required for each operation according to cyst (cysts) locations. A long, 10/12 mm trocar was Introduced from a point as close as possible to the cyst, and two long strip of gauze soaked with hypertonic sodium chloride solution as a scolecidal agent were placed around the cyst. The cyst was then punctured with a 14 gauge 120 mm needle and the cyst content was rapidly aspirated. At that moment, an additional aspirator tip was placed close to the puncture point to avoid spillage of cyst contents. The cyst cavity was then nearly filled with hypertonic sodium chloride solution for irrigation, which was left in the cavity for 5-10 minutes. In the next step, the cyst wall was opened and the endocyst was evacuated into a specimen-retrieval bag with careful observation of the separation from pericyst. The cystic cavity was reirrigated with hypertonic saline and the telescope was introduced into the cavity to explore for potential biliary openings and retained daughter cysts. The procedure was completed with partial un roofing, and closed-suction drains were placed into the cysts with subhepatic or perihepatic drains.[19]

While Martin Ertem et al did other procedure of attaching the cyst is little difference in this study[13] they introduce 3 gauzes into the abdominal cavity, placed around the cyst, and soaked with 10% povidone iodine solution as a scolecidal agent. The cyst was punctured with a 14 gauge 6F aspiration needle. As a precaution, the tip of a 5 mm suction catheter was placed close to the puncture site, and as much as cystic fluid as possible was aspirated, so that when the endocyst (germinative membrane) detached from the cystic wall and shrank to the bottom of the cyst when. The deflated cystic wall was suspended by 2 graspers, and cystotomy was performed. At this stage, the 11 mm trocar was exchanged for an 18 mm one. A transparent tube with a 15 mm internal diameter was inserted through the 18 mm trocar, and the germinative membrane was aspirated . A hose of the same diameter was connected to the transparent tube, and the entire membrane was removed. In all cases, the telescope was inserted into the cyst to explore for potential biliary openings and retained daughter cysts. The cystic cavity then irrigated with 20% hypertonic saline, and unroofing was performed by partial or near-total cystectomy, a drain was placed in the cystic cavity. Gauzes and pieces of the excised cystic wall were placed in an endo sac and removed.

Albendazole (10 mg/kg per day) was administered postoperatively to all patients.

Follow-up by US every 3 months during the first year, then by US and CT every 6 months during the second year. The result of this study although have little drawback but encouraging regarding hospital stay time consume early return to work resume normal activity dealing with other pathology remote from operative site like in this study surgical procedures for

inguinal hernia repair (trans-abdominal preperitoneal polypropylene mesh plasty)[13] was done in to one patient simultaneously and this also an advantages to laparoscopic intervention.

While Palanivelu et al in india he advocate the 2 way canula for the treatment of liver hydrated cystes laparoscopically.

Palanivelu Hydatid System (PHS)

The PHS consists of a trocar and cannula along with 5 and 3 mm reducers. The trocar is 29 cm long. It is hollow throughout its length to accommodate a suction cannula (Fig. 1). Its tip is pyramidal shaped, with each facet of the pyramid bearing a fenestration to enable any fluid leaking on its insertion to be sucked into its hollow body by the cannula placed within. The cannula is 26 cm long, with an inner diameter of 12 mm. It has two side channels—one for gas insufflation and another for suction. The suction channel has an inner diameter of 10 mm. Its outer nozzle is designed so that the suction tube has an airtight fit on it.

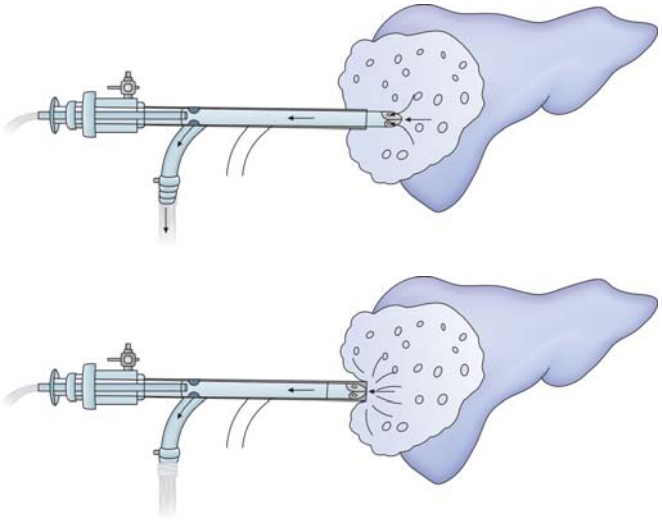

Fig. 1: Special trocar used for hydatid cyst surgery

TECHNIQUE

After introducing the camera port through the umbilicus following creation of pneumoperitoneum, the hydatid cyst is identified on the surface of the liver. Then, the PHS trocar with cannula is introduced into the peritoneal cavity directly over the hydatid cyst. Once inside the peritoneal cavity, the trocar is removed and the cannula alone is advanced until its tip is in total contact with the hydatid cyst surface. Suction is applied through the side channel to maintain contact between the cyst and the cannula opening. Continuous suction creates a vacuum seal between the cyst wall and the rim of the cannula opening and prevents any spillage. Thereafter, the trocar with a 5 mm suction nozzle inside (connected to another suction machine) is introduced into the cannula and, by steady pressure, is pushed into the cyst along with the cannula). Any fluid spillage on puncture of the cyst wall is immediately suctioned either into the body of the hollow trocar through its fenestrated tip and then into the suction cannula or into the outer cannula and then into the suction side channel. Once the PHS enters the hydatid cyst, the trocar is removed and the cavity is irrigated through the main channel while simultaneously maintaining continuous suction. In this way, fragments of laminated membrane, daughter cysts and debris are easily removed. Once the returning fluid is clear, CO_2 is insufflated at low pressure (3-4 mm Hg) and another telescope is introduced into the cavity through the cannula to visualize the interior for any overt cyst–biliary communication. In the absence of overt cyst–biliary communication (verified by the absence of bile staining in the suctioned fluid and nonvisualization of the opening within the cyst cavity), 0.5% cetrimide is instilled into the cyst cavity as a scolicidal agent. Separate telescopes should be used for intra peritoneal and intracystic visualization to minimize the risk of anaphylactic shock. After 10 minutes, the scolicidal agent is suctioned and the cyst is marsupial zed. The minor biliary leaks that are seen near the cyst wall are sutured by laparoscopic extracorporeal suturing with 3-0 vicryle. All patients were treated with albendazole 10 mg/kg/day for at least 2 weeks pre-operatively and continued postoperatively for 4 weeks patients follow-up by US which was repeated at shorter intervals. CT scan was performed if indicated in the follow-up period.

Resultes of *palanivelu hydatid system (PHS)study:* In 83.3% of patients, only evacuation of the hydatid cyst by the PHS was done. In 13.7%, this was followed by left lobectomy because the cysts were surge almost the entire left lobe of the liver. The remnant cavity was dealt with by omento plasty. The average follow-up period was 5.9 years, during which there were no recurrences. PHS is successful in preventing spillage,

The average duration of surgery was 52 minutes. None of the patients in this study had intraoperative anaphylactic shock which is the major concern . Postoperatively, two patients (2.7%) had infection, whereas nine patients (12%) had a minor biliary leak that stopped draining by 5-7 days. Out of the 75 patients, regular follow-up was maintained for 59 patients, with an average follow-up period of 5.9 years. To date, there have been no recurrences.[16]

In other study by Alexandra K Tsaroucha et al and Alexandros C. Polychronidis,[20] (in North-Eastern Greece) over the last 20 years. In the period from 1984 to 2003.[20] Same encouraging result they obtained to their patients.

