Laparoscopic assisted pancreatoco-duodenectomy - Temperature variations

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Abstract

We have evaluated the incidence of hypothermia during laparoscopic assisted pancreatoco-duodenectomy in twenty patients. The intravenous infusions, irrigation fluid and CO₂ insufflated were not warmed and we lack facilities for patient warming. A mean drop of 1.9 °C during laparoscopy over five hours and mean drop of 0.8 °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, Pancreatoco-duodenectomy, Hypothermia.

Introduction

Pancreatoco-duodenectomy is the surgical treatment of choice for carcinoma of the periamplillary 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 pancreatoco-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 pancreatoco-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 pancreatoco-duodenectomy. Therefore, it is necessary to evaluate incidence of hypothermia during
Laparoscopic assisted pancreatoco-duodenectomy

Material and methods
The following parameters were recorded in patients who underwent laparoscopic assisted pancreatoco-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. CO₂ 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 CO₂ 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 °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 rewarming 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 °C during the laparoscopy phase over 5 hours. Out of the drop 0.8 °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 °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 °C in our series of laparoscopic assisted pancreatoco-
Laparoscopic assisted pancreatoco–duodenectomy. Therefore using measures to minimize hypothermia is recommended.

References

Laparoscopic assisted pancreatico-duodenectomy


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Conflict of interest: None declared.

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

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

Table – 2: Mean temperature drop, insufflated CO$_2$ Intravenous (IV) fluid infusion during laparoscopy phase.

<table>
<thead>
<tr>
<th>Hours from start of procedure</th>
<th>Mean volume of CO$_2$ insufflated (L/hour)</th>
<th>Mean volume of IV fluids infused (ml/hour)</th>
<th>Mean temperature drop (celcius) per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1$^{st}$ hour</td>
<td>75-100</td>
<td>130-150</td>
<td>0.8</td>
</tr>
<tr>
<td>2$^{nd}$ hour</td>
<td>75-100</td>
<td>100-200</td>
<td>0.3</td>
</tr>
<tr>
<td>3$^{rd}$ hour</td>
<td>75-100</td>
<td>125-175</td>
<td>0.5</td>
</tr>
<tr>
<td>4$^{th}$ hour</td>
<td>75-100</td>
<td>100-150</td>
<td>0.1</td>
</tr>
<tr>
<td>5$^{th}$ hour</td>
<td>75-100</td>
<td>100-130</td>
<td>0.2</td>
</tr>
<tr>
<td>Total</td>
<td>375-500</td>
<td>555-805</td>
<td>1.9</td>
</tr>
</tbody>
</table>
Table – 3: Mean temperature drop during laparotomy phase.

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