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Postoperative analgesia in laparoscopic liver resection: An international survey

Manu-Priya Sharma, Georgina Cubas, Simon Cottam, James Gill, Gudrun Kunst, Zoka Milan

ABSTRACT

Aims: We undertook a worldwide survey of current practices regarding postoperative analgesic management of laparoscopic hepatic resection (LHR). Methods: An online 10-question survey was sent to hepatobiliary units worldwide. Results: Forty-five responses were received. Anticipated postoperative pain was described as "less intense" in LHR when compared to open hepatic resection (OHR) in 41/45 centers and "equally intense" in 3/45, and "more intense" in 1/45. Only 2/45 respondents thought that the pain score was lower than 2. Most of the responses (11/45) indicated VAS 4, while all the scores above 4 were represented equally.
Overall, 2/5 of the centres used the same method of analgesia for LLR as for OLR, while 3/5 of the centres used different methods of analgesia. Centres that used the same type of analgesia used mainly epidural (7/18) and PCA or opioid infusion (6/18). Centres that had changed the type of analgesia for LLR used mainly PCA or opioid infusion (18/27). Generally, PCA or opioid infusion was the most common type of analgesia, followed by epidural and intrathecal anesthesia. Regarding length of hospital stay (LOS), 30% reported LOS of <3 days, 44% between 4–6 days, 15% 7–9 days and 4% 10 days. Conclusion: Our survey shows evidence of varied perception of the intensity of postoperative pain following LHR and, consequently, variety in postoperative analgesia technique, which, contribute to different LOS. It has also shown the need for: 1) audits and 2) RCTs and improvement in communication and information exchange between centers about postoperative analgesia in LHR.

Keywords: Analgesia, Laparoscopic, Liver resection, Postoperative

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INTRODUCTION

Since the first laparoscopic liver resection (LLR) in 1992, the global use of LLR has undergone an exponential increase [1–3]: a laparoscopic approach was chosen for approximately 30% of all liver resections and for more than 60% of left lateral segmentectomies performed at select centres worldwide [3].

Evidence indicates that LLR is associated with fewer complications, less blood loss, fewer transfusions, shorter

hospital stays, equivalent operating times, and equivalent resection margins, especially for minor (left lobe) liver resections compared with open liver resection (OLR) (evidence of 2a) [4].

Although postoperative pain treatment plays an important role in enhanced recovery, little has been written about the type and duration of intraoperative and postoperative analgesia for LLR. Lower visual analogue scale (VAS) scores [5], a significant reduction in patient-controlled analgesia (PCA) use [6], and a shorter duration of analgesia [7] have been reported for LLR compared with OLR. However, little has been written about the type of postoperative analgesia, the role of multimodal analgesia, and the types of local anesthetics and opioids used.

We performed an international audit in order to obtain the opinions of medical professionals involved in LLR about the postoperative pain intensity and use of postoperative analgesia in patients who have undergone LLR.

MATERIALS AND METHODS

An online 24-question survey designed by us was sent to all centres with addresses on the International Liver Transplantation Society website (www.LiTAC.net). Additional questionnaires were sent to hepatobiliary units worldwide via personal contacts from our liver transplantation centre visitors and authors who had published reports on liver transplantation or liver resection.

Of the 24 questions, 15 were multiple choice and 9 left space for answers.

Data were collected over a six-month period, from September 2014 to March 2015. The results were collated using Google Docs and presented in Excel format and analysed by us.

Data were presented in tables and graphics. We used Student's t-test to compare the difference in duration of surgery and the difference in the postoperative analgesia between laparoscopic and open liver resections.

RESULTS

Of 158 questionnaires sent, 55 responses were received from 52 experts from centres, of which 45 performed LLR. We analyzed only the results from centres that performed LLR. The greatest number of responses came from Europe (n=22), followed by North/South America (n=13), and the Asia-Pacific region (n=11).

Centre-related data

Most of the centres were state or government hospitals; only eight were private university hospitals. Most replies came from major hospitals: 18 from hospitals with >1000 beds, 14 with 500–1000 beds, 11 with 250–500 beds, and 2 with <250 beds. In terms of the size of the LLR program, only seven centres performed more than 50 LLRs per year.

Surgery-related data

As given in Table 1, there were no statistically significant difference in duration of surgery between open and laparoscopic liver resection (Student's t-test, p=0.9).

Pain intensity

The anticipated postoperative pain was described as "less intense" with LLR compared with OLR at 41/45 centres, "equally intense" in 3/45, and "more intense" in 1/45.

