Systematic review of the impact of operative techniques on postoperative pain in laparoscopic cholecystectomy

prospect
procedure specific postoperative pain management

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Background and Goal of Study

- Laparoscopic cholecystectomy is a commonly performed surgical procedure in which adequate analgesia has a role not only in patient comfort, but also in minimising length of hospital stay.
- Two systematic reviews have examined the role of intraperitoneal, port-site and incisional analgesia in laparoscopic procedures,[1,2] and two further systematic, qualitative reviews have examined laparoscopic cholecystectomy studies in which analgesia was an endpoint.[3,4]
- However, these reviews have two limitations:
  - A systematic review of laparoscopic cholecystectomy studies in which analgesia was an endpoint including meta-analysis as well as qualitative analyses has not been performed.
  - A systematic analysis of the techniques used during the laparoscopic procedure itself, for example insufflation methods, to ascertain whether these impact on postoperative pain management, has not been conducted.
- The objective of this systematic review was to compare the efficacy and safety of analgesic, anaesthetic and operative techniques aimed at influencing postoperative pain in adult patients undergoing laparoscopic cholecystectomy.

Materials and Methods

- The review was conducted according to the methods of the Cochrane Collaboration.[5]
- MEDLINE was searched from 1966–June 2002 and EmBASE from 1988–June 2002 using pre-defined search criteria and reference lists of identified studies were also searched for further references. Articles were only considered for inclusion where they were in the English language.
- Studies eligible for inclusion were:
  - Those in which all patients or a definable subgroup underwent laparoscopic cholecystectomy.
  - Randomised trials of operative analgesia compared with either placebo or other methods of operative analgesia and anaesthesia aimed at influencing postoperative pain, and randomised trials of operative techniques conducted to examine their effect on postoperative pain.
  - Double-blinding was required for all types of operative analgesia except neuraxial routes of administration where the placement of a catheter for placebo administration would be considered unethical.
  - The use of visual analogue scale (VAS) or verbal rating scale (VRS) was required for inclusion.
- Meta-analysis was conducted on mean differences in postoperative VAS score grouped for 0–6 hours, 6–12 hours and 12–24 hours. VRS scores were converted to VAS scores.

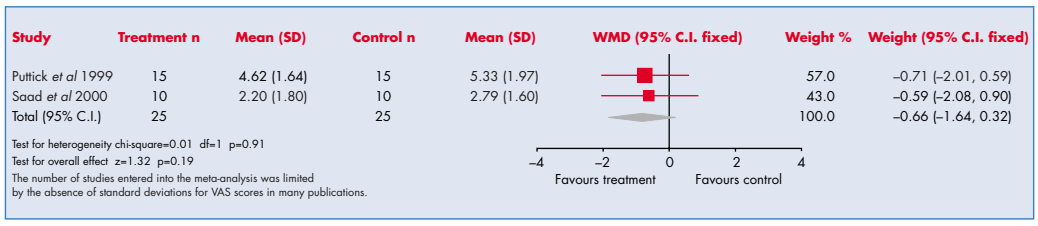

Figure. Meta-analysis of VAS scores for warmed CO_2 pneumoperitoneum *vs.* conventional CO_2 pneumoperitoneum (WMD = weighted mean difference)

Results

- Fifty-nine studies were included for analysis and 70 studies were excluded. The most common reason for exclusion was the use of open, rather than laparoscopic, cholecystectomy.
- The following studies and outcomes of operative techniques aimed at influencing postoperative pain were identified:
  - Warmed CO_2 pneumoperitoneum (n=84) *vs.* conventional CO_2 pneumoperitoneum (n=76; 3 studies) The three studies all utilised CO_2 warmed to 37 °C *vs.* unwarmed CO_2.[6-8] No studies reported a significant benefit in reducing VAS scores for warmed CO_2 pneumoperitoneum, and a meta-analysis also showed no benefit (Figure; weighted mean difference -0.66 [95% C.I. -1.64, 0.32], p=0.19).
  - Low pressure CO_2 pneumoperitoneum (n=66) *vs.* conventional CO_2 pneumoperitoneum (n=44; 2 studies). Both studies utilised high *vs.* low pressure arms.[9,10] The mean differences were 4 mmHg for the first and 7.5 mmHg for the second studies. Low pressure was superior to high pressure pneumoperitoneum in both studies for reductions in VAS scores and use of supplementary analgesics. Low pressure was superior to high pressure pneumoperitoneum in one study for length of hospital stay.
  - Microlaparoscopic cholecystectomy (n=200) *vs.* conventional laparoscopic cholecystectomy (n=124; 5 studies). All five studies examined standard techniques *vs.* smaller port sizes.[11-13] The microlaparoscopy approach was superior to control in reducing VAS scores for three studies, with the remaining two studies showing superiority on the first day only. There was no significant advantage for the microlaparoscopy approach in the use of supplementary analgesics in four studies (not recorded for the remaining study), although the length of convalescence was significantly reduced in two studies.
  - Radially expanding (n=142) *vs.* conventional cutting trocars (n=156; 2 studies).[14,15] Epigastric, but not umbilical pain, was reduced in one study and the remaining study showed no significant benefit. One study also reported a reduced incidence of intra-operative port bleeding, and postoperative wound complications and haematoma whilst the remaining study did not examine this parameter.
  - Additional operative technique studies (9 studies, n=495 active, n=238 control) were grouped, but had disparate protocols and techniques, and therefore meta-analyses could not be performed.
    - N_2O pneumoperitoneum was superior to CO_2 pneumoperitoneum for VAS scores.[16]
    - Humidified CO_2 was superior to standard CO_2 pneumoperitoneum for VAS scores and time to return to normal activities, but not for use of supplementary analgesics or length of hospital stay.[17]
    - Suction to remove the CO_2 pneumoperitoneum was superior to no suction for VAS scores for shoulder tip pain.[18]
    - Peritoneal lavage was significantly superior to no lavage for VAS scores, and the addition of suction to lavage was superior to no suction.[19]
    - Active aspiration of the gallbladder bed was superior to non-active aspiration for use of supplementary analgesics, but not for VAS scores.[20]
    - The following techniques had no significant benefit in single studies: Gasless *vs.* conventional CO_2 pneumoperitoneum;[21] CO_2 *vs.* helium pneumoperitoneum;[19] gasless *vs.* low pressure pneumoperitoneum;[22] day procedure *vs.* overnight stay.[23]

Conclusions

- Of available techniques, microlaparoscopy and low pressure CO_2 pneumoperitoneum appear to have a beneficial effect on post-operative pain in laparoscopic cholecystectomy.
- Warmed CO_2 pneumoperitoneum appears to have no significant benefit *vs.* unwarmed CO_2.
- Lavage and/or suction may have a role in reducing postoperative pain.
- For other techniques, further data are required for definitive conclusions to be made.

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