

# Use of Trocars and Ports Dipped in 10% Povidone Iodine Solution vs Conventional Technique to Prevent Port Site Infection in Laparoscopic Surgeries: A Hospital-based Randomized Controlled Trial Study

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Received on: 12 March 2023; Accepted on: 15 June 2023; Published on: 16 August 2024

## ABSTRACT

**Context:** This study was undertaken to reduce the incidence of port site infection (PSI).

**Aim:** The study aimed to evaluate the impact of povidone iodine (PI)-dipped ports on PSI and compare it to non-PI-dipped ports.

**Materials and methods:** A total of 164 patients undergoing elective laparoscopic surgery were enrolled in the study. All patients underwent routine preoperative workup. They were randomized into control and intervention groups. For patients in the intervention group, ports were dipped in 10% PI solution 5 minutes prior to usage. In the control group, conventional techniques were used. Patients were evaluated for infections on days 1, 3, 7, and 30.

**Statistical analysis:** Data was compiled in Microsoft Excel and processed using Statistical Package for the Social Sciences (SPSS) software. Quantitative parameters were compared using the *t*-test while qualitative were compared using the Chi-square test.

**Results:** The two groups were equally matched with respect to demographic and laboratory factors with no statistically significant difference between the two. Port sites were evaluated on days 1, 3, 7, and 30 using the Southampton scoring system. In the intervention group, infection was found to be 3.6% on day 1; 6.1% on day 3; and 1.2% on days 7–30. No statistically significant difference was found when compared to the infection rate in the control group (3.6, 2.4, and 1.2%).

**Conclusion:** Ports dipped in PI have no significant impact on the incidence of PSI in elective laparoscopic surgeries.

**Keywords:** Laparoscopic surgery, Port site infection, Povidone iodine.

*World Journal of Laparoscopic Surgery* (2024): 10.5005/jp-journals-10033-1630

## INTRODUCTION

The advent of laparoscopic surgery has revolutionized the field of surgery, with benefits ranging from decreased postoperative pain and quicker return to regular activity and fewer postoperative complications. However, even with minimally invasive surgery, port site complications are reported in as high as 6.8% of the patients.<sup>1</sup>

These complications include wound infection [port site infection (PSI)], bleeding, incisional hernia, omental injuries, port site metastasis, and port site pain. Port site infections are reported in some of the patients. Studies have reported the incidence of PSI between 1.8 and 6.7%.<sup>2,3</sup>

This incidence is less than that of open surgeries but still makes up a significant portion of patients. Surgical site infection (SSI) predisposes the patient to many other complications such as septicemia, wound dehiscence, and herniation.

Port site infection can easily negate the advantages of laparoscopic surgery by increasing the length of hospital stay, delayed recovery, increased hospital expenditure, and severe pain. The umbilical port is found to be more commonly affected than other ports with respect to infection.<sup>2</sup>

Povidone iodine (PI) is a frequently used antiseptic in surgeries, commonly used as a skin disinfectant before surgeries. It is available in 7.5 and 10% concentrations. About 7.5% PI is used for surgical scrubbing while 10% is used as an antiseptic agent.

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**How to cite this article:** Koujalagi RS, Agarwal A. Use of Trocars and Ports Dipped in 10% Povidone Iodine Solution vs Conventional Technique to Prevent Port Site Infection in Laparoscopic Surgeries: A Hospital-based Randomized Controlled Trial Study. *World J Lap Surg* 2024;17(3):135–138.

**Source of support:** Nil

**Conflict of interest:** None

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Intraoperative irrigation of the wound with 10% PI before closure has been shown to reduce the incidence of SSI and hence is commonly employed.<sup>4</sup>

A study conducted by Kumar et al. has shown that dipping trocars and ports in 10% PI solution before insertion into the abdomen can reduce the incidence of PSI.<sup>5</sup>

The drawback of the study was that the duration for which the trocars and ports were dipped in the PI solution was not mentioned, and it was limited to only laparoscopic cholecystectomies.



Fig. 1: Ports dipped in PI

The aim of our study is to determine whether trocars and ports dipped in PI solution, reduce the incidence of PSI in laparoscopic surgeries.

## MATERIALS AND METHODS

A total of 164 patients were enrolled in this study over a period of 1 year from January 2021 to December 2021. About 66 patients were male (40%) and 98 were females. All patients were explained about the procedure and were enrolled after obtaining due consent.

Patients were randomized using sequentially numbered opaque envelopes randomly selected. Patients were not informed about the group they had been allocated to.

### Inclusion Criteria

All patients undergoing elective laparoscopic surgery in the Department of General Surgery were included in the study. Only patients above the age of 18 years were included.

### Exclusion Criteria

Patients with signs of peritonitis were not included in the study. All patients were tested for PI sensitivity prior to surgery and sensitive patients were excluded. Patients with immunocompromised status were excluded from the study.

### Preoperative Procedure

A routine workup of the patient was done. Detailed history with the examination was conducted. All blood investigations were done. Shaving of the parts from nipple to mid-thigh was done for all patients. All patients were tested for PI sensitivity. On the table, after induction of anesthesia, the abdomen was painted with PI solution.

### Intervention Group

Ports and trocars were painted with 10% PI solution and left for 5 mins in a kidney tray as shown in Figure 1. After 5 minutes the ports were removed and were inserted into the abdomen either by open or by closed technique as shown in Figure 2.

### Control Group

Ports and trocars were introduced into the abdomen without coating them with 10% PI solution as shown in Figure 3.