STATISTICAL ANALYSIS

Most statistical analysis used standard method of statistical evaluation of the data performed using the Fisher exact test and Goodman and Kruskal test. Results are expressed as median ± SD. Differences were considered significant at $P<.05$.

OUTCOME AND FOLLOW-UP

Patient follow-up in the convalescence stage were evaluated in the outpatient clinic evaluation included physical examination, abdominal sonography and liver function tests. Abdominal X-Ray, sinogram for the residual persisting cavity if necessary. Postoperative ERCP was not necessary in every patient.

CONVERSION TO OPEN LAPAROTOMY

Conversion to open laparotomy was performed in a very few number of patient who had 2 large hydatid cysts and abnormal liver function tests[16] in the most of the mentioned studies.

COMPLICATIONS

Bile peritonitis occurred for large cysts can be treated conservatively. This complication can be treated by laparoscopy (lavage and pericystic drainage) or by laparotomy anaphylactic reaction which might occur when the assembling of the transparent cannula over a relatively protruding cyst is triad if this thin membrane of the cyst ruptured, whoever this complication can be successfully treated with fluids, ephedrine, and dopamine and the postoperative convalescence was uneventful. In most of patients reported in most of the series.[13,16]

Atelectasis, pneumonia, and drug-induced fever as equal as open surgery.

DISCUSSION

Although hydatid disease is an endemic disease, physicians and surgeons worldwide may encounter the disease sporadically because of increased travel and migration.[16] Hence, doctors everywhere should be aware of the diagnosis and the therapeutic options available for the management of hydatid disease surgery remains the mainstay of treatment for hepatic echinococcosis. With many surgical options regarding dealing with cyst but in this article we review those who approached the cyst with (controlled rupturing and reaspiration drainage). The first report of laparoscopic treatment of hydrated cyst of the liver was published in 1994[16] and was followed soon after by the first report of anaphylactic shock complicating laparoscopic treatment of hydrated cysts of liver.[15,18]

Laparoscopy in hydatid liver disease has gained a lot of attention all over the world however the role of laparoscopy in abdominal surgery including any liver pathology such as segmental resection and transplant liver donations in going development and succeed. While in hydatid remain controversial several controlled trails have being done some of them prefer laparoscopy while other not. The aim of this review was to identify which method is superior and better and if so what are the benefits and who it could be instituted more widely.

There is also diversity in the quality of the randomized controlled trails. The main variable in these trails are the following parameters:

Number of patient in the trail with drawl of cases studied in open is more study available due to the task of laparoscopy is early practiced in that the first trail of laparoscopic drainage of liver hydatid disease was done at 1994[16,17,19,20] regarding exclusion of cases done according to the local surgical practice and laws that govern the selection of patients for safe end result. Blinding also was taken in full consideration intention to treat analysis was gained a lot of time to predict a lower and highest *p* value in the studies. Publication biases was taken the highest respective publications and most authorized all over the world. Taken in to consideration the local practice variations in areas where these studies done.[21]

CONCLUSION

Minimally access surgery invade the field of liver hydatid disease and deliver excellence result in properly selected patients in certain center of laparoscopy surgery and appeared to be promising in this field of newly generated surgical practice which is safe and effective method in selected patients. Further studies should be encouraged in this field because there is no universally accepted standard technique all over the world.

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Laparoscopic versus Various Types of Open Ligation of Testicular Veins for Treatment of Varicocele

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Abstract

Varicocele therapy is controversial issue with no single approach adopted as the best therapeutic option. Patient were divided into groups which received 2 different modalities of treatment [namely high ligation of testicular veins, Paloma operation and subinguinal microscopic varicocelectomy [SMV] and compare them with laparoscopic varicocele ligation [LVL]. Group 1[164 patients] treated with LVL. Group 2 [101 patients] treated with open method [65 patients with paloma and 36 patients with SMV]. Group 1 showed less recurrent rate [4%] vs. [8%] for group 2. Less hospital stay for group 1 [1.3 days] vs.[3.5 days] for group 2. Return to normal activity was shorter in group 1 [4.5 days] vs. [9 days] in group 2. More costeffective for group 1 patients than group 2.

Keywords: Laparoscopy, varicocele, paloma high ligation, LVL (laparoscopic varicocele ligation), SMV (subinguinal microscopic varicocelectomy).

Aims and objectives: The aim of this study was to compare the effectiveness and safety of laparoscopic and conventional methods (open technique) in the treatment of varicocele. The following parameters were evaluated for both laparoscopic and open procedures.

1. Operative technique
2. Patient selection
3. Operating time
4. Postoperative complications including recurrences
5. Hospital stay
6. Cost-effectiveness.

Material and methods: A literature search was performed using medline and other search engines, the following search terms were used [laparoscopic versus open methods in treatment of varicocele]. Criteria for selection of the literature were no. of cases, methods of analysis operative time and institution where the study was done.

INTRODUCTION

The prevalence of varicocele in adolescence is equivalent to that of general male population [average of 15%] where as before puberty varicocele is rare.[1,2] The incidence of varicocele in male patient with infertility is approximately 40%.[3,4] Varicocele can negatively and progressively affect testicular growth , histology, function resulting in progressive decline in fertility.[5] 50-60% of male patients treated for varicocele show improvement in semen quality.[3] In the last few years varicocelectomy has been performed by laparoscopy.[6]

PATIENTS AND METHODS

The study included [256] patients divided into 2 groups. Group 1 [164 patients] referred to general and pediatric surgery department for LVL. Group 2 [101 patients] referred to urology department for SMV and paloma operation. The age of the patients in group 2 ranges between 8-24 years [average of 24.4 years.]. Those in group 1 were between 8-39 years [average 21.3 years]. The majority of school aged patients were asymptomatic and disease discovered during routine medical examination. While testicular pain and/or swelling were the main complaints among patient aged 15-25 years, subfertility was the major presentation among those above 25 years age .The diagnosis of varicocele was established mainly by clinical examination with patient in upright position. The disease was graded according to criteria published by Lion et al. In majority of patients, the varicocele was grade 2 or 3.

- 62 patients in group 1 had left sided varicocele.
- 109 patients in group 2 had left sided varicocele.
- Bilateral varicocele was present in 3 patients group 2.
- Bilateral varicocele was present in 19 patients group 1.

Doppler U/S was done in all patients to confirm diagnosis and to evaluate testicular size pre and postoperatively. Seminal fluid analysis was performed preoperatively for male infertility cases and repeat it postoperatively every 6 months for 18-24 months.

RESULTS

- In group 2 average operative times was
  - 38 minutes for unilateral cases.
  - 70 minutes for bilateral cases.
- In group 1 average operative time was
  - 58 minutes for unilateral cases.
  - 75 minutes for bilateral cases.
- In group 2:
  - 65 patients had paloma operation of which 9 patients had recurrence [13.8%].
  - 36 patients had SMV operation of which 4 patients had recurrence [11%].

- In group 1:
  - 164 patients had LVL of which 6 patients developed recurrence [3.8%].
- Also in group 1: Retropubic collateral channels were identified in 7% cases during LVL.
  - Lateral collateral channels were identified in 17% cases during LVL.
  - All collaterals were interrupted by clipping or diathermy.

