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Total laparoscopic hysterectomy steps: An upcoming minimally invasive procedure

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Abstract
Laparoscopic hysterectomy is an upcoming minimally invasive procedure as compare to total abdominal hysterectomy, it is clearly associated with less intra-operative blood loss, shorter hospital stay, early ambulation, early resumption to daily physical activity, cosmetically looks better and less fear of abdominal wound infection. In patient who are obese, elderly and can't afford more bedridden time, TLH is best procedure. In recent era TLH should be the treatment option for benign uterine gynaecological pathologies especially in elderly, obese women. In this respect, we outlines the steps of laparoscopic hysterectomy.

Keywords: total laparoscopic hysterectomy, benign disease, surgical steps, minimally invasive procedure

Introduction
Hysterectomy is one of the most common surgical procedure performed for benign uterine pathologies [1]. It is the second most frequently performed major surgical procedure on women next only to caesarean section. Most common reasons for performing hysterectomies are fibroids, bleeding irregularities, endometrial hyperplasia, cervical dysplasia, endometriosis and genital prolapsed malignancy [2]. Approximately 90% of hysterectomies are performed for benign conditions [3]. The above-mentioned benign disease can be approached by conservative treatment, medical or surgical operation or by definitive surgery, which is hysterectomy. Hysterectomy is done via three routes abdominal, vaginal, laparoscopy.
The first laparoscopic hysterectomy was performed in 1988 by Harry Reich and published in 1989 but it was only from 1991 onwards that this surgical method was brought in to practice [4]. Evidence- based studies have shown that laparoscopic hysterectomy is better alternative to abdominal hysterectomy, but have some limitations like longer learning curve, takes longer time to perform, expensive equipment, general anaesthesia, manpower, higher operative cost and serious complications due to inadequate experience of surgeons this modality is not resorting till now, according to previous studies [5]. Now this gap is being steadily bridged, owing to training programs worldwide. Laparoscopic approach may not be feasible in patients with history of multiple abdominal surgery, dense pelvic/bowel adhesions and large fibroid where TAH takes the lead. Therefore, the aim of this document is to offer a better insight and a detailed description of the surgical steps of laparoscopic hysterectomy, in order to better govern this innovative approach for the benefit of patients and provide recommendations covering the technical aspect of this approach.

Major steps include
- Preparation and Positioning
- Insertion of uterine manipulator
- Pneumoperitoneum creation and Trocar placement
- Round ligament desiccated
- Mobilize the bladder
- Tubo-ovarian ligament or infundibulopelvic ligament (if ovary removed) desiccated
- Posterior leaf of broad ligament desiccated upto uterosacral ligament posteriorly
- Secure the ipsilateral uterine vessels
- Separation of uterus with cervix from the vaginal vault
- Remove the uterus

- Vaginal cuff closure
- closure of ports

Case report

A 52 years old para 3 women was admitted at Zenana SMS hospital, Jaipur in gynae OPD with chief complaints of abnormal uterine bleeding, pain abdomen and weakness for last 1 year. Per vaginum examination show cervix in mid position, uterus anteverted, ante flexed, bulky (10-12 weeks), mobile, bilateral fornices free with bleeding, rest of general physical examination and systemic examination did not reveal any significant abnormality. Patient evaluated for hysterectomy but patient was obese and with diabetes mellitus with probability of wound dehiscence put for laparoscopic procedure after pre anaesthetic check-up. After taking a valid consent and having done necessary investigations, patient was taken for procedure. Patient withstands procedure well without any significant event intraoperatively and post operatively. The procedure was undertaken under general anaesthesia. Patient was discharged from hospital with a stable general condition on 3rd postoperative day and asked to follow up in our outpatient department.

Steps towards a successful TLH

1. Operation theatre setup and Patient Positioning

Patient is placed in modified dorsal lithotomy position and the table was tilted nearly 45^0 trendelenburg with the leg spread apart in little ventral position, this position provide lateral movement of the uterine manipulator. The arms were kept along the patient's body to prevent brachial plexus injury. The use of shoulder braces which prevent cephalad slide during Trendelenburg position (shown in figure no.1).

