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Original Research Article

Laparoscopic assisted pancreatico-duodenectomy - Temperature variations

KB Galketiya[1*], MVG Pinto[2]

[1]Consultant Surgeon/ Senior Lecturer, [2]Consultant Anesthetist/ Senior Lecturer
Faculty of Medicine, University of Peradeniya, Sri Lanka
*Corresponding author email: kbgalketiya@yahoo.com

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Abstract

We have evaluated the incidence of hypothermia during laparoscopic assisted pancreatico-duodenectomy in twenty patients. The intravenous infusions, irrigation fluid and CO_2 insufflated were not warmed and we lack facilities for patient warming. A mean drop of 1.9 ^{0}C during laparoscopy over five hours and mean drop of 0.8 ^{0}C during the open phase were observed. Therefore warming the infusion and irrigation fluids and warming the patient are recommended to reduce the degree of temperature drop.

Key words

Laparoscopy, Pancreatico-duodenectomy, Hypothermia.

Introduction

Pancreatico-duodenectomy is the surgical treatment of choice for carcinoma of the periampullary region and head of pancreas. The open procedure is associated with considerable morbidity and occasional mortality. The long incision, continuous handling and prolonged use of retractors can result in post operative respiratory inadequacy due to severe pain and ileus. There is often significant blood loss. Laparoscopic assisted pancreatico-duodenectomy is an achievable alternative minimizing post-operative complications, thus facilitating early feeding, mobilization and discharge from hospital [1, 2, 3, 4, 6, 9]. Laparoscopic pancreatico-duodenectomy necessitates a steep, stepwise learning curve and literature indicates the need of further studies to recommend its routine use [4, 5, 6, 7, 8, 9]. Hypothermia is a complication of prolonged surgery [10, 11, 12, 13, 14, 15, 16]. General anaesthesia, gas insufflations, use of irrigation fluids, exposure of body cavities during open phase, contributes to hypothermia [11, 13, 14]. The operating times are significantly longer in laparoscopy assisted pancreatico-duodenectomy. Therefore, it is necessary to evaluate incidence of hypothermia during

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laparoscopic assisted pancreatico-duodenectomy.

Material and methods

The following parameters were recorded in patients who undergone laparoscopic assisted pancreatico-duodenectomy.

- Duration of surgery.
- Starting and hourly temperature.
- Volume of gas insufflated.
- Volume of intravenous (IV) fluids.
- Volume of irrigation fluid.
- Respiratory and cardio-vascular monitoring.
- Hourly urine output.

We didn't use warming devices due to unavailability. CO_2 used to create pneumoperitoneum, irrigation fluid and intravenous infusions were not warmed. The temperature was recorded by naso-pharyngeal probe.

Results

A total number of twenty patients were studied. In two, complete resection was achieved with laparoscopy. In others conversion to open was done at various stages as a safe decision for the patient. Stage performed with laparoscopy with time spent was as per **Table – 1**. The starting temperature ranged from 36.2-36.8 ˚C. Mean temperature drop, insufflated CO_2, Intravenous (IV) fluid infusion during laparoscopy phase was as per **Table – 2**. Mean temperature drop during laparotomy phase was as per **Table - 3**. The respiratory and cardiovascular parameters monitored as well as the urine output were maintained normal during the procedures.

Discussion

Hypothermia is a known complication of major abdominal operations [10, 11, 12, 13, 14, 15, 16]. Hypothermia is defined as a temperature lower than 34.5 ^{0}C [13]. General anaesthesia, use of epidural, gas insufflations, use of irrigation fluids, exposure of body cavities during open phase, poor covering of patients, low operating room temperature and prolonged operating times contribute to hypothermia [11, 13, 14]. There are reports showing no difference of the incidence of hypothermia in both access techniques, open and laparoscopy [16].

Hypothermia leads to an increase in systemic vascular resistance due to vasoconstriction and possible altered organ perfusion and a shift in the oxyhemoglobin dissociation curve to the left. These can cause tissue hypoxemia. Cardiac arrhythmias, coagulation abnormalities, altered drug metabolism, and increased metabolic demands during re warming are reported due to hypothermia. A higher incidence of post operative wound infection is also documented. Animal experiments have shown evidence for enhanced tumour growth attributed to hypothermia during laparoscopic procedures [12, 13, 14, 15, 16, 17]. Using warming of patient, use of warmed irrigation fluids and warmed intravenous infusions have shown to reduce the incidence of per operative hypothermia [10, 11, 14, 16].

In our study, there was a mean drop of 1.9 ^{0}C during the laparoscopy phase over 5 hours. Out of the drop 0.8 ^{0}C was in the first hour. During the open phase there was a further drop of 0.8 (mean) over 4 hours. The temperature drop per surgery ranged from 1.9-2.3 ^{0}C. The drop was more when the laparoscopic dissection was closer to completion as the total time of surgery was more in them compared to early conversion.

Conclusion

There is a drop of temperature of 1.9-2.3 ^{0}C in our series of laparoscopic assisted pancreatico-

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duodenectomy. Therefore using measures to minimize hypothermia is recommended.

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Table – 1: Stage performed with laparoscopy with time spent.

Laparoscopic dissection done up to	Portal vein dissection	Supra-duodenal dissection	Division of stomach and pancreas	Complete resection
Number of patients	10	05	03	02
Mean time of laparoscopy phase (min)	120	210	240	300
Mean time of open phase (min)	230	170	150	120
Total time (min)	350	380	390	420

Table – 2: Mean temperature drop, insufflated CO_2, Intravenous (IV) fluid infusion during laparoscopy phase.

Hours from start of procedure	**Mean volume of CO_2 insufflated (L/hour)**	**Mean volume of IV fluids infused (ml/hour)**	**Mean temperature drop (celcius) per hour**
1st hour	75-100	130-150	0.8
2nd hour	75-100	100-200	0.3
3rd hour	75-100	125-175	0.5
4th hour	75-100	100-150	0.1
5th hour	75-100	100-130	0.2
Total	375-500	555-805	1.9

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Table – 3: Mean temperature drop during laparotomy phase.

Hours from start of procedure	Mean volume of IV fluids infused (ml/hour)	Mean temperature drop (celcius)/hour
1st hour	150-175	0.3
2nd hour	125-150	0.1
3rd hour	100-130	0.2
4th hour	120-130	0.2
Total	495-585	0.8