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Comparison of PMAT Camera Holder with Human Camera Holder

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Abstract

Aim: During minimal access surgery an assistant is controlling the laparoscope and surgeon should be free to manipulate instruments. Although the advantages of laparoscopic surgery are well documented, one disadvantage is that, for optimum performance, an experienced camera driver is required who can provide the necessary views for the operating surgeon. There are many drawbacks in human camera operator especially if they are not trained. The self camera-control by the surgeon gives more stability of the laparoscopic image. The aim of this study was to compare PMAT camera holder device with traditional assistant-driven laparoscopic camera control.

Materials and Methods: Laparoscopic Appendicectomy, Ovarian Cystectomy and Laparoscopic sterilization were performed. On 14 patients, the operating surgeon used the "PMAT" and performed the surgery without a laparoscopic camera assistant. On the other group of 14 patients, an experienced camera operator was responsible for control of the laparoscopic field of vision in the traditional manner. The time required for surgery was documented.

Results: The mean operative times for PMAT and camera person-assisted appendicectomy was 45 minutes and 40 minutes respectively. For ovarian cystectomy 45 and 50 minutes and for laparoscopic sterilization it was 15 and 10 minutes. There were no differences in outcome of surgery or blood loss in the two groups. The operative surgeon perceived some increase in shoulder and neck pain with use of the PMAT scope holder.

Conclusions: This PMAT device provides a means for the operative surgeon to safely perform simple laparoscopic procedures alone without significantly increasing operative time or morbidity.

Keywords: Laparoscopic surgery, Robotic Surgery, Device Camera, EndoAssist, Camera holder.

INTRODUCTION

In the current era of evidence based medicine enthusiasm for laparoscopic surgery is rapidly gaining momentum. There is an immense amount of literature showing advantages of minimal access surgery and acceptance by almost all the surgical speciality.[1,2] The advantages of laparoscopic surgery are well documented but there are significant challenges not only to the operating surgeon but also to the person who holds laparoscope.

In laparoscopic surgery, the operating surgeon does not have direct visual control of the operative field. The surgeon depends on the camera assistant to maneuver the camera for optimum visualization of laparoscopic target of dissection.[3-6] In only advanced units and hospital the laparoscopic team can afford to use an experienced camera assistant, elsewhere this is not economically feasible on a regular basis. This difficulty and helplessness of surgeon is compounded by the fact that cooperation must occur on a real-time basis with each step and camera person should be adequately trained in laparoscopy. As such, independent driver bias arises where conflicts of cooperation and skill can occur in which the surgeon's optimum view is somewhat hampered by the camera driver's perception. Manual camera control can also be physically demanding leading to fatigue and a suboptimum visual field when the camera operator is exhausted. During prolonged procedures frustration and conflicts can occur between camera operator and surgeon. Very often an equally experienced camera driver is required as the surgeon to facilitate necessary views for the operating laparoscopic surgeon. Ideally, the surgeon should have full control of all instruments required that are directly required for conducting a given minimal access surgical procedure. This includes surgical operative instruments and control of the operative field. The purpose of non-human motorized camera holders is to facilitate camera-control to the surgeon and to stabilize the visual field during minimally invasive procedures. Recently many such, active and passive camera holders have been developed everywhere in the world to offer the surgeon an alternative and better tool for control of the operating surgeon.[7,8] The advantages of non-human camera operator include:

- Elimination of the fatigue of the assistant who holds the camera.
- Elimination of fine motor tremor and small inaccurate movements.
- Delivery of a steady and tremor-free image.
- Non-dependency on camera operator.
- Reduced cost of surgery.
- Reduced number of highly skilled staff.

In this study, we describe our experience with laparoscopic techniques using a PMAT camera holder.

Materials and Methods

To manipulate the laparoscope along with the visual perception, this mechatronic assistant with three degrees of freedom was used (Fig. 1). This mechatronic device is made of aluminum and weighs 2.5 kg, including laparoscope and camera. This system consists of a harness (Fig. 2A) that is placed over the surgeon's shoulders.
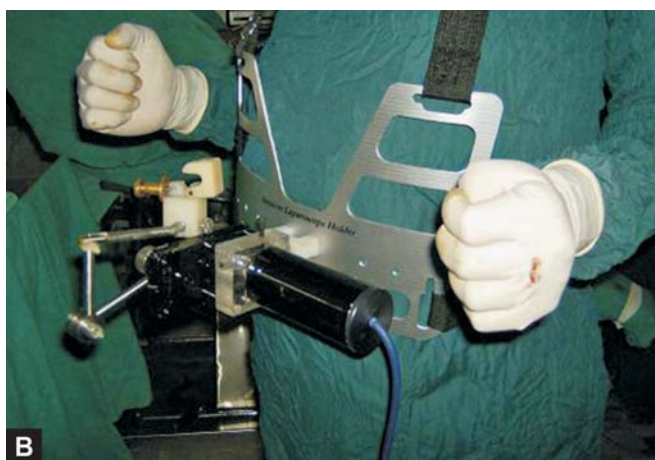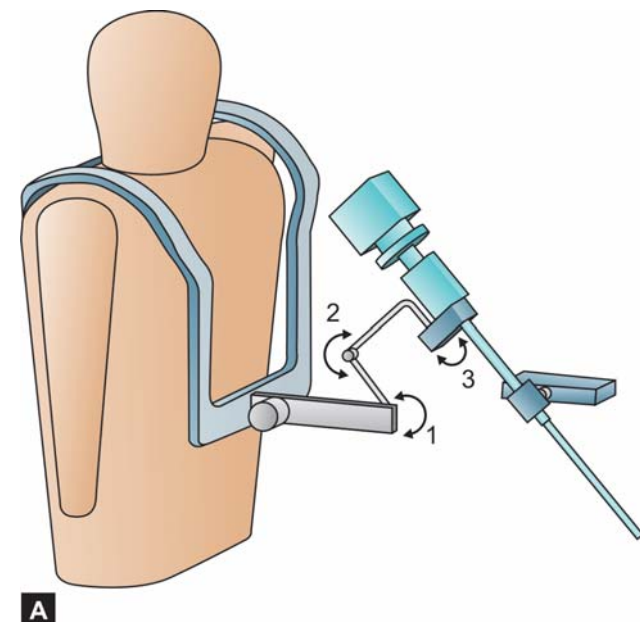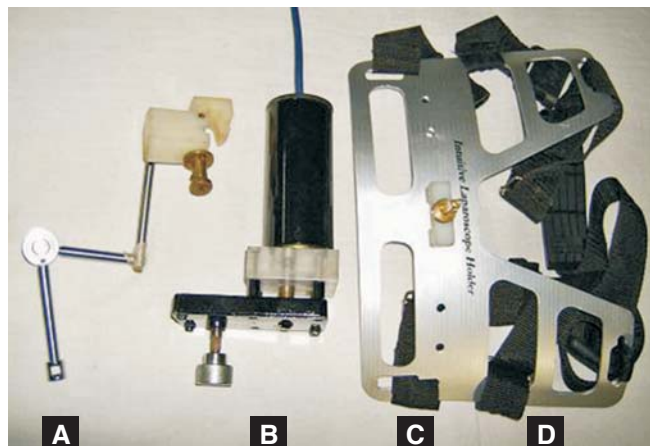

Fig. 1: PMAT laparoscopic camera holder (A) design, (B) current prototype.

The first degree of freedom is subject to the harness and is the active part (Figure 2B), while the other two degrees are the passive ones (Figure 2C). The end of the whole part is attached both to the laparoscope and to the camera, with a device called

Figs 2A to D: PMAT and parts: (A) harness, (B) active link, (C) passive link, (D) laparoscope holder.

laparoscope holder (Figure 2D); this can be easily removed manually. To make movements inside the patient this mechatronic system uses a supporting point and movement to the port of entry from the laparoscope to the patient. To navigate the laparoscope, we need six basic movements: Up, down, in, out, to the left, to the right. To perform any of these movements inside the space along with the harness, the surgeon will use the following techniques: For the right and left movements of the laparoscope, it is advisable to use lateral body movements along with the last passive link of the system (Fig. 3A). A more valuable movement can be achieved through a partial change in the lateral posture of the surgeon's torso. There are two ways to insert or to remove the laparoscope: Either the surgeon moves his/her torso close to or away from the patient, or he/she uses his/her entire body to perform these movements (Fig. 3B). The angle of entry or exit of the laparoscope for the up and down positions inside the patient is obtained with the assistance of the active rotative link and the second passive link along with the near and far position of the surgeon's body to the point of insertion as illustrated in Fig. 3C. The active degree of freedom is moved in both ways using two switches. To make mixed movements, the surgeon moves his/her body through visual perception.

The mechatronic assistant was developed at CINVESTAV IPN. In electrical department. Mexico Patent number 1540. It was Simulated in Visual Nastran software and tested in box trainer with phantom model and animal model before clinical trial over human.[9] Practical application the study included a total of 28 laparoscopic procedures in which 14 were performed without PMAT and 14 with PMAT. The procedures were conducted by three experienced surgeons and gynecologists and included, 12 Appendicectomy, 8 ovarian cystecomy, and 8 laparoscopic sterilization. Before using PMAT its lever was dipped into Cidex overnight. The wearing plate and electrical part of PMAT was kept in formalin chamber overnight to facilitate proper disincentive action. The PMAT was applied to the neck
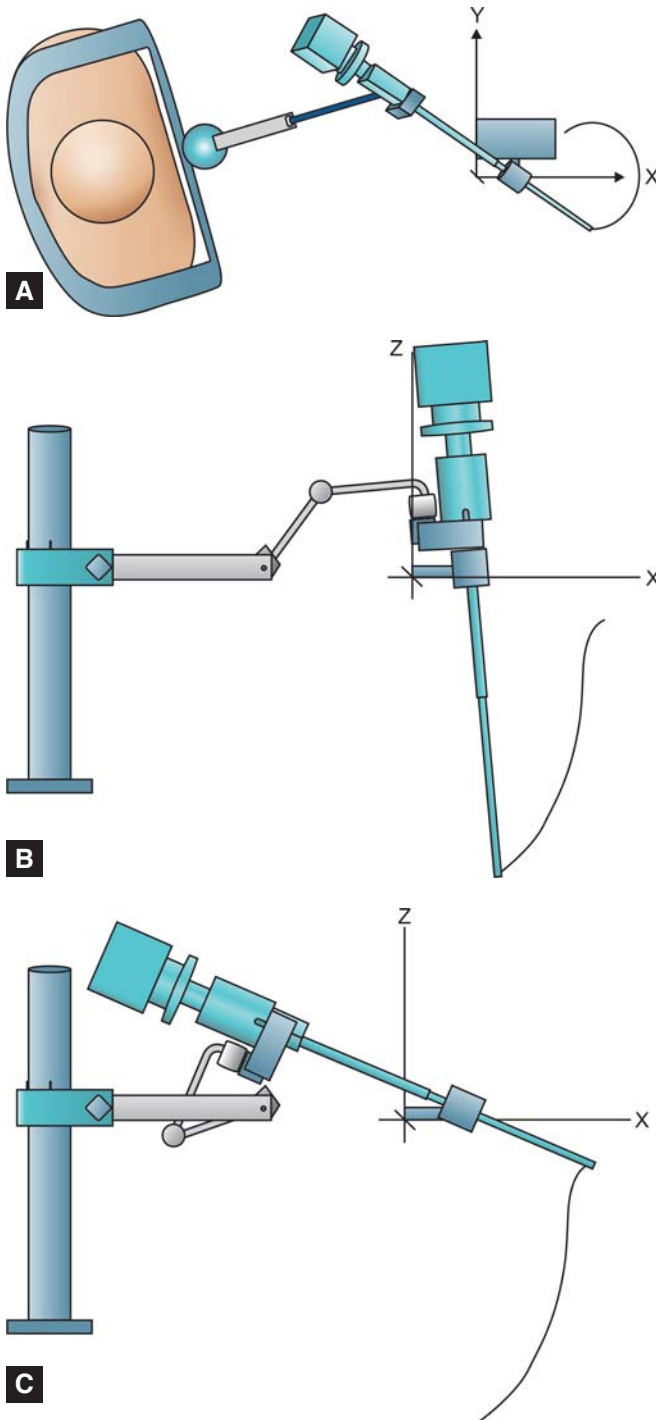
Figs 3A to C: Movements: (A) right and left, (B) in and out, (C) up and down.

of the surgeon once the access is complete. Veress needle technique was used for access in this study. All non-complicated simple cases were selected for this study. Human camera operator was kept in standby throughout the procedure during this study so that in case of difficulty he can takeover of camera.

The surgeon noted:

1. The extent of body comfort and muscle fatigue, by using a modified body part discomfort
2. Ease of scope movement or usability
3. Need to clean the telescope
4. Time of set-up the PMAT
5. Overall operative time
6. Surgical performance, and
7. Necessity to change the position and side of the table during surgery

During all the procedure a thirty-degree Stortz laparoscope was used. Camera of Maxer (Germany), and the Telescope (Hanki sass Wolf) were used in surgery.
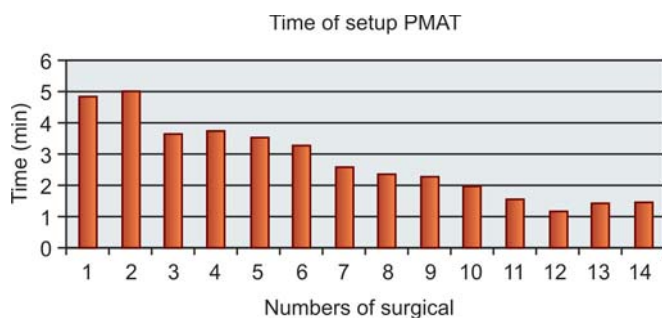
Results

All cases included in this study were free from any intraoperative complications including major bleeding or other factors which would have demanded additional hemostatic or reconstructive steps. With regard to the extent of body comfort and muscle fatigue, all three surgeons involved with the evaluation felt comfortable with the PMAT for each of the laparoscopic procedures studied, with no loss of autonomy. The surgeons were slightly felt fatigue with use of the PMAT for laparoscopic procedure which took more time, and prompting for motion adjustment was required repeatedly for the cases studied. With regard to ease of scope movement and the need to clean the telescope, we found that, on average, the PMAT need more time to disconnect the telescope. The time of set up was also analyzed and overall set up time was more for PMAT than human camera operator. The set-up time for all cases was under 5 min (graphic 1). With regard to surgical performance, all three surgeons reported that the PMAT device did not compromise surgical performance if co-axial alignment was maintained (Eye of the surgeon, target of dissection and centre of the monitor in same line). They also reported that the PMAT device was a viable option which enabled optimum task performance for all the types of case studied, and comparable with use of a human camera driver. There were no significant differences between complication rates or total operative time for procedures conducted with the PMAT device or with a conventional human assistant (Table 1), (Graphic 2). With regard to the need to clean the scope, we found this was not a useful tool for measuring the performance of the PMAT because it varies from case to case. Scope cleaning depends on several factors, e.g. the assistant driving the camera, the body fat of the patient, the type of surgery being performed, temperature difference with telescope and patient anatomy.

Discussion

Kavoussi et al[10], in 1995 reported results of a study on the accuracy and use of a robotic surgical arm compared with a

	Operative Time					
	Laparoscopic Appendicectomy		Laparoscopic Ovarian Cystectomy		Laparoscopic Sterilization	
n	Human Assistant	PMAT	Human Assistant	PMAT	Human Assistant	PMAT
1	39	40	42	54	14	9
2	43	47	49	47	17	10
3	39	49	44	49	15	9
4	38	45	45	50	14	12
5	42	44	—	—	—	—
6	39	45	—	—	—	—
Σ/n	**40**	**45**	**45**	**50**	**15**	**10**

Graphic 1: Time of setup the PMAT operative time
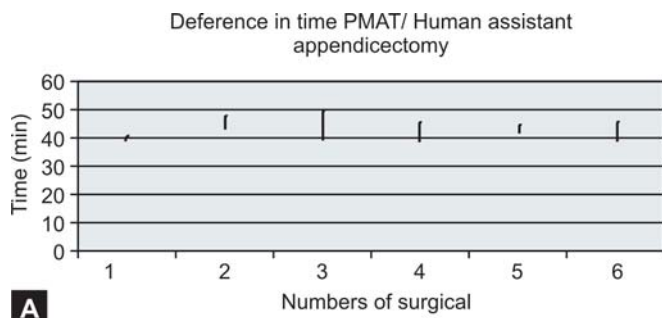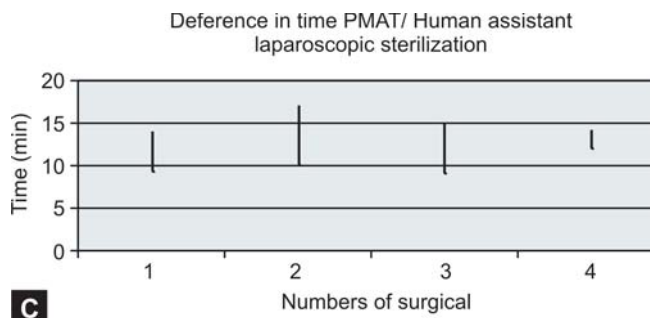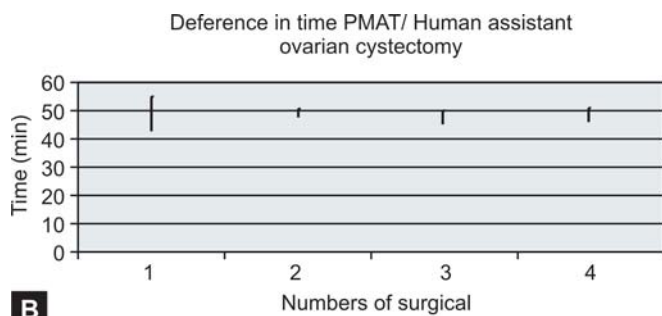
Graphic 2: Difference in time using PMAT and human assistant: (A) Laparoscopic Appendicectomy, (B) Laparoscopic Ovarian Cystectomy, (C) Laparoscopic Sterilization, (D) Mean operative time during the surgical procedures

human surgical assistant during urological laparoscopic surgery. They observed that camera positioning was significantly steadier with fewer inadvertent movements when under robotic rather than human control. They found no significant difference in the operative times during dissections using the ro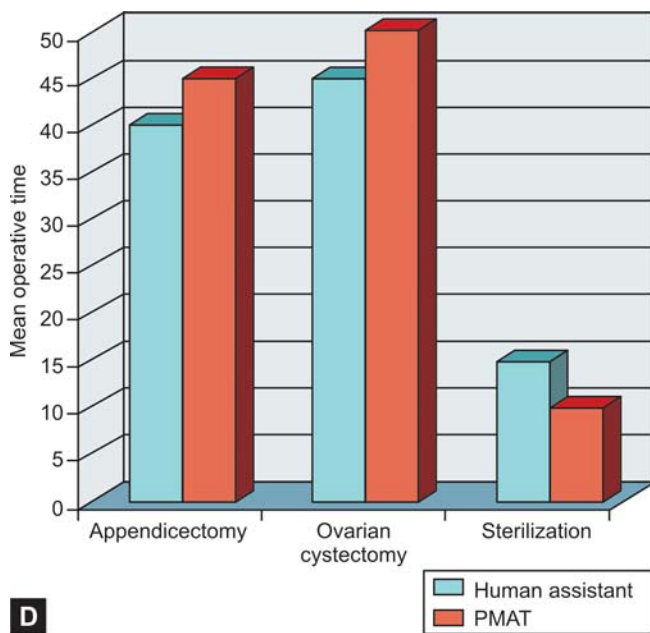bot or human assistant, however. Begin et al,[11] defined the motions of the human camera operator and expressed them mathematically by use of a spherical displacement model. They then applied this to a revolving robotic arm with six degrees of freedom in conjunction an automated camera in the performance of cholecystectomy and other procedures in animal models. Turner compared the cost-effectiveness of using a robotic assistant instead of a human assistant in a series of 12 cases of solo surgery in laparoscopic bladder neck suspension. He concluded that the cost of the robotic arm was less than that of human systems and that the former was a cost-effective means of performing the procedure.[11] Having discovered that non-human-controlled camera devices were economically and technically feasible, several groups sought to compare the different devices. Robotic arm outperformed human camera holders and improved efficiency and cost savings. The current price of the AESOP (Robotic camera operator is $100,000 US dollars). It is not possible for every surgeon to use robotic camera operator due to the cost. Keeping in mind all these constrain to manipulate the laparoscope along with the visual perception, we propose a mechatronic assistant with three degrees of freedom. This mechatronic device is made of aluminum and weighs only 2.5 kg, including laparoscope and camera. It would be very cost effective and performance-wise similar to that of an AESOP device. These costs when balanced against use of man power and cost per hour of employing a human camera driver points in favor of the non-human-controlled camera devices from a strictly health economics point of view. One of the big advantage with PMAT is complete autonomy of the surgeon to obtain the desired optimum operator view without relying on the experience and skill of his assistant. The disadvantages of the PMAT are that it cannot be used where surgeons want to operate in wide area and in the cases where co-axial alignment cannot be maintained during whole procedure. It is good for fixed and small target of dissection, where camera can be fixed between the working instrument and where the co-axial alignment can be maintained throughout the procedure. Use of the finger-operated electronic switch sometimes results in the need to take surgeons eye off the operative field to search for the switch which will move camera in or out. It is also necessary for the surgeon to learn to use the PMAT, but proficiency in the execution of the camera movements is easily acquired in a few minutes. There was slight neck or shoulder discomfort. Even after these minor problems in our study the PMAT enabled the surgeon to intuitively control his field of laparoscopic vision without compromising the movements of his instrumentation during laparoscopic surgery.