Testicular artery was detected in 94% cases in group 18%]. Repair of right inguinal hernia [5 patients 3%]. 75% cases in group 2.

In group 1: Other procedures were concomitantly performed including right orchidopexy [14 patients 8%]. Repair of right inguinal hernia [5 patients 3%].

In group 1: No intra-abdominal visceral or vascular injuries with LVL. Three patients had pneumoscrotum which resolved spontaneously within 24-48 hours?

One patient in each group developed wound infection.

Scrotal edema developed in 11 patients in group 2 compared to only 3 patients in group 1.

In group 2: All required one or more narcotic injections after surgery.

In group 1: Only 13% required one or more narcotic injections after surgery.

Return to school after LVL was much faster [3-7days group1] compared to [7-14 days group 2].

Ipsilateral hydrocele developed in 3 patients in each group. No testicular atrophy in any case of study regardless whether testicular artery was clipped or not. Improvement in seminal fluid analysis was observed in 43% cases in group 2 compared to 51% cases in group 1.

DISCUSSION

Laparoscopic varicocelectomy has gained lot of attention around the world. However, the role of laparoscopy in varicocele remains controversial. Several controlled trials have been conducted, some in favour of laparoscopy, others not. The goal of this review was to ascertain that if laparoscopic varicocelectomy is superior to conventional, and if so, what are the benefits and how it could be instituted more widely.[7] There is also diversity in quality of randomized clinical trials; the main variables in these trials are the following parameters:

1. No. of patients in trial.
2. Withdrawal of cases.
3. Exclusion of cases.
4. Blinding.
5. Publication.
6. Intention to treat analysis.
7. Local practice variation.
8. Prophylactic antibiotic used.
9. Follow-up failure bias.

CONCLUSION

LVL is minimally invasive procedure that is easy to perform with simple instrument, but other procedures like hernia repair can be simultaneously performed. It is the best approach when recurrent disease and obesity are problems. The clear visualization magnification facilitate detection of abnormal collateral channels, one of major reasons for postoperative recurrences. LVL has minimal postoperative morbidity, shorter convalescence and faster return to normal activity.

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Fibrin Sealant versus Use of Tackers for Fixation of Mesh in Laparoscopic Inguinal Hernia Repair

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Abstract

Background: Laparoscopic fixation of meshes prior to their fibrous incorporation should be reliable to minimize recurrences following transabdominal preperitoneal hernia repair (TAPP) and totally extraperitoneal repair (TEP) repair of inguinal hernias. However, suture, tack and staple-based fixation systems are associated with postoperative chronic inguinal pain. Initial fixation with fibrin sealant offers an atraumatic alternative, but there is little data showing that fibrin-based mesh adhesion provides adequate biomechanical stability for repair of inguinal hernia by TAPP and TEP.

Methods: A literature search was performed using medline and the search Google, Springer link and Highwire press. The following search terms were used: *Laparoscopic hernia mesh*, *Fibrin glue*, and *Tackers*. 2293 citations were found in total.Selected papers were screened for further references. Criteria for selection of literature were the number of cases (excluded if less than 80), methods of analysis (statistical or nonstatistical), operative procedure (only universally accepted procedures were selected) and the institution where the study was done (specialized institution for laparoscopic surgery).

Results: Mesh fixation has always invited lots of interest amongst surgeons and instrument companies due to the wide range of post-operative complications each of them caused. TAPP and TEP usually involves fixation of mesh, however many studies challenging the mesh fixation in TEP are being published. There are two most common methods of fixing mesh using fibrin glue (Tissucol) and tackers. Fibrin sealant possesses both mechanical strength and elasticity. Overall, data from previous studies, shows that mesh stability with fibrin sealant fixation is at least equivalent to suture fixation, indicating that fibrin sealant could be considered the fixation method of choice in inguinal hernia repair. This new method of mesh fixation is obviously potentially less harmful than stapling the mesh and can help reduce the risk of chronic postoperative pain at a comparative or even lower cost than a stapling device.

Conclusions: Fibrin glue gives an adequate mesh fixation with a less chance of chronic postoperative pain. It appears to be an alternative to staples and may help reduce the postoperative pain problems after hernia repair. All methods give the same results in terms of recurrence rate, hospital stay, and costs; but with better results in terms of post-operative pain, seromas, and trocar-related trauma. However the use of fibrin glue needs extensive study, as the anatomical dissection and inguinal region preparation have to be carefully performed, and the mesh size has to be adequate; peritoneum closure with a running suture is more time consuming. Large randomized trials and longer follow-up are required to demonstrate the advantages of either technique.

Keywords: Laparoscopic hernia mesh repair, fibrin sealant and tackers, mesh fixation.

INTRODUCTION

Laparoscopic repair of inguinal hernias can be accomplished by totally extraperitoneal (TEP) or transabdominal preperitoneal (TAPP) techniques. It involves mesh fixation to avoid displacement and recurrence. Fixation usually uses staples that can lead to nerve injury and chronic postoperative pain.[1-4]

The correct fixation of the mesh, as well as the right size of the graft, are considered the most important surgical steps in the laparoscopic hernia repair to prevent the risk of recurrence.[7] The use of 10 mm titanium staples to fix the mesh is the conventional approach. Some studies of laparoscopic hernia repair have shown that recurrences are caused by the rolling up of the mesh, incorrect stretching of the mesh, or by incomplete covering of the hernia defect. A correct method of securing the mesh has been recommended by several authors. Anyhow, some complications of laparoscopic hernia repair, such as nerve injury (chronic postoperative pain, neuralgias, pubalgias) and hematomas in the Retzius space (bleeding from vascular lesions) are inherent to the use of the staples.[10]

Fibrin glue (Tissucol/Tisseel, Baxter health care, Deerfield, IL, USA) offers an atraumatic alternative, but there is insufficient data giving direct evidence whether fibrin-based mesh adhesion provides adequate biomechanical stability.[9,11]

Tackers are associated with a certain amount of surgical trauma and complications such as neuralgia or paresthesia because of nerve entrapment. Pubalgia is caused by stapling of the prosthesis to Cooper's ligament. Bleeding or hematomas in Retzius space (muscular, corona mortis) also can occur. In terms of tensile strength and mesh dislocation, fibrin glue is equivalent to stapling and better than no fixation of the mesh.

Some data suggest that mesh fixation is not needed for preserving satisfactory long-term results, stapling of the mesh

to avoid displacement and reduce the risk of recurrence prevails among surgeons. The chronic pain that may persist in the groin area postoperatively is one of the most serious problems that may affect the results of hernia surgery.

Postoperative chronic pain is defined as pain persisting more than 3 months after the operation. The prevalence of chronic postoperative pain after hernia surgery ranges from 3% to 54%.[12] Although laparoscopic repair appears to be significantly less likely to induce postoperative chronic pain this type of complication is still reported up to 22.5% of patients.[14] Stapling of the mesh, which may lead to nerve injury and osteitis pubis, has been identified as one of the possible causes of the persistence or development of pain after hernia surgery.[15,17]

AIMS AND OBJECTIVES

The aim of this study was to compare the effectiveness and safety of using fibrin sealant and tackers for mesh fixation in laparoscopic inguinal hernia repair based on:

- Operative time
- Discharge period
- Complications
  - Groin chronic pain
  - Hematoma of scrotum
  - Seroma
  - Trocar hernia
  - Trocar site bleeding
  - 10 mm trocar site pain
- Recurrence rate

MATERIAL AND METHODS

A literature search was performed using medline and the search Google, Springer link and Highwire press. The following search terms were used: *Laparoscopic hernia mesh, Fibrin glue,and Tackers*. 2293 citations were found in total. Selected papers were screened for further references. Criteria for selection of literature were the number of cases (excluded if less than 80), methods of analysis (statistical), operative procedure (only universally accepted procedures were selected) and the Institution where the study was done (specialized institution for laparoscopic surgery).