The estimated average pain scores (VAS 0–10) for laparoscopic procedures are shown in Figure 1. Only 2/45 respondents thought that the pain scores following LLR were lower than 2. Most of the responses (11/45) indicated VAS 4, while all of the scores above 4 were represented equally.

Table 1: Duration of surgery: laparoscopic liver resection (LLR) versus open liver resection (OLR)

Duration (min)	LLR	OLR
30–60	1	1
60–120	15	7
120–240	11	26
240–360	13	8
360–480	3	2
>480	1	1

No statistically significant difference in duration of surgery (Student's t-test, p=0.97).

LLR laparoscopic liver resection; OLR open liver resection

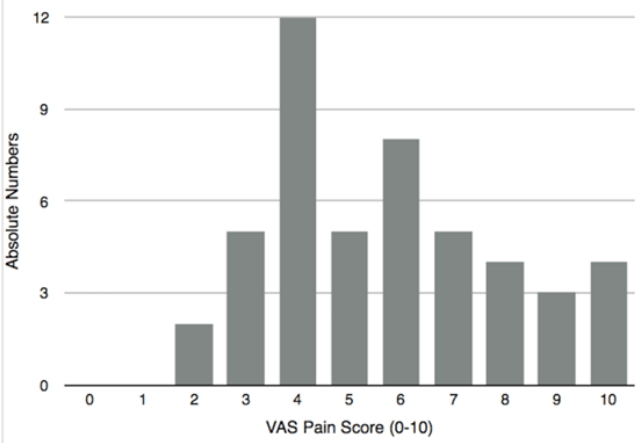

Figure 1: The estimated average pain scores (VAS 0–10) for laparoscopic procedures.

Mode of primary analgesia

Overall, 2/5 of the centres used the same method of analgesia for LLR as for OLR, while 3/5 of the centres used different methods of analgesia (Table 2).

Centres that used the same type of analgesia used the following types of analgesia: epidural (7/18), PCA or opioid infusion (6/18), intrathecal (3/18), and other analgesia (2/18). Centres that had changed the type of analgesia for LLR used mainly PCA or opioid infusion (18/27) and no epidural at all (Table 2). Patient controlled analgesia or opioid infusion was the most common type of analgesia, followed by epidural and intrathecal anaesthesia. There were no statistically significant difference in types of postoperative analgesia between centres that used the same technique and centres that changed technique of postoperative analgesia for LLR (Student's t-test, p=0.62)

Intraoperative analgesia, type, and drugs used

The greatest variety of answers (approximately 15 different ones) was received for the type of intraoperative analgesia used. For intravenous analgesia, the use of fentanyl, remifentanil, sufentanil, and morphine was reported. Epidural boluses and an epidural bolus followed by intravenous opioids were also mentioned. For intrathecal anaesthesia, opioids were used as an addition intraoperatively.

Duration of postoperative analgesia

As shown in Figure 2, the duration of analgesia was mainly two or three days, although some centres used it for one day only, and some centres maintained primary analgesia for five days.

Who manages postoperative analgesia?

As shown in Figure 3, postoperative analgesia is managed in a variety of ways. At most centres, the surgical team manages postoperative analgesia followed by a pain team and anesthetists.

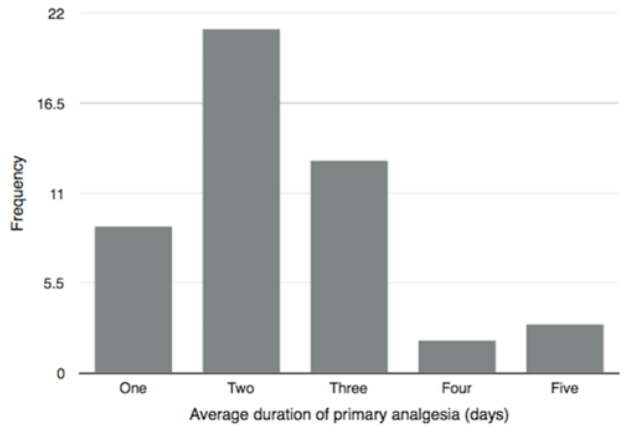

Figure 2: Duration of post-operative analgesia.