CONCLUSION

The PMAT is an intuitive, effective and easy to use device for holding camera during simple laparoscopic procedures like laparoscopic appendicectomy, ovarian cystectomy and sterilization. It can replace the human camera operator where surgeon can himself maintain co-axial alignment. PMAT reduces the constraint of requiring an experienced camera driver for optimum visualization during laparoscopic procedures. Further large scale feasibility studies to accept it as a useful tool for every surgeon are warranted.

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Harmonic Scalpel and Clipless Cholecystectomy

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Abstract

Background: The ultrasonically activated (Harmonic) scalpel has proven to be an effective, efficient, and safe instrument for dissection and hemostasis in both open and laparoscopic surgical procedures. This Harmonic scalpel work on the tissue's cutting and coagulating very effectively with the replacement the high frequency current, which can be connected with diverse complications. The principle is transforming of the electric power into mechanical longitudinal movement of the working part of the instrument, by piezoelectrical transducer situated in the handpiece. The primary use of the Harmonic scalpel in laparoscopic cholecystectomies has been for the division of the cystic artery and liver bed dissection. Advancements in the Harmonic scalpel blade tip now provide for the reliable ultrasonic division and closure of the cystic duct.

Keywords: Harmonic scalpel, Cholecystectomy.

INTRODUCTION

Designed as a safe alternative to electrocautery for the hemostatic dissection of tissue, the ultrasonically activated (Harmonic) scalpel was introduced into clinical use nearly a decade ago. This innovative method of cutting tissue was based upon the coagulating and cavitational effects provided by a rapidly vibrating blade contacting various tissues.[1,2] The resulting decrease in temperatures, smoke, and lateral tissue damage placed the Harmonic scalpel in contrast to the effects seen with the more traditional electrosurgery/cautery. In addition, the elimination of inadvertent, sometimes unrecognized, electrical arcing injuries with their potentially hazardous sequelae supported the role of the Harmonic scalpel as a potentially safer instrument for tissue dissection. Since its inception, the Harmonic scalpel has gained significant clinician acceptance and applications. Uses now range widely to include surgery of the head and neck, chest, liver, spleen, kidney, adrenal glands, colon, rectum, gastroesophageal junction, and others. Although variously described in the literature, wide acceptance and usage of the Harmonic scalpel for standard laparoscopic cholecystectomies is lacking among our American general surgeon colleagues. Clip and cautery techniques predominate. Furthermore, total Harmonic scalpel dissection in the performance of a laparoscopic cholecystectomy is a technique described only in the European literature[3] and, at best, is only anecdotal in the United States This study was undertaken to demonstrate the efficiency, safety , and cost effectiveness of the Harmonic scalpel as the sole instrument to achieve complete hemobiliary stasis in the performance of laparoscopic cholecystectomies.

CASE REPORT

Patient ages ranged from 17 years to 73 years, and treatment was rendered in both elective outpatient and acute inpatient settings. Operative procedures were performed with the patient under general anesthesia and placed in the standard supine, crucifix, reverse-Trendelenburg position. Pneumoperitoneum was achieved by either Veress needle or visually guided cannula CO_2 insufflation. All procedures were performed through 2 operative ports and a camera port. Dissection of the gallbladder was initiated at the Triangle of Calot with identification, skeletization, and division of the cystic duct and artery. Antegrade mobilization of the gallbladder from the liver bed followed with subsequent removal of the specimen through the umbilicus. In all but 2 cases, closure and division of the cystic duct and artery as well as mobilization of the gallbladder from the liver bed were accomplished solely with the Harmonic scalpel equipped with an LCS-C5 curved blade tip at a level 2 setting. Two patients with visibly large cystic ducts (greater than 5 mm) underwent additional Endoloop closure of the duct remnant. No intraoperative cholangiograms were performed. Any patients presenting with clinical evidence of choledocholithiasis or biliary pancreatitis underwent preoperative endoscopic retrograde cholangiopancreatography (ERCP) evaluation and treatment. All patients were evaluated up to 4 weeks postoperatively in the office.

BACKGROUND

Laparoscopic cholecystectomy is frequently complicated by gallbladder perforation and loss of bile or stones into the peritoneal cavity. The aim of this study was to compare the use of ultrasonic dissection and electrocautery with respect to the incidence of gallbladder perforation and intraoperative consequences.

Methods

Patients undergoing elective laparoscopic cholecystectomy were randomized to electrocautery or ultrasonic dissection of the gallbladder. The main outcome measures were gallbladder perforation, operating time and the number of times the lens was cleaned. Univariate and multivariate analyses were performed.

Conclusion

The use of ultrasonic dissection in laparoscopic cholecystectomy reduces the incidence of gallbladder perforation and helps the operation to progress. Less experienced surgeons benefit most from ultrasonic dissection, particularly in complicated intraoperative circumstances.

Advantages and Limits

The disadvantage of monopolar coagulation, the limits of the bipolar coagulation and the frequent changes of instruments during laparoscopic procedures, are three elements that make the harmonic dissectors very useful in laparoscopic surgery.

Results and Conclusions

After our short experience with HS and in concordance with literature, we consider that: The advantages are: the features to coagulate nearest delicate anatomic structures (biliary tree, large bowel, blood vessels) the absence of the smog and the slag; the scissors is a versatile device which allows the dissection and the coagulation without changes the instruments. The limits are: hemorrhages after insufficient coagulation or prehension, the necessity of the learning curve, high costs of the disposable materials. The HS device represents a real progress, especially for that laparoscopic surgery which requires the coagulation of blood vessels placed in thick and fat structures.

COMPLICATION OF HARMONIC SCALPEL

Background

The harmonic scalpel is an ultrasonically activated surgical instrument for tissue dissection. Despite its expanding surgical applications, there are no reports about associated complications.

CASE: A 35-year-old woman sustained injury to the sigmoid colon from the use of the harmonic scalpel during laparoscopic lysis of pelvic adhesions. The injury was identified and repaired laparoscopically in a primary fashion with no subsequent sequelae.

Conclusion

Acoustic energy coupling and overheating of the laparosonic blade extender sheath occur with bending of the instrument.

This can happen with steering of the blade extender during laparoscopic surgery and may increase the exposure risk of adjacent tissues to injury.

Results

There was no conversion to open cholecystectomy and no intraoperative or immediate postoperative complications. The operative times varied depending on the degree of pericholecystic and cholecystic and/or associated intraperitoneal adhesions with an average incision to closure time of 42 minutes. Division of the cystic duct by the harmonic scalpel required approximately 2 to 3 minutes, depending on the ductal thickness and associated inflammation. In general, the cavitational effect on the surrounding pericholecystic tissues, especially in the region of the liver bed, allowed for easier mobilization of the gallbladder, thus avoiding inadvertent compromise of the gallbladder wall and bile spillage. No Liver bed charring or bilious seepage from any ducts of Luschka was observed. Length of procedure, hospital stay, and return to full functional status did not vary significantly from patients observed previously (personal experience) who underwent clip and cautery procedures. All patients evaluated in the office postoperatively demonstrated no evidence of bile leakage or atypical complaints.

DISCUSSION

This study clearly demonstrates that the Harmonic scalpel provides complete and reliable hemobiliary stasis in most patients undergoing laparoscopic cholecystectomies. In all patients who underwent division of the cystic duct and artery by harmonic scalpel alone, there were no clinically apparent immediate or remote postoperative bile leaks or hemorrhages. In the 2 patients with larger diameter cystic ducts (greater than 5 mm) identified intraoperatively, closure was accomplished with application of a chromic Endoloop. Harmonic scalpel division alone was not attempted due to the inherent limitations of the instrument. Except for the 2 to 3 minute interval required for cystic duct division, use of the harmonic scalpel did not adversely affect the length of procedures. In fact, properties intrinsic to the harmonic scalpel (cavitation and smokeless coagulation) seem to provide an advantage over electrocautery in the dissection of the gallbladder and may enhance surgeon performance. Certainly, harmonic scalpel division of the cystic duct could be utilized independently of the direction of gallbladder dissection. One additional benefit of harmonic scalpel dissection of the liver bed is the more effective closure of the ducts of Luschka. While rarely of clinical significance, bile leakage from the liver bed may contribute to postoperative pain, small bilomas, and the occasional return to the operative room. Objective data documenting length of hospitalization and

resumption of normal activities were not studied. In a previous investigation, Tsimoyiannis et al[8] demonstrated comparable recovery times in patients undergoing laparoscopic cholecystectomies using ultrasonically activated shears for dissection when compared with patients undergoing the more traditional clip and cautery technique. Subjective observations throughout this study would substantiate this finding. There appears to be a cost benefit when using a single disposable instrument (LCS-C5 Harmonic scalpel blade tip), especially when compared with the usage of the disposable Endoshears and clip-applier in combination. At Clark Memorial Hospital, the difference is approximately $20.00 per case. The cost benefit is more apparent in cases where other disposable instruments are used in conjunction with the Harmonic scalpel. However, it would be unrealistic to extrapolate these savings on a national level. Instrument costs vary considerably across the United States, depending on manufacturer fees, regional distribution contract fees, and hospital markups. Hopefully, a cost benefit would be realized in the majority of the country.

CONCLUSION

The Harmonic scalpel is a safe, efficient, and practical instrument to use during laparoscopic cholecystectomies, and its role can be expanded to include complete hemobiliary stasis**.**

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The Role of Laparoscopic Surgery in the Surgical Treatment of HIV Patients

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AIMS OF STUDY

The purpose of present study is to evaluate the role of laparoscopic surgery in the surgical treatment of HIV patients (related or unrelated to HIV illness in whom requiring surgical intervention) by comparing results of open surgeries with the results of review articles on laparoscopic surgeries under following headings as:

1. Universal precautions during surgery
2. Procedure details
3. Operation time
4. Blood loss
5. Occupational exposure risk
6. Postoperative analgesics requirement
7. Postoperative morbidity and mortality
8. Economy

INTRODUCTION

Despite much clinical experience, there are few published accounts of the surgical manifestations of HIV/AIDS and role of laparoscopic surgery in HIV patients. More than 40 million people worldwide are infected with HIV. Surgical treatment of HIV-infected patients is indicated for problems both related and unrelated to HIV infection.[3] The laparoscopic surgeon plays an important role in the diagnosis and management of AIDS related conditions in conjunction with physician. As most of the HIV patients are poorly nourished, immunocompromised and final outcome of the open surgeries is not satisfactory. Laparoscopic procedures provide several specific advantages over routine (open) procedures in this population. For the patient, the extent of invasiveness is diminished; incisions are limited,[6] associated with better preservation of the immune system than open surgery[7] which decreases healing time and wound complications, pulmonary function is optimized; and the patient rapidly returns to regular activity. Although CO_2 pneumoperitoneum affects the peritoneal response to injury, it seems to have no harmful effect in terms of intra-abdominal infection. For the surgical team, risk of exposure to body fluids is minimized.[5]

REVIEW OF LITERATURE

A computerized Medline Search was conducted from 1966 through the present and turned up only 10 papers concerning HIV positivity and surgery, none of them being in transgendered or transsexual individuals. In 1997, Flum and Wallack[1] conducted a literature search concerning the impact of the human immunodeficiency virus infection and syndrome has had on the practice of surgery. They concluded that the incidence of human immunodeficiency virus infection ranges from 1.3% of patients hospitalized at sentinel hospitals to 1.5/1,000 patients in lower risk environments. The rate of percutaneous injury during an operation is 5 to 6% and human immunodeficiency virus transmission after percutaneous injury with a needle contaminated with the human immunodeficiency virus is 3%. Furthermore, Lowenfels, Mehta, Levi, Montecalvo, Savino and Wormser[2] reported in 1993 on the incidents of percutaneous injuries in surgeons. They reported that there was a decrease in the frequency of reported percutaneous injuries over the period 1988 to 1993. The number of yearly injuries per surgeon decreased from 5.5 to 2.1. As Flum and Wallack[1] reported, the transmission of human immunodeficiency virus after percutaneous injury with a needle contaminated with HIV is 3%. It would therefore seem not particularly dangerous to the individual surgeon, providing universal precautions are undertaken, to undertake surgery on HIV positive patients. From the first case in 1988 until mid 1995, our index of severity of HIV infection was the CD4 Lymphocyte count. After this time the viral load has been used and this is measured as viral RNA. Before 1995, measurement of viral load was unavailable to us. In 1901, first diagnostic laparoscopy was performed by Kelling on dog. After him in 1910, a Swedish internist, Jacobaeusc performed first diagnostic laparoscopy in human. After that an era of minimal access surgery created outbreak in the treatment of HIV patients due its advantages over traditional open surgeries.

INDICATIONS OF LAPAROSCOPY IN HIV PATIENTS

Indications of laparoscopy in surgical patients and HIV patients are almost same as HIV- negative patients.

Laparoscopy in HIV Positive Patients with Acute Abdomen

- Correct diagnosis achieved with least surgical trauma.
- Institution of timely and effective treatment.
- Reduction of risks of transmission of virus to theater personnel's due to small incision and less contact with patient's body fluids.

Diagnostic laparoscopy minimizes unnecessary laparotomies and complications.

Laparoscopy in Trauma Patients (Blunt and Penetrating)

Trauma patients with equivocal signs are always a dilemma, more so when patients are victims of "Urban violence, car accidents, intoxication by alcohol, spinal cord injury and/or head injury. Commonly used diagnostic peritoneal lavage (DPL) has a sensitivity of > 95% and specificity of 83%. The rate of unnecessary laparotomy is still very high with a morbidity of 20% and mortality of 6%. If diagnostic laparoscopy is combined with diagnostic peritoneal lavage then the sensitivity can be increased up to 100% and specificity up to 90%. Diagnostic laparoscopy is extremely useful in patients with equivocal signs and hemodynamically stable. It is slowly replacing the old belief that, all penetrating abdominal wounds whether stab or gunshot should be explored. Also in cases of subcapsular tears of liver or spleen or minor tears in mesentery or omental injury can now be completely conserved saving the number of non-therapeutic laparotomies (NTL).

Laparoscopy in ICU Patients/Critically Ill

- Acalculus/Calculus cholecystitis.
- Large bowel perforation.
- Duodenal and gastric perforations (e.g. stress ulcers)
- Duodenal and gastric perforations (e.g. stress ulcers)
- Pancreatitis (due to biliary sludge)
- Intra-abdominal hemorrhage.

It is extremely difficult to diagnose above mentioned complications in a patient who is already in MOF (multiple organ failure). There are no symptoms and signs which can be elucidated as patients are on ventilation or gravely ill and delay in surgical treatment may lead to increase in morbidity and mortality.

Laparoscopy in Chronic Abdomen in HIV Patients

Most of patients presenting with chronic abdominal pain after laparotomy found to have mesenteric lamphadenopathy, or drug induced pancreatitis, here diagnostic laparoscopy can take mesenteric lymph node biopsy without much major surgical trauma.

Role of Laparoscopy in Gynecological Emergencies

Laparoscopy is useful in the early recognition of pelvic inflammatory disease and Fitz Hughes Curtis syndrome (Perihepatitis associated with PID). It is also useful in the early recognition of pelvic inflammatory disease and Fitz Hughes Curtis syndrome (Perihepatitis associated with PID).

Role of Laparoscopy in Suspected Acute Appendicitis

Commonest abdominal emergency all round the world is acute appendicitis. An early diagnostic laparoscopy in suspected acute appendicitis reduces the risk of appendiceal perforation, improves diagnostic accuracy and reduces the number of negative laparotomies. It helps the surgeon to rule out concomitant problems but two important groups of patients where it is immensely useful in:

- Premenopausal women when it is difficult to rule out gynecological conditions.
- Obese patients in whom large incisions may be required to remove the appendix.

Laparoscopy in Patients with Perforated Peptic Ulcers

Early diagnosis and treatment of perforated peptic ulcer within 6 hours of the incident can reduce mortality from 90% to about 10%. Diagnostic laparoscopy is much more sensitive than CT as it can determine the type of fluid along with food debris and can accurately localize the site of perforation. Perforations are closed by simple suture, omental patch, fibrinous glue, falciform ligament patch or ligamentum teres patch. The trend is towards suture less closure or ligamentous patches. A larger delay, beyond 6 hours, makes closure difficult and hazardous due to inflammatory changes and phlegmon. Main disadvantage is increased operating time and recent studies have not shown to decrease length of hospital stay, resumption of normal diet, reduction of pain in the first 24 hours, or early return to normal activities. Prospective random trials are needed to clarify these factors.

Laparoscopy and Small Bowel Obstruction (SBO)

Early SBO, with minimal peritonitis, single band adhesions, without obvious gangrenous changes in the bowel can be managed by therapeutic laparoscopy.

The other criteria for selection are:

- Proximal obstruction.
- A partial obstruction.
- Obstruction partially responding to nasogastric suction.

Laparoscopy and Diverticular Disease

Diagnostic laparoscopy is very useful in diagnosing severity of diverticular disease so that management decision can be

taken whether to conserve or proceeded to surgery. Abscesses can be drained under direct vision.

Laparoscopy in Biliary Disorders

Commonest surgical presentation in HIV patients is acalculus cholecystitis where open cholecystectomy is dangerous here laparoscopy is the best option. Also conditions like obstructive jaundice due to ca-pancreas laparoscopic Whipple's operation can be done.

Laparoscopy in Pulmonary Diseases

Laparoscopy is also useful for diagnosis (thoracoscopy) and different therapeutic procedures in HIV patients like closure of bullies, pnuemonectomy, etc.

Laparoscopy for Lymph Node Biopsy

This is most common indication for diagnosis of different conditions histopathologically, (e.g. cervical lymph nodes) during this risk of needle prick injuries are more during open surgery so laparoscopic approach is best for same. It is also useful for biopsy of mesenteric and pre- and para-aortic lymph nodes avoiding major laparotomy.