Content

Mesh fixation has always invited lots of interest amongst surgeons and instrument companies due to the wide range of postoperative complications each of them caused.[19] TAPP and TEP usually involves fixation of mesh, however many studies challenging the mesh fixation in TEP are being published.[22] There are two most common methods of fixing mesh using fibrin glue (Tissucol) and tackers.

Ideal Mesh

Ideally, modern hernia mesh fixation methods should be compatible with the mechanical properties of the mesh. A breaking strength of 16-32 N is the minimum required . Also, the fixation aid should tolerate elasticity in the range of 20-30% in new meshes, without provoking rigid shear forces. Fibrin sealant possesses both of these mechanical properties. Overall, data from previous studies, shows that mesh stability with fibrin sealant fixation is at least equivalent to suture fixation, indicate that fibrin sealant could be considered the fixation method of choice in inguinal hernia repair. Tissucol_/Tisseel_ fibrin sealant has been approved in Germany for the indication of mesh fixation in hernia surgery.

Fixation of the Prosthesis

Mesh is fixed with 1 ml of Tissucol for unilateral hernias and 2 ml for bilateral hernias. The prosthesis is fixed along its upper margin, from Coopers ligament to the *triangle of disaster* and to the *triangle of pain*, using a 3 mm catheter (Duplotip; Baxter health care), which fits the Tissucol syringe. The mesh also may be fixed wherever necessary to increase its stability. Tissucol may be applied in two different ways: by resting the tip of the Duplotip catheter where the mesh is to be fixed and by squeezing out a few drops of glue. With the latter method, the glue seeps across the mesh and fixes it. One also can separate the mesh slightly from the inguinal wall, spray the glue directly on it, and then place the mesh to the wall. The two methods appear to be comparable.

Postoperative Complications

After a 23.7 months follow-up regarding postoperative pain, hospital stay, complications and recurrence, together with short term resumption of regular physical activity show the efficacy and safety of this technique. The results are better considering there is no dissection of peritoneal structures that mesh fixation is completely nontraumatic and the procedure is easily reproducible.

With the use of Tissucol as the means of fixation (in both TAPP and TEP techniques) there is decreased neuralgia, caused mainly by staples placed in proximity to one of the several nerves that course below the ileo-pubic tract with a percentage varying from 0 to 19.6%.[18,20,21,24,27,31] Stapling Cooper's ligament may cause pain through osteitis, as stated by Toy.[31] Regarding long-term results in terms of seroma and recurrence, the former are avoided by the porous structure of the mesh and by the no structural dissection procedure. There is an argument going on as to how long follow-up has to last to assess recurrences correctly.

Stoppa et al, showed that recurrences usually occur during the first postoperative year.[30] It's important for the mesh to overlap the defect by 3 or 4 cm and to properly fix it with Tissucol. Pascal's hydrostatic law states that pressure applied within a limited space is transmitted equally in all direction. If the mesh lies well over the defect, it will be kept in place by the abdominal pressure.[30] There are two kind of meshes for these procedures,

paramount and parietex (Sofradim) which seems ideal because it is easily glued and the polyester structure is rapidly integrated into the peritoneum. This is also helped by fixing with Tissucol.

Polyester is a reticular knit able to promote genesis of new vessels, whilst polytetrafluoroethylene (PTFE) is of laminar structure, and enhances cellular infiltration of the outer third of the structure. Newly formed vessels do not penetrate PTFE because the laminar interface is not as good as the reticular one. Polyester is also better because it causes a milder inflammatory reaction and a great fibroblastic proliferation. For these reasons we believe polyester and fibrin glue to be the biomaterials of choice for peritoneal only laparoscopic hernioplasty.

Laparoscopic hernia repair is a technique that cannot be learned as quickly as the conventional open technique by young surgeons or by surgeons who are not expert in minimal-invasive surgery. Some surgeons consider a good learning curve of about 250 operations for laparoscopic hernia repair[27] to reach a recurrence rate similar to that of the Lichtenstein's technique. This is not correct, as a young surgeon who works in a mininvasive surgical department can easily learn the minimal-invasive technique working with an expert senior surgeon.

The operative cost of laparoscopy is higher, but it is important to consider the results and patient satisfaction. The costs depend on the operative time, use of disposable instruments, type of mesh and method of fixation, hospital stay, and time to return to normal activity.[28,29] In many cases however, the laparoscopic approach is adopted at the request of the patient during their first visit. Complications in laparoscopic approach may be important but are related to the surgeon's laparoscopic experience and to a good knowledge of laparoscopic anatomy which can avoid the risks of vascular or nerve injury during dissection or clips positioning. Others complications are typical of laparoscopy (trocar lesions, electrocautery lesions, and so on).

A laparoscopic or conventional open approach to repair inguinal hernia is used depending on the characteristics of the patient and hernia type, but when possible a minimal invasive approach gives the patients more benefits and better results. The possibility of using different methods to fix the mesh, during recent years, may be an interesting possibility to reduce the complication rate and to obtain better postoperative recovery. The first experience in the use of human fibrin glue (Tissucol) for mesh fixation was in open hernia repair.[26] For laparoscopic hernia repair the possibility of nerve injury (pain or paresthesia) caused by entrapment from incorrect placement of staples (above all lateral cutaneus femoral nerve, but ilioinguinal, and genitofemoral are also at risk)[13,30] and epigastric vessels lesion by clips application may be avoided using fibrin glue either in the TAPP technique[25] or in the TEP.[24,31] It seems that not only entrapment but also postoperative fibrous scar around the staples can lead to nerve injury.[16]

Various studies report from 0 to 6% of postoperative neuropathic complications.[13,32,33] In our total review, the incidence is very low (0.09%) as surgeons tend to avoid staples placement in nerve areas and to use the minimum number of staples. Chronic pain is not always due to staples, but may be caused by inflammatory reaction around the mesh with scarring around the nerve, which may induce neurologic pain as in open technique. Bleeding and incisional hernia from the 10 mm trocar site may be reduced using 5 mm ports. Another important aspect is recurrence after hernia repair; in the laparoscopic technique the possible causes are: insufficient extent of dissection, inadequate size of the prosthesis, and incorrect kind of fixation of the mesh. It is important to reach on overlap of at least 2-3 cm from the hernia edge; if this is not possible the possibility of migration of the prosthesis is too high. The use of fibrin glue to fix the mesh was not associated with an increased recurrence rate, but no significant difference were observed in terms of neuropathic complications or seroma. It is the use of a 5 mm trocar rather than 10 mm that reduces intraoperative bleeding, and postoperative trocar site pain, as well as incisional hernias. The use of Tissucol reduces epigastric vessels incidental lesions, and has a hemostatic effect, reducing hematomas.