We keep the table in a low position and have a monitor directly facing each surgeon to promote an ergonomic working environment whenever possible uterine manipulator holding assistant should also have visual access to the surgery. (Surgeon team shown in figure no.2) Cable and irrigation system must be placed in an organized state to avoid mixing during surgery. (Operation theatre setup shown in figure no.1)

The surgeon needs to be familiar with all the equipment in the operating room and should routinely inspect equipment for malfunction or servicing needs. An equipment list is shown in table 4. In general, it is important for the surgeon to simplify the equipment list as much as possible. This prevents crowding in the operating room and facilitates room turnover and staff familiarity with the equipment being used. Right-handed surgeon work normally from the left side of the patient. Positions of different assistants of laparoscopic team shown in figure no.3.

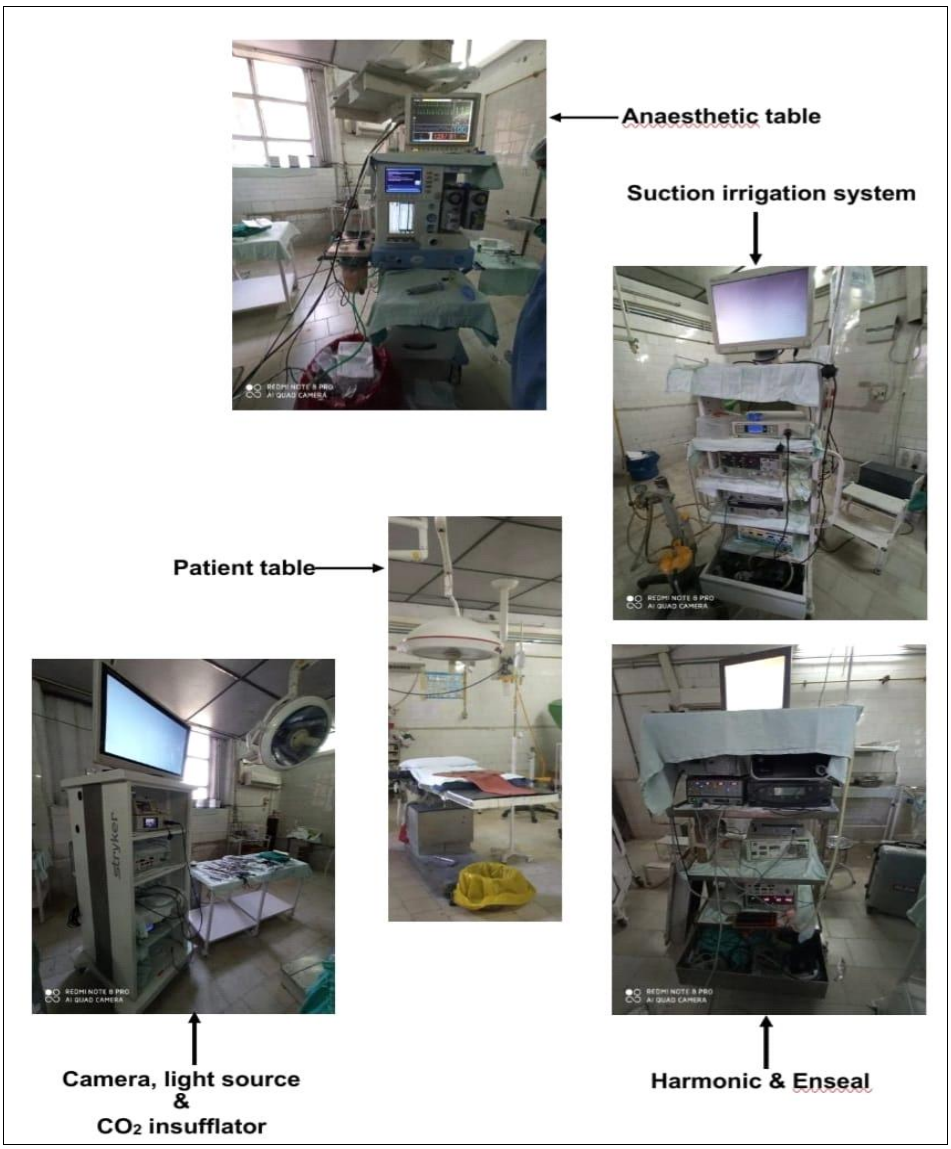