Anal Disorders

This is the one of commonest surgical presentation in HIV patients due to loss of perianal fat there develops piles and rectal prolapse which can be treated laparoscopically with minimum complications.

CONTRAINDICATIONS FOR LAPAROSCOPY

Contraindications for laparoscopy are same for both HIV positive and negative patients.
1. Severe COPD and cardiac diseases
2. Grade II and III shock
3. General peritonitis
4. Previous extensive abdominal surgery
5. Bleeding disorder
6. Advanced stages of pregnancy
7. Suspected malignancy
8. Patients with cryptococcal meningitis

MATERIAL AND METHODS

The source of data was open surgeries performed on HIV patients at Bel-Air Hospital, Panchgani, during the period of November 2006 to December 2007. Bel-Air Hospital is one of leading institute for HIV treatment and doctors training center under Indian Red-Cross Society and NACO. The results of open surgeries are compared with the review articles data collected by reviews of articles laparoscopic surgeries on HIV patients by using search engine Google, Highwire press, Springerlink,PubMed,Yahoo & other linked references. The keywords used are HIV, laparoscopy, universal precautions, immunocompression and complications.

SOURCE OF DATA

Seventy-four patients of HIV operated for various surgical presentations operated at BEL-AIR HOSPITAL, PANCHGANI, MAHARASHTRA forms main source of data for present study. Patients were presented to surgery OPD, referred from HIV wards for surgical problem and from other medical practitioners after diagnosis of HIV.

SELECTION OF PATIENTS

The patients with surgical indication were selected as per their presentation for either emergency or planned open surgeries. For the routine surgeries patients were investigated for basic and anesthesia point. HIV confirmatory test, CD4 count was also done apart from above investigations. Preoperative single dose of antibiotics were given almost every case.

OPERATIVE TECHNIQUE

During surgery strict universal precautions were taken by whole surgical team, like use of eye protective goggles, full rubber shoes, plastic arm guards, foot cover, waterproof surgical gowns, double gloves etc. Also precautions were taken to avoid spillage on floor, needle stick injuries were prevented by avoiding direct transfer of sharp instruments from surgeon to nurse and vice versa, i.e. keeping a kidney tray between. All waste materials were disposed as per CDC guidelines. As much as disposable items were used.

Postoperatively patients were transferred either to SICU or wards as per patient's condition. Usually patients were discharged on 9th or 10th day after removal of sutures.

Post Exposure Prophylaxis (PEP)

Post exposure prophylaxis (PEP) is antiretroviral drug treatment that is started immediately after someone is exposed to HIV. The aim is to allow a person's immune system a chance to provide protection against the virus and to prevent HIV from becoming established in someone's body. In order for PEP to have a chance of working the medication needs to be taken as soon as possible and definitely within 72 hours of exposure to HIV. Left any longer and it is thought that the effectiveness of the treatment is severely diminished[33] PEP usually consists of a month long course of two or three different types of the antiretroviral drugs that are also prescribed as treatment for people with HIV. The commonest used regimen in our hospital

is—Tab. Lazid (Zidovudine 300mg + Lamivudine 150 mg) for 28 days. As with most anti-retrovirals these can cause side effects such as diarrhea, headaches, nausea/vomiting and fatigue. Some of these side effects can be quite severe and it is estimated that 1 in 5 people give up PEP treatment before completion.[33]

RESULTS

Total of 74 patients presented with surgical problems, out of them 22 patients treated with conservatively while remaining 52 treated with operative treatment forms basis of study.

Time of Surgery

Out of 52 operated patients, 14 (26.92%) patients operated on an emergency basis and 38 (73.08%) had planned surgeries.

	No. of patients	Percentage (%)
Emergency	14	26.92
Planned	38	73.08
Total	52	100

Type of Operation

Out of 52 patients 18 (26.92%) patients underwent major and 34 (47.06%) minor surgeries.

	No. of patients	Percentage (%)
Major	18	52.94
Minor	34	47.06
Total	52	100

Operation Time

Maximum number of patients (40) required 30 minute to one hour time, only some complicated cases (3) required more operative time i.e. 3 to 4 hours.

Time	No. of patients	Percentage (%)
0–1 hour	40	76.52
1–2 hours	04	07.69
2–3 hours	05	09.61
3–4 hours	03	05.76

Blood Loss

The approximately blood loss during surgery varies from minimum of 30 ml to maximum of 300 ml depending of type of surgery and findings.

Occupational Exposure

During overall study total 4 assisting nurses subtended with needle prick injury while assisting the surgeries in operation theater. They all received emergency PEP (Post-exposure prophylaxis).

Postoperative Antibiotics

Most of the patients received at least 7-8 day course of postoperative higher antibiotics.

Postoperative Analgesics

Present study on open surgeries analgesics were given as thee times a day for 7 to 8 days.

Incidence of Wound Infection

Incidence of wound infection was found in almost 20-25% of cases in the form of stitch abscess. It is found that incidence of wound infection was more in patients having low CD4 count (< 200). One patient developed fecal fistula after resection anastomosis and treated conservatively. Incidence of respiratory complications like pneumonia observed in 12 patients (23.07%).

Hospital Stay

Hospital stay for patients underwent open major surgeries varied from 8 days to 15 days.

Economy

Average total expenses for surgery was 800 to 12000 depending upon type of surgery, hospital stay and complications.

Mortality

Total 4 patients died in present study out of 52 operated patients. So overall mortality rate was 7.69%.

DISCUSSION

The literature on postoperative complications is descriptive and inconsistent and does not support a firm conclusion on the association between rates and HIV serostatus or disease stage. The ultimate outcome of surgery in HIV-infected patients is most likely dependent upon many independent variables and not just the underlying viral infection or disease stage.[4]

Total number of patients with surgical problems was 74, out of that 52 (70.27%) patients required open surgery. The number of patients in the data is less as compared to other studies,[8,11,12] as HIV is still a social stigmata and most of patients are not exposing themselves. Also most of patients are managed symptomatically by general practitioners. The overall incidence

of postoperative complications during open surgeries was 25% as compared to laparoscopic surgeries.[2,4,10,26-28] Also respiratory complication rate is also to the higher side as compared to laparoscopic surgeries,[2,6,9-12,25,29] this is due to most of the patients are suffering from pulmonary TB, also due to poor built and weakness the ambulation is problem as compared to laparoscopy surgery maintains interior milieu.[7,30,31]

The blood loss during major surgeries was ranged from 30 to 300 ml; it is very much towards higher side as compared to literatures on laparoscopic surgery.[6,13,18] This is because laparoscopy is an electrosurgery and there is minimal tissue dissection and trauma.[6] Postoperative analgesics requirements were higher side as compared to laparoscopic surgery. The incidence of needle prick injuries during open surgery was found to be 7.6% is quite a higher than comparative to the standard rate, i.e. 0.3 %.[3] The results of laparoscopic surgeries shown negligible risk of occupational transmission. This is because in laparoscopy there is no direct exposure to the blood and secretions, also suturing is done via small wound, also no much sharp instruments used routinely.[5,23]

The average operative time was 3 hours for major surgery and 30 minutes for minor surgery. Literature study showed laparoscopic surgeries are taking more time than open surgeries,[5] this is because maximum time is wasted in instrument set up like insufflators adjustment, light adjustment, white balancing , access, etc.

Mortality rate in present series of open surgeries is 7.69%. The comparative study on laparoscopy shown less mortality rate with expertise hands but mortality rate is higher with inexperienced hands due to major vessel bleeding. Hospital stay during open surgeries varied from 2 to 15 days as compared to literatures on laparoscopic surgery, laparoscopic surgeries have very less hospital stay, i.e. only 1-2 days.

Economically, open surgeries costs 2000 to 12000 rupees while laparoscopic surgery cost ranges between 15000 to 50000 rupees. The higher cost is due to cost of staplers, hemostatic instruments.

CONCLUSIONS

Above study revealed following conclusions.

Compared to traditional operations, there are fewer traumas to the skin and muscles and less postoperative pain and disability with a laparoscopic procedure. Also, patients have a shorter hospital stay and a quicker recovery period.

There is a reduced infection rate. This is because delicate tissues are not exposed to the air of the operating room over long periods of time.

Video magnification also offers surgeons better exposure of the diseased organ and its surrounding vessels and nerves. As a result, delicate manuevers can better be performed.

Laparoscopy reduces risk of occupational transmission in surgical team.

The disadvantages of laparoscopy include the expensive equipment involved in performing it. Not all hospitals may be able to afford certain procedures.

Another issue is the need for surgeons to take special training in performing the minimally invasive operations. The need for additional training is because laparoscopic surgeons leave the familiar territory of a three-dimensional operating field to working on a two-dimensional flat video display. Learning the procedures requires some degree of practice moving the long laparoscopic instruments while handling delicate tissues.

Finally, laparoscopy cannot always be performed on everyone. For example, some patients with many prior operations may have so much scar tissue within the body that a safe laparoscopic operation cannot be done.

Thus, in modern era of minimal access surgery laparoscopy is an asset to the HIV patients by reducing mobility and increasing their life expectancy.

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Laparoscopy Complications in Neonates and Small Infants

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Abstract: Laparoscopy in pediatric surgical practice has become a reality, and many sophisticated procedures are nowadays being performed by it, this article tries to focus on the laparoscopy among neonates and small infants and to answer the question how safe is the MAS in this group of patients. Few important studies were revised carefully figuring out the complications specific to laparoscopy, their rate and underlying causes.

Keywords: Complications, laparoscopy, MAS, neonates, infants.

INTRODUCTION

Minimal access surgery though, first described as early as 1973, it was mainly used for diagnostic purposes. Historically, pediatric surgeons were slow to get used to minimal access surgery (MAS) techniques compared with the adult surgical community. The reasons behind those debates and hesitations were many and could be summarized into:

PATIENTS FACTORS

Physiological Issues

The physiologic response to pneumoperitoneum in children is more obvious than in adults. Peritoneal insufflation with carbon dioxide was discovered to be a cause of hypercarbia, acidemia, and decreased oxygenation in the pediatric piglet model. Pneumoperitoneum-induced hypothermia was a major concern also.

Anatomical Issues

Laparoscopy in children requires special care. The abdominal cavity (in relation to surface area) in infants and children is less than that of adults. The abdominal wall in children is very elastic compared to that in adults which increases the difficulty of port incertion.

Anesthesia for MAS in Neonates

MAS in neonates makes new challenges for the pediatric anesthetists who should establish how to maintain one lung ventilation (in thoracoscopy), keep infant warm against cold insufflation with cold CO_2, avoid hypercarbia and abdominal distention and many other tasks that need knowledge, skills and special training.

TECHNICAL FACTORS

Differences in size and physiology have required a number of technological modifications to apply MAS techniques to this population. Minimal access surgery in infants has additional ergonomic problems compared with that of adult patients.[12] The small endoscope needs to be positioned at a short distance from the target thus limiting the field of view. The surface available for insertion of working instruments and the internal operative workspace for maneuvering of these instruments are limited, so the tips of instruments can move out of vision field easily and could cause inadvertent injuries. However, special care must be taken when using smaller-sized instruments while doing surgical tasks.Tremors and imprecise movements will be exaggerated because the small extracorporeal hand movement will be translated into relatively larger one because of the longer intracorporeal shaft length in comparison to extracorporeal part, and the magnification of the operative field.[12] In addition, the risk of puncture by inadvertent movements or damage by excessive grasping forces is higher due to the small surface area of the tip of fine instruments.

PRACTICAL FACTORS

Lack of infrastructures.

Lack of formal training programs in MAS. Many of pediatric surgeons—who were well established in the art of open surgery—were terrified of the long learning curve of the new technology and unenthusiastic to apply to newborn babies and children.[8] All these factors made pediatric surgeons worry about the complications that might happen. But nowadays, there are increasing numbers of complex MAS procedures in infants, including thoracoscopic esophageal atresia repair, laparoscopic duodenoduodenostomy and laparoscopic porto-enterostomy for biliary atresia some of which involve anastomosis in small neonates weighing less than 1.5 kg.[12]

The usual procedures done in neonates and small infants by laparoscopy are:

Diagnostic Laparoscopy

1. Diagnostic gold standard for impalpable testes
2. Liver biopsy
3. Direct cholangiography
4. Lower GI bleeding
5. Intersexual anomalies
6. Recurrent abdominal pain
7. Blunt/sharp abdominal trauma
8. Seromuscular bowel biopsy

Therapeutic Laparoscopy

1. Orchidopexy for intra-abdominal testes
2. Cholecystectomy.
3. Anti-reflux surgery (Nissen, Thal) fundoplication
4. Resection of benign ovarian tumors
5. Pyloromyotomy
6. Gonadectomy for dysgenic gonads
7. Small bowel resection
8. Lap-assisted pull through for Hirschsprung's disease
9. Lap-assisted pull through for anorectal malformations
10. Nephrectomy for non-functioning kidney
11. Partial nephrectomy for duplex system
12. Adrenalectomy
13. Varicocelectomy
14. Appendectomy
15. V-P shunt placement
16. Uncomplicated liver cysts
17. Splenectomy for minimal or moderate splenomegaly
18. Meckel's diverticulum

As a summary minimal access surgery (MAS) in neonates and small infants carries a significant consideration. The tolerance of these small babies and the assumed physiological effect of MAS, in addition to the required anesthetic and surgical skills, have made it difficult to perform such procedures in many international centers. The present article tries to answer the important question; laparoscopic surgery in neonates and small infants is it safe?

Aim of the Article

To evaluate the complications of minimal access surgery in neonates and small infants.

Material and Method

A literature search was performed using Medline, the search engine Google, springer link and highwire press. The following search terms were used: laparoscopy, minimal access surgery, neonates, infants, complications. Selected papers were screened for further references. Criteria for selection of literature were methods of analysis (statistical or non-statistical), and the institution where the study was done (Specialized institution for pediatric laparoscopic surgery, well known centers)

RESULTS

The search gave a wide range of scientific material, but only Seven studies were chosen as a final result of the search (the most important and recent ones according to the above mentioned selection criteria), revised, presented in summary and to be discussed later.

Multicentric Assessment of the Safety of Neonatal Video Surgery

Nicolas Kalfa, 1 Hossein Allal et al Surg Endosc (2007) 21:303–308

218 neonates (mean age, 16 days; weight, 3,386 g) from seven European university hospitals were included in a retrospective study. In 42 cases minor and major complications occurred (19.2%). In 16 cases, the complications were due to surgical incidents, and in 26 cases, they were related to poor tolerance of the pneumoperitoneum or pneumothorax (anesthetic incidents). The overall rate of conversion to open surgery was 15%.

Complications of Laparoscopic Surgery in Neonates and Small Infants

Iwanaka, H. Uchida, H. Kawashima, A. Nishi, S. Kudou, R. Satake Journal of Pediatric Surgery, Volume 39.

Total number of 585 children underwent laparoscopic surgery during the study period. The children were classified into three groups according to the body weight:

154 infants weighing less than 5 kg (group S), most common procedure was pyloromyotomy. Complications were observed in 9.7%.

96 infants weighing less than 10 kg (group M), most common procedure was Nissen fundoplication, Complications were observed in 15.6%.

335 children weighing more than 10 kg (group L), most common procedure was appendicectomy, complications were observed in 9.6%.

The rate of visceral injuries (GIT and other organs) was significantly higher in group S (5.2%) than in the other groups M (3.1%) and L (1.2%).

Minimal Access Surgery of Pediatric Inguinal Hernias: A Review

Ramanathan, Saranga Bharathi, Manu Arora Vasudevan Baskaran Surg Endosc

Collection of data of studies included 22 surgeons from different countries resulted in total of 3580 cases of congenital inguinal hernias which give 4776 hernias (unilateral and bilateral) within age ranging from 4 days up to 18 years. No any significant

increase in any specific complications among the younger age group was noticed.

Laparoscopic Inguinal Hernia Repair in Children: The Early Learning Curve of the Trainer and Trainees

S Manoharan, MG Swindells, T Tsang
Department of Pediatric Surgery, Norfolk and Norwich University Hospital NHS Trust, Norwich, UK

45 patients were included in the study with ages ranged from 4 weeks to 4 years. About 37 of those children were aged less than 1 year. 8 were more than 1 year. The median age was 4 months. All of them underwent laparoscopic inguinal hernia repair. There were no intraoperative complications, and no patient required conversion to an open procedure. There has been no presentation with recurrent inguinal hernia following early follow-up.

Outcomes after Laparoscopic Surgery in Neonates with Hypoplastic Heart Left Heart Syndrome

Journal of Pediatric Surgery, Volume 42, Issue 6
Pages 1118 - 21, B Slater, S Rangel, C Ramamoorthy
C Abrajano, C Albanese

12 patients with HLHS underwent a total of 13 surgeries during the study period (8 combined Nissen fundoplication and gastrostomy tubes, 3 isolated gastrostomy tubes, 1 Ladd procedure, and 1 combined Nissen fundoplication and gastrocutaneous fistula closure). Perioperative complications (which are not specific for laparoscopy) were observed in 6 patients (3 gastrostomy tube site infections, 1 small bowel obstruction, 1 postoperative sepsis, and 1 urinary tract infection). There was no mortality in this series.

Tolerance of Laparoscopy and Thoracoscopy in Neonates

Nicolas Kalfa, Hossein Allal

The study included 49 neonates (mean age: 11 days; weight: 3285 g) underwent 50 Laparoscopy procedures (Laparoscopy and Thoracoscopy). No surgical incidents were noted. Ten anesthetic incidents occurred (20%), 3 of which required temporary or definitive cessation of insufflation (O_2 saturation < 70%). Systolic arterial pressure decreased in 20% of the cases, but was controlled easily by vascular expansion. Temperature loss (mean postoperative temperature: 35.6°C) was proportional to the duration of insufflation (Core temperature was <36°C in 50% of the patients and <34.5°C in 12%. For 1 infant, the hypothermia (33.6°C) was complicated by an episode of bradycardia).

Laparoscopic Urinary Tract Surgery in Infants Weighing 6 kg or Less: Perioperative Considerations and Comparison to Open Surgery

Neheman A, Noh PH, Brenn R, González R

Retrospective nonrandomized chart review: comparison between 17 infants weighing 6 kg or less in whom laparoscopic urinary tract surgery was done and a weight matched group of 18 patients in whom open urinary tract surgery was performed. Surgical complications occurred in 1 patient (6%) from the laparoscopic group and 2 patients (11%) from the open group. No anesthesia complications were recorded.

DISCUSSION

Laparoscopy in small children requires special care, because of its high potentiality to develop complications. These complications can be divided into two categories:

Nonspecific laparoscopic complications; those might occur in any laparoscopic procedure and are further classified into:

Those specifically attributable to the insufflation of gas into a body cavity (physiological).Those due to specific instruments used to carry out the laparoscopic procedure and are not unique to the kind of surgery but common for the procedure in general like Veress needle insertion, trocar placement[16] (surgical). **Specific complications** which might occur for certain procedure in particular like injury to iliac vessels in inguinal hernia repair, injury to vagus nerve in fundoplication …. etc.

Unique aspects of neonatal physiology makes dealing with them is not merely as if they are small models of adult persons, and in MAS specially the element of insufflation has important effect on their cardiovascular system Changes in cardiovascular function during laparoscopy are affected by insufflation pressure, intravascular volume, patient position and anesthetic agents[16] This was observed clearly in **study 1.** There was no mortality but a significant morbidity (19.2%) including both surgical (7.5%) and anesthetic incidents (12%). The anaesthetic incidents occurred during insufflations includes decrease oxygen saturation, transient hypotension, hypercapnia, hypothermia and metabolic acidosis. It was possible to correct these complications in 42% by ventilatory adjustments, intravenous fluids and external warming. But insufflations had to be temporarily (35%) or definitively (23%) stopped, and conversion to open surgery was done in the latter. The risk factors for an insufflation-related incident were young age, low body temperature, thoracic insufflation, high pressure and flow of insufflation, and length of surgery (if the operation lasts > 100 min the complication rate increases).