The operative time is longer by about 10 minutes compared with the use of staples; this is due primarily to the peritoneum closure using a running laparoscopic suture. The operative costs of the two techniques is similar if we use 2 ml of Tissucol for each hernia. In some studies the use of fibrin glue was less expensive than stapling.[24]

Results and complications (832 Patients)

	Fibrin glue use	*Staples use*
Operative time (minutes)	35	25
Discharge (hours)	24	24
Complications:		
• Groin chronic pain	0%	0%
• Hematoma of scrotum	0%	1.14%
• Seroma	2.4%	2.29%
• Trocar hernia	0%	1.14%
• Trocar site bleeding	0%	4.41%
• 10 mm trocar site pain	0%	5.88%
Reccurence rate	0	0

Using the TAPP technique, chronic pain was only observed in 0.13%. A statistically significant difference was found concerning postoperative pain 30 days after surgery on the right flank in the area of the 10 mm trocar. Other differences that are worth mentioning are those related to some postoperative complications due to the 10 mm trocar on the right flank: reduced bleeding, reduced postoperative discomfort and the lower risk of incisional hernias.This was a pilot study; it of course needs confirmation in a larger randomized trial.

In some studies, TAPP hernia repair with Tissucol resulted in a low rate of postoperative pain and rapid resumption of normal activities. Postoperative complications affected only 2.2% (7/320) of the hernias and were readily treated without the

need to extend the hospital stay. Importantly, no recurrences have been observed in this study. These results compare favorably with those reported by other studies of laparoscopic hernia repair. A multicenter study of 9,955 laparoscopic hernia repairs reported postoperative complication rates of 4.6% for hematomas, 2% for neuralgias, and 0.4% for chronic pain.[46] Reports of persistent neuralgia with inguinal pain attributable to stapling vary in the literature from 0.5 to 14%.[37,41,46]

In a study by Stark et al,[49] the rate of nerve entrapment in laparoscopic patients was 4.2% (19/448). The genitofemoral nerve was affected with a high frequency (2%), and the ilioinguinal or lateral cutaneous nerve of the thigh was affected in 1.1% of the cases.

Some studies have investigated the use of mesh without any fixation. Like the application of fibrin glue, this method is nontraumatic because it avoids all stapling problems.[23] Ferzli et al[39] reported a 1.8% recurrence rate for patients without fixation of their prosthesis. Other studies comparing stapling without fixation of the mesh found no difference.[41,47,48] However, these studies have been criticized as having too few patients, too short a follow-up period (range, 1-32 months), or too great a loss to follow-up evaluation(8-12% of patients).[5,6] The size of the prosthesis is an important factor.

In few experience, fixation of a 14.13 cm mesh ensures better prosthesis stability, and consequently less dislocation and recurrence. The use of smaller stapled prostheses (11·6 cm) is associated with recurrence rates of up to 5%, whereas patients treated using TAPP with no mesh fixation have recurrence rates as low as 0.16%.[41,47] Inadequate lateral fixation is a main cause of recurrence after both TAPP (36%) and TEP (22%).[38] The reason for this is that most of the nerves run laterally where no staples can be applied.

Gluing a large mesh on the triangles of disaster and pain is likely to stop the prosthesis from lifting and dislocating, thereby avoiding inferomedial and inferolateral recurrence,[38] as seen in 0.4% (3/715) of the hernias treated with staples.[45] Fibrin glue is reported to have hemostatic properties,thus reducing seroma and hematoma formation.[44]

In other study, the incidence of postoperative seromas was1.8% (6/320), whereas the incidence reported in the literature varies from 3.8 to 10.5%.[40,41,47] Tissucol also is cheaper than any other means of mesh fixation. For example, 1 ml of Tissucol costs e80, as compared with e300 for Endoanchor (Ethicon Endo-Surgery) and e250 for Protak (Tyco, Norwalk, CT, USA). The use of fibrin glue instead of stapling means that the TAPP procedure is nontraumatic and minimally invasive, as evidenced by the absence of inguinofemoral pain in this study.[36]

In an animal study in which TEP groin hernia repairs were performed, Katkhouda et al.[43] demonstrated that graft motion and tensile strength were similar in the staples and fibrin glue groups, and both were significantly superior compared to those of the nonfixed mesh group. In addition, histological examinations revealed that the fibrin glue triggered a stronger fibrous reaction and inflammatory response with more fibroblastic mesh ingrowth in comparison to the other two groups. This again suggests that mesh fixation is preferable and that the fibrin glue meets the requirements for both efficiency and security of fixation.

It applies particularly to unilateral TEP repairs but more so to bilateral repairs in which the dissected space for the mesh implantation is the same as the working space, making it larger than needed for mesh placement as opposed to the space in which mesh is placed in TAPP repairs. The recurrence rate in the fibrin glue group was slightly lower than in the tack staples group but did not differ significantly, and the case of recurrence reported in the fibrin glue group is probably related to an inadequate mesh size in a large direct hernia. Overall, the recurrence rate in the fibrin glue group remains within the value range of most of the reports on TEP repairs irrespective of mesh fixation.[39,49,52]

DISCUSSION

During the past few years, there has been more focus on the pain that may arise after groin hernia surgery. Chronic pain after hernia surgery is a complex and controversial problem that affects not only open but also laparoscopic procedures. Three pain syndromes have been identified: somatic, neuropathic, and visceral pain.[42] Besides nerve damage during dissection, thermal injury due to electrocautery, and inflammatory and/or mechanical reaction to the mesh, stapling of the mesh is the most frequent evocated mechanism.[34,45,48]

Among other potential factors causing postoperative pain is the repair of recurrent hernias. There is a great variation in the rate of postoperative chronic pain, ranging from 0.1 to 0.4% and 22.5%[41,45,49] in laparoscopic repairs for which staples are used to attach the mesh. Among the explanations for such a wide discrepancy are the range of pain evaluation methods used, which include clinical examination of the patients, phone calls, and mailed questionnaires and tools to score the severity of the pain. Some studies have reported only cases of pain clinic attendance, possibly underestimating the problem.[8]

The rate of chronic postoperative pain observed in the tack staples group (14.7%) is among the highest reported in the literature,[45,49] but it included all patients who reported even transient or mild pain in the long-term. To date, the series reporting the lowest postoperative chronic pain rates have not used any means of mesh fixation.[34,35,52]

Tamme et al.[52] and Beattie et al.[34] observed 2.55 and 0% chronic pain problems, respectively, after TEP repair, with a recurrence rate of less than 0.6%. However, the largest of these two series did not specify the length of follow-up and the other one was a rather small series (n = 89). Although two randomized studies with a short follow-up of nonfixed mesh in laparoscopic

repairs (one in TEP and the other in TAPP) did show promising results in terms of recurrence,[40,51] justification for routine nonstapling of the mesh in TEP is not yet substantiated.[13] The low rate of chronic pain complications was similarly observed in many studies by avoiding stapling.This confirms that mesh stapling does play a key role in generating postoperative pain after laparoscopic hernia repair.[50] The compared studies had a relatively short follow-up with a small number of patients and different evaluation periods, the procedures compared were identical except for the fixation means in two similar groups of patients.

