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Laparoscopic Appendectomy Translates into Less Analgesics and Faster Return to Work in Asia

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ABSTRACT

Background: Laparoscopic appendectomy (LA) is claimed to require less analgesic and allow for a faster return to work. This study examines whether these benefits hold true in Asian patient populations.

Methods: A retrospective audit of emergency appendectomies over one year was conducted to study outcomes of postoperative pain, length of stay (LOS), duration of analgesia, and hospitalization leave (HL). A telephone questionnaire evaluated post-discharge analgesic intake, residual symptoms at follow-up, adequacy of HL and opinion on teleconsult reviews.

Results: Of the 201 patients, 187 (93%) underwent LA. Presurgery symptoms were significantly longer in the open appendectomy (OA) group (mean: OA 3.79, LA 1.81 days; $p = 0.026$) which also had a higher frequency of perforation (71.4%). LA patients reported less pain compared to OA (LA 3.60 vs. OA 4.14; $p = 0.068$) but were prescribed the same 2 weeks of analgesics as OA. LOS was significantly less for LA (mean LA 3.09, OA 6.93 days; $p = 0.006$). Mean HL for LA and OA were 17.9 and 21.8 days respectively ($p = 0.05$). Nearly 83% patients did not complete the prescribed course of analgesics and 47% patients felt that HL was more than adequate. Seventy-five percent of patients were asymptomatic at hospital follow-up and nearly 41% agreed to teleconsult reviews.

Conclusion: Majority of LA patients do not need 2 weeks of analgesics and their HL can be shortened for faster return to work thereby realizing the true benefits of minimally invasive surgery. Selected cases can be offered postoperative teleconsultation.

Key Words: Analgesia, Hospitalisation leave, Laparoscopic appendectomy, Open appendectomy, Tele-consult.

INTRODUCTION

Acute appendicitis is one of the most common acute abdominal emergencies in general surgery with the disease burden estimated to be 90 – 100 cases/100,000 in developed countries.[1,2] A recent publication by Bhangu et al.[3] estimated the lifetime risk of acute appendicitis to be 7% – 8%.

The treatment of acute appendicitis has seen a sustained shift from the traditional open approach to minimally invasive approach over the past several decades.[4] Laparoscopic appendectomy (LA) is now widely accepted in Singapore as the surgical option of choice in most cases.[5]

Several randomized studies in western literature have shown that LA is superior to open appendectomy (OA) in terms of reduced pain and shorter length of stay (LOS) in hospital.[6–9]

It is also proven to perform better in terms of lower analgesic requirements and early return to work and activity.[10]

However, there are not many studies from Asia where analgesic requirements, LOS, and duration of leave with return to full activity are included. Socioeconomic factors, diverse Asian ethnicities, and cultural influences may affect these proven benefits of minimally invasive surgery. We performed a comparative audit between LA and OA to look at analgesic requirements and duration of hospitalization leave (HL). A telephone questionnaire evaluated post-discharge analgesic intake, residual symptoms at

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Table 1.
Telephone Survey Questions

1. How many days did you take the painkillers after your discharge?
2. Was the quantity of analgesics prescribed excessive?
3. Was the duration of hospitalization leave adequate, inadequate or more than adequate?
4. Could you have gone to work earlier?
5. Did you have any symptoms or residual pain during your follow-up clinic visit?
6. Would you prefer your post-surgery review to be a telephonic consult or a hospital visit?

follow-up, adequacy of HL, and opinion on teleconsult reviews.

METHODS

A retrospective comparative audit of patients undergoing emergency appendectomy between June 1, 2020 and June 30, 2021 was conducted in a tertiary care Asian hospital. Inclusion criteria were all patients undergoing either LA or OA with documented postoperative visual analog pain scores and full medical records in our electronic hospital database.

Demographic data of age, sex, and race were obtained for the study population. Duration of prehospital symptoms, operative findings, postoperative pain scores, LOS and duration of clinic review, and HL were analyzed between the two groups.