Table 2: Types of postoperative analgesia

Type of analgesia	Same technique for LLR and OLR (n)(%)	Change of technique
Intrathecal	3 (17%)	1 (4%)
Epidural	7 (39%)	1 (4%)
PCA or opioid infusion	6 (33%)	18 (67%)
TAP block	1 (6%)	2 (8%)
Other	1 (6%)	5 (18%)
Total	18	27

No statistically significant difference (Student's t-test, p=0.62)

LLR Laparoscopic liver resection, OLR Open liver resection; PCA Patient controlled analgesia, TAP block Transversus abdominis plane block, n number.

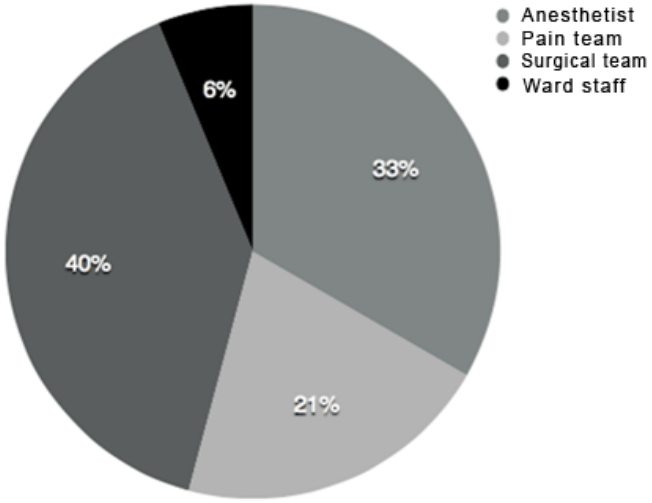

Figure 3: Management of postoperative analgesia.

Additional analgesia as a part of multi-modal analgesia

All centres agreed that they use regular additional analgesia in combination with the primary mode of analgesia. As shown in Figure 4, paracetamol was the most commonly reported additional analgesia, followed by different NSAIDs, oral opioids, acetaminophen, and metamizol. Rescue additional analgesia was used rarely, at 5/45 centres. The use of oxycodone, tramadol, and ketamine as rescue analgesia was also reported.

Transition from primary analgesia to the end of any analgesia

Once primary analgesia is stopped, a variety of medications are used to provide analgesia for less intense pain. We found that they are used in similar proportions, and that some centres use combinations of them. Paracetamol was the most commonly reported analgesic, followed by NSAIDs.

Surgical local infiltration

While most teams reporting using wound infiltration (34/45), a small percentage used intra-abdominal local anesthetics (3/45).

Length of hospital stay (LOS)

The main indication for hospital discharge was the surgeon's decision (36/45), followed by the ability to eat and drink (8/45). Only one centre used adequate pain relief as an indication for patient discharge following LLR. Regarding LOS, 30% reported an LOS of <3 days, 44% of 4–6 days, 15% of 7–9 days, and 4% of 10 days, while 7% were unable to report an average LOS for their institution (Figure 5).

DISCUSSION

This international survey shows that in terms of postoperative analgesia following LLR:

- Most experts involved in LLR think that pain post-LLR is less intense than pain following OLR.
- Most of the expected pain scores following LLR are >4; therefore, adequate analgesia is paramount.
- Of the survey participants, 3/5 used the same postoperative analgesia as for OLR (most commonly epidural analgesia), and 2/5 have changed the analgesic method used (most commonly PCA and opioid infusion).
- PCA and intravenous opioids are the main modes of postoperative analgesia, followed by epidural and intrathecal analgesia.
- A variety of intraoperative analgesia methods were reported, with 15 different ways represented equally.
- The average duration of postoperative analgesia is 2–3 days.
- Surgical and pain teams are involved in postoperative analgesia.
- Various medications are used as additional analgesia (i.e., as multimodal analgesia). Paracetamol and NSAIDs are the most commonly used medications. Adjunct analgesia also varies from centre to centre.
- Once primary analgesia is discontinued, paracetamol is the main analgesic, followed by NSAIDs and oral morphine.

This survey also shows that anesthesia for hepatobiliary surgery is not a separate entity, and that anesthetists are not involved in the management of postoperative analgesia. Anesthetists are also not involved in publications on that topic. Thus, it is difficult to identify the anesthetists involved.