The abdominal surface/cavity ratio in neonates and small children is less than that of adults. The abdominal wall in children is very flexible compared with adults. Special attention

is also needed in trocar placement to prevent intra-abdominal injuries.[11] Therefore, minimally invasive surgery in small children and infants requires high skills and special training and in **study no 2** the results took in consideration the surgical complications in the first place without focusing on the physiological complications due to insufflation and anesthesia. These complications are attributed to the size of working space and skills of the surgeon. It was observed that the rate of visceral injuries (GIT and other organs) was significantly higher in smaller infants, and the probable causes are: (1) limited surgical field because of small telescope and fewer ports and incomplete preoperative bowel preparation to get rid of intestinal gases, (2) Sharp tip of instruments, (3) then and fragile gastrointestinal walls, (4) poor opportunity for learning and practicing these procedures.[1] In **study 3** the percentage of complications in general was unremarkable but the vascular complications (Although small in number) have the potential to assume threatening proportions, i.e. the complications might be qualitative rather than quantitative. However, the MAS in inguinal hernia have the advantage of detection and repair of subclinical contralateral defect without need for another access.[5] Also postoperative pain, operation time (especially for bilateral cases), recovery, and cosmetic results are additional advantages, and this goes with the results of **study no. 4** were the conclusion is (Laparoscopic inguinal hernia repair in children is safe, with minimal complications). Operative time decreases with increase in surgeons' experience.[6] And the results of the previous two studies (3 and 4) may be because this procedure is relatively easier, short-timed and common; so surgeons are familiar with it. **Study 5** was included because assessment of laparoscopic procedures needs to be done also in complicated cases. The results are in favor of application of MAS on this category of infants, but (a multidisciplinary approach, including availability of a skilled and experienced anesthesia team, is believed to be vital to get optimum outcomes in these critically ill children).[4] In the **study no. 6** focus was again on the evaluation of the respiratory, hemodynamic, and thermic effects of video-surgery (MAS) on newborn babies (in the first month of life) and to determine the risk factors associated with per- and postoperative complications.[3]

This study figures out the neonatal high sensitivity to insufflation as the main limiting factor in MAS.

Risk Factors

Low body temperature, high variations of end-tidal pressure of CO_2, high oxygen or vascular expansion requirement at the beginning of insufflation.

The length of surgery. More than 100 minutes of insufflation. Thoracoscopy (The neonates were more sensitive to thoracoscopy than laparoscopy).

Patients' age and weight were not determining factors for insufflation tolerance.[3]

Study no. 7 includes small group of cases and its results are in favor of MAS.

CONCLUSION

Despite the very rapid growth of MAS in children in the past few years, its application in neonates should not be considered as a direct alternative of techniques used in older children.[9] Because of the much reduced working room and the potential effects of carbon dioxide insufflation (pneumoperitoneum and pneumothorax) on an immature cardiopulmonary system of the newly born baby, neonatal MAS is rendered more difficult. It is technically demanding and needs good selection of optimum instruments size and in infants it has extra ergonomic problems compared with that of adult patients. Adequate training is essential to gain enough skills and experience to face the challenging new, more advanced procedures integrated in this field to achieve less operative time and more safety to the patients. Relatively few studies reporting the complications of MAS were published, and most of those supporting the feasibility and safety of applicating laparoscopy in the first month of life are case reports or short clinical series,[2] (knowledge of risk factors and alarming signs of incidents may help to improve the tolerance of this technique during the neonatal age).

In the other hand laparoscopy in pediatric surgical practice has become a reality and looking at its advantages.[11,14]

1. Less postoperative pain
2. Better cosmetic results

Shorter hospital stay

Early return to normal activities including feeding, bowel movements, and work/school

Performance of surgery in deep cavities of small children like the hiatus and the pelvis with good illumination and magnification

Reduced wound complications

Early discharge from the hospital can decrease the hospital bill.

Makes it worthy to devote the time and effort to improve its advantages and broaden its usage scope based on sound scientific fundamentals.

As a summary, more efforts should be made to study and publish the effects and results of MAS among neonates and small infants to weigh them against the well-established traditional ways of open surgery, but (at the present time Laparoscopy should be considered an additional tool, with specific indications, in hands of a surgeon who has the sound principles of child surgery and capable of managing the complications independently, at the time of need. It is important that the operating surgeon knows how to select the cases that benefit from this new technology.

"We are made wise not by recollection of our past but for our responsibility for our future"

George Bernard Shaw

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Role of Mechanical Dilatation of Cervix in Hysteroscopy

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Abstract

Background: Hysteroscopy with sample of the tissue is the gold standard in the diagnosing of abnormal uterine bleeding. Operative hysteroscopy can then be performed as a therapeutic procedure in patients presenting with intrauterine abnormalities. Cervical dilatation poses a great challenge particularly in nulligravid, post-menopausal women and women with cervical stenosis. Difficulties encountered in dilating the cervix poses threat to complications such as cervical tears, creation of false track, hemorrhage and uterine perforation.

Objective: The aim of this study is to review the role of mechanical dilatation in hysteroscopy using oral and vaginal misoprostol and laminaria.

Methods: This study involves a retrospective analytical review and compares the role of oral and vaginal misoprostol and laminaria application in achieving cervical ripening before hysteroscopy. Its effects in cervical dilatation as well as the dosing, advantages and side-effects were also reviewed. There were twenty articles included in this study as extracted from electronic databases Cochrane Library, Medscape, Highwire Press and Google. Most of the articles assessed the cervical diameter by the largest number of Hegar dilators that could be inserted into the cervix without resistance. Subjective assessments of adverse effects and complications were recorded.

Conclusion: Methods of cervical priming before hysteroscopy lessens the need of further cervical dilation pre-operatively, lessens the complications associated with the entry of the hysteroscope into the cervical os and offered acceptable side effects.

INTRODUCTION

Recent advances in fiberoptics, light sources, high resolution lenses, and endoscopic surgical instrumentation made hysteroscopy an important diagnostic tool as well as therapeutic tool for patients presenting with intrauterine diseases. Hysteroscopy permits direct visualization of the uterine cavity thus making it the gold standard in diagnosing abnormal uterine bleeding. Operative hysteroscopy as well has gained popularity as a minimally invasive approach to intrauterine lesions (Siegler and Valle, 1988). However, a systematic review of diagnostic hysteroscopy in more than 26,000 women reported a failure rate of 4.2% for ambulatory hysteroscopy and 3.4% for in-patient procedures. Failed procedures were mainly attributed to technical problems, including cervical stenosis, anatomic and structural abnormalities and pain and intolerance.[1] Flexible hysteroscopes used in this procedure range in diameter from 2.7-5 mm; rigid hysteroscopes, from 1-5 mm; and operative hysteroscopes can be as large as 8-10 mm.[2,3] The diameters of the telescope prerequisite the dilatation of the cervix to 10-11mm prior to insertion of the instrument. Ideally, hysteroscopy is performed with minimal or no cervical dilation.[3] But this may not always be possible because the common complications encountered during the procedure are reported mainly to be related to the difficulty in entering the internal cervical os with the telescope especially in nulliparous and postmenopausal women. Complications reported are cervical tears, creation of false passages, and uterine perforation.[4] Prevention of cervical injury and uterine perforation during termination of pregnancy has been demonstrated by pre-operative cervical ripening[5,6] and may be achieved either mechanically, such as with osmotic dilators,[7] or biochemically with prostaglandins.[8] Misoprostol is a prostaglandin E1 analogue which is commonly used in obstetrics for induction of abortion and labor as well as postpartum to control bleeding (Bugaho et al., 1994). Misoprostol applied before hysteroscopy has reduced the need for cervical dilatation, facilitated hysteroscopic surgery and minimized cervical complications (Preutthipan and Herabutya, 1999). On the other hand, laminaria tents, made from the stems of Laminaria japomica (brown seaweed), are attractive natural substances that can cause cervical dilatation with minimal and no systemic side effects. They have been shown to be effective in inducing cervical priming prior to operative hysteroscopy (Ostrzenski, 1994). The aim of this work is to review several studies of the role of cervical dilatation in hysteroscopy.

Methods

There were 19 reported randomized controlled trials that evaluated the efficacy of misoprostol on cervical ripening in gynecologic patients, after searching medical literature databases including Cochrane Library, Medscape, High wire Press and Google. One article evaluated the efficacy of laminaria tents. The search terms used included "mechanical cervical dilation", "cervical ripening" and "hysteroscopy." References from identified publications were manually searched and cross-referenced to identify additional relevant articles. The studies have shown different cervical responses and outcomes.[9-28] Most of the studies compared the effect of misoprostol against placebo on different groups of women, such a nulliparous women and postmenopausal women. Patients received misoprostol

either orally or vaginally. The dosages given in the studies varied from 200 and 1000 mcg given between 2-24 hours before the surgery, via oral, sublingual or vaginal route. One of the studies compared the effect of laminaria tents against placebo. The patients were randomly assigned into two groups. They underwent hysteroscopic procedure with a 5-10 mm hysteroscope during the follicular phases of their cycle. The cervical width was assessed by the largest number of Hegar dilators that could be inserted into the cervix without resistance. Subjective assessment of the ease of the dilatation to 9 mm by the surgeon was also recorded. Adverse effects like pre-operative pain, mild lower abdominal pain and slight vaginal bleeding were recorded.

DISCUSSION

Recently, hysteroscopy has been used to investigate women presenting with abnormal uterine bleeding (Nagele et al, 1996). Hysteroscopy plus sampling the endometrial tissue increased the sensitivity and specificity for the detection of endometrial pathology when compared with blind endometrial biopsy alone. However, difficulty in cervical dilatation has been one of the major causes of failure of this procedure (Scottish Hysteroscopy Audit Group, 1995). The articles reviewed showed that vaginal misoprostol applied pre-operatively facilitates cervical priming and reduced the need for cervical dilation, facilitated the ease of diagnostic and operative hysteroscopy and minimized cervical complications. One article mentioned that both misoprostol and laminaria were equally effective. Nevertheless, misoprostol is superior over the laminaria due to easy application, cheap cost and convenience and better acceptability to the patient. Both oral and vaginal misoprostol showed no significant difference with respect to cervical opening, duration of dilation as well as the rate of complications. Most studies of dosing have involved the use of vaginal misoprostol administration with dosages of 200 microgram to 400 microgram given 9-12 hours before hysteroscopy showing the greatest benefit. One review showed that misoprostol application is safe and effective for cervical priming against placebo in premenopausal women but not in postmenopausal women. Misoprostol is a drug used for the treatment of peptic ulcer disease. The cost is cheap, self-administration is easy and does not require hospital resources in application, other than information.

CONCLUSION

In conclusion, methods of cervical priming and dilation before hysteroscopy negate the need of further dilating the cervix at the operation theater prior to the procedure. Among the methods offered in the market, misoprostol is highly superior in the cervical ripening before hysteroscopy due to cheap cost, easy to apply and mild side effects.

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Hysterosalpingography, Laparoscopy or Both in the Diagnosis of Tubal Disease in Infertility

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Abstract

Objectives: To evaluate and compare the diagnostic value of hysterosalpingography (HSG) with laparoscopy in the assessment of fallopian tube patency in infertile women.

Design: A comparative prospective cross-sectional study.

Setting: Department of Obstetrics and Gynaecology in Goztepe Education and Research Hospital, Istanbul, Turkey.

Materials and Method: Laparoscopy was performed in 100 infertile patients with either unexplained infertility or tubal factors indicated by hysterosalpingography. Regarding laparoscopy as the reference standard, tubal patency findings in histerosalpingography were compared with laparoscopic findings.

Results: The sensitivity, specificity, positive predictive value, negative predictive value of HSG in detecting tubal patency were 0.80, 0.75, 0.91 (95 % CI 0.82-0.96), and 0.55 (95 % CI 0.38-0.70), respectively. The false- negative and false-positive rates of HSG in detecting tubal patency were 15 % and 6 %, respectively. Adnexial adhesions, ovarian cysts and pelvic endometriosis were detected in 27% of cases with normal HSG's. Of the twelve cases of bilaterally occluded tubes detected by HSG, only 3 (25%) were confirmed to have bilateral occlusion during laparoscopy.

Conclusion: Because HSG has a limited value for accurately identifying tubal patency, laparoscopy is necessary to rule out the existence of peritubal adhesions and mild and moderate endometriosis.

INTRODUCTION

Hysterosalpingography (HSG), laparoscopy or both can be applied to demonstrate tubal patency. Owing to its noninvasive nature and low cost, hysterosalpingography (HSG) is widely used as a first-line approach to assess the patency of the Fallopian tubes and uterine anomalies in the routine fertility workup.[1] However, even when tubal patency is demonstrated by HSG, laparoscopy has been suggested as a mandatory step to rule out the existence of peritubal adhesions as well as endometriosis and peritubal adhesions.[2] Some authors have suggested laparoscopy after hysterosalpingography for pelvic pathologies which could be missed with HSG.[3,4]

Since morphological abnormalities of the Fallopian tubes can be visualized directly under laparoscopy, it is generally accepted as the gold standard in diagnosing tubal pathology and other intra-abdominal causes of infertility. Diagnostic laparoscopy has become the standard procedure in the infertility work up in many clinics as the final test to be performed before the couple is referred to infertility treatment. This diagnostic scenario concerns couples eligible for intrauterine insemination (IUI), i.e. unexplained infertility, male subfertility and cervical hostility. Laparoscopy is not usually performed in patients who are already planned for assisted reproductive technology. In such patients, assessment of the tubes and other intra-abdominal pathologies is of less concern except in the presence of hydrosalphinges which can be diagnosed by ultrasonography.[5] Meta-analyses of 20 studies on basic infertility investigations carried out in 4000 infertile women were reviewed to determine the accuracy of hysterosalpingography (HSG) in the demonstration of tubal patency, with the idea that tubal obstruction is a reliable finding of HSG that does not have to be confirmed by laparoscopy; however, normal hysterosalpingographic findings are not sufficient enough to exclude tubal pathologies with peritoneal factors.[6] Nevertheless, Fatum et al stated that couples with unexplained infertility should be treated with IUI without preceding diagnostic laparoscopy, and if unsuccessful, they should be referred directly to IVF.[7]

The relative merits of HSG and laparoscopy in the screening for tubal pathologies have been a matter of discussion for more than 30 years. We designed a study to compare the diagnostic value of hysterosalpingography (HSG) with laparoscopy in the assessment of fallopian tube patency in infertile women.

Materials and Methods

Hundred patients admitted to the Infertility Department of Goztepe Education and Research Hospital between March 2008 and July 2008 were included in this cross-sectional study. The informed consents of all the patients were obtained and the

study was approved by the Human Research Review Committee. Patients with subfertility complaints lasting less than a year, women older than 40 years at the time of their first visit, anovulation despite clomiphene citrate or bromocriptine use, partners with abnormal semen analyses according to the WHO criteria, previous histories of oophorectomy, salpingectomy or pelvic inflammatory disease and surgical or medical treatment for endometriosis were excluded from the study. The past medical histories, semen analyses, day 3 hormone levels and investigations for ovulation were obtained from all the study participants and a physical examination was carried out. Hysterosalpigography and laparoscopy was performed for the assessment of tubal patency in all the participants except for those with recent HSGs performed within the last two years, in whom only laparoscopy was performed and the available HSG was evaluated. All hysterosalpingographies were performed in the outpatient clinic of the department of radiology, between the 7th to the 10th day of the menstrual period. A water soluble contrast medium was used. Photographs were taken at the instant when the uterine cavity and tubes were filled with opaque material and when an overflow was seen at both sides of the tubes or when maximal filling of the tubes was observed without any overflow. After 30 minutes, a late film was made to detect contrast depots. HSG findings were classified as having no tubal occlusions, one-sided tubal occlusion or two–sided tubal occlusions (partial or total occlusion). Additional abnormalities of the uterine cavity were recorded as well. The laparoscopic examination was performed under general anesthesia, in the follicular phase of the menstrual cycle. After making a pneumoperitoneum, a thorough inspection of the pelvis, internal genitalia, and liver region was performed, followed by testing for Fallopian tube patency using Methylene Blue. A dilute solution of Methylene Blue was injected through the cervix via a Rubin cannula. The presence of adhesions, structural abnormalities of the uterus, endometriosis and Fallopian tube occlusion were sought for. Tubal occlusions detected with laparoscopy were classified as no tubal occlusions, one-sided tubal occlusion or two–sided tubal occlusion. During laparoscopy, therapeutic reproductive surgery such as coagulation of grade I or II endometriosis, adhesiolysis or cystectomy were performed when required.

Statistics

Tubal occlusions detected at HSG were compared with occlusions detected at laparoscopy. Tubal pathology was defined as any form of tubal occlusion, be it one-sided or two-sided . Sensitivity, specificity, positive predictive value, negative predictive value and likelihood ratio of HSG in the diagnosis of tubal occlusions were calculated, regarding laparoscopy as the reference standard. Confidence intervals (95% CI) were reported.

Results

Hundred cases with unexplained infertility or infertility due to tubal factors were included in this study. Mean female age of the study was 31.1 ± 5.5 (range 20-40). 69 Patients had primary and 31 had secondary infertility. The average infertility duration of patients with primary infertility was 2.6 years. The average duration of patients with secondary infertility was 4.3 years. 63 of the laparoscopic procedures conducted were diagnostic, while 37 were operative. Table 1 shows tubal status detected at HSG as compared to tubal status detected at laparoscopy. The sensitivity and specificity of HSG were 0.80 and 0.75, respectively, with a positive predictive value of 0.91 (95 % CI 0.82-0.96) and a negative predictive value of 0.55 (95 % CI 0.38-0.70), when tubal pathology was defined as any form of tubal occlusion detected at laparoscopy be it one-sided or two-sided. The false- negative and false-positive rates of HSG in detecting tubal patency were 15 % and 6 %, respectively. The likelihood ratio of HSG for a positive test result was 3.21 and the likelihood ratio for a negative test result was 0.26 (Table 1).

In laparoscopy, 21 patients were found to have intraabdominal adhesions disturbing the tuboovarian anatomy. 8 patients were diagnosed with stage 1 or 2 endometriosis. Ovarian cysts were detected in three patients and hydrosalpinx detected in 5 patients. Laparoscopic surgery was performed in cases with intraabdominal pathologic findings. A summary of tubal patency findings in HSG and laparoscopy can be found in Table 2.

TABLE 1: Comparison of tubal status between HSG and laparoscopy

HSG	Laparoscopy			
	No occlusion	One-sided occlusion	Two-sided occlusion	Total
No occlusion	61	5	1	67
One-sided occlusion	9	11	1	21
Two-sided occlusion	6	3	3	12
Total	76	19	5	100

Disease defined as any abnormality: sensitivity 0.80, specificity 0.75

TABLE 2: Detection of tubal status at HSG and laparoscopy

	Tubal status at HSG and laparoscopy n
HSG patent, Laparoscopy patent	61
HSG one-sided occluded, Laparoscopy patent	9
HSG two-sided occluded, Laparoscopy patent	6
HSG patent, Laparoscopy one-sided occluded	5
HSG one-sided occluded, Laparoscopy one-sided occluded	11
HSG two-sided occluded, Laparoscopy one-sided occluded	3
HSG patent, Laparoscopy two-sided occluded	1
HSG one-sided occluded, Laparoscopy two-sided occluded	1
HSG two-sided occluded, Laparoscopy two-sided occluded	3
Total	100

Of the 67 patients with normal HSG findings, 12 were found to have adnexial adhesions, 3 were diagnosed with pelvic endometriosis and 3 patients had ovarian cysts. Of the twelve cases of bilaterally occluded tubes detected by HSG, only 3 (25%) were confirmed to have bilateral occlusion during laparoscopy.