Fig 1: Operation theatre setup

Fig 2: Laparoscopic Team and Patient Position

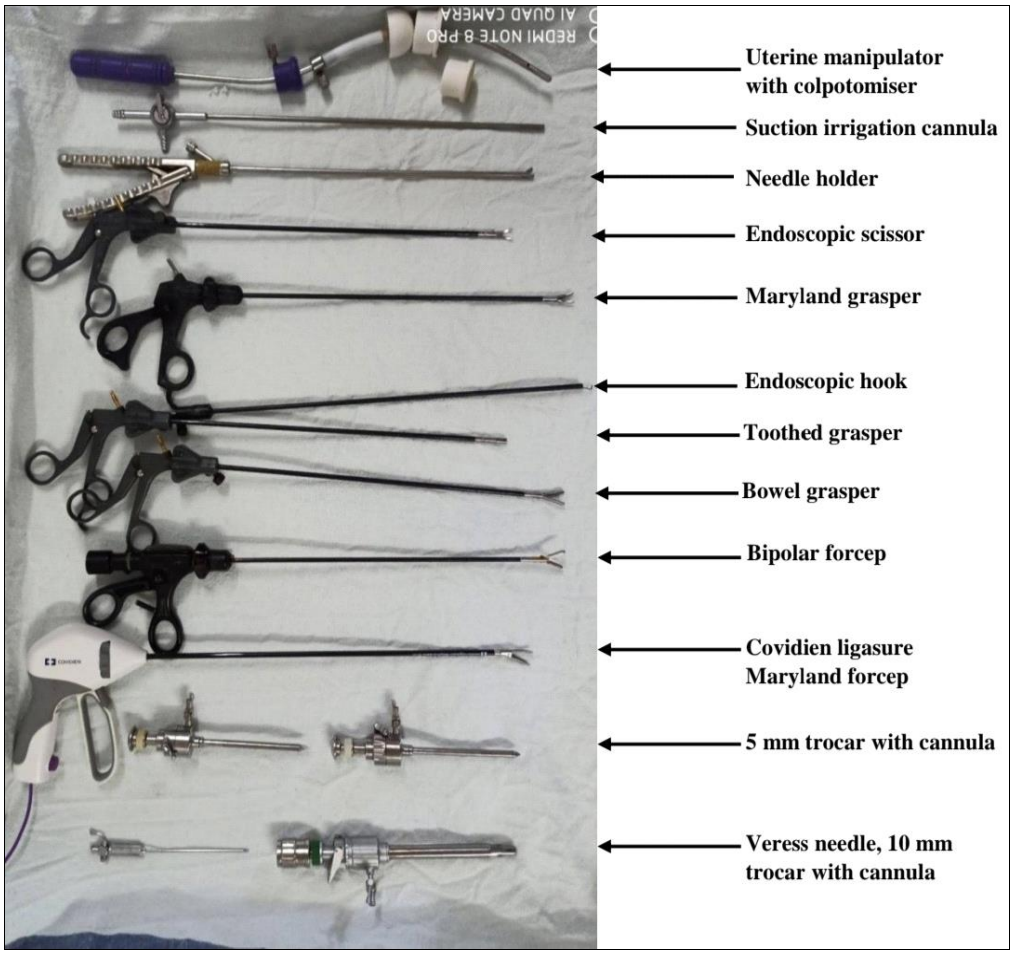

Fig 3: Laparoscopic Instruments

Uterine manipulator insertion

After painting and draping bimanual examination was done. K-90 catheter inserted into the bladder which drained the bladder continuously during the whole procedure. Posterior wall of the vagina retracted with Sim‘s speculum and the anterior lip of the cervix held with vulsellum. Then the Uterine sound was introduced into the uterus to assess the uterocervical length. The serial dilatation of cervix was done through up to no. 8 Hegar’s dilator for placement of uterine manipulator with colpotomiser which was used to manipulate the uterus during whole procedure and delineate the vaginal margin for cutting the cervicovaginal junction. (Shown in figure no.4)

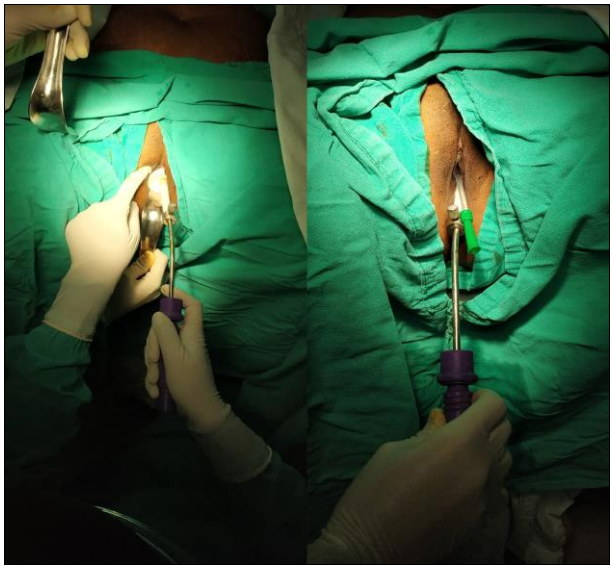

Fig 4: show uterine manipulator insertion and K-90 catheter for urine drainage during whole procedure

