

## Laparoscopic Gynae-oncological Procedures: Lessons Learnt After a Single Institution Audit of Complications and Their Management in 567 Consecutive Patients

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### Abstract

**Study Objective** To retrospectively evaluate the complications of the laparoscopic pelvic surgeries and to formulate the guidelines to avoid them.

**Design** Retrospective study (Canadian Classification).

**Setting** Advanced Laparoscopic Institute.

**Patients** Nine hundred and seven operated for gynecological malignancies.

**Intervention** Laparoscopic surgeries.

**Measurements and Main Results** 567 women suffering from different pelvic conditions were studied in a period of 60 months. The median age of the patient was 35 (11–80). Complications occurred in 32 patients (32/567, 5.5 %). The overall incidence of urinary tract injury in all the advanced cases at our institute was 2.1 % (12/567). The incidence of bowel injury at our center was 1.76 %. The incidence of vascular injury at our institute was 1.76 % (10/567).

**Conclusion** Laparoscopic complications are different than those seen following open surgeries. Anticipation, early recognition, and timely intervention help to reduce morbidity. Laparoscopic management of complications is possible. Formulating standard guidelines can help to avoid many such complications.

**Keywords** Complications · Laparoscopic surgery · Gynaecology

### Introduction

Minimal access surgery as a modality for the treatment of pelvic pathologies is gaining grounds with more and more gynecological cancers being treated laparoscopically. Formulating standard guidelines can benefit the surgeons and can help to minimize complications. Many studies have reported their complications but a few have reported their management [1, 2].

We have been performing minimally access surgery for gynecological cancers since 2003 (4). This report is to evaluate the safety of these procedures with the gaining experience and numbers. We have tried to analyze our complications, their nature, causes, and management and formulate their rules for their prevention. Increasing evidence in minimally access surgery along with advancement in instrumentation has lead to more and more surgeons adopting these and advanced surgical procedures. It is imperative for the surgeons to know the right steps of surgery and be aware of its likely complications, prevention, and management. Though several reports have claimed decrease in the complications with experience, it is in the first few cases one should try and minimize complications.

In this report we have analyzed our complications. We have tried to look at their nature and cause and finally have given some thoughts for future prevention.

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## Materials and Methods

This is a retrospective study of patients who underwent various laparoscopic pelvic surgeries for malignancy from July 2005 to June 2009. All surgeries were done by the chief author and assisted by same surgical team.

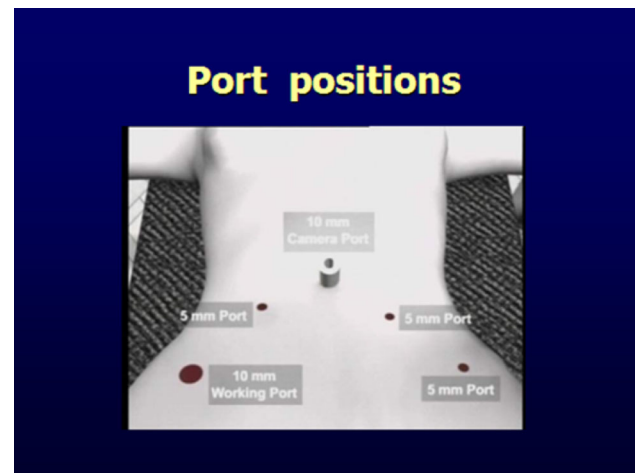
### Preoperative Preparation

All patients underwent preoperative bowel preparation with polyethylene glycol dissolved in 1 l of drinking water a day prior to surgery. A written informed consent was obtained. A combination of regional and general anesthesia was used. Patient was placed in modified Lloyd-Davies position with bolster below the pelvis at the level of anterior superior iliac spine. Preoperative catheterization was done in all patients and nasogastric tube was inserted under anesthesia.