Discussion

Histerosalpingography (HSG) is a frequently utilized diagnostic method in the assessment of tubal status and detection of intrauterine anatomical defects in the infertility diagnostic workup. However, the inadequacy of HSG in determining the state of tubal patency, emphasizes the need for laparoscopy. Laparoscopy provides both a panoramic view of the pelvic reproductive anatomy and a magnified view of pelvic organs and peritoneal surfaces. It is generally accepted that, diagnostic laparoscopy is the gold standard in diagnosing tubal pathology and other intraabdominal causes of infertility.[8] Compared with laparoscopy, HSG has only moderate sensitivity but relatively high specificity. If an occlusion is detected in HSG, there is a 60% possibility of the tubes to be actually patent, however, when patency is demonstrated in HSG, there is little chance the tube to be actually occluded.[9,10] In our study, the likelihood ratio of HSG for tube patency was found to be 3.21, and the likelihood ratio for tubal occlusion was 0.26. Consequently, similar to the studies mentioned previously, we concluded that HSG is more accurate in detecting patent tubes rather than occluded ones. Both false negative and false positive results can be seen with HSG. In accordance with literature, the false-negative results were much more common than the false-positive results in our study.[11] Injection of contrast material during HSG can lead to the misdiagnosis of tubal occlusion following cornual spasm.[12] In HSG, while one tube can be observed to be patent, the other one can be occluded. Whereas this observation may indicate an actual one sided proximal tubal occlusion, most commonly it is due to the tendency of the contrast material to enter the tube with the least resistance. Therefore, the occluded appearing tube is in fact most likely to be normal.[13] Another scenario resulting in false-negative diagnosis of tubal occlusion is when inadequate wedging of the cervical cannula allows leakage of contrast material into the vagina, thus interfering with generation of sufficient intracavitary pressure and often leading to the misdiagnosis of tubal occlusion.[14] In our study, we found 15 false negative cases. Although often venous and lymphatic channels can be identified by their anatomy, contrast intravasation into uterine and ovarian veins can sometimes be mistaken for tubal filling.[15] False- positive HSG results may be due to the contrast material entering through the dilated tube with hydrosalphinx. In the presence of peritubal adhesions, even though the tubes may actually be patent, focal contrast deposits can lead to the

misinterpretation as distal occlusions.[16] In our study we found 6 false- positive cases.

Both HSG and laparoscopy have advantages and disadvantages. HSG is quite accurate in defining the uterine cavity. Laparoscopy on the other hand, although not able to give information on the uterine cavity, is superior to histerosalpingography in the assessment of tubal patency and allows detection and, most importantly, treatment of intraabdominal pathologies as endometriosis and peritubal adhesions. The disadvantages of histerosalpingography are the possibility of allergic reactions to iodine, pelvic infections, endometriosis secondary to carriage of endometrial tissue onto extrauterine sites, and tubal rupture due to contrast material given under pressure in patients with hydrosalphinges. Also the ovaries are said to be exposed to 500-1000 mRads of radiation during HSG. The disadvantages of laparoscopy are its invasiveness, cost, and related risks of surgical complications.[17] During our HSGs, a water soluble contrast medium was used, and no complications were encountered. During laparoscopy, the only complication encountered was hemorrhage from the 5 mm trocar insertion site that was managed by cauterization.

A diagnosis of unexplained infertility is usually made only after it has been demonstrated that the female partner ovulates regularly, has patent fallopian tubes, shows no evidence of peritubal adhesions, fibroids or endometriosis and has a partner with normal sperm production and function.[2] Fatum et al suggested that couples with unexplained infertility should be treated by 3-6 cycles of combined gonadotrophins and IUI without preceding diagnostic laparoscopy, and if unsuccessful, they should be referred directly to IVF. In their opinion, this approach would prove to be the most cost effective and efficient treatment protocol.[7] In Drake et al's series of 24 cases with unexplained infertility, 18 were found to have abnormal findings in laparoscopy. It was proposed that the usage of laparoscopy as a standard test of tubal function would reduce the apparent incidence of unexplained infertility. They concluded that laparoscopy is an essential final step in an otherwise negative work-up for infertility.[18] Laparoscopy has been shown to reveal abnormal findings in 21-68 % of infertile patients with a normal hysterosalpingogram.[4,8,19] Hening et al have detected adnexial adhesions and pelvic endometriosis during surgery in 21% of patients with normal HSG findings.[20] The superiority of laparoscopy over HSG in assessing extratubuler pathology is shown in our study as has been demonstrated in other studies.[6] Tanahatoe et al stated that laparoscopy revealed abnormalities that resulted in altered treatment decisions in 25% of the patients who would normally have been scheduled for IUI if laparoscopy had not been performed. The altered treatments mainly concerned surgery for minimal/mild endometriosis and periadnexial adhesions, both performed during diagnostic laparoscopy.[8] In our study, 27 % of cases with normal HSGs were found to have adnexial adhesions, ovarian cysts and pelvic

endometriosis. Of the twelve cases of bilaterally occluded tubes detected by HSG, only 3 (25%) were confirmed to have bilateral occlusion during laparoscopy.

These findings are in accordance with the aforementioned studies. Contrary to Farum et al's suggestions[7] though, we are of the thought that proceeding to IUI without a prior diagnostic laparoscopy will lead to low pregnancy rates, a prolonged period of time until a pregnancy is achieved, or to the unnecessary referral of the patient to IVF, a very costly treatment.

Speroff et al state that laparoscopy has been suggested traditionally to be an integral diagnostic procedure of most infertility investigatory protocols. Also, according to Speroff et al, following a normal HSG and laparoscopy, the couple is diagnosed as suffering from unexplained infertility and should be referred to the next line of treatment.[11] Moreover, the study of Perquin et al showed that routine use of HSG at an early stage in the fertility workup prior to laparoscopy and dye does not influence the cumulative pregnancy rate.[21]

CONCLUSION

HSG demonstrated reduced positive predictive value especially for bilateral proximal tubal occlusion. Moreover, HSG has a limited value for accurately identifying tubal patency. Therefore, we suggest that laparoscopy is necessary to rule out the existence of peritubal adhesions and mild and moderate endometriosis as causes of infertility in patients with abnormal HSG findings.

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The Comparative Estimation Result Radical Nephrectomy Executed "Opened", Laparoscopic and Laparoscopic Hand-assisted Access

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Abstract: The moment of introduction by Robson in 1963 radical nephrectomy this method remains the standard in surgical treatment at cancer of a kidney. Traditionally operation was carried out by the open technique. However for last decade significant progress in the field of a urological laparoscopy has started to change this standard Laparoscopy access at operations in urology has started to carry out in 70th years mainly in the diagnostic purposes. In XXI century the laparoscopy began to play a significant role in a urological practice.

Aims: Improvement of results of treatment patients of malignant tumors of a kidney at use ORN, LRN and HALRN.

Materials and methods: Results of treatment of 120 patients with a cancer of a kidney in the age of from 32 till 77 years (middle age -54,6±8,4 years). Patients have been divided into three groups: in first group 60 (50%) patients it is executed ORN. In the second group at 26 (21.7%) by patients it is executed LRN. Into the third group have entered 34 (28.3%) the person by whom it is executed HALRN. The various steps for HALRN are shown in Figs 1 to 2A to C.

In the first group the size of a tumors has on the middle made 8.4 ± 1.2 sm, in the second group 6.7 ± 1.1 sm, and in the third group 7.1 ± 1.8 sm.

Results: At ORN middle operative time has made 135.7 ± 8.2 minute, with middle blood loss 274.3 ± 28.5 ml. The length of a operational cut has on the made 18.4 ± 2.3 sm. Duration of time invalidity has made 31.2 ± 7.6 day. Middle stay of the patient in hospital has made 16.8 ± 2.7 day.

At LRN middle operative time has made 122.6 ± 4.1 minute, with middle blood loss 115.4 ± 17.3 ml. The length of a operational cut has on the made 5.3 ± 0.4 sm. Duration of time invalidity has made 15.9 ± 4.1 day. Middle stay of the patient in hospital has made 6.2 ± 3.1 day.
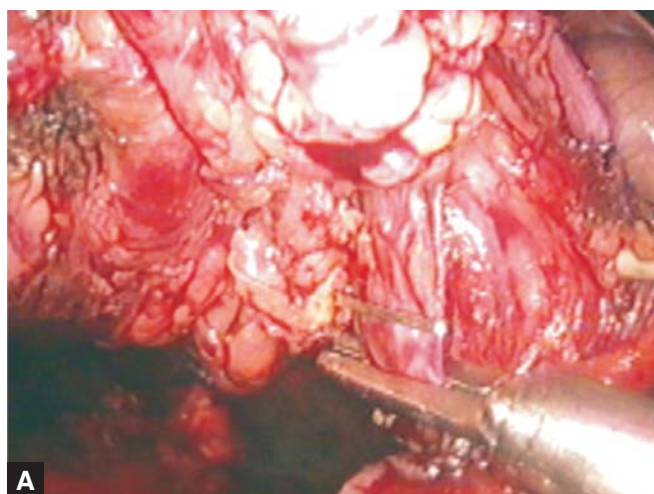
Clipping of Renal vein
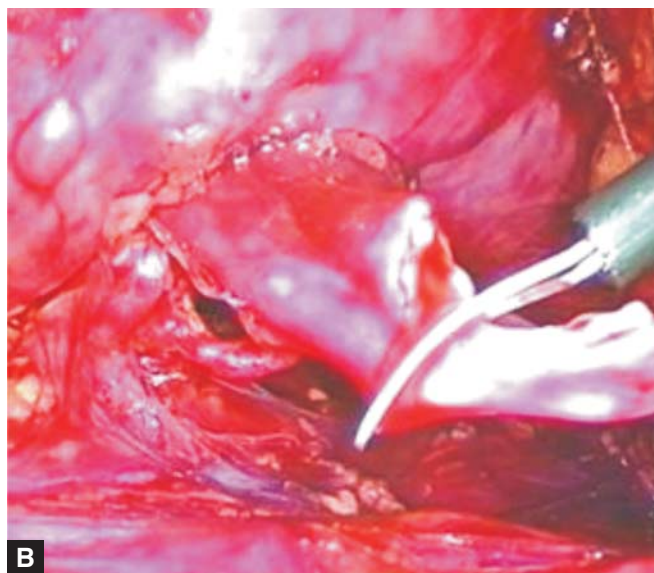
Seperation of an artery

Stage of processing kidneys vessels

Figs 1A to C

At HALRN middle operative time has made 108.6 ± 10.3 minute, with middle blood loss 125.4 ± 15.2 ml. The length of a operational cut has on the middle made 6.7 ± 0.6 sm. Duration of time invalidity has made 17.6 ± 5.2 day. Middle stay of the patient in hospital has 7.8 ± 1.6 made day.

After ORN drainages established in a box of a kidney deleted on the average on 3.4 ± 0.8 day, and after LRN and HALRN accordingly on 1.1 ± 0.2 and 1.3 ± 0.5 day after operation.

After ORN are noted next complications: at 47 (39.2%) patients infringement of skin sensitivity in the field of postoperation traces, at 29 (24.2%) asymmetry of a forward belly wall and 6 (5%) patients postoperation abdominal hernia. After LRN and HALRN in the postoperative period of patients' complications it is noted.

Figs 2A to C: (A and B) Hand" carries out mobilization of kidney, facilitating stage clips on kidneys, arteries, veins and mobilization of Urethra. (C) Extraction of a kidney through Hand-port
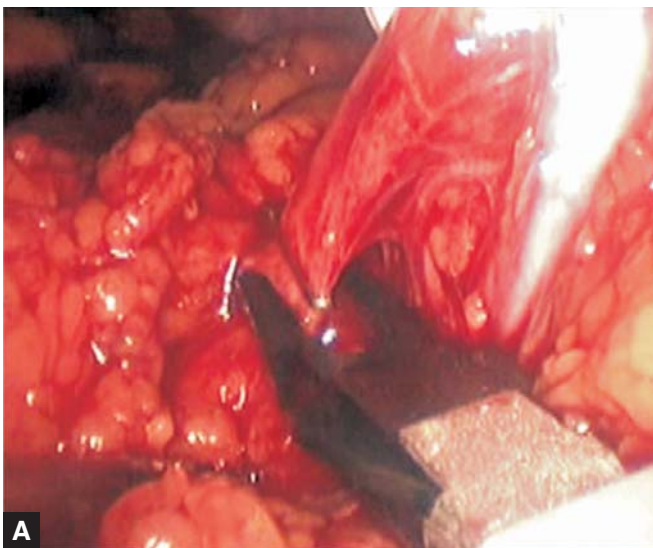
Conclusions: LRN and HALRN at a cancer of a kidney is the radical and quite justified intervention allowing essentially improving direct results of surgical treatment and quality of a life of the patient in remote terms.

Advantages LRN and HALRN are: good cosmetic effect, smaller blood loss, reduction of time of stay in a hospital and the general disability.

LRN and LRN provides good results even at III (T3N0-1M0) stages of a cancer of a kidney that is caused by an opportunity of performance total lymphadenectomy and reduction trauma fabrics during surgical intervention.

Comparison between Laparoscopic Gastric Banding and Laparoscopic Sleeve Gastrectomy

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Abstract: Obesity is one of the most diseases that considers as a global health problem, with a prevalence of >20% among the adult population in Western countries and >30% in the USA.[1,2] The incidence of overweight and obesity has increased and it has been identified as an epidemic associated with an increase in the diseases related to obesity, such as coronary heart disease, type 2 diabetes, hypertension, dyslipidemia, stroke, obstructive sleep apnea, osteoarthritis and polycystic ovary syndrome. Recent a lot of studies on cancer prevention found that increased body weight was associated with an increased death rate for all cancers combined and for cancers at multiple specific sites. Thus, high body mass index (BMI) is a risk factor for higher overall mortality.

Clinicians all over the world have long been aware of the impact of obesity on health, functioning and well-being. In search of effective solutions, morbidly obese patients are increasingly turning to bariatric surgery.

There are a lot of bariatric surgeries to achieve the desirable weight loss but the restrictive procedures are more popular as Gastric banding (GB). It is characterized by minimal invasivity, total possibility of reversibility and good weight loss at long-term. On the other hand, Sleeve gastrectomy (SG), described by Hess and Marceau since 1988 during the procedure of duodenal switch and since 1993 by Johnston in an isolated form, is a less common restrictive operation for obesity, with major invasivity and a longer learning curve than GB.

Classification of Obesity

Obesity class		BMI (Kg/M$_2$)
Normal		18.5 – 24.9
Over weight		25 – 29.9
Morbid obesity	I	30.0 – 34.9
	II	35.0 – 39.9
	III	Over 40

Materials and Methods

A literature search was performed using search engine Google, HighWire Press, Springer Link The following search term was used: morbid obesity, laparoscopic gastric banding, sleeve gastrectomy, outcome, effect on BMI, complication.

Surgical Technique

Laparoscopic Gastric banding (GB) Described in 1993 by Catona, is a surgical option that involves placing a silicone band circumferentially around the uppermost aspect of the stomach. The band creates a small proximal pouch that empties slowly resulting in early satiety and a decreased appetite. The band is attached to an access port that is secured to the rectus muscle and can be accessed percutaneously in the office with a needle. Injection of saline into the port results in tightening of the band. This is performed on an individual basis according to weight loss and appetite. It is the most popular in Europe while in USA it has been approved by FDA in 2001.

Sleeve Gastrectomy (SG) described by Hess and Marceau since 1988 during the procedure of duodenal switch and since 1993 by Johnston in an isolated form, consists of vertical gastric resection of 80% capacity with exeresis of the fundus and body of the stomach linearly from the Hiss angle to 3–4 cm from the pylorus using Endo GIA staplers, which leaves a gastric residual volume ranging from 50 ml to 200 ml. However, as yet, there is no agreement on the optimum residual volume.

Effect of Surgery on Weight

Studies showed that both SG and GB have achieved a good reduction in the excess weight (Excess weight is defined as the difference between the actual weight and the ideal weight for longevity). Initial success in bariatric surgery is defined as a >50% loss of excess weight, or 50% EWL. In GB %EWL was at 1 and 3 years, 41.4% and 48%, respectively. While in SG it was 57.7% at 1 year and 66% at 3 years. Patients with higher BMI may require a second-stage operation later, in order to lose the rest of their excess weight if their BMI remains >45.

Effect on Co-morbidities

Both of the procedure significantely improve or cured the patient co-morbidities and those changed were related to % EWL. In SG After 12 months, 57.8% of the patients were co-morbidity-free and 31.5% presented only one comorbid condition while in GB. More than 63.8% of patients with sleep apnea improved and 46.9% of them stoped using the CPAP. The following table shows the effect of reducing weight on different diseases.

Co-morbidities	Improvement in %
Arthritis	59
Asthma	82
Diabetes	81
GERD	74
HTN	49
Hyperlipidemia	32
Stress incontinence	80

Effect of Surgery on the Level of Serum Ghrelin

Ghrelin, an acylated upper gastrointestinal peptide, is the only orexigenic hormone, where circulating levels decrease with feeding and increase before meals, achieving concentrations sufficient to stimulate hunger and food intake.[14] This hormone is primarily produced by the enteroendocrine cells of gastric mucosa and to a lesser extent from the duodenum. The procedure of SG involves resection of the gastric fundus, the predominant part of the stomach in the production of ghrelin, resulting in less stimulation of the hunger center. A recent study by Langer[15] compared the ghrelin levels in patients submitted to SG and to GB, showing in patients with SG a significant decrease in plasma ghrelin at day 1 after surgery, confirmed also after 1 and 6 months, in contrast to no change found in patients with GB. Moreover, in patients with GB, the plasma ghrelin levels 1 and 6 months after surgery appeared increased compared with the preoperative levels of the same group.

Complications

Complications were reported in both procedures and percentages were reasonable. LAGB is the safest bariatric operation with mortality of 0.2%, 30-day morbidity of 5%, and delayed complication (gastric prolapse, erosion, port-tubing disconnection) rate of 12%. It has the advantage of complete reversibility by laparoscopic explanation, preservation of anatomy, and ability to perform a SG or other malabsorbative procedures. In SG complications occurred in ~9% of patients included trocar-site problems such as infection, hernia and hemorrhage. Other postoperative complications include urinary tract infection and atelectasis. Some studies document a leak from the anastemosis site but of major concern and were treated conservatively. In GB and SG mortality was less than 1%.

CONCLUSION

Both of the procedures are safe and effective in reducing weight with more advantage for SG regarding the weight loss and effect on hunger. It is clear that GB in the best procedure for people who wants to have a reversible operation, but it is not for patients who are concern about a prosthesis in their bodies. SG is superior to GB in super obese and high risk patients.

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Long-term Outcomes in Laparoscopic vs Open Ventral Hernia Repair

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Abstract

Objective: To ruleout whether there was a difference in, recurrence rate, morbidity, and duration of hospital stay between patients undergoing open or laparoscopic ventral hernia surgery.

Materials and methods: Cohort study in single-institution was compared prospectively collected from patient cohorts undergoing laparoscopic or open intraperitoneal onlay mesh repair. Literature search was performed using search engine Google and our online facility of Springer Link. The following search terms were used. Laparoscopic versus ventral hernia repair, 'laparoscopic repair of ventral hernia, controversies in laparoscopic ventral hernia repair, comparison of laparoscopic and open (Ventral Hernia) repair, Laparoscopic Repair of Ventral Hernia during obesity. About 143 citations found in total. Data collected from 360 consecutive patients who had undergone laparoscopic or open intraperitoneal onlay mesh repair of a ventral hernia were prospectively collected from October 1995 and December 2005 are recorded .

