



# A COMPARATIVE STUDY BETWEEN THE PERIUMBULICAL AND THE INTRAUMBULICAL INCISIONS IN LAPAROSCOPIC PROCEDURES

## Authors

### 1. DR. BIKRAMJIT MAITY

MBBS, DNB(SURGERY), FMAS, FIAGES

ASSISTANT PROFESSOR

SURGERY

BURDWAN MCH

### 2. DR. POULOMI ROY (Corresponding Author)

MD (PHYSIOLOGY)

### 3. DR. ARUNAVA CHOUDHURY

MS, SENIOR RESIDENT, BURDWAN MCH

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## **ABSTRACT**

**Introduction:** Laparoscopic surgery is now a widely accepted treatment modality in every field of general surgery. Laparoscopy is a procedure conducted using small incisions with the aid of a camera in the abdomen, laparoscope helps with therapeutic and diagnostic interventions.

**Aims & Objectives:** To determine the safer and the easier technique for laparoscopic umbilical port insertion.

**Material and methods:** The present study was a Prospective Cohort Study. This Study was conducted from 1st September 2018 to 31st August 2020 at Department of General Surgery, Burdwan Medical College & Hospital. Total 100 patients were included in this study.

**Result:** The distribution of study participants according to the presence of co-morbidity. In IU group 6 (12%) patients had diabetes mellitus, 5 (10%) had hypertension and 2 (4%) had anaemia. In PU group, 5 (10%) had diabetes mellitus, 4 (8%) had hypertension and 3 (6%) had anaemia, no significant difference was observed (p value = 0.834).

**Conclusion:** No significant difference was observed between both procedures regarding operation time, wound infection, nausea and vomiting. However, infraumbilical incision had fewer complications as compared to periumbilical incision.

**Keywords:** Infraumbilical, Appendectomy, Wound Infection and Cholecystectomy.

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## **INTRODUCTION**

Laparoscopic surgery is now a widely accepted treatment modality in every field of general surgery. Laparoscopy is a procedure conducted using small incisions with the aid of a camera in the abdomen, laparoscope helps with therapeutic and diagnostic interventions.<sup>1</sup>

A modern surgical method is laparoscopic surgery, also called minimally invasive surgery (MIS), band aid surgery, or keyhole surgery. Unlike the more traditional, open technique, there are a range of advantages for the patient with laparoscopic surgery. These include reduced hemorrhaging and shorter healing time due to smaller incisions, decreased hospital stay and cosmesis. The key element is the use of a laparoscope, a long fiber optic cable system that allows the affected area to be viewed by snapping the cable from a location that is more distant, but easier to access.

Laparoscopic surgery; whose development has been so impressive in the last decade; was initially introduced at the beginning of this century by Dimitri Ott, Georg Kelling and Hans Christian Jacobsen. Ott inspected the abdominal cavity of pregnant women in 1901 and afterwards Georg

Kelling performed a procedure called “koelioscopic” close to the definition of modern laparoscopy. In 1975, Tarasconi, from the Department of Obstetrics-Gynaecology at the University of Passo Fundo Medical School (Passo Fundo, RS, Brazil), began his experience with laparoscopic organ resection (Salpingectomy), first recorded at the Third AAGL Conference, Hyatt Regency Atlanta, November 1976. In 1985, Erich Mühe performed the first laparoscopic cholecystectomy. Afterward, laparoscopy gained rapid acceptance for non-gynecologic applications.

In India, the first laparoscopic cholecystectomy was performed at the JJ Hospital, Mumbai, by T.E. Udwardi in 1990, followed by Dr. Jyotsna Kulkarni a few months later in Pune. The first Minimal Access Surgery (MAS) workshop in a teaching hospital was conducted by Dr. J. B. Agarwal and Dr. A. Dalvi at KEM Hospital, and in a private hospital at P. National Hospital D. Hinduja, Mumbai.

Operative laparoscopy has become the standard approach for most common surgeries cholecystectomy, appendectomy, and ovarian cystectomy.<sup>2</sup>

## **MATERIALS AND METHODS**

**Study design:** Prospective Cohort Study

**Study Area:** Department of General Surgery, Burdwan Medical College & Hospital

**Definition of Population:** Patients who were admitted in surgery wards for laparoscopic cholecystectomy, appendectomy and diagnostic laparoscopy during the study period.

**Study period:** 1st September 2018 to 31st August 2020

**Sample Size:** A total of 100 patients were selected and randomly divided into two groups with 50 patients in each group. 50 patients received periumbilical incision and 50 patients received infraumbilical incision.

