

Laparo-Endoscopic Single Site (LESS) Cholecystectomy with Regional Anesthesia

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BACKGROUND

Laparo-endoscopic single site (LESS) surgery is a recently developed procedure that requires a single incision in the umbilicus. Besides approaching a “no scar” surgery, LESS offers the potential advantages of decreased postoperative pain and shortened hospitalization [1,2]. This prospective randomized pilot study was undertaken to evaluate the feasibility and elucidate any complications with epidural anesthesia for patients undergoing LESS cholecystectomy. The secondary objectives were to determine differences in postoperative pain and time until discharge from the PACU.

METHODS

After obtaining an Institutional Review Board approval, a prospective, randomized, pilot study was undertaken. Twenty patients, 17 patients with chronic cholecystitis, 10 of which additionally had cholelithiasis, and three patients with biliary dyskinesia, classified as either ASA I, II or III physical status, ages of 18 to 75 years, scheduled for an elective Laparo-Endoscopic Single-Site (LESS) cholecystectomy gave consent for the study from June 2010 to July 2011. Patients were excluded if they had acute cholecystitis, body mass index greater than 35kg/m², a contraindication for LESS surgery or epidural anesthesia, or currently taking chronic narcotic pain management.

The patients that were randomized to undergo epidural anesthesia had an epidural catheter placed at thoracic level T4-6 in the preoperative holding area. The epidural anesthetic used was 20-25 mL of lidocaine 2% administered initially as a 5mL bolus and then titrated in 5mL boluses to produce and sustain a T2/T4 sensory blockade. Sedation was administered to all but one patient in the form of propofol (25-75µg/kg/min), midazolam (0.05mg/kg) or dexmedetomidine (0.04µg/kg).

Patients undergoing general anesthesia had anesthesia induced with intravenous propofol 2-3 mg/kg, lidocaine 100mg, and fentanyl (1.5 µg/kg). Tracheal intubation was facilitated with rocuronium 50mg IV. Anesthesia was maintained with a mixture of 50% oxygen to air and Sevoflurane 1-2%.

All patients received an arterial catheter for beat to beat blood pressure monitoring and blood gas sampling. Arterial blood gases were collected at three intra-operative times: incision, five minutes after insufflation and five minutes after closure.

Diaphragmatic irrigation with an anesthetic solution consisting of 250mL saline containing 75mg of marcaine was administered to patients receiving epidural anesthesia if they complained of shoulder pain. However, all patients received marcaine irrigation at the completion of the cholecystectomy (same dose). In addition to marcaine irrigation, patients were given fentanyl 50µg as needed for continued discomfort caused by shoulder pain.

Pain was assessed upon arrival to the PACU, at 5 minutes post-arrival and every 15 minutes thereafter until discharge ready status was achieved. Pain was also assessed on postoperative day one, six and seven and at one and three months postoperative. Operative time and time until PACU discharge-to-home readiness were recorded. Results are expressed as mean ± SD.

RESULTS

Twenty patients were enrolled in the study and were randomized to receive either epidural or general anesthesia for their LESS cholecystectomy. There were no significant differences between the groups with regard to age, gender, BMI, or ASA status (Table 1). All procedures were completed with the LESS approach and with the randomized method of anesthesia, as there were no conversions from epidural to general anesthesia or from single to multiple ports/incisions for the laparoscopic surgical approach.