Main outcome of the study: Hernia recurrence and duration of hospital stay and morbidity. Postoperative complications of Clavien grade 2 or more than grade 2 were considered as major complications.

Results: Intraperitoneal onlay mesh surgery was performed in 233 patients by open approach and in 127 patients by laparoscopic approach. Groups were similar for sex and body mass index and it is calculated by weight in kilograms divided by the height in meters squared and the mean age for the laparoscopic group was 3 years younger; and the mesh was selected larger for the laparoscopic group. Mean follow-up for both laparoscopic and open groups was 30 and 36 months; and the conversion rates are 4%. Major morbidities were 15% in the open group and 7% in the laparoscopic group. Recurrence rates were 9% in the open group and 12% in the laparoscopic group. Postoperative inpatient admission was more frequent after the open procedure than after the laparoscopic procedure (28% and 16%, respectively).

Conclusions: Outcomes of the study shows not much difference with respect to recurrence rates after long-term follow-up; however, lower rate of major morbidity and increased outpatient-based procedure rates favor laparoscopic repair in this study.

INTRODUCTION

More than 2 million abdominal surgery's take place yearly in USA; with an estimated 3 to 20% of those patients develop ventral incisional hernia. With 90 000 ventral incisional hernia repairs are performed every year, the question of whether an open or laparoscopic repair should be performed it depends on general surgeons interest. Data are still inconclusive on morbidity and recurrence rates. The main purpose of this study is to compare the outcome of the patients undergoing open and laparoscopic intraperitoneal onlay mesh repairs in a single institution for a period of 10 years.

DATA

Data from all 651 patients who underwent ventral incisional hernia repair between October 1995 to December 2005 at a single institution were collected prospectively. Patients who had undergone an intraperitoneal onlay mesh repair, either open or laparoscopic, are only considered. The techniques of both repairs have been described here.

Open Mesh Techniques

Rives, Stoppa and Wantz popularized Open surgical technique

After taking patients to operative theater and under general anesthesia, endotracheal intubation and with close monitoring operation was started. After painting and draping of abdomen the incision was made according to the site and size of the hernia subcutaneous flap was raised up to 4 to 5 cm around the hernia and the hernial sac was found, contents was reduced sac was excised. The mesh is placed in the intraperitoneally and fixation of the mesh done with interrupted sutures at minimum of two centimeters from the fascial edge. Anterior rectus sheath closed over the mesh with a loop of polypropylene without tension, and then skin closed over the drain depending upon size and extension of the wound.

Laparoscopic Repair of Ventral Hernia

Almost all types of Ventral Hernia can be operated by minimal access surgical techniques except if the size more than 10 cm and it should be explained clearly to the patient that the laparoscopic repair will not help cosmetically if the skin is very lax and hanging loosely in the large hernia. In Laparoscopic Ventral Hernia Repair evacuation of urinary bladder in lower abdominal surgery and Nasogastric tube in upper abdominal surgery is necessary, because in most of the cases the access is through the palmar's point which is about 2 to 3 cm below the

left costal margin in mid clavicle line. Day before surgery bowel should be prepared, that will give more working space during surgery in the abdominal cavity. Laparoscopic Ventral Hernia Repair can be done with various methods either intraperitonial or extraperitonial. But in our study repair was done intraperitonially.

Anesthesia

General anesthesia with endotracial intubation and close monitoring.

Patient Position

Supine position without any tilt, so that the bowel is distributed evenly.

Port Position

Port Placement Technique

The patient is painted and draped and after that checking light cable, insuffilation tube, electrosurgical cautery, suction irrigation canula and veress needle patancy with focusing and white balancing of the camera, then pneumoperitoneum is created by veress needle in the left palmar's point (this point is contraindicated in splenomegaly) other site like right hypochondrium, flank or iliac fossa can also be used for telescope port. Once pneumoperitoneum created then 10 mm port put after desirable insufflation another one 5 mm port and 10 mm port according to Baseball diamond concept put under vision, after diagnostic laparoscopy the procedure if there is any adhesion careful Adhesiolysis is done. Content of sac returned back which is either omentum or bowel then the extent of defect assessed thoroughly then measurement of the defect drawn on the external surface of anterior abdominal wall and adequate size mesh that cover the whole defect and overlapping up to 4 to 5 cm from the edge of the defect, all the necessary precaution to be taken to avoid contamination of the mesh, then the mesh rolled and inserted in port to the abdominal cavity, then mesh unrolled and it is fixed by means of Tacker, Endoanchor or Protack, to abdominal wall with out opening the peritoneum technique. After completing the repair the ports withdrawn under vision and telescope port are removed last. Ports of 10 mm better to be repaired because cases of incisional hernia reported in some articles. Recently two port laparoscopic ventral hernia repairs were also reported in some articles.

Choice of Mesh

For the hernia repair laparoscopically meshes underwent many changes over the last few years, in general the ideal mesh is characterized by economic aspects, functionality, operative handling, sterility and even anti-infective property and optimized biocompatibility.

1. It should be rapid and permanent in growth into the prosthesis.
2. It should decrease the risk of intestinal adhesion.

There are two types of mesh commonly used synthetic and collagen based in most article ePTFE were used with polypropylene, because of a low affinity for adhesion, the PTFE mesh is probably the first choice for intraperitoneal prosthesis. In summary the use of mesh can reduce the recurrence rate from 40 to 50% to about 10% only.

The type of operation was determined by surgeon preference. Patients were referred from the same patient pool to members of a surgical group.

Exclusion Criteria

Patients, who underwent additional procedures at the time of hernia repair, such as planned bowel resection or nonmesh repairs, are excluded from this analysis.

Additional dates were collected from the review of patient records. Variables are assessed by patient demographics like age, sex, body mass index [BMI is calculated as the weight in kilograms divided by the height in meters squared], and co morbidities like obesity diabetes, IHD, pulmonary diseases, details about the operative procedure (open versus laparoscopic repair and type and size of mesh used), and outcome data such as morbidity, recurrence rates, and duration of stay. The type of mesh used depends upon the operating surgeon's preference and mesh availability. Polypropylene was used by some surgeons and it was determined by intraoperatively so that the amount of omentum present will prevent bowel contact with the mesh to prevent adhesion. The duration of hospital stay was recorded either as outpatient surgery and assigned the value of 0.5 days or as a postoperative inpatient admission with the number of days recorded. Comorbidities are specifically addressed were the corners. If a patient was identified to have pulmonary disease that was stated in the medical record for follow up. Patients who underwent a conversion to open repair remained in the laparoscopic group for an intention-to-treat analysis.

Complications

Clavien classification was used for staging postoperative complications. Complications of grade II or higher are considered as major complications. In this classification, grade I complications not require pharmacological treatment or intervention; grade II complications that include patients those requiring pharmacological treatment, total parenteral nutrition or blood transfusions, grade III complications require surgical, radiological or endoscopic intervention; grade IV complications are life threatening and require intensive care unit management; and grade V complications result in death. Postoperative occurrences of a seroma are identified by examine the patient.

In laparoscopic hernia surgery, the hernia sac are not excised. This effectively leaves behind a potential space for seroma formation. It happens to be one of the complications inherent to this procedure. A significant seroma was defined as a seroma that caused pain or discomfort, erythema, or infection. Most seromas resolve with time, some requiring eight to 12 weeks for complete resolution. Majority of the authors considered the seromas for conservative management. Some surgeons have advocated using dressing or abdominal binder to cause compression on abdominal wall to occlude the potential dead space.

In the laparoscopic group patients, significant seromas are aspirated. In the open group, drains are placed at the time of operation to prevent the formation of a seroma. No data were collected regarding fixation-related pain. A statistical analysis was done by using Fisher exact test and Wilcoxon rank sum test, and test with SAS statistical software version 9.3 (SAS Institute, Inc, Cary, NC).

Results

From the year 1995 October to December 2005, a total of 651 patients underwent ventral hernia repair at single institution. Around 514 (79%) underwent an open ventral hernia repair and 137 (21%) underwent a laparoscopic ventral hernia repair. Around two hundred eighty one patients (55%) who have underwent the open repair and 10 patients (7%) who have underwent the laparoscopic repair were excluded from the study because they underwent either additional procedure, like planned bowel resection or a nonmesh ventral hernia repair. A total of two hundred and thirty three patients who underwent an open procedure and one hundred twenty seven patients who underwent a laparoscopic procedure are used in the final statistical analysis. Five patients (4%) required conversion from the laparoscopic to the open procedure because of hemodynamic instability, or inability to obtain visualization, or technical difficulties during the mesh placement.

Diagnosis of cancer in sixteen patients (7%) in the open hernia group and 7 patients (6%) in the laparoscopic hernia group had diagnosed prior to surgery. There are no data on preoperative prealbumin levels are collected. The mean BMI as a proxy for obesity-related malnutrition are similar for both the groups. Describes the different types of mesh used for the repairs, with the polypropylene mesh used in the earlier phase of the study in patients with sufficient omentum present. No mesh-related bowel fistula was recorded.

Around, 43 patients (12%) experienced Clavien grade II complication or much higher. in the open hernia repair group major complications were significantly seen when compared to laparoscopic hernia group. One patient (0.4%) had a postoperative DVT after open ventral hernia repair which was complicated by *Candida* septicemia and he was died. In the laparoscopic group one patient manifested sepsis by an unrecognized enterotomy on the first postoperative day and it required reoperation for mesh removal. The patient was recovered and underwent open ileostomy takedown and hernia repair done one year later. Six patients experienced mesh infection in the open group which required removal of the mesh. None of the patients from the laparoscopic group had mesh infection. Major complications seen in patients with preexisting pulmonary comorbidities; Around 27% of patients with pulmonary comorbidities versus 10% of patients without pulmonary disease suffered postoperative complications. The recurrence rate and complication rate were not correlated with the type of operation performed (laparoscopic vs. open) in patients with pulmonary comorbidities. By using a logistic regression model, and the occurrence of the complication was associated with the operative method without the adjustment for pulmonary disease and the remained associated after adjustment for pulmonary disease. BMI did not alter these conclusions, and BMI did not contribute significantly to the model. In 16 patients (13%) in the laparoscopic group and 21 patients (9%) in the open group had recurrence at a mean follow-up between 30 and 36 months respectively. Median follow-up was done 25 months for patients with open hernia repair and 36 months for the patients with laparoscopic hernia repair. 75 patients (32%) in the open hernia group and 45 patients (36%) in the laparoscopic group had more than 36 months duration for follow-up. Determination of recurrence was done by physical examination and documentation in the record. In addition to the records, all the available imaging studies that include computed tomography scans obtained in asymptomatic patients for unrelated diagnoses like cancer follow-up or injury are reviewed. Any information of recurrence in the record or on the imaging studies, whether they are symptomatic or not, are taken as recurrence. Statistical analysis did not reveal about the effect related to the type of mesh used on the recurrence rate. Studies revealed that patients who developed a postoperative abscess had increased recurrence rate that is 4.4-fold recurrence when compared with those who did not develop an abscess. Patients with higher BMI rates more than 30 had a 5-fold risk of recurrence when compared with patients with normal weight (BMI<25) Postoperative inpatient admission was more frequent in the open procedure than after the laparoscopic procedure respectively; The higher rate of outpatient surgery in the laparoscopic group than in the open group was associated with a shorter mean duration of stay (mean ± SD length of stay, 0.9 ± 1.4 days vs. 1.4 ± 2.0 days, respectively).

DISCUSSION

Ventral hernias are more common, and controversy are still exists as to the best method for surgery. There are no large randomized or multicenter trial has been completed till today, although one systematic review was published in the year 2004. Data from smaller trials and cohort studies represent the available evidence.

Some of these studies are summarized in our study has provided an additional experience in a large patient population and a long follow-up.

Systematic review performed by the auspices of the Royal Australasian College of Surgeons Australian Safety and Efficacy Register of New Interventional Procedures–Surgical and other recent studies show clear differences in the duration of the hospital stay, operating room supply cost, and the total hospital cost between open and laparoscopic ventral incisional hernia repair. Studies show patient underwent laparoscopic hernia repair had significantly shorter the hospital stay, the instrument cost was significantly higher, and the overall cost was significantly lower. Large variations without a clear difference between the open and laparoscopic hernia repair methods in comparison with complication rates and recurrence rates. Our study used the Clavien classification of complications to account not only for the occurrence of a complication but also for the severity. By using this classification, data suggest that more severe complications occurred in patients undergoing open ventral hernia repair, whereas seromas were more frequently noted in patients undergoing laparoscopic repair. The most significant patients for complications are patients with preexisting pulmonary disease. This study did not have enough statistical power to examine any correlation between the complication rates and mesh type.

Older studies described obesity as a risk factor for the development of ventral incisional hernias and also risk factor for recurrence and complications. studies show that patients with a BMI more than 30 had a risk of recurrence 5 times higher when compared to patients with a BMI less than 25. The high BMI combined with a relatively long follow-up may have contributed to our recurrence rates, which were at the upper end of the reported spectrum. Laparoscopic patient group required significantly fewer inpatient admissions, a finding that may be explained by better pain control or faster recovery from operative trauma, as suggested by others.

CONCLUSION

This study confirms that laparoscopic ventral incisional intraperitoneal onlay mesh hernia repair is associated with less severe complications, equivalent recurrence rates, and shorter hospital stays when compared with open repair. It further validates the use of the laparoscopic approach.

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Role of Minimally Invasive Surgery in the Treatment of Ectopic Pregnancy

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Abstract: Ectopic Pregnancy, in which gestational sac is outside the uterus, is the most common life-threatening emergency in early pregnancy. The incidence of ectopic pregnancy (EP) has increased all over the world from 0.5% thirty years ago, to a present day 1-2%.[1] This complication of early pregnancy, results in not only fetal loss, but also the potential for considerable maternal morbidity and the risk of maternal death.[2-4].

Until the risk factors that lead to EP are more fully understood, early detection and appropriate management will be the most effective means of reducing the morbidity and mortality associated with this condition.[5-6] Although the incidence of EP increased, with the improvement of diagnostic approaches, patients were detected at an earlier stage and possible to be treated more conservatively.[7] Surgery remains the mainstay of treatment.[8] Surgical treatments may be radical (salpingectomy) or conservative (usually salpingostomy), and they may be performed by laparoscopy or laparotomy.[9] Improved anesthesia and cardiovascular monitoring, together with advanced laparoscopic surgical skills and experience, justifies operative laparoscopy for surgical treatment of EP even in women with hemodynamic instability.[10]

Ectopic Pregnancy usually occurs 98% of cases in the uterine tube. Trophoblast can be implanted at various sites:

1. The ampulla (64%)
2. The isthmus (25%)
3. The infundibulum (9%)
4. The intramural junction (2%)
5. Ovarian (0.5%)
6. Cervical (0.4%)
7. Abdominal (0.1%)
8. Intraligamental (0.05%)
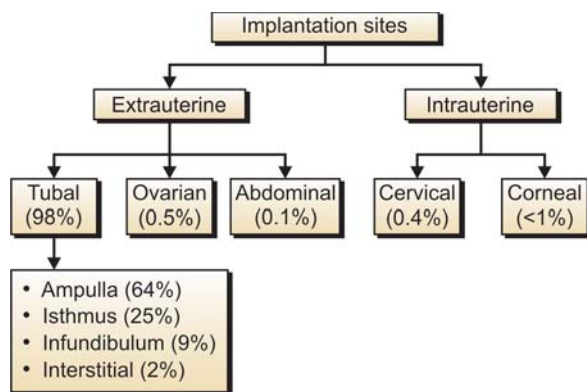
Aims and Objectives: The aim of the review to summarize the role of minimal access surgery as in the management of ectopic pregnancy.

Keywords: Ectopic pregnancy, operative laparoscopy, laparoscopic, salpingectomy, cornua, surgical treatment, minimal access surgery.

Material and Method

A literature search was performed using the search engine Google, highwire press and springerlink. Selected papers were taken for the further references.

All articles, RCT, (randomized controlled trial) following predominantly laparoscopic protocol were included for review.

Patients Selection of Laparoscopic Approach

- Confirmed diagnosis
- Absent fetal heart beat
- Hemodynamic stable status
- Accessibility for laparoscopic treatment and trained laparoscopist on duty.

Non-candidates for Laparoscopic Surgery

- Large hemoperitoneum
- Unstable hemodynamic status (stage II or stage III shook)
- Severe pelvic adhesion
- Refusal

Diagnosis

1. Historical Features and Physical Findings

Ectopic pregnancy is usually diagnosed in the fist trimester of pregnancy. The most common gestational age at diagnosis is 6 to 10 weeks. Documentation of risk factors is an essential part of history-taking, and asymptomatic clinic patients with risk factors may benefit from routine early imaging. However, more than half of identified ectopic pregnancies are in women without known risk factors.[11, 12]

Risk factors associated with ectopic pregnancy include:
- Current use of intrauterine device
- Use of clomiphene citrate
- Prior tubal surgery

- Pelvic inflammatory disease
- Infertility
- Induced abortion, adhesions
- Myomata
- Progestin only oral pill

2. Use of Beta Human Chorionic Gonadotropin Measurement

In the emergency department, pregnancy is diagnosed by determining the urine or serum concentration of B human chorionic gonadotropin (β-hCG). This hormone is detectable in urine and blood as early as 1 week before an expected menstrual period. Serum testing detects levels as low as 5 IU/L, whereas urine testing detects levels as low as 20-50 IT/L.[13, 14] In most cases, screening is done with a urine test, since obtaining the result of a serum test is time-consuming and is not always possible in the evening and at night.

A single serum measurement of the β-hCG concentration, however, cannot identify the location of the gestation sac. If a low serum β-hCG level (< 1000 IU/L) is associated with a higher relative risk of ectopic pregnancy, then can very low levels predict a benign clinical course? A single serum β-hCG measurement cannot exclude ectopic pregnancy or predict the risk of rupture unless it is less than 5 IU/L.[14]

In a normal pregnancy, the first trimester β-hCG concentration rapidly increases, doubling about every 2 days. An increase over 48 hours of at least 66% has been used as a cutoff point for viability.[15] Ectopic pregnancy may present with rising, falling or plateau β-hCG levels; thus, serial measurement is most useful to confirm fetal viability rather than to identify ectopic pregnancy.

3. Use of Progesterone Measurement

Measurement of the serum concentration of progesterone has been investigated as a potentially useful adjunct to serum β-hCG measurement, since progesterone levels are stable and independent of gestational age in the first trimester. A Meta analysis, published in 1998, of studies assessing a single progesterone level demonstrated good capacity of low levels (≤ 5 ng/mL) to correctly diagnose pregnancy failure, but this cutoff was unable to discriminate between ectopic pregnancy and intrauterine pregnancy. Both high (≥ 22 ng/mL) and low (≤ 5 ng/mL) cutoff points have since been studied for their ability to correctly identify nonviable pregnancy and ectopic pregnancy.[16, 17] Invasive diagnostic testing (e.g. D and C) could be postponed in the former patients but offered to the latter, as could treatment with methotrexate, without fear of interrupting a potentially viable intrauterine pregnancy.

4. Ultrasound Imaging

A β–hCG level that has risen above the discriminatory threshold in the absence of sonographic signs of early pregnancy is considered presumptive evidence of an ectopic pregnancy. With the evolution in ultrasound technology, the discriminatory threshold has dropped form 6500 IU/L with a transabdominal approach to between 1000 and 2000 IU/L with transvaginal imaging.[18] The spectrum of sonographic findings in ectopic pregnancy is broad. Identification of an extrauteine gestational sac containing a yolk sac (with or without an embryo) confirms the diagnosis. Suggestive finding include an empty uterus, cystic or solid adnexal or tubal masses (including the tubal-ring sign, representing a tubal gestational sac), hematosalpinx and echogenic or sonolucent cul-de-sac fluid. It is therefore found that the proportion of patients with the tubal rupture, heavy intra-abdominal bleed and pre-shock/shock have decrease owing to early diagnosis.