It is not known if the enhanced inflammatory response induced by fibrin glue,[44] may explain the slightly higher-rate of seromas in the fibrin glue group (12 vs 9.8%). This minor complication is generally associated with direct hernias. In addition, there is no report of any other complications (fever or local inflammation) that could be related to an enhanced inflammatory process. Among the explanations for the increased inflammatory reaction in the animal study is the use of human fibrin glue in pigs.[44]

There was no significant difference in the development of postoperative hematomas, although the rate was slightly lower in the fibrin glue group, in which one of the three patients with hematoma had to be operated on while on calciparin. In this study, it is impossible to attribute the lower risk of hematoma to the effect of Tisseel on local hemostasis.[37] Although no comparison is available between the tack staples group and the fibrin glue group in terms of operation duration, the use of Tisseel and its application device did not seem to change the mean operative time of 54 minutes, which is comparable to that of other series using stapling or not,[46,52] as long as the fibrin glue is prepared during the hernia sac dissection. The only difference in terms of operating costs between the two series was in the fixation devices. Two milliliters of Tisseel is available for 149 USD, whereas the single-use tacker stapler is 287 USD.

In conclusion, there is no evidence in the literature to support nonfixation of the mesh in TEP repair of groin hernias, whereas the use of staples has been identified as one of the factors for postoperative chronic pain. Although prospective randomized trials should be performed. Tisseel fibrin glue for mesh fixation is secure as the tack staples, ensuring an adequate fixation and a low recurrence rate. This new method of mesh fixation is obviously potentially less harmful than stapling the mesh and can help reduce the risk of chronic postoperative pain at a comparative or even lower cost than a stapling device.

CONCLUSION

Fibrin glue gives an adequate mesh fixation with a less chance of chronic postoperative pain. It appears to be an alternative to staples and may help reduce the postoperative pain problems after hernia repair. All methods give the same results in terms of recurrence rate, hospital stay, and costs; but with better results in terms of postoperative pain, seromas, and trocar-related trauma. However the use of fibrin glue needs extensive study, as the anatomical dissection and inguinal region preparation have to be carefully performed, and the mesh size has to be adequate; peritoneum closure with a running suture is more time consuming. Large randomized trials and longer follow-up are required to demonstrate the advantages of either technique.

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Laparoscopic Hysterectomy—Beyond Garry and Reich Classification

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Abstract

The advantages and disadvantages of laparoscopic hysterectomy (LH) and laparoscopic assisted vaginal hysterectomy (LAVH) have been reviewed. Studies show that both procedures are safe and the patients show similar postoperative reconstitution. A number of studies show that LAVH is faster to perform and therefore amenable to the stated objective of making these service available on a day care surgery basis. Other studies show that, with adequate skill laparoscopic hysterectomy is easier to perform and has less associated morbidity as well as reduced cost. The varied and divergent views with regard to the efficacy and acceptance of the procedures primarily depend on the practices in different regions and programs. Acceptance of laparoscopic or laparoscopic vaginal hysterectomy varies in different regions. There is necessity therefore to develop further this procedures which have high level of satisfaction among female patients. The uptake of this procedure is slow particularly in the Third World Countries there is need to promote policy and programs within the different regions so that endoscopic surgery becomes part and parcel of curricular in both undergraduate and postgraduate programs. Only then would the problems associated with the learning curve be minimized.

Keywords: Total laparoscopic hysterectomy, laparoscopic assisted hysterectomy, abdominal hysterectomy, vaginal hysterectomy, pelvic pathology.

Aims and objectives: The aim of this study was to review the safety and efficacy of total laparoscopic hysterectomy and the laparoscopic assisted vaginal hysterectomy in women. Garry and Reich classified modes of hysterectomy into nine types. This study will review relative efficiency and efficacy of type 3 and type 5 of this classification. The parameters used to evaluate literature both in the total laparoscopic hysterectomy and the laparoscopic assisted vaginal hysterectomy include; patient selection criteria, operative time and technique, intra-operative and postoperative complications, time until resumption of diet, postoperative morbidity, hospital stay, cost effectiveness and the quality of life.

Materials and methods: A literature review was performed using Highwire press, Google, and the Springer link search engine. The following terms were used: Laparoscopic assisted vaginal hysterectomy, total laparoscopic hysterectomy, total abdominal hysterectomy, vaginal hysterectomy. Over two hundred and fifty six citations were found. Selected papers were screened for further reference. Criteria for selection of the literature were the number of cases, method of analysis, operative procedure and the institution were the study was done.

INTRODUCTION

Total laparoscopic and assisted vaginal hysterectomy are relatively new procedures that are rapidly replacing abdominal hysterectomy because of perceived benefits including reduced morbidity, early mobilization and recovery and significantly better esthetics. Laparoscopic vaginal hysterectomy has enhanced the capacity of gynecological surgeons to deal with pelvic pathology that were previously a relative contraindication for vaginal hysterectomy. Since vaginal hysterectomy has been utilized to perform one third of all hysterectomies, this constituted an important development in gynecological health.

Many service providers advocate for laparoscopic assisted vaginal hysterectomy (LAVH) because of supposed benefit over and above those of total laparoscopic hysterectomy (TLH), including increased safety, and ease of operation.[4] There is less risk to bladder, bowel and vascular injury. The hazard associated with resection of uterine arteries is avoided. However, a number of publications indicate resection of the uterine artery can be achieved safely during TLH using bipolar diathermy, ligature and clear set step by step procedures.

In many studies there is no significant difference between the benefits accrued in either of the two procedures. Some studies indicate that there is no risk of reduction in the length and prolapsed of the vaginal vault in TLH as compared with laparoscopic assisted vaginal hysterectomy.

Since the first LAVH by Reich in 1989 arguments regard cost benefit analysis of this procedures has continued to be generated. It is necessary therefore that a study that avoid confounding factors and many of the biases in the health system be carried out.

It is the considered opinion of this review, that there is need to expand on the Garry and Reich classification and consider the different laparoscopic approaches, as complimentary matrix of procedures, through which one can surf back and forth during minimal access hysterectomy depending on the challenges encountered intraoperatively.

DISCUSSION

Hysterectomy is one of the most commonly performed major operations. Approximately 600,000 hysterectomies are performed in the United States each year and 20% of women in the UK undergo hysterectomy before the age of sixty.[2,3] Historically the uterus has been removed by either the abdominal or vaginal route. The vaginal operation is preferable when there are no contraindications because of lower morbidity and quicker recovery. Laparoscopic hysterectomy has gained a lot of attention internationally in the recent passed. The role of minimally invasive surgery in the management pelvic abnormalities continues to expand. However the role of laparoscopic assisted vaginal hysterectomy viz a vis that of laparoscopic total hysterectomy remains of great interest and opportunity to expand on the options available to the laparoscopic surgeon to deal pelvic pathology. The most common indications for hysterectomy include fibroids (30%), abnormal uterine bleeding (20%), endometriosis (20%) and genital prolapsed (15%).[6,7,10]

Despite all the advantages of vaginal and laparoscopic surgery over laparotomy, the majority of hysterectomies indicated for benign pathologies are carried out by laparotomy. The VALUE study suggested that 67% of surgeons still used the abdominal approach as the main mode of hysterectomy. Other multicenter studies which provide a good representation of the means by which hysterectomies are earned out, show that only 30% of the operations use the vaginal route, including laparoscopic assisted vaginal hysterectomy.[7]

For hysterectomies carried out on nonprolapsed uterus the results reported demonstrate that on average only 27% are carried out by the vaginal route. These results alone justify the statement that there is a place for laparoscopic surgery for hysterectomy in order to reduce the number of laparotomies.