The results of this survey are in accordance with those in literature in terms of the duration of LLR, intensity of pain, duration of analgesia, and LOS [8–11] . Additional retrospective or prospective studies of analgesia in LLR are needed, including research on the effects of analgesia on recovery and tumur recurrence. Anesthetists should

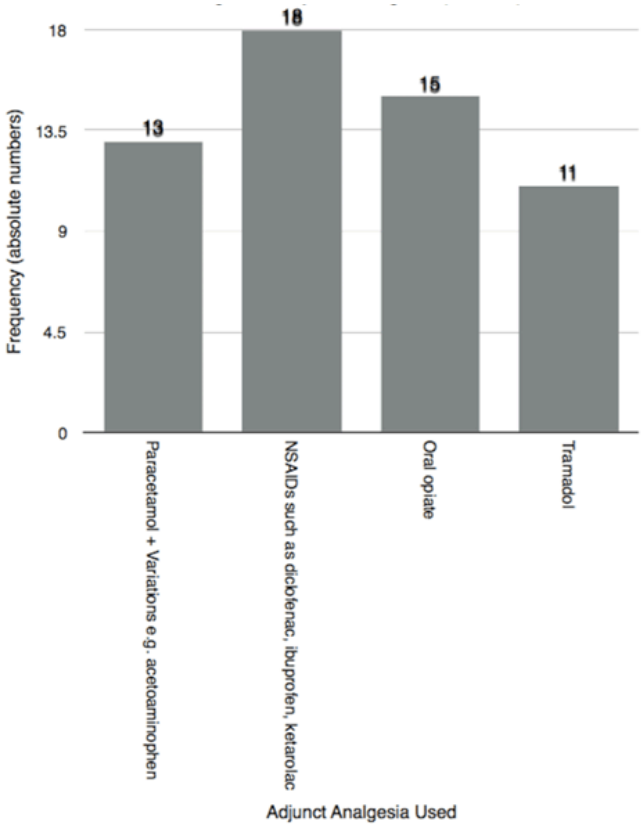

Figure 4: Additional analgesia as a part of multimodal analgesia.

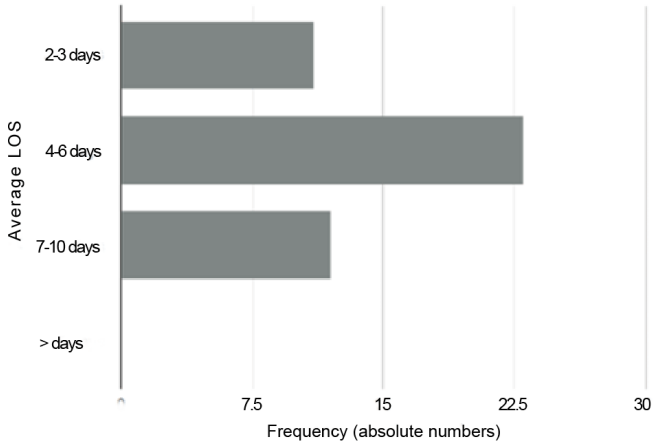

Figure 5: Length of hospital stay.

join with experts involved in LLR and contribute to postoperative pain treatment. The importance of this study is that it shows great variety in the way that postoperative analgesia is managed and it shows the need for more research in this area.

There are a number of limitations to this survey. First, a small number of centres responded, despite significant effort and hundreds of e-mails sent. We received replies from both surgeons and anesthetists. Consequently, the details regarding analgesia were of different quality.

Some parts of the world were not represented, including Africa, Egypt, and Turkey. Our efforts to find representatives were unsuccessful.

The answers that we received and processed were based on the impressions of practicing surgeons and anesthetists and may not accurately represent the real situation.

Most of the centres that submitted responses performed <50 LLRs/year. However, there are centres that perform >50 LLRs/year and the number of such centres is increasing [3] .

The proportion of major liver resection is significantly higher in North/South America than in Asia-Pacific and Europe [3] . We received responses mostly from European centres.

CONCLUSION

Our survey shows evidence of weak communication among anaesthetists involved in laparoscopic liver resection (LLR), varied perceptions of the intensity of postoperative pain following LLR, and variety in the postoperative analgesia techniques used, which, among other factors, contributes to differences in the length of hospital stay. It also shows a need for: 1) audits and 2) randomised controlled trials and improvements in communication and information exchange among centres regarding postoperative analgesia in LLR. Our contact database can become a platform for a website where anaesthetists can share their experiences.

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Author Contributions

Manu-Priya Sharma – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Georgina Cubas – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Simon Cottam – Substantial contributions to conception and design, Revising it critically for important intellectual content, Final approval of the version to be published

James Gill – Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Gudrun Kunst – Acquisition of data, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

Zoka Milan – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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