Thorough physical and clinical examination with preanesthetic checkup was performed. Surgical intervention was done under general anesthesia, on an in-patients basis.

Four different operative techniques were used:
1. Laparoscopic linear salpingiotomy (tubal aspiration)
2. Laparoscopic salpingectomy
3. Laparoscopic fimbrial expression
4. Laparotomy

Laparoscopic Linear Salpingiotomy

Used as method of choice in patients with unruptured ampullary pregnancy. A linear incision was made over antimesenteric border of tubal segment containing pregnancy with point needle monopolar diathermy. Prior injection of 5-8 ml of diluted solution containing 5 units of vasopressin in 20 ml normal saline is made with 20 gauge spinal needle into the mesosalpinx. Product of conception extrudes itself, if not this can be completed by using hydrodessection or gentle traction with laparoscopic forceps. Copious irrigation is used to dislodge trophoblast. The opening of fallopian tube was left to heal by secondary intention.

Laparoscopic Salpingectomy

This method is chosen for treatment of isthmic pregnancy, with tubal distriction, hydrosalpinx, recurrent ectopic in the same tube, severe adhesions or patients choice. This procedure involves resection of segment of tube containing pregnancy in several ways including laser, stapling devices, endoloops, or progressive biopolar coagulation and cutting the mesosalpinx begins at proximal isthmus of tube, progressed to fimbriated end.

Laparoscopic Fimbrial Expression

Milking of the tube was done for the patients with fimbrial ectopic pregnancy. Trophoblastic tissue either sucked out by suction, or retrieved through 10 mm ports and sent for histopathological examination.

Laparotomy

Laparotomy was performed through a pfannenstiel incision and standard surgical techniques (the same laparoscopic techniques) were applied.

Postoperative follow-up consists of serial hCG assessment (twice weekly) until complete negativity (< 5IU/L), with weekly clinical examination and transvaginal ultrasound if needed.

Postoperative management follows the normal practice. Analgesia was prescribed to the patients on demand, namely pethidine, 1.5 ml/kg IM every 4 four hours or diclofenac sodium 100 mg.

DISCUSSION

A large number of studies on the management of ectopic pregnancy can be found in the literature, ranging from case report to randomized trial, from expectant management to radical surgery. It is now accepted that the surgical treatment of ectopic pregnancy should be via laparoscopy except for a few exception (contraindication for laparoscopy, state of hemodynamic shock, surgeon with insufficient experience).

Success Rate – K Clasen et al (1997) had strict laparoscopic approach to 194 cases of ectopic pregnancy resulting in a 97.4% success rate.[25] Other series of studies also confirm the success rate of operative laparoscopic surgery in ectopic pregnancy between 87-97%.[26-30]

Some authors had performed operative laparoscopic even in hemodynamically unstable patients with good success rate.[9]

Operative Time

Lundorff P et al 1991 conducted a randomized, prospective clinical trial was conducted to comparing the efficacy of laparoscopic treatment with conventional conservative abdominal surgery for tubal pregnancy. Laparoscopic surgery took less time (73 min) versus 88 min for laparotomy group.[24] In fact, it actually saves time, as during a laparotomy, opening and closing the abdomen just to gain access to the affected tube consumes precious operating time. Other comparative studies support this fact.[22,26,27]

Peri- or Postoperative Complication

Chatwani A et al in non-randomized study found statically significant decrease in operative blood transfustion rate in laparoscopic group. Another review article by Mohammed H. (2002) suggested that there was no major difference in intraoperative or postoperative complications in laparoscopic group and laparotomy group.[20, 21]

Hospital Stay

Various randomized control trial comparing laparoscopic surgery versus laparotomy in treatment of ectopic pregnancy showed shorter hospital stay and convalescence period.[22, 24]

Fertility Outcome

Concern fertility restoration and pregnancy outcome following conservative or radical approach by minimal access surgery proved no significant difference when compared with open surgery. Overall conception rate of 77.3%, with an ongoing pregnancy rate 81.2% have been reported.[30, 31]

Cost Effectiveness

In this current era of minimal access surgery the cost of endoscopic/laparoscopic set up is much high and need specialized theater set up, more staff and maintenance. But owing to reduce hospital stay, faster recovery time, the expenditure can be considered cost effective.[22, 23]

Quality of Life Analysis

Minimal access surgery as an operative choice for management of life-threatening condition like ectopic pregnancy lead to increased quality of life in term of shorter hospital stay, speedy postoperative recovery, reduce need of postoperative analgesia, cosmetically good scar and less psychological trauma to the patients.

CONCLUSION

Critical overview of literature of all possible approach demonstrate that the minimally access surgery is not only safe and effective, but also economical then open laparotomy in the treatment of ectopic pregnancy and should consider as the gold standard in treating in ectopic pregnancy.

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Role of Laparoscopy in the Management of Giant Hiatal Hernia

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Abstract: Giant hiatal hernia is defined as greater than one third of the stomach in the thoracic cavity[1] and representing 5 to 10 % of all hiatal hernia.[8] The hiatal opening in a patient with a large hernia is wide, with the right and left crura very thin and often separated by 5 cm or more.[8] The aim of this review is to analyze the role of laparoscopy in the management of giant hiatal hernia.

Introduction: Traditionally repair of giant paraesophageal hernia has been performed through open laparotomy or thoracotomy, with the advent of laparoscopy, nowadays giant hiatal hernia are performed with laparoscopy.

Saveral recent reports have shown that laparoscopic repair of paraesophageal hiatal hernia is feasibadle and effective, obtaining comparative result to open surgery.[2]

Material and method: A review of article was done through the internet using search engine Google, high wire press springerlink pubmed through the internet facility available in laparoscopy hospital in Delhi.—using

About 3500 articles available on the net, only selected article were screened for further reference. Operative procedure selected only from the center, where the study was done, are specialized in laparoscopic surgery.

Keywords: Giant hiatal hernia, Laparoscopy management, complication, recurrence.

SURGICAL PROCEDURE

Preoperation work-up including carefull history regarding patient symptom: I. Barium swallow X-ray, II. Upper gastrointestinal endoscopy, III. Esophageal manometry, IV. pH monitoring, should be done.

Aim and Objective

The aim of the study was to evaluate the effectiveness and safety of laparoscopy in the treatment of giant hiatal hernia.
    The following parameter were evaluated;

1. Operative time
2. Operative technique
3. Postoperative pain
4. Complication
5. Hospital stay
6. Functional index
7. Quality of life analysis

OPERATIVE PROCEDURE

The surgical technique employed include:
- Standerd five cannula technique
- Devide the lesser omantom to expose the right hilar piller within the lesser sac
- Reduction of hernia by means of atraumatic grasper in a hand over hand fashion
- Complete excision of sac
- Primary closure of hiatal hernia defect with either suture approximation of crura or by different type of mesh application (for tension-free repair)
- After closing the hiatus a fundoplication (Nissen or toupet) with or without collies gastroplasty will complete the operation depending upon the finding of intraoperative gastrointestinal endoscopic assessment of short esophagus and esophageal manometry.

Review of Citation

M. Morino et al 2006,[8] Performed laparoscopic repair of giant hiatal hernia on 65 patients Oct 1991- April 2003.

- Primary (suture) closure of the hiatal defect was done in 14 cases
- Tension-free repair using a mesh was performed in 37 cases
- 14 patients underwent Collies – Nissen gastroplasty.
- There was no intraoperative complication and no conversion to open technique
- Mesh operation time was 130 min
- No motility
- One major complication (1.5%)
- An esophageal perforation
- Postoperative complication – 12 patients have transient subcutaneous emphysema in the neck that resolve spontaneously.

- Mean hospital stay was 4.8 day
- Transient dysphagia occurred in 7 patients
- Recurrent hernia present in 23 patients (35.4%)
- Recurrent rate was 77% in direct suture and 35% when mesh was used.

Recurrence of hiatal hernia according to type of surgical technique are given in Table 1:

TABLE 1: Result of recurrences

Surgical technique	Patients (N)	Recurrences N (%)	Reintervention N (%)
Direct suture	14	10(77)	5 (36)
PTFE	4	4 (100)	3 (75)
Polypropylene	23	7 (30)	1 (4)
Mixed (PTFE + Polypropylene)	10	2 (20)	1 (10)
Collies-Nissen	14	0	1 (7)

PTFE, Polytetrafluoroethylene
Source: M. Morino et al[8]

No patients with a Collies-Nissen fundoplication experience recurrence.

R Parmeswaran et al 2006[12] performed laparoscopic repair of large paraesophageal hiatal hernia between Jan 2000 and July 2004 on 49 patients.

- The median age of these patients was 68 years
- The techniques used Nissen fundoplication
- There were two conversion to open surgery

- Major morbidity was atrial fibrillation, pulmonary embolism and splenectomy rate was 10.2%.
- Minor morbidity included – chest infection, jaundice, dysphagia, small pneumothorax rate was 20.4%
- Recurrence rate of 27 patients that is 66% patients.

LE Ferri et al 2005,[13] performed repair 60 cases paraeso-phageal hernia for reevaluation of result of laparoscopic repair against open laparotomy from 1990 to 2002.

- For this study 25 cases repaired with open transabdominal
- 35 cases repaired with laparoscopy
- Laparoscopic repair resulted in
  - Lower blood loss
  - Fewer intraoperative complication
  - Shorter length of hospital stay
  - Radiological recurrence was 44% for open and 23% for laparoscopic procedure
- Laparoscopic repair was associated with a significant reduction in time to oral intake, parental opioid use and length of hospital stay.

Anatomic recurrence was identified in 8 of 18 open and 7 of 31 that is (23%) patients in the laparoscopic group five recurrences occurred in the first 15 patients where only 2 of the last 20 patients have had recurrence.

James D Luketich et al[5]: In October 2000 performed laparoscopic surgery for giant hiatal hernia from July 1995 to February 2000 on 100 patients.

- There were three cases in which open conversion done due to adhesion

TABLE 2: Operative and short-term outcome after open and laparoscopic paraesophageal hernia repair

	Open	Laparoscopic	P value
Operative			
Time (min)	123 (30-153)	120 (65-190)	0.6
Blood loss (ml)	300 (50-1500)	50 (25-250)	<0.001
Complications n (%)	6/25 (24%)	2/35 (6%)	0.01
	Splenecotmy *4	Gastrotomy	
	Liver laceration	Bleeding (converted)	
	Esophageal Perforation		
Short Term			
Time to oral intake (days)	4 (2-35)	1 (1-3)	<0.001
Length of stay (days)	13 (6-86)	3 (1-6)	<0.001
Morphine (mg)	109 (50-243)	19 (0-175.6)	<0.001
Complications (postop)[a] n (%)	8/25 (32%)	5/35 (14%)	0.18
Minor (Class I)	5	4	
Major (Class II-IV)	3	1	

[a] Complication classification as proposed by Clavien et al[14]
Source: L.E. Ferri et al[13]

- The median surgical time was 3.6 hours
- Median length of stay was 2 days
- The crural repair was primary in 96 patients and 4 had mesh repair
- 72 patients got Nissen fundoplication and 27 Collies-Nissen fundoplication
- Intraoperative complication includes:
  – Pneumothorex occurred in four (4) patients.
  – Esophageal perforation occurred in five (5) patients.
  – Gastric perforation occurred in three (3) patients.
- Major perioperative complication include stroke 1 patients, MI-1 patients, ARDS-1 patients, Pulmonary emboli-3 patients, reoperation for abscess 2 patients, recurrent hernia in one patient.
- Overall surgical death rate one (1) percent.[5]

Andrew F Pierr, et al (2002)[1]; performed elective repair of giant paraesophageal hernia in 2003 patients between June 1995 to July 2001.

- Mean age was 67 year
- Laparoscopic procedure included
  – 69 patients Nissen fundoplication
  – 112 Collies-Nissen fundoplication
  – 19 other procedure
- Three patients got open conversion due to adhesion.
- Median length of hospital stay was 3 day
- Minor and major complication in 57, (28%) patients
- Postoperative esophageal leak was 3%
- Death 1%
- Recurrence hiatal hernia in 5 patients
- Result;
  – Excellent in 128 patients
  – Good result in 12 patients
  – Fare result in 7 patients
  – Poor result in 5 patients
- Based on postoperative follow-up and GERD questionnaire.

DISCUSSION

There are now several study, report the outcome of laparoscopic management of giant hiatal hernia.[5,10-14] Probably the first successful repair was described by Sir Alfred Cushieri and coworker in 1991. Since then laparoscopic technique have been used increasingly in the approach to patients with paraesophageal hernia.[11]

Rate of recurrence after laparoscopic repair have been variable. Some studies have reported a high recurrence rate of 42%, in other study have reported lower recurrence rate. The anatomic recurrence rate in the series of R Parmeswaran et al (2006) was 17.85%, which is consistent with other series.

TABLE 3: Review of various study with radiological follow-up data

References	Patients (n)	Median Follow-up (mo)	Radiologic recurrence (%)
Hashemi (2000)	26	17	42
Weichmann (2001)	60	19	7
Khaitan (2002)	31	25	40
Diaz (2003)	116	30	32
Taragona (2004)	46	30	20
Aly (2005)	100	48	30
Current study (2005)	49	19	18

Source: R. Parmeswan et al.

Various methods have been used to reduce the rate of recurrence. Those are:

- Prosthetic mesh insertion
- Use of Teflon pledgetted horizontal mattress suture to encircle fiber bundle of both crus of diaphragm.
- In case of short esophagus found on intraoperative endoscopy.
  – Add an esophageal lengthing procdure during the crural repair, i.e. Collies-Nissen gastroplasty to achieve a tension free intra abdominal repair, etc. the rate of recurrence is higher in the learning curve after which the failure rate diminished.[13]

Although laparoscopic repair of giant hiatal hernia is a technically challenging procure but, with the gain of experience result is compared favorably to the open operation[1,8,10,11].

Laparoscopic approach to paraesophageal hiatal hernia offer an excellent visualization of the hiatal region during the phase of hernia reduction the laparoscopic approach allow very precise identification of the anatomic structure and dissection is facilitated by pneumoperitoneum.

Laparoscopic repair of large hiatal hernia is now safe and effective technique for the management because patient population often consisting of elderly, debilitating patient, avoiding an open procedure, may prove beneficial. This is technically challenging procedure but as experienced gained and committed follow-up is performed. We belief this approach well provide an excellent option for patient with paraesophageal hiatal hernia.[10]

CONCLUSION

Although technically demanding this approached provide better exposure of the surgical field than open transadominal procedure and add the known general advantage of laparoscopy in term of reduced morbidity, shorter hospital stay rapid and

recurpation, and decreased pain medication. This advantage may be especially valuable in the paraesophageal hernia patient population because most patients are elderly and have multiple comorbid condition.

ACKNOWLEDGEMENT

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Laparoscopic Excision of Endometrioma

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INTRODUCTION

Endometriosis can have a significant impact on the sufferer, the gynecologist and the health care system. For the sufferer, quality of life may be significantly decreased.[24] For the gynecologist it constitutes a considerable workload, accounting for 10–15% of new referrals.[24] For the surgeon, the diagnosis and treatment of endometriosis accounts for 25–35% of laparoscopies and 10–15% of hysterectomies each year.[25] Finally for the health care system, endometriosis imposes considerable costs; direct costs of surgical therapy are estimated at US$5805 and for medical treatments US$2418.[26] The indirect costs of time away from employment, the burden of pain and its impact on quality of life are also recognized. Surgical treatment of endometriosis may be effective in relieving dysmenorrhea, dyspareunia, non-menstrual pelvic pain and dyschesia.[24,27] It is most common in the pelvic cavity, including the ovaries, the uterosacral ligaments, and pouch of Douglas. Common symptoms include dysmenorrhea, dyspareunia, non-cyclic pelvic pain, and subfertility. The clinical presentation is variable, with some women experiencing several severe symptoms and others having no symptoms at all. The prevalence in women without symptoms is 2-50%, depending on the diagnostic criteria used and the populations studied. The incidence is 40-60% in women with dysmenorrhea and 20-30% in women with subfertility.[1-3] The severity of symptoms and the probability of diagnosis increase with age.[4] The most common age of diagnosis is reported as around 40, although this figure came from a study in a cohort of women attending a family planning clinic.[5] Symptoms and laparoscopic appearance do not always correlate. The American Society for Reproductive Medicine has published a classification of severity of endometriosis at laparoscopy.

Several factors are thought to be involved in the development of endometriosis. Retrograde menstruation remains the dominant theory for the development of pelvic endometriosis, though as this is almost universal it is unlikely to be the sole explanation.[7-9] The quantity and quality of endometrial cells, failure of immunological mechanisms, angiogenesis, and the production of antibodies against endometrial cells may also have a role.[10,11] Embryonic cells may give rise to deposits in distant sites such as the umbilicus, the pleural cavity, and even the brain.[8,9]

Risk factors generally relate to exposure to menstruation: early menarche and late menopause increase the risk whereas the use of oral contraceptives reduces.[5]

What is the natural course of endometriosis?

Studying the natural course is difficult because of the need for repeat laparoscopy. Two studies in which laparoscopy was repeated after treatment in women given placebo, however, reported that over 6-12 months, endometrial deposits resolved spontaneously in up to a third of women, deteriorated in nearly half, and were unchanged in the remainder.[12,13]

Diagnosis of Endometriosis

What Features of History and Examination are Important?

In women of reproductive age who present with recurrent dysmenorrhea or pelvic pain you should take a full history of reproduction and carry out a pelvic examination. The cyclical nature of the pain and the relation of the pain to menstruation points to the diagnosis of endometriosis. Painful micturition, defecation, and dyspareunia are also associated. In young women you should consider other diagnoses such as pelvic infection, problems in early pregnancy, ectopic pregnancy, ovarian cyst torsion, and appendicitis (Table 1). During pelvic examination, tenderness in the posterior fornix or adnexa, nodules in the posterior fornix, or adnexal masses may indicate endometriosis. Adolescents presenting with dysmenorrhea do not require a pelvic examination as disease is uncommon.

Transvaginal ultrasonography can reliably detect endometriomata (cysts of endometriosis), but failure to reveal cystic structures does not exclude the diagnosis of endometriosis.[3,14] Magnetic resonance imaging is increasingly used to identify subperitoneal deposits, although retroversion, endometriomata, and bowel structures may mask small nodules.[4,15] Although concentrations of the cancer antigen CA125 are slightly raised in some women with endometriosis, the test neither excludes nor diagnoses endometriosis and is not considered useful in establishing the diagnosis.[5] The threshold for surgery is unlikely to be influenced by the CA125

concentration, and the guidelines from the Royal College of Obstetricians and Gynecologists described CA125 as having only limited value as either a screening or a diagnostic test.[6]

Laparoscopy is the only diagnostic test that can reliably rule out endometriosis. It is also accurate in detecting endometriosis and is considered the standard investigation.[6]

What are the Indications for Laparoscopy?

Many young women experience dysmenorrhea (about 60-70%), and unless there are other features to indicate endometriosis laparoscopy is not recommended.[16] Some women will require further investigation to guide management. For adolescents who present with dysmenorrhea, the recommended approach is to first prescribe non-steroidal anti-inflammatory drugs (NSAIDs) and oral contraceptives.[17,18] The lack of measurable pain relief with these drugs is usually an indication for further investigation.[19] Other indications for laparoscopy include severe pain over several months, pain requiring systemic therapy, pain resulting in days off work or school, or pain requiring admission to hospital.

Treatment options for medical therapy include oral contraceptives, progestogens, androgenic agents, and gonadotrophin releasing hormone (GnRH) analogues. All suppress ovarian activity and menses and atrophy of endometriotic implants, although the extent to which they achieve this varies. There have been few randomised controlled trials of medical treatment versus placebo, although many trials have compared different types of medical treatment.[7-10] All medical treatments are similarly effective in relieving pain during treatment.