3. Pneumoperitoneum creation

For Pneumoperitoneum creation, table must be in neutral position to prevent vascular injury**.** The procedure is done under general anaesthesia. A nasogastric tube was inserted to deflate the stomach. Veress needle access depend on the patient's obesity, more obese more perpendicular access should be made. Before veress needle access, surgeon must be ensure that stomach is decompressed and any organomegaly must be ruled out. Palmer point accessement done.

A subumbilical stab incision was given. There are two method to introduced the safety trocar intra-abdominally one is gasless and the another one is to insufflate the abdomen via the veress needle. We used the second method. Veress needle inserted through the stab incision (shown in figure no.5), for confirmation of intra-abdominal position of needle, the—Hanging drop test was done.

After confirmation gas tube (CO2) was connected with the veress needle to insufflate the abdomen to increases intra-abdominal pressure upto 12-15 mmHg at the rate of 1- 1.5 liters per minute, till the intra-abdominal pressure reading on monitor was above 10 mmHg or there was loss of dullness on percussion over the right upper quadrant and uniform distension of lower abdomen was achieved. Veress needle was then removed. When pressure is high then needle may be in the omentum which can be dislodged by slightly withdrawing and gently shaking the needle tip. If pressure is persistently high then needle is in incorrect position, reinsertion is needed.

Now Trendelenburg position was given to the patient, a safety trocar is inserted through subumbilical incision after incision extended upto 10 mm. A 30^0 laparoscopic camera with light source was introduced through the primary port to delineate the whole intra- abdominal & pelvic anatomy and any trocar injury, two more ports were made on the left side of the abdomen under laparoscopic vision.

Second port was made two centimetre above and two centimetre medial to the anterior superior iliac spine. These ports were placed lateral to the rectus sheath to avoid injury to the inferior epigastric vessels and to allow adequate space to approach the deep pelvis.

The third port was made at the level of the camera port which in obese patient shifted medially and in thin patient shifted laterally, in big uterus shifted upwards and centrally (shown in figure-6). The optimal trocar orientation is 90^0 from abdominal plane, trocar placement must allow free movements of the instruments, means high and lateral placement is done for optimal triangulation.