Nulliparous patients are very representative of the population of patients for whom vaginal surgery rarely presents under the best conditions for surgeons with average training minimal access surgery. Almost 40% of hysterectomies in nulliparous patients used laparoscopic surgery.

Many studies show that laparoscopic hysterectomy increasingly replacing open hysterectomy are in line with this evolution.[1,3,30] One reason for this is the laparoscopic surgery technique used for hysterectomy. Whereas certain centers perform simple LAVH, others used total laparoscopic hysterectomy for all the patients. For certain patients, simple LAVH may be enough to avoid laparotomy, but in others with very poor vaginal accessibility the only alternative to laparotomy is to carry out total hysterectomy exclusively via the laparoscopic route. The important role played by vaginal accessibility when establishing the indication for total laparoscopic hysterectomy has already been underlined in certain series in which nearly half the patients who underwent laparoscopic hysterectomy were nulliparous.

Poor vaginal accessibility in majority of patients is also the reason why, despite the use of laparoscopy, some centers use uterine volume reduction procedures.

When the use of reduction techniques was essential, several procedures including morcellation, bivalving, coring, were combined. For these patients, laparoscopic surgery should not be considered 'a waste of time' but rather as the only solution to enable them to avoid laparotomy.

The indications for abdominal hysterectomy are those that constitute the contraindication for vaginal hysterectomy. Laparoscopic vaginal hysterectomy modifies the contraindication since tissue dissection and mobilization is initiated intra-abdominal as elucidated by Garry and Reich.[10] There is also diversity in the quality of literature on the subject. The main variables with regard to the subject mater include the number of patients in the trial, withdrawal of cases, exclusion of cases, blinding if the study, local medical care practice, the use of prophylactic antibiotic treatment and follow-up failure within the study period become important factors.

A retrospective observational comparing LAVH, TAH and VH was carried out. Many of the laparoscopic vaginal hysterectomies were converted to abdominal hysterectomy. The evaluate study concluded that although it could be considered that such conversions represented prudent surgery it was felt that on the balance they represented a failure of planned procedure and should be considered as major complications.[7] Laparoscopic hysterectomies particularly TLH are fast trying to fulfill the goals of every pelvis surgeon of providing safe easily performed procedure which provdes significant satisfaction to the patient. A great proportion of hysterectomy are performed totally laparoscopicaly and are much less traumatic than vaginal, LAVH or open abdominal hysterectomies according to some studies. The benefits include reduced blood loss, reduced risk of surgical injuries, less pain and early mobilization. Studies indicate the potential of TLH to become the method of choice over the currently popular laparoscopically assisted vaginal hysterectomy.[3,8]

In total laparoscopic abdominal surgery; different levels of injury have been reported, including bladder, ureter, bowel and vascular injuries.[5] These results underline the fact that, this is a difficult operation requiring considerable skill in laparoscopic surgery.

Recently the evaluate study concluded that LAVH was associated with a significantly higher rate of major complications than abdominal total hysterectomy (TAH). LAVH took longer to perform but was associated with less pain, quicker recovery and better short-term quality of life measures. In contrast to this the study by Lumsden et al did not show any difference in postsurgery recovery, satisfaction with the outcome of the operation or quality of life four weeks postoperatively between TAH and LAVH. The study concluded that although it could be considered that such conversions represented prudent

surgery it was felt that on the balance they represented a failure of planned procedure and should be considered as major complications.[3]

Analysis of studies, show that complications usually arise during the learning curve of the new procedure. A publication from Finland analyzing prospectively 10110 hysterectomies performed nationwide revealed that with increasing experience of surgeries performed by the surgeon, the number of complications was significantly decreased.[11] This can be attributed to the performance of the same standardized steps every time in the surgeries makes the surgeon well-versed with the technique and decreases the rate of complications.

The average intraoperative blood loss for laparoscopic assisted vaginal hysterectomy is about 200 m/s. The mean operative time is two hours. The postoperative complication rate has been quoted to be about 5.9%.[9] Through the use of standardized procedural steps TLH and assisted vaginal hysterectomy can become an easy procedure which can be mastered by many. The salient features of the steps include use of a combination of regional and general anesthesia, ergonomic port, patient and surgeon positioning, proper retraction of the uterus, appropriate sharp dissection and the prudent of energized equipment, including bipolar forceps and harmonic.[7]

There is compelling need for continuous refining of the technique of hysterectomy to avoid traumatic, hemorrhagic and infective morbidity, speedy recovery with minimal hospitalization, early return to work and therefore providing quality health care.

The average total LAVH cost is $7,500 to the patients, in the West, if use of disposable instruments is limited and the use of bipolar cautery is encouraged instead of sutures or Endo GIA that are more expensive.[16]

Minimal access hysterectomy is a recently introduced technique and even though the complications associated with this operation have already been addressed, larger studies, both with respect to the number of patients and the length of follow-up, are necessary so that the real risk of complications can be properly assessed.

In spite of the dramatic increase of LAVH procedure since its first description in 1989, its value remained controversial. advocates encourage LAVH as a procedure for conversion of abdominal hysterectomy into a vaginal one. Indeed vaginal hysterectomy entails fewer complications, shortened hospital stay, more rapid recovery and return to normal activity. This is in addition to the better cosmetic appearance of the laparoscopic scar if compared to the laparotomy in many studies. However, critics point out that LAVH requires longer operative time and is more expensive.

Studies show that LAVH could be done in a wide variety of indicated cases of hysterectomy. Other diagnoses that are difficult to be made clinically such as adenomyosis, endometriosis, endometrial hyperplasia, cervical intraepithelial neoplasm, chronic cervicitis, and the nature of the ovarian neoplasm are easily confirmed during TLH/LAVH.

Years after the first case of TLH and laparoscopic assisted hysterectomy was published; this operative procedures are performed in relatively few centers worldwide. The reasons for this restriction can be unavailability of a formal curriculum, lack of standardization of procedures and training as well as the cost of infrastructure. Therefore, a proper training program with a standardized procedure is necessary for the education of the resident and fellow doctors to qualify them for coping with the possible difficulties encountered during this surgery. The cost of equipment and disposables needs to come down as well.

It is important for a gynecological surgeon to add TLH to his surgical armamentarium on condition that he is well-familiar with the performance of LAVH.[13] In turn, for a surgeon to be proficient in LAVH he ought to be a good vaginal surgeon capable of performing vaginal hysterectomy for nondescend uterus. So much so, at any stage if difficulty are encountered, the surgeon must be able to convert TLH to laparoscopic hysterectomy (LH) or LAVH, and seldom a surgeon may be called upon to complete hysterectomy by the abdominal route (the default operation).[14,17]

In summary, laparoscopic hysterectomy and laparoscopic assisted vaginal hysterectomy are a safe route provided the surgeons are well-trained, because then the rate of complications is not higher than that observed with laparotomy or by the vaginal. It is important to indicate that conversion to any mode of hysterectomy from another, should be considered as a dictate of safety and efficacy rather than a surgical complication.