Primary port was inserted by open umbilical tube technique and pneumoperitoneum was created. In a patient with previous surgical scar Veress needle was inserted through Palmer's point and blind trochar entry was performed. The port position for all pelvic surgeries was the same as shown in Fig. 1; a 10-mm camera port at the umbilicus and another 10-mm working port at Mac Burney's point. 5-mm working port is placed in the para-rectal region on the right and similarly two 5-mm retracting ports are placed on the left side. We evaluated all complications during laparoscopic pelvic surgeries and their management as shown in Table 1. Complications were classified as intraoperative and postoperative depending on type of organ injury. Complications like postoperative pain, wound infection, and trochar injury were not included in the study (grade 1 and 2). Only complications requiring operative intervention were included in our study (grade 3).

## Results

567 women suffering from different gynecological malignancies were studied in a period of 60 months. The median age of the patient was 35 (11–80). Complications occurred in 32 patients (32/567, 5.5 %). Major complications were seen during Laparoscopic radical hysterectomy. Among the 32 complications, 20 were recognized intraoperatively and were treated immediately. Urinary tract injury was the most common complication seen in 12/567 patients (2.11 %). 5 patients had bladder injury and 7 had ureteric injury. 3 bladder injuries were detected intraoperatively and were repaired with 2–0 vicryl. Indwelling catheter was removed after 3 weeks. Two injuries were detected in the postoperative period. One was treated with laparoscopy

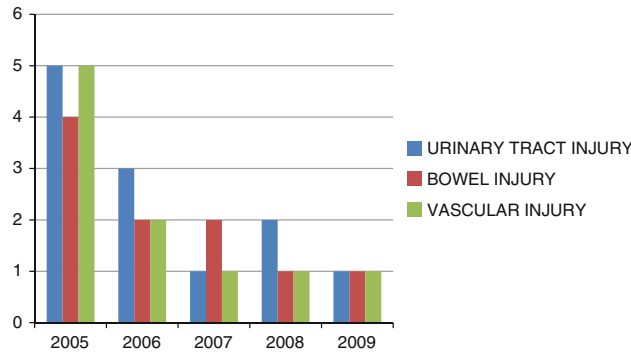


**Fig. 1** Standard pelvic port positions

**Table 1** Type of procedures

Procedures	Number	Complications			
		Ureteric injuries	Bladder injuries	Bowel injuries	Vascular injuries
Lap radical hysterectomy	408	4	4	4	5
Lap bilateral salphingo-oophrectomy with hystrectomy	75	1	1	2	1
Lap anterior exenteration	55	0	0	1	2
Lap posterior exenteration	20	2	0	1	1
Total pelvic exenteration	09	0	0	2	1

and other required formal repair of vesico-vaginal fistula by laparotomy after 6 weeks. In the patients with suspected ureteric injuries, D J stenting was attempted successfully in three patients. In patients where the stenting could not be done laparoscopic reimplantation was done. Vascular injury was seen in 10 patients (1.76 %) undergoing major surgery laparoscopically. Out of that 8 injuries were seen intraoperatively and 2 presented with secondary hemorrhage. All vascular injuries were managed by laparoscopic suturing of the injured vessel except one patient who had external iliac vein injury which was repaired by laparotomy. 10/567 (1.76 %) patients had bowel injury. Four patients had small bowel injury and 6 had large bowel injury. They were managed by laparoscopic primary suturing. The various procedures with complications seen in our study are: see Tables 1 and 2.

**Table 2** List of complications

Complications	Management	Number
Ureteric injuries	Double j ureteric stenting	3
	Reimplantation with psoas hitch	4
Bladder injuries	Primary suturing with Foley catheterization	3
	Delayed injury	2
Bowel injuries	Primary suturing	
	Small bowel	4
	Large bowel	6
Vascular injuries	Primary stirring intraoperative	8
	Secondary hemorrhage	2