The side effect profiles are important in deciding treatment choices. Progestogens are associated with irregular menstrual bleeding, weight gain, mood swings, and decreased libido. The side effects associated with danazol include skin changes, weight gain, and occasionally deepening of the voice, and it is infrequently prescribed now. GnRH analogues dramatically lower estrogen concentrations, and side effects include the development of menopausal symptoms and the loss of bone mineral density with long-term use (both reversible). Estrogen therapy in an add back regimen is useful for preventing side effects with GnRH analogues.[10] In the randomised controlled trials comparing subcutaneous depot medroxyprogesterone acetate (SC-DMPA) with GnRH analogues the bone loss was less with the progesterone during treatment.[20-21] Recurrence of painful symptoms after six months of medical treatment may be as high as 50% in the 12-24 months after the treatment is stopped.[22-23] Recurrence may in part be because large lesions respond poorly to medical treatment. It is generally accepted that endometriomata are not amenable to medical treatment, although temporary clinical relief may be achieved.

The levonorgestrel intrauterine system (LNG-IUS) is an established treatment for heavy menstrual bleeding but can also be used for dysmenorrhea and endometriosis.[11,24] In one study only 10% of women who had a levonorgestrel intrauterine system after surgery for endometriosis had moderate or severe dysmenorrhea compared with 45% of the women who had surgery only.[12] In a trial of 82 women with endometriosis the levonorgestrel intrauterine system had similar effectiveness to GnRH analogues, but the potential for long-term use of this system is advantageous if the woman does not want to conceive.[13] It has also been used in women with rectovaginal disease.[14] In the future aromatase inhibitors may have a therapeutic role in endometriosis as they inhibit estrogen production selectively in endometriotic lesions, without affecting ovarian function.[25]

Is Surgery or Medical Treatment More Effective?

There are no randomised controlled trials comparing medical versus surgical treatments for the management of endometriosis, and the decision about medical or surgical treatment at the time of diagnosis will depend on several factors including patient's choice, the availability of laparoscopic surgery, the desire for fertility, and concerns about long-term medical therapy.

Surgery for endometriosis can be performed laparoscopically or as an open procedure. It entails excision or ablation (by laser or diathermy), or both, of the endometriotic tissue with or without adhesiolysis. There are few trials of laparoscopic treatment.[14,15] Surgical excision of endometriosis results in improved pain relief and improved quality of life after six months compared with diagnostic laparoscopy only.[14] In one of the trials laparoscopic treatment also included uterine nerve ablation (LUNA),[15] and pain improvement persisted for up to five years in more than half of the women.[26] About 20% of women do not report any improvement after surgery.[14]

No randomised controlled trials have compared laser versus electrosurgical removal of endometriosis, and only one small trial, with inconclusive results, compared excision versus ablation.[27]

How often does Endometriosis Recur after Surgery?

Recurrence of endometriosis after laparoscopic surgery is common.[16,26] Even with experienced laparoscopic surgeons, the cumulative rate of recurrence after five years is nearly 20%.[17] Another study reported recurrence of dysmenorrhea in almost a third of women within one year of laparoscopic surgery in women who received no other treatment.[16]

What is the Evidence for Surgery in Women with Endometriomata?

Randomised controlled trials comparing excision or drainage and ablation for endometriomata 3 cm reported that recurrences were reduced and subsequent spontaneous pregnancy increased in the women who underwent excision.[19] Though excisional surgery of the capsule could lead to removal of normal ovarian tissue and result in reduced ovarian reserve,[20,28] there

is no evidence that this occurs, whereas a recurrence of the endometriomata will inevitably mean further surgery. Rectovaginal endometriosis presents surgical challenges because of difficult access and the possibility of injury to the bowel. Although reported long-term outcomes are encouraging with advanced laparoscopic techniques, there are few prospective studies and no randomised controlled trials.[16, 17] One small study of the levonorgestrel intrauterine system in women with rectovaginal endometriosis found improved dysmenorrhea, pelvic pain, and dyspareunia after one year.[29] A trial comparing estrogen and progesterone combination with low dose progestogen in 90 women with rectovaginal disease reported substantial reductions at 12 months in all types of pain without major differences between groups.[21] Overall, two thirds of patients were satisfied with this approach.

Should Women have Hormonal Treatment before Surgery for Endometriosis?

Only one study has examined this question. There was no evidence of a difference in the difficulty of surgery in the women who had received preoperative hormonal treatment.[30]

Should Women have Hormonal Treatment after Conservative Surgery?

There was no evidence of improved pain relief with postoperative hormonal treatment (including danazol, GnRH analogues, oral contraceptives, and medroxyprogesterone acetate) up to 24 months after surgery.[11] The studies to date are small, however, and there is insufficient follow-up to rule out a benefit.

What are the Effects of Hormonal Treatment after Oophorectomy (with or without hysterectomy)?

There was no evidence of increased rates of recurrence in women who had both ovaries removed and who were given nearly four years of combined hormone therapy, but the study was underpowered to detect clinically important differences.[22]

What is the Impact of Endometriosis on Fertility?

Although management of pain may be the more immediate issue, the long-term outcome of fertility should not be overlooked. Few studies have examined this. A systematic review of medical treatment for women with infertility and endometriosis did not find evidence of benefit,[7] and it is not recommended for women trying to conceive.[6,23] A systematic review of laparoscopic treatment of endometriosis in women with subfertility suggested an improvement in pregnancy rate in the 9-12 months after surgery.[31] A second systematic review of laparoscopic excision compared with ablation endometriomata reported a five-fold increase in rate of pregnancy.[19] There is the ongoing concern about ovarian reserve in women who have laparoscopic

excision.[20,28] The other concern is the impact of endometriomata on artificial reproductive techniques.[32] The European Society for Human Reproduction and Embryology (ESHRE) recommends surgery if endometriomata are 4 cm.[23]

Aim of Study

The objective of this review was to determine the most effective technique of treating an ovarian endometrioma; either excision of the cyst capsule or drainage and electrocoagulation of the cyst wall. The end-points assessed were the relief of pain, recurrence of the endometrioma, recurrence of symptoms and in women desiring to conceive the subsequent pregnancy rate, either spontaneous or as part of fertility treatment.

Material and Methods

The reviewers searched the cochrane menstrual disorders and subfertility group specialised register of trials,[24] the cochrane register of controlled trials,[25] medline (1966-august 2007), embase[26] and reference lists of articles, the handsearching of relevant journals and conference proceedings and by the cochrane menstrual disorders and subfertility group trials register is based on regular searches of medline.

Selection Criteria

Randomised controlled trials of excision of the cyst capsule versus drainage and electrocoagulation of the cyst in the management of ovarian endometriomata.

Main Results

No randomised studies of the management of endometriomata by laparotomy were found. Two randomised studies of the laparoscopic management of ovarian endometriomata of greater than 3cm in size, for the primary symptom of pain were included. Laparoscopic excision of the cyst wall of the endometrioma was associated with a reduced recurrence rate of the symptoms of dysmenorrhea (OR 0.15 CI 0.06-0.38), dyspareunia (OR 0.08 CI 0.01-0.51) and non-menstrual pelvic pain (OR 0.10 CI 0.02-0.56), a reduced rate of recurrence of the endometrioma (OR 0.41 CI 0.18-0.93) and with a reduced requirement for further surgery (OR 0.21 CI 0.05-0.79) than surgery to ablate the endometrioma. For those women subsequently attempting to conceive it was also associated with a subsequent increased spontaneous pregnancy rate in women who had documented prior sub-fertility (OR 5.21 CI 2.04-13.29). A further randomised study was identified that demonstrated an increased ovarian follicular response to gonadotrophin stimulation for women who had undergone excisional surgery when compared to ablative surgery (WMD 0.6 CI 0.04-1.16). There is insufficient evidence to favor excisional surgery over ablative surgery with

respect to the chance of pregnancy after controlled ovarian stimulation and intrauterine insemination.

DISCUSSION

Endometriosis should be suspected in any woman of reproductive age who presents with dysmenorrhea or chronic pelvic pain. Only laparoscopy can reliably identify endometriosis. If endometriosis is diagnosed at the time of laparoscopy, laparoscopic surgery should be the first choice of treatment, especially in women of reproductive age with an endometriomata. In women with endometriomata, the cyst wall should be stripped out, instead of drainage and ablation, as the recurrences are fewer and pregnancy rates improved. At present, there is no evidence of benefit of postoperative medical treatment but the levonorgestrel intrauterine system has the potential for long-term use. In women who wish to conceive surgical, rather than medical, treatment should be offered.

Management of these blood filled cysts is controversial. The laparoscopic approach to the management of endometriomata is favored over a laparotomy approach as it offers the advantage of a shorter hospital stay, faster patient recovery and decreased hospital costs. Currently the commonest procedures for the treatment of ovarian endometriomata are either excision of the cyst capsule or drainage and electrocoagulation of the cyst wall. Although the surgery is more challenging. After an initial unsuccessful surgery for restoration of fertility in patients with advanced endometriosis, in vitro fertilization rather than repeat surgery is more effective. Laparoscopic treatment of endometriomas should be performed by excisional surgery. Drainage and/or medical therapy is associated with a very high recurrence rate. The main concern with excision of endometriomas is the potential to decrease ovarian reserve. Most experts would agree that if there is an endometrioma of 4 cm or greater that a laparoscopic excision be performed before an anticipated in vitro fertilization cycle to decrease the potential risk of infection and improve access to follicle.[24, 26]

Postoperative follow-up after laparoscopic ovarian endometrioma excision were studied retrospectively. Recurrence was defined as the presence of endometrioma more than 2 cm in size, detected by ultrasonography within 2 years of surgery. Fourteen variables (age, presence of infertility, pain, uterine myoma, adenomyosis, previous medical treatment of endometriosis, previous surgery for ovarian endometriosis, single or multiple cysts, the size of the largest cyst at laparoscopy, unilateral or bilateral involvement, co-existence of deep endometriosis, revised American Society for Reproductive Medicine (ASRM) score, postoperative medical treatment and postoperative pregnancy) were evaluated to assess their independent effects on the recurrence using logistic regression analysis. The overall rate of recurrence was 30.4% (68 224). Significant factors that were independently associated with

higher recurrence were previous medical treatment of endometriosis [odds ratio (OR) = 2.324, 95% confidence interval (95% CI) = 1.232–4.383, P = 0.0092) and larger diameter of the largest cyst (OR = 1.182, 95% CI = 1.004–1.391, P = 0.0442). Postoperative pregnancy was associated with lower recurrence (OR = 0.292, 95% CI = 0.028–0.317, P = 0.0181). Previous medical treatment of endometriosis or large cyst size was a significant factor that was associated with higher recurrence of the disease. Postoperative pregnancy is a favorable prognostic factor. Study of ovarian endometriosis after hormonal therapy, medical treatment led to an incomplete suppression of endometriotic foci.[26] Furthermore, second look laparoscopies performed after the resumption of menses have demonstrated that the disease may return with time when hormonal suppression is discontinued.[4,15,28]

CONCLUSION

There is good evidence that excisional surgery for endometriomata provides for a more favorable outcome than drainage and ablation with regard to the relief of pain, recurrence of the endometrioma, recurrence of symptoms and in women desiring to conceive the subsequent pregnancy rate, either spontaneous or as part of fertility treatment.

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Common Bile Duct Injury in Laparoscopic Cholecystectomy—Inherent Risk of Procedure or Medical Negligence—A Case Report

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Abstract: We present a case report of common bile duct injury which occurred in a patient who underwent laparoscopic cholecystectomy for cholecystitis and cholelithiasis. The patient died within 96 hours of the surgery. The case was investigated by the police as the relations of the victim alleged death due negligence on the part of treating doctors. The clinical details, autopsy findings, report of histopathological examination and medicolegal aspects are discussed along with relevant literature.

Keywords: Cholecystctomy, common bile duct injury, negligence.

INTRODUCTION

For more than a century classical cholycystectomy has been a method of choice in surgical management of gallbladder disease. Laparoscopic cholecystctomy introduced in the late eighties, has now become the gold standard and has taken the place of conventional cholecystectomy.[1] It is now the treatment of choice for symptomatic gallstone disease.[2,3] Though it is a very safe procedure, it does have its own morbidity and rarely mortality due to numerous complications.[4]

CASE REPORT

A 44-year-old male patient presented to a private hospital with the complaints of acute onset of pain in the right upper abdomen for two days with 4-5 episodes of yellowish vomiting. He was examined by a surgeon and admitted to the hospital on the next day. As per clinical records, there was a history of dyspepsia with acid brash. The pain was radiating to right hypochondrium and back. There was no history of jaundice and diarrhea. On clinical examination, his general condition was satisfactory with stable vitals. The central nervous system, cardiovascular system and respiratory system were normal on examination. Abdominal examination showed slight tenderness in the right hypochondrium,. There was no organomegaly or free fluid. Ultrasonography revealed acute cholecystitis with cholelithiasis. Laboratory investigations were within normal limits.

Laparoscopic cholecystectomy was performed on the next day of admission under general anesthesia. During the surgery gallbladder was found to be thick walled with dense omental adhesions. The Hartmann's pouch was not well developed. Gallbladder was sessile and Moynihan's hump was present.

During dissection the common bile duct was accidentally injured at the junction of gallbladder. The injury was identified immediately during the procedure. A second opinion of other senior consultant was sought and it was decided to convert the procedure to open through a right subcostal incision. The injury to common bile duct was repaired and a no. 12 T tube was placed across the repair. Gallbladder was dissected out of its bed, hemostatis achieved, suction irrigation done and a no. 32 chest drain tube placed in the subhepatic region. The incision was closed in layers. The patient was shifted to the surgical ICU. The gallbladder was sent for histopathological examination. There was no anaesthetic complication during the entire procedure. On the first and second postoperative day patient was afebrile and stable hemodynamically. He was kept on intravenous fluids, antibiotics, analgesics and proton pump inhibitors. Oral feeding was withheld.

On the third postoperative day patient developed oliguria. Urine output failed to respond to a fluid challenge. The opinion of a physician was sought and the patient was shifted to

Medicine ICU. A diagnosis of cholangitis with septicemia and associated pancreatitis was made. Computerized Tomography of abdomen did not reveal any leakage from the T tube as the dye was passing smoothly from CBD into duodenal loop without any extravasation. Patient was kept on intravenous fluids, antibiotics, vasopressor support and was placed on ventilator. Central line was inserted. Blood was sent for culture and sensitivity test, Serum amylase and serum Lipase. ECG and X-rays were done. Arterial Blood Gas analysis showed severe metabolic acidosis.

The investigations revealed deranged clotting parameters and high level of Serum amylase and Serum Lipase. A vasopressin infusion was started and sodium bicarbonate was administered to correct acidosis. Consultation was sought from senior nephrologists. Non-contrast Computerized Tomography of abdomen was done which was normal. Patient was on dalacin, amikacin and vancomycin. The coagulation abnormality was corrected with one unit of Fresh Frozen Plasma and one unit of platelets. He was started on Xigris (Activated Protein C) on fourth postoperative day. Despite these measures the patient's condition continued to deteriorate. In the morning hours of the fifth postoperative day, the patient developed cardiac arrest. Cardiopulmonary resuscitation was attempted with adrenaline, atropine and sodium bicarbonate but was unsuccessful and the patient was declared dead.

The relations of the deceased lodged a complaint at the police station alleging negligence in the treatment by the doctors. The inquest was conducted by police and autopsy was performed the body by the board of doctors.

Autopsy findings revealed stitched wounds on right and left side of chest with injection marks (Therapeutic Central Venous Line insertion site), Stitched wound 24 cm in length on anterior abdominal wall (Stitched Surgical Incision), stitched wound around umbilicus (Therapeutic) and injection marks in both side inguinal and both side cubital fossa. Internally, stitched surgical wound on first part of duodenum. CBD was attached to first part of duodenum. Gallbladder was absent. Gel foam present in gallbladder fossa. Both lungs were congested and edematous. Petechial hemorrhages were seen on surface of lungs and liver. Heart shows subendocardial petechial hemorrhages. There was no evidence of pericardial, pleural effusion or hemoperitoneum.

Histopathological Examination

Histopathological examination indicated congestion in spleen, fatty change in liver, severe pulmonary edema and hemorrhage in lungs and acute tubular necrosis of proximal tubules of kidneys.

Cause of death was attributed to multiple organ failure due to septicemia following cholecystectomy.

DISCUSSION

Professional negligence is defined as absence of reasonable care and skill or willful negligence of a medical practitioner in the treatment of a patient, which causes bodily injury or death of patient. A doctor is not liable if he exercises reasonable skill and care, provided that his judgment conforms to accepted medical practice and does not result in an error of omission. The doctor cannot be sued for professional negligence, when statistics show that accepted methods of treatment have been employed on the patient and that the risk and injury which resulted are of a kind that may occur even though reasonable care has been taken.

In the present case, the patient was admitted with diagnosis of acute cholecystitis. Laparoscopic cholecystectomy, which is the treatment of choice for gallbladder diseases[1] was performed by the treating surgeon. During the surgical procedure injury to common bile duct occurred. Bile duct injuries result in high morbidity, long-term hospitalization and may be life threatening.[1] The incidence of bile duct injury reported varies in different studies. *Gronroos et al (2003)* reported that the risk of bile duct injury was 0.86% in total patient population.[2] *Krahenbuhl et al (2001)* reported that overall bile duct injury incidence was 0.3%; 0.18% for symptomatic gallstones, and 0.36% for acute cholecystitis. In case of severe chronic cholecystitis with shrunken gallbladder incidence was as high as 3%.[5] *Calvete et al (2000)* reported that overall incidence of bile duct injury was 1.4%[6] and *Huang et al (1997)* reported that bile duct injury accounted for 0.32%.[7]

Richardson et al (1996) has mentioned that severe inflammation, aberrant anatomy and poor visualization as contributory factors for CBD injury.[8] This complication may occur even when the operating surgeon is well experienced.[5,6,9] *Francoeur et al (2003)* reported that these injuries could not be anticipated and as such it is an inherent risk of this procedure thus, it is unavoidable and uniformly first concerned of surgeon after injury is about the patients well being.[9]

The bile duct injury in this case was immediately recognized by the operating surgeon. Injury to common bile duct was repaired by using T-Tube and converting the procedure of laparoscopic cholecstyectomy to open procedure. Other senior surgeon was also consulted and involved in operation. The procedure adopted was in conformation to that as reported in literature.[5,6] *Kienzle (1999)* had reported that bile duct injury cannot be considered as malpractice, because it could be intraoperatively made out and immediately treated.[10] *Carroll et al (1998)* concluded that factors that predisposes to lawsuits include treatment failures in immediately recognized injuries, complications that result from delays in diagnosis and misinterpretation of abnormal cholangiograms.[11] *Low et al (1997)* reported that in Germany the main reasons for acceptance of a case of common bile duct injury in laparoscopic

cholecystecomy as malpractice were delay in changing to conventional cholecystectomy, delay revisions, laparoscopic revisions and not reverting to conventional cholecystectomy in unclear situations.[12]

Clinical record revealed that patient was appropriately managed postoperatively. He was admitted in intensive care unit. All the relevant investigations were carried out. The consultations were taken from the nephrologists and physicians of critical care units. In spite of all possible measures patient could not survive. As per report of postmortem examination, the cause of death was multiple organ failure due to septicemia following surgical procedure for gallbladder. Such events though rare, are known to occur and are reported in literature. Bauer et al (1998) reported one case of bile duct injury during laparoscopic cholecystectomy, who died postoperatively due to multi-organ system failure.[13] There was/were no evidence/s or finding/s which could substantiate the allegation of negligence against the treating doctors. The literature supports the bile duct injury as an inherent risk of procedure.

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