**Inclusion Criteria:** Patient admitted for planned

- Laparoscopic cholecystectomy
- Laparoscopic appendectomy
- Diagnostic laparoscopy

**Exclusion Criteria:**

- Patients with congenital or ischemic heart disease.
- Re-operative abdomen
- Portal hypertension and cirrhosis
- Gravid uterus
- Acute calculus cholecystitis

## **RESULT AND DISCUSSION**

Although the initial peritoneal access is an important factor in laparoscopic surgery, methods vary widely according to surgeon. Both the IU incision and the PU incision are being used. Most reports of single incision surgery use the IU incision<sup>3</sup>. Not only is the IU incision easier to single incision surgery, but a truly ‘scarless surgery’ can be performed. The perform scar is less visible in the IU incision. But due to concerns over complications such as wound infection or umbilical hernia, the PU incision is still being used.

Hence, the present study was conducted in the Department of Department of General Surgery, Burdwan Medical College & Hospital upon patients admitted in surgery wards for laparoscopic cholecystectomy, appendectomy and diagnostic laparoscopy. A total of 100 patients were selected and randomly divided in two groups with 50 patients in each group. 50 patients received periumbilical incision and 50 patients received infraumbilical incision. The purpose of this study was to compare the two different methods of the umbilical incision through outcomes such as hospital stay, postoperative wound infection, nausea, and vomiting and patients’ satisfaction were examined and compare between both groups.

Laparoscopic procedures are the commonly performed surgical intervention in all over the world because of its better outcomes such as less hospital stay, less complication, shorter operative

time and better cosmetic results<sup>4</sup>. Many of techniques have been applied for laparoscopic procedures, out of which single incision laparoscopic surgery resulted better outcomes with fewer rate of complications as compared to conventional surgery<sup>5</sup>. In present study we used two different techniques (infraumbilical versus periumbilical incision) in patients undergoing laparoscopic procedures such as laparoscopic cholecystectomy, appendectomy and diagnostic laparoscopy and compare the outcomes between both groups to analyze which one is better. In this regard 100 patients were included. Majority of patients 28 (56%) were females while 44% were males. These results were similar to many of previous studies in which male patients were high in numbers 55% to 65% as compared to females<sup>6</sup>.

In present study we found no significant difference regarding body mass index and co-morbidities between both groups ( $p > 0.05$ ). A study conducted by **Lee et al.**<sup>7</sup> reported similarity in which they no significant difference was observed regarding BMI between both groups, they also reported that in intraumbilical group hypertension found in 13.8% and diabetes found in 6.3% patients while in periumbilical group 12.4% patients had hypertension and 10.7% had diabetes.

The results of study show there was no difference in operation time between the two groups (37.600 minutes for IU vs. 42.200 minutes for PU;  $p$  value = 0.107). Significant difference was observed in estimated blood loss and start of diet ( $p$

value=0.646). Length of postoperative hospital stay was comparable between two group ( $p$  value= 0.607). A study conducted by **Rajkhowa et al.**<sup>8</sup> reported mean hospital stay in intraumbilical group was 5 days and in periumbilical group mean hospital stay was 5 days.

There were no differences in the complication rates between the two groups. The incidences of the two most feared complications of the IU incision, wound infection and umbilical hernia, did not differ between the two groups. In the case of wound infection, none occurred in the IU group, and 2 cases of wound infection in the PU group were treated with conservative care in the outpatient clinic. There was no statistical significance. There were no umbilical hernias in the two groups. **Antoniu et al.**<sup>9</sup> reported that when single port totally extraperitoneal is performed through a transumbilical incision, the risk of hernia may increase. However, these findings may be limited to transumbilical single incision surgery, since it requires a relatively longer incision in the umbilicus.

**Lee et al.**<sup>10</sup> reported that single incision laparoscopic appendectomy performed with an IU incision had lower incidence of complications compared to open appendectomy and that infection rates were actually lower in the single incision group. Based on this observation, we compared laparoscopic single port appendectomy using the IU and PU approaches for our study, to

observe which approach gave better postoperative results. In our study, the wound complication rates of the PU and IU approach did not show any significant difference. Port site infection was observed for 4 (8.0%) patients in the IU group and 5 (10.0%) patients in the PU group. A study conducted by **Audrey Bouffard-Cloutier et al**<sup>11</sup> reported similarity and reported that periumbilical incision had high rate of wound infection as compared to infraumbilical, however no significant difference was observed with p-value >0.05. Another study conducted by **Awan et al**<sup>12</sup> demonstrated that patients received intraumbilical incision method had fewer rate of port site infection as compared to transumbilical method (5% Vs 5.9%).

The periumbilical incision leaves an obvious scar close to the umbilicus. Although there are periumbilical scars with better cosmetic results. When the intraumbilical incision is made, the entire incision is contained within the umbilical ring. Additionally, unlike the smooth skin adjacent to the umbilicus, the umbilicus itself contains many skin folds. The incision is made into one of the creases, and the scar is virtually invisible.