## Discussion

Minimally invasive surgery has known advantages over open surgery in terms of faster recovery, less postoperative pain, and quick return to normal life and day to day activity. Complications following laparoscopic cancer surgeries are different from those seen in open surgeries. These are due to the limited vision, instrumentation failure, and various energy sources used during laparoscopy. Since the view is limited and techniques vary, every surgeon should be aware of the possible consequences and should know how to prevent, recognize, and manage them without delay. As the complexity of the procedures performed laparoscopically has grown, so also the spectrum of complications. Laparoscopic complications always get noticed and amplified. These are quoted by surgeons opposing laparoscopic oncological procedures. Therefore, we decided to evaluate and audit our own results in more than 500 consecutive patients. The question we asked is whether we have reached a stage when we have the safety profile matching that of open surgeries.

Complications were defined as any deviation from the normal postoperative course. The complications were classified according to severity in 4 categories [3]. Grade 1 included minor risk events not requiring therapy (with exceptions of analgesic, antipyretic, antiemetic, and anti-diarrheal drugs or drugs required for lower urinary tract infection). Grade 2 complications were defined as potentially

life-threatening complications with the need for intervention or a hospital stay longer than twice the median hospitalization for the same procedure. Grade 2 was divided into 2 subgroups based on the invasiveness of the therapy selected to treat the complication; grade 2a complications required medications only and grade 2b required an invasive procedure [1]. Grade 3 complications were defined as complications leading to lasting disability or organ resection, and finally, a grade 4 complication indicated death of a patient due to a complication (Clavien system) [2]. We have only included grade 3 patients in our study.

The rate of complications in various studies ranged from 0.2 to 10.30 %. The great variation in the complications rate may be due to the complexity of the procedure, surgical skills, and stage of the presentation of diseases. The total complication rate in our study has been 5.5 % which is comparable with international study. Injuries to the urinary tract were the most common of the complications in the laparoscopic surgery. The overall incidence of urinary tract injury in all the advanced cases at our institute was 2.11 % (12/567). Previous cesarean section was the single most cause increasing the chances of injury. Bladder injuries were recognized intraoperatively by the presence of pneumaturia seen in the urinary drainage bag. Pneumaturia is a term used when the Foley's urobag gets filled with CO<sub>2</sub> gas. This happens when the urinary bladder is injured giving way to the gas under pressure used during laparoscopy. The urinary

bladder injuries detected intraoperatively were repaired immediately with vicryl 2–0 interrupted sutures in two layers. The delayed bladder injury was seen after 1 week and was presented with vesico-vaginal fistula. The cause of this delayed bladder injury is usually ischemia due to thermal damage. One of the patients with bladder injury presented with vesico-vaginal fistula. In spite of all the precautions, some unsuspected bladder injuries may occur in difficult cases. Its recognition rather than injury is important. Hence in difficult cases we fill the bladder with normal saline and check for any leak. This simple test has helped us to detect injuries intraoperatively. Bladder injuries can be prevented by following few basic simple techniques. While doing any pelvic surgery it is important that the bladder is catheterized with a Foley's catheter. One should stay at the plane below the fat of the bladder. The anterior vaginal wall is devoid of fat and this principle of dissection prevents bladder injury. In patients of the previous pelvic surgeries like LSCS the dissection of the bladder should always start from the lateral side and then continued in the center as there are adhesions in the center. A combination of blunt and sharp dissection helps to separate the bladder.

The ureteric injuries in our series manifested within 7–10 days following injury. The clinical presentation was vaginal urinary leak. Three patients could be managed by cystoscopic double J ureteric stenting. In four patients in whom double J ureteric stenting was not possible, laparoscopic ureteric reimplantation by psoas hitch [4] was done. The ureteric injuries are due to avascular necrosis and hence presentation is delayed.

It is our policy to visualize the ureter always at the end of surgery for peristalsis as well as denudation. A double J ureteric stents should be inserted in doubtful cases either preoperatively, or in intraoperative or postoperative period. Among the ureteric injuries, 5 were seen in the first 200 patients of laparoscopic radical hysterectomy, 2 in the next hundred, and none in the last hundred. This may be due to number of factors like shifting from bipolar energy source to ultrasound. In fact, in the last 150 patients we have stopped using energy source at the level of ureteric tunnel. Our changing strategy and continuous audit has helped us to achieve to this safety in patients.