Fig 5: show veress needle insertion

Fig 6: Show trochar placement

4. Now we show surgical steps of total laparoscopic hysterectomy in figures

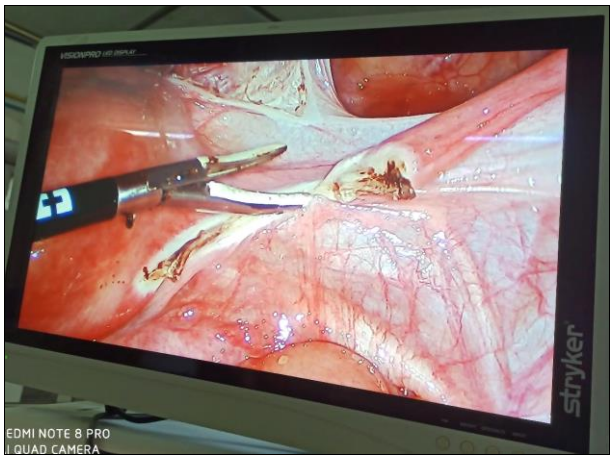

Fig 7: Round ligament, coagulated at three places and cut

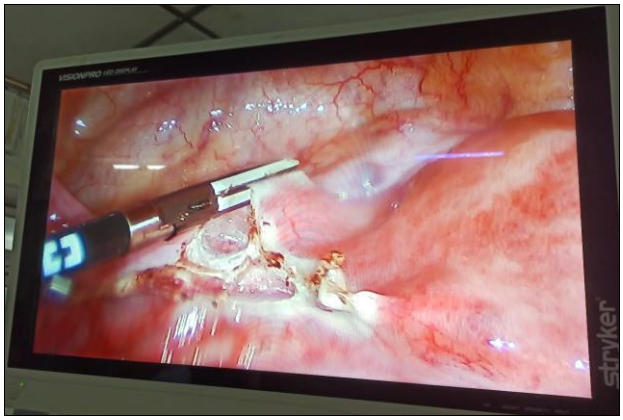

Fig 8: Dissecting the anterior leaf of the broad ligament

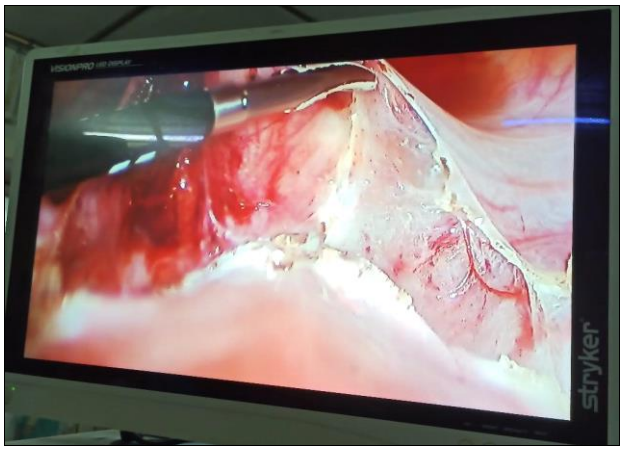

Fig 9: Uterovesical fold dissection

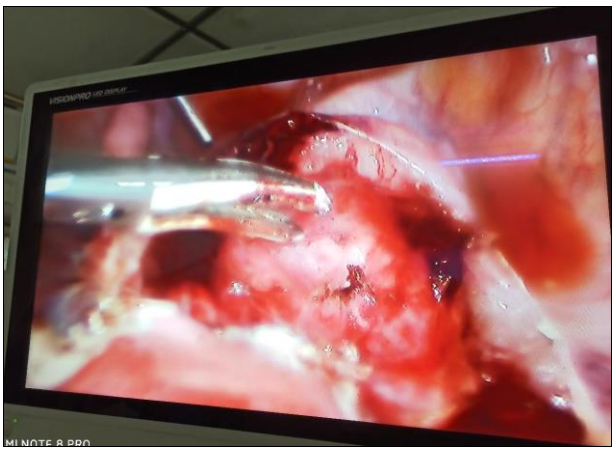

Fig 10: Bladder was dissected and pushed down

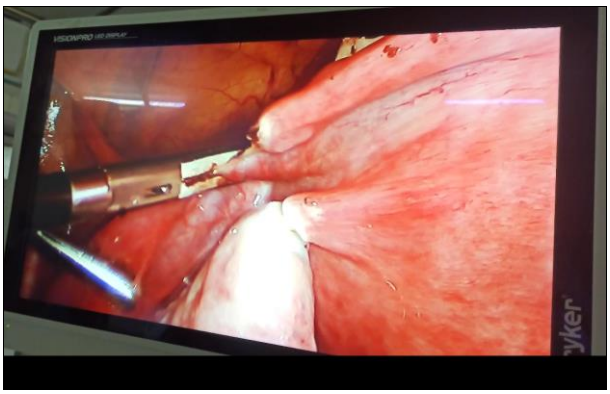

Fig 11: Fallopian tube and ovarian ligament desiccated

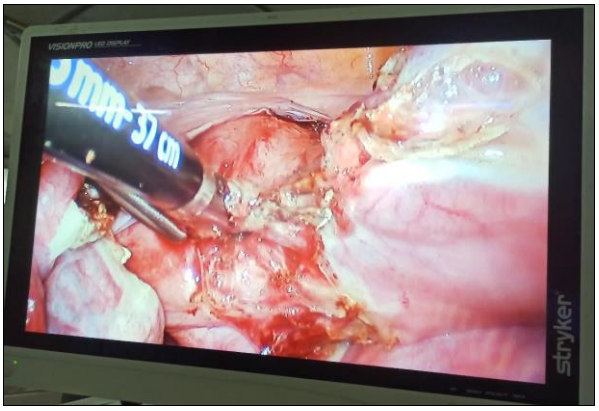

Fig 12: Posterior leaf of broad ligament desiccated up-to Uterosacral ligament posteriorly and uterine vessels skeletonized, coagulated and cut