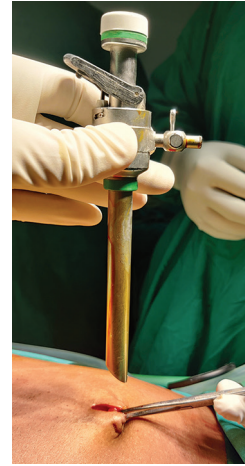


Fig. 2: Ports being inserted



Fig. 3: Normal ports

## Outcome

### Surgical Site Infection

The patients in both groups were assessed for SSI on postoperative days 1, 3, 7, and 30 using the Southampton wound scoring system.

### Statistical Analysis

Data was compiled in Microsoft Excel and processed using Statistical Package for the Social Sciences (SPSS) software. Quantitative parameters were compared using a *t*-test while qualitative were compared using Chi-square test.

## RESULTS

All patients were randomly allocated into the two groups, and 82 patients were allocated to each group. Both groups were checked for demographic parameters and were found to be equally matched. There was no statistical difference in age, gender, laboratory values, and types of surgeries. None of the included patients were diabetic. A total of 15 patients were found to be hypertensive and were equally distributed among the two groups.

Wounds were assessed for infection on days 1, 3, 7, and 30 using the Southampton wound scoring system. Seven patients were found to have infections over this period. On day 1, a total of

**Table 1:** Infection status at various time points

Infection status at	Intervention group	%	Control group	%	Total	%	Yates Chi-square	p-value
Day 1								
No	79	96.34	79	96.34	158	96.34	0.0000	1.0000
Yes	3	3.66	3	3.66	6	3.66		
Day 3								
No	77	93.90	80	97.56	157	95.73	0.5970	0.4400
Yes	5	6.10	2	2.44	7	4.27		
Day 7								
No	81	98.78	81	98.78	162	98.78	0.0000	1.0000
Yes	1	1.22	1	1.22	2	1.22		
Day 30								
No	81	98.78	81	98.78	162	98.78	0.0000	1.0000
Yes	1	1.22	1	1.22	2	1.22		
Total	82	100.0	82	100.0	164	100.0		

3 patients in the intervention group and 3 patients in the control group were found to qualify criteria for infection. On day 3, a total of 5 patients in the intervention group and 2 patients in the control group were found to have infection ( $p > 0.05$ ) (Table 1). One patient in each intervention and control group was found to have purulent discharge and hence wounds were opened. On days 7 and 30, one patient in each group had signs of infection ( $p > 0.05$ ).

## DISCUSSION

The advent of laparoscopic surgery has revolutionized the surgical field. The advantages such as reduced postoperative pain, decreased length of hospital stay, quicker return to regular activity, and a lower frequency of wound infection give it an edge over conventional open surgery in gastrointestinal procedures.

The advantages of laparoscopic surgeries along with the implementation of ERAS protocol have allowed the introduction of the concept of ambulatory or outpatient surgeries.<sup>6</sup> Procedures like laparoscopic cholecystectomies, laparoscopic appendectomy, etc. are being actively done as outpatient surgeries.

Complications such as wound infection and postoperative pain act as a disadvantage with respect to ambulatory surgery. They not only add to the patient cost but also increase the inpatient load of a hospital.

We undertook a randomized control trial; in one group we dipped the ports and trocars in 10% PI before introducing them into the abdomen while in the other group, we directly introduced the trocars. A total of 164 patients who consented and met the inclusion criteria were enrolled in the study. No patients included in the study were showing signs of peritonitis. They were randomized into two groups of 82 patients each. The two groups were comparable with respect to the demographic and laboratory parameters.

In our study, the incidence of PSI was found to be comparable in the two groups and the results were not statistically significant. The overall infection rate in our study was found to be 4.27%. This is in line with the PSI rate found in other studies. This could be attributed to good sterilization techniques and maintenance of adequate asepsis during surgery.

This result was in contrast to the study conducted by Kumar et al. which had shown a significant decrease in the incidence of PSI. This difference could be attributed to the greater sample size in our study.<sup>5</sup>

A meta-analysis conducted by Fournel et al. found a significant reduction in the incidence of SSI when wounds were irrigated with PI intraoperatively.<sup>4</sup> This could not be reiterated in our results.

In our study, we found pain to be comparable between the two groups and had a sharp decline on day 1 of surgery. This decrease in pain score is in line with the principles of laparoscopic surgery. The patients reported a decrease in pain from 12 hours to 24 hours and from 12 hours to day 3. The decrease in pain was significant ( $p < 0.0001$ ) in both groups. The change in pain was significantly more in the control group at these time points ( $p < 0.05$ ).

A study by Leggett et al. showed how a smaller incision surgery can significantly reduce the pain of the patient.<sup>7</sup> This is also the basis of laparoscopic surgery becoming the new norm in general surgery. Lee et al. reported that the pain at the incision site is much more than the visceral pain and the pain is maximum in the initial 1–2 days.<sup>8</sup>

## CONCLUSION

Povidone iodine dipped ports and trocars have no effect on the incidence of PSI.

## Limitations

When considering the incidence of PSI, the sample size is small.

The study excluded emergency laparoscopic surgeries, which have a higher risk of infection.

## Ethical Approval

Ethical clearance was obtained from the institutional ethics committee prior to the start of the trial. Trial registry: The trial was prospectively registered with the Clinical Trial Registry of India (CTRI No.: CTRI/2021/03/032108).

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