The trocar for a laparoscope was introduced through an infraumbilical incision, and two 5 mm trocars were inserted through separate incisions below the bikini line. Since the umbilical incision is invisible, when this patient is wearing

underwear or a swimming suit, there is no visible scar.

Also, the infraumbilical incision is easy to perform. First of all, the fascia lies directly beneath the umbilical skin with virtually no subcutaneous fat. So, it takes very little time to divide the fascia lying directly underneath after incising the skin, and with a minimum of further dissection, the peritoneal cavity is entered. Secondly, the close proximity of the layers also allows for a much faster closure. In most of our patients, a single full layer suture was sufficient for closure. No additional sutures were made in the subcutaneous fat layer, or the skin. The periumbilical incision, in comparison, needs a more cumbersome process.

Closure is usually done layer-to-layer, meaning the fascia, the subcutaneous fat, and the skin are all separately closed. Third, in the case of an obese patient with a thick layer of subcutaneous fat, the opening and closure of the periumbilical trocar site is often very difficult. In contrast, with lateral retraction of the skin on both sides of the umbilicus, the umbilical ring is easily exposed in even obese patients, so the infraumbilical incision could be easily performed.

The cosmetic survey score by Vancouver Scar Scale was found in the IU group Mean & SD value of Vascularity  $1.040 \pm 0.40$ , Pigmentation-  $1.100 \pm 0.75$ , Pliability-  $1.420 \pm 0.75$  & Height  $0.900 \pm 0.30$  respectively. And mean & SD value

of PU group Vascularity  $1.800\pm 0.49$ , Pigmentation-  $1.520\pm 0.57$ , Pliability-  $1.660\pm 0.51$  & Height  $1.920\pm 0.60$  respectively. Comparison between two groups we had found the statistically significant in Vascularity, Pigmentation, Pliability & Height p value were  $<0.05$ .

Choosing the superior laparoscopic access is not an issue. Laparoscopy has been proven to be a safe, feasible alternative for open surgery in major surgery such as cancer surgery<sup>13</sup>. All these types of surgery may benefit from applying the infraumbilical incision.

### **CONCLUSION**

At the end of the study on the basis of the results we can conclude that:

The infraumbilical incision is a safe and feasible alternative for the periumbilical incision that can be easier to perform with better cosmetic results of initial intraperitoneal access that can reduce the operation time and offer superior cosmetic effects to the patient. Our results show that despite the widespread belief that an infraumbilical incision will cause more wound infection and incisional hernia, actual wound complication rates do not differ from the cases with periumbilical incision. The cosmetic survey score was significantly higher in the IU group compared to PU group.

No significant difference was observed between both procedures regarding operation time, wound infection, nausea and vomiting. However, infraumbilical incision had fewer complications as compared to periumbilical incision.

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**Table: Type of surgery**

Type of Surgery	Intraumbilical Incision (IU)			
	Frequency	Percentage	Frequency	Percentage
<b>Cholecystectomy</b>	37	74	35	70
<b>Appendectomy</b>	09	18	10	20
<b>Diagnosis Laparoscopy</b>	04	08	05	10
<b>Total</b>	50	100.0	50	100.0
<b>Chi-Square Value: 0.219: P-Value: 0.89</b>				

**Table 2: Distribution according to co-morbidities**

Co-morbidity	Intraumbilical Incision (IU)		Periumbilical Incision (PU)	
	Frequency	Percentage	Frequency	Percentage
<b>Diabetes</b>	6	12.0	5	10.0
<b>Hypertension</b>	5	10.0	4	8.0
<b>Anemia</b>	2	4	3	6.0
<b>Total</b>	50	100.0	50	100.0
<b>Chi-Square Value: 0.362: P-Value: 0.834</b>				



**Table 3: Distribution according to co-morbidities**

Variables	Intraumbilical Incision (IU)		Periumbilical Incision (PU)		P-Value
	Mean	±SD	Mean	±SD	
Duration of	37.600	±7.50	42.200	±9.59	0.107
Estimated Blood	20.200	±7.35	24.600	±6.29	0.646
Start of Diet (days)	1.220	±0.41	1.060	±0.23	<0.001
Hospital Stay	2.120	±0.74	2.080	±0.72	0.607

**Table 4: Postoperative Complications**

Post-operative Complications	Intraumbilical Incision (IU)		Periumbilical Incision (PU)		P-Value
	Frequency	Percentage	Frequency	Percentage	
Port site Infection	4	08	5	10	0.500
Umbilical Hernia	0	0.0	0	0.0	-
PONV	7	14.0	8	16.0	0.500
Paralytic Ileus	1	2.0	1	2.0	0.237
Haemorrhage	0	0.0	1	2.0	0.500