Bowel injury is one of the most important complications of laparoscopic surgery. It is potentially life threatening, especially if the injury is not recognized at the time of operation. It is also one of the common complications in minimally invasive surgeries [5], the incidence of bowel injury at our center was 1.76 % (10/567) [6]. More recently, Zaki et al. [7] Reported two cases of bowel injury among 1508 patients (incidence 1.3:1000) which was mainly seen in benign gynecological surgeries like sterilization and infertility. The incidence of these complications is between 0.62 and 1.60 per thousand laparoscopies [8, 9].

The small bowel injuries were during the adhesiolysis of previous open or lap surgeries. The injury was more common in the dilated bowel where it was very densely adherent to the scar. We never used any energy source for the adhesiolysis. Monopolar current was never used as this current is known to travel or cause inadvertent blind injury which can go unnoticed [7]. Rectal injuries were due to excessive retraction of the rectum.

Recognition of bowel injury is important as they may be fatal to the patient if not recognized and treated early. Majority of the bowel injuries were recognized intraoperatively due to greenish discharge on direct visualization or feculent smell. Only one patient had a delayed presentation with pain in abdomen, distention, and bilious vomiting with persistent high-grade fever. She was treated by exploratory laparotomy and resection anastomosis of the segment of the bowel.

All large and small bowel injuries diagnosed on table were treated immediately by laparoscopic primary suturing with silk 2–0 interrupted sutures in two layers. Thorough lavage of the spilled contents was done. An elective drain was also kept at the end of surgery.

The incidence of vascular injury at our institute was 1.76 % (10/567) which was comparable with reported literature [10, 11]. Most of the vessel injuries were during the difficult pelvic lymph node dissection. These injuries were in form of a small end and, therefore, could be sutured laparoscopically. Only in one patient the external iliac vein was traumatized and hence conversion to open was needed.

One should be very careful while dissecting near the vessel. One should use minimum of the diathermy current near the vessels [12]. Use of blunt dissection instead of sharp with suction tip at the time of nodal clearance is advisable. To avoid the injury we recommend that one should always dissect parallel rather than perpendicular to all the tubular structures.

Immediate compression of the bleeding vessels is the most important step as this will help to take further steps correctly. Free left hand of the surgeon was the key to success in achieving control of the bleeder. After the bleeder was caught the vessel was clipped with the vascular clip wherever it was feasible. Suction was used to identify the exact site of bleeding and to control it. The bleeding vessel was sutured laparoscopically after identifying the exact site when it was not possible to control by clip [13]. One patient had external iliac vein injury and needed laparotomy. The vein was sutured with 4–0 prolene. Patient was discharged uneventfully.

In our series the overall incidence of complications is comparable to those seen during open oncological procedures. Majority of the open surgery complications are under-reported and hence the true incidence is never known, while in laparoscopy all these are evident. Almost all our (90 %) complications were managed laparoscopically and hence the benefit

of minimally access was not lost even after a complication. In the last 150 patients we have no complications with the patient getting discharged on the third postoperative day.

The vascular, bowel, and bladder injuries did not lead to increase in the hospitalization; only in patients who needed ureteric reimplant, the hospital stay was more than 5 days.

Increasing one's own experience and standardizing the techniques, good team, and availability of all advanced instrumentation have lead to zero complication in the last 150 patients. Hence it is imperative to audit once own experience so as to achieve the steps of 100 % safety.

## Conclusion

Complications are integral part of any surgery. While in those in open are under-reported, those in laparoscopy are obvious. 90 % of the complications can be recognized and repaired at the time of primary surgery. With gaining one's own experience, standard steps, and auditing one's records, we can achieve 100 % safety profile in gynecological oncosurgery.

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