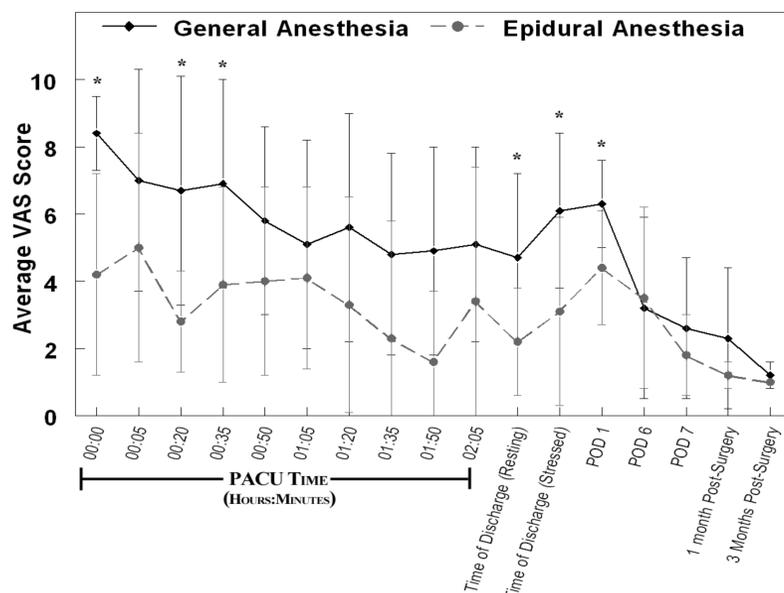
The primary objective of the study was to assess the feasibility and safety of undertaking LESS cholecystectomy procedures under epidural anesthesia as measured by intraoperative and postoperative adverse events. The most common intra-operative adverse event was shoulder pain, which was reported by three patients in the epidural anesthesia cohort. One patient in the general anesthesia cohort experienced bradycardia and hypotension at the start of CO₂ insufflation. In this case, ephedrine 10mg IV was administered and hemodynamics stabilized. No other adverse events were recorded intra-operatively. Post operative adverse events are quantified in Table 2.

In effort to prevent or alleviate shoulder pain, the diaphragm was irrigated with diluted marcaine for all study patients. Three patients that were randomized to epidural anesthesia complained of persistent discomfort despite irrigation of the diaphragm with marcaine solution. In an attempt to reduce these patient discomforts, insufflation pressures were lowered from 12-15 mmHg to 10-12 mmHg and fentanyl 50µg was administered. The change in end tidal CO₂ after irrigation was not significant when compared between or within the cohorts (Table 1).

We measured arterial blood gases at the start of surgery, after insufflation and after closure of the wound and found that P_aO₂ and P_aCO₂ remained within normal limits during the procedure.

Patients that received epidural anesthesia had significantly lower pain scores upon arrival to PACU compared to patients that received general anesthesia (4.2 ± 3.0 vs. 8.4 ± 1.1; p=0.02) (Figure 1). Resting and stressed pain scores were significantly lower in the epidural anesthesia cohort compared to the general anesthesia cohort when measured immediately prior to discharge from the hospital (p=0.02; Figure 1).

Figure 1. Post-Operative Pain Scores



*P VALUES OF <0.05 ARE CONSIDERED STATISTICALLY SIGNIFICANT.

Table 1. Patient Demographics

	General	Epidural	P Value
ASA Class (1/2/3)	1/6/3	3/5/2	----
ET CO ₂ Before Irrigation	35.9 ± 2.1	34.0 ± 12.6	0.48
ET CO ₂ After Irrigation	35.0 ± 3.0	28.7 ± 14.6	0.27
Length of Surgical Procedure (Min) mean ± SD (median)	65.2 ± 25.1 (53)	64.5 ± 21.5 (67.5)	0.68
Time Until PACU Discharge Ready (Min) mean ± SD (median)	201.5 ± 106.2 (200)	134.0 ± 77.2 (110)	0.14

Table 2. Post-Operative Adverse Events

	General	Epidural
Shoulder Pain	1	3
Severe Abdominal Pain	1	0
Urinary Retention	3	1
Shivering	2	0
Nausea	3	1
Dizziness	0	2

CONCLUSION

Despite higher incidences of shoulder pain, most studies, including ours, report high satisfaction rates regarding comfort of the operation and superior postoperative pain control afforded by thoracic epidural anesthesia. Ventilation can be maintained by spontaneous breathing during LESS cholecystectomy with adequate exchange of carbon dioxide and oxygen. Our study has shown that thoracic epidural anesthesia for LESS cholecystectomy provided better pain control in the immediate postoperative period and on postoperative day one compared to general anesthesia.

REFERENCES

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