The American college of obstetricians and gynecologists guidelines state that the route of hysterectomy should depend on the patient's anatomy and surgeon's experience.[12]

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Treatment of Vault Prolapse: Laparoscopic versus Open Sarcocolpopexy

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Abstract

Pelvic organ prolapse is one of the common problems for parous women. A literature review of published articles was done to determine the best method of treatment for pelvic prolapse mainly laparoscopic and open laparotomy methods. Electronic search made via medline, google and springer link using the keywords laparoscopic/open sarcocolpopexy and vault/organ prolapse and relevant articles were reviewed. More than 2000 patients included in this review and the results showed that laparoscopic sacrocolpopexy has shorter hospital stay 1-1.8 days in the as compared to the laparotomy group which is 4-5.8 days ($p < 0.005$). Regarding estimated blood loss laparoscopy has less bleeding compared to laparotomy (172 +/– 166 mL vs 234 +/– 149 mL; P = .04). But the operation time is longer with this method, mean operation time is 223(+/–24) minutes for the laparoscopic group and 195 (+/–45) minutes for the abdominal sarcocolpopexy group. Other complications like mesh erosion up to 5% is the same for both procedures. The chance of recurrence10-20% after sarcocolpopexy is a possibility for both methods with short and long-term period of follow-up 3 months to 13 years. In conclusion laparoscopic approach has favorable outcome if properly done by skilled surgeon especially with decreased hospital time and operation time.

Keywords: Laparoscopic sarcocolpopexy, pelvic prolapse, vault prolapse, open sarcocolpopexy.

Aims and objectives: The aim of the study was to compare the effectiveness and safety of laparoscopic and conventional open abdominal sarcocolpopexy in the treatment of pelvic organ prolapse. Parameters evaluated for both methods include patient selection, operative technique, and operative time, intraoperative and postoperative complications. Evaluation was also done for post-operative morbidity, hospital stay, cost effectiveness and short-term and long-term quality of life.

Materials and methods: A literature search was performed using Medline and search engines', Google, Springer link and Highwire press. The following search terms were used laparoscopic sacrocolpopexy, pelvic organ prolapse, vault prolapse, suspension treatment.1640 citations were found in total and selected papers were screened for further references. Criteria for selection of literature were the number of cases (excluded if less than 20), method of analysis (statistical or nonstatistical), operative procedure (only universally accepted procedures were selected) and the institution where the study was done (specialized institution for laparoscopy surgery).

INTRODUCTION

With the aging of the population, pelvic organ prolapse is an increasingly common condition seen in women. Cause of pelvic organ prolapse is multifactorial and result in weakening of the pelvic support connective tissue and muscles as well as nerve damage. It is estimated about 50% of parous population may encounter pelvic organ prolapse. Patients may be asymptomatic or have significant symptoms such as those relating to the lower urinary tract, pelvic pain, defecatory problems, fecal incontinence, back pain, and dyspareunia. To correct this problem different abdominal and vaginal surgical techniques have been used. The abdominal approach can be laparoscopic or open method to restore pelvic anatomy and sexual function.[1]

The open technique is performed through abdominal incision and involves suspending the prolapsed vaginal vault to the sacral promontory using a synthetic mesh (polypropylene, Gore-tex,® Mersilene®). It is associated with a risk of hemorrhage from presacral vessels and around 4.3% of women may require a blood transfusion. The chance of mesh erosion is 5%. The subjective success rate following an abdominal sacrocolpopexy in a randomized study was 94% and the associated objective success rate was 76%.[2]

Laparoscopic sacrocolpopexy which is relatively new technique is an alternative to open method although operative time tends to be slightly longer, intraoperative complications are related to the surgeon's experience and remain comparable to those noted in laparotomy however, it requires a high degree of laparoscopic skill to perform the procedure via this route.

Even though there are a number of procedures to correct this problem the two most widely methods are being used by different surgeons worldwide. This paper tries to asses which method is more appropriate to treat with the least complication and with long lasting favorable functional anatomical outcome.

CONTENT

More than 2000 patients were included in this study, all the comparison done only on laparoscopic and abdominal sacrocolpopexy cases. Patients with additional procedures at the time of surgery and variations of pelvic organ prolapse surgery were excluded from the study to avoid biases.

Operation time: Mean operation time is 223(+/–24) minutes for the laparoscopic group and 195(+/–45) minutes for the abdominal sarcocolpopexy group. This is slightly greater in the laparoscopic approach, and is evident on all studies included

in this review. With experienced surgeon the operation time usually is comparable to open techniques.[3,4]

Blood loss: As compared to laparotomy, laparoscopy is associated with less blood loss to the patient even though proper quantification of the actual blood was not done in most revised articles. In cohort study done on 113 patients estimated blood loss (172 +/– 166 mL vs 234 +/– 149 mL; P = .04) after laparoscopy and after laparotomy respectively. This difference mainly attributed to injury to blood vessels can easily be avoided due to clear vision via laparoscope usually the amount of blood loss will be minimum, of course one of the complication of laparoscopy is accidental injury to great vessels which can be reduced with proper training and experience.[3,4]

Hospital stay: as discussed in the different studies is significantly shorter 1-1.8 days in the laparoscopy group as compared to the laparotomy group which is 4-5.8 days ($p < 0.005$). This is very important advantage of laparoscopy because it saves much time for the patient to resume daily activities early and also saves much cost for hospitals by decreasing bed occupancy, the cost effectiveness to the patient is not properly shown in the different studies and need further evaluation.[3]

Success rate can be determined in two ways objective success that is after properly scheduled follow-up visits the physician will perform physical examination and determine the success of the treatment. Based on the presence or the absence of descent of the pelvic organs subjective success rate is the patient's perception about her symptoms of prolapse, sense of well-being and sexual function after the procedure. Objective success for both method ranges from 85-92% there is no significant difference in both methods while subjective success rate is considered 79-85 %.[3-7]

Other complications like bladder, rectal injuries are not common but are similar in both methods.[7]

Conversion rate in case of difficulty reported in some of the literature ranges from 0-11%, but this conversion rate is decreased when the operator is well skilled.

Recurrence rate after both laparoscopic and laparotomy sacrocolpopexy is usually similar it ranges 12-46%. Most of the patients were followed from 3 months up to 13 years as the number of years increases the chance of recurrence increases regardless of the method used to correct the prolapse. Laparoscopic sarcocolpopexy is also associated with high-rate of satisfaction.[3,4,6,8]

DISCUSSION

Pelvic organ prolapse was being treated by different methods but after the introduction of laparoscopy many surgeons are utilizing this new advanced technology to treat their patients.

Laparotomy can be performed for this problem with equal success rate but with disadvantages of scar over the abdomen, more blood loss and longer hospital stays. These findings are inherent in the procedure and most studies have shown that the recurrence and correction of the anatomical defect are similar with laparoscopic sacrocolpopexy. But with these disadvantages still it can be used effectively if there is lack of experience with laparoscopy and when there is no laparoscopic instrument.

Laparoscopic sarcocolpopexy is nowadays favored by patients because It is mainly minimally invasive and as shown in many of the studies associated with less blood loss which is significant and is also associated with less hospital stay to patients also statically significant difference as compared to the open technique.

Operation time is also prolonged in most of the studies and complications like mesh erosion is similar in both groups. As surgeons experience and skill increases some of the complications can be minimized and this method can be used to treat pelvic organ prolapse.

CONCLUSION

Both laparoscopic and open sarcocolpopexy can be used for the treatment of pelvic organ prolapse but laparoscopic approach has slight advantage over the open method mainly less blood loss and operation time with sound cosmetic result. In experienced hands laparoscopic sarcocolpopexy can be used effectively with favorable outcome.

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