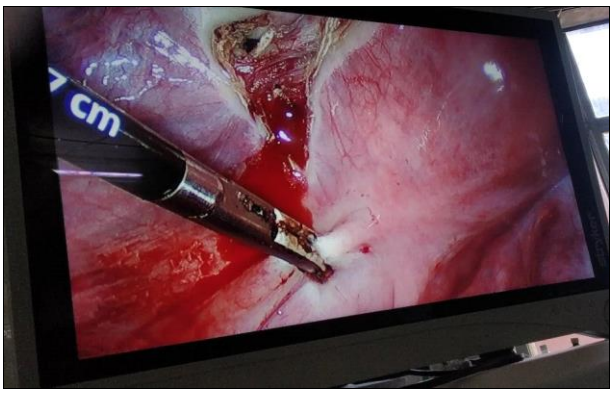

Fig 13: Uterosacral ligament desiccated

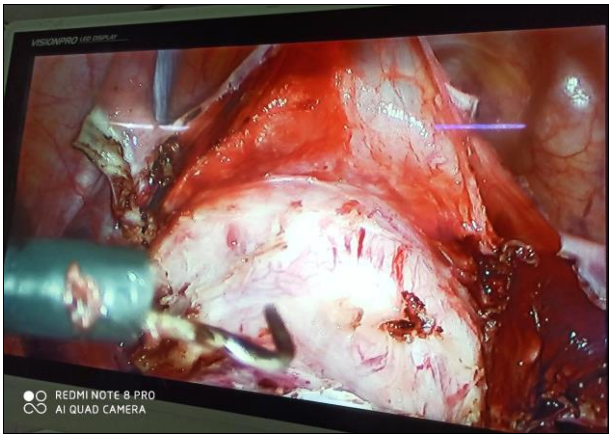

Fig 14: Monopolar cautery used to cut over the indentation of the colpotomizer cup to deliver out the uterus

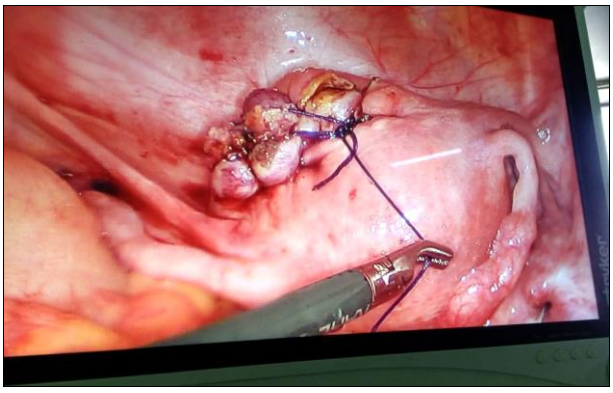

Fig 15: Endo-suturing of the vault

After removal of all instruments, abdominal ports closure was done

Post-operative management

We gave our patients intravenous antibiotics for 2 days, next 3 days gave oral antibiotics. Parenteral painkiller for 2 days after this on patient request oral painkiller was given and appropriate prophylactic antiemetic also added in treatment plan for 2 days. Patient go home on third day of surgery & come for stitch removal. We are prospectively evaluating recovery and resumption of normal activities following our laparoscopic hysterectomy cases and we have to found that patients resume their normal activities on average within 4 weeks following surgery.

Discussion

Laparoscopic hysterectomy is better alternative to abdominal hysterectomy. Total laparoscopic hysterectomy (TLH) is an upcoming minimally invasive procedure in term of low intraoperative blood loss, less post-operative haemoglobin drop, lower percentage of wound infection, less post-operative pain, early ambulation, quicker recovery, quicker return to normal physical activity, cosmetically looks better, more post-operative satisfaction and better quality of life due to small abdominal incision in TLH surgery [1] according to previous conducted studies.

One of the main reason for not resorting to this method is the inexperience of the surgeons in this modality and due to some limitations like longer learning curve, takes longer time to perform, expensive equipment, general anaesthesia, manpower, higher operative cost, therefore only few surgeon perform this procedure[5]. Now this gap is being steadily bridged, owing to training programs worldwide. Laparoscopic approach may not be feasible in patients with history of multiple abdominal surgery, dense pelvis/bowel adhesions and large fibroid where TAH takes the lead. So we give this document to make the surgeon more familiar to laparoscopic hysterectomy procedure.

Summary

Total laparoscopic hysterectomy is a safe and effective procedure for women needing a hysterectomy. Steps described herein are not meant to be an absolute truth, but rather a true and tested method that has served us well to safely accomplish this procedure.

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