Pain scores were recorded thrice daily during the period of hospitalization in the emergency appendectomy pathway. The average of the recorded pain scores until time of discharge was used for analysis.

IBM SPSS Statistical Package (version10, Cary, NC, USA) was used for data analysis. The differences between LA and OA were tested using one-tailed unpaired *t*-tests. All results were cross checked for accuracy with two–tailed *t*-testing. Hypothesis testing was performed at 95% confidence interval with p value of < 0.05 being statistically significant.

A telephone survey was conducted to understand post-discharge recovery, duration of analgesic intake, residual symptoms at follow-up, adequacy of HL, and opinion on teleconsult reviews.

Table 2.
Patient Demographics in Laparoscopic Appendectomy and Open Appendectomy Groups

Variable	Category	Laparoscopic Appendectomy (%)	Open Appendectomy (%)	*p* Value
Age	< 20	19 (10.17)	2 (14.28)	
	20 – 30	76 (40.65)	2 (14.28)	
	30 – 40	36 (19.25)	4 (28.57)	
	40 – 50	26 (13.90)	1 (7.15)	
	50 – 60	15 (8.02)	1 (7.15)	
	60 – 70	11 (5.88)	3 (21.42)	
	70 – 80	3 (1.60)	0 (0.00)	
	> 80	1 (0.53)	1 (7.15)	
Average Age		35.2	44.3	0.061
Gender	Male	126 (67.4)	10 (71.4)	
	Female	61 (32.6)	4 (28.6)	
Race	Chinese	94 (50.2)	10 (71.4)	
	Malay	37 (19.8)	2 (14.3)	
	Indian	20 (10.7)	0 (0.00)	
	Missing	36 (19.3)	2 (14.3)	
Presence of perforation		58 (31.0)	10 (71.4)	0.005

Table 3.
Mean Pain Scores

	Laparoscopic Appendectomy	Open Appendectomy	*p*-Value
Pain score (out of 10)			
Total	3.21 (n = 187)	4.14 (n = 14)	0.068
Perforated	3.26 (n = 58)	3.60 (n = 10)	0.303
Nonperforated	3.16 (n = 129)	5.50 (n = 4)	0.073

Table 1 shows the questions asked to patients during the telephone interview. For non-English speaking patients, hospital translators were used to conduct the questionnaire.

RESULTS

A total of 201 consecutive patients undergoing emergency appendectomy within the study period were selected based on the inclusion criteria. Of these,187 patients (93%) underwent LA (OA = 14/201, 7%). Incidence of perforated appendicitis was far more in OA (71.4%) than LA (31%) group. Patient demographics are shown in **Table 2**.

Presurgery symptoms of abdominal pain, nausea, vomiting, and fever ranged from 1 to 7 and 1 to 14 days for LA and OA patients respectively (mean: LA 1.81 vs. OA 3.79) ($p = .026$).

Overall, the OA group reported greater average postoperative pain scores on discharge compared to the LA group (4.14 vs. 3.60; $p = .068$). **Table 3** shows the overall pain scores in the two groups on discharge as well as among the perforated and nonperforated cases. Although the LA group had lower pain scores, none of them reached statistical significance.

Table 4.
Indications for Open Appendectomy in 14 Patients

Reason for Conversion	Patients
Retrocaecal perforation of appendix base	2
Extensive adhesions from previous laparotomies	4
Difficulty in identifying perforated appendix	4
Peritonitis with septic shock* from perforated appendix	4

* All 4 patients needed upfront lower midline laparotomy.

The mean LOS in LA and OA was 3.09 and 6.93 days respectively ($p = .005$, range, LA: 1 – 16, OA: 3 – 15).

Table 4 shows the indications for the 14 patients in the OA group. Four patients presented with septic shock and peritonitis due to perforated appendicitis and needed a lower midline laparotomy.

Return to work or normal activity was measured by the number of days of HL granted. The mean duration of HL for LA and OA was 17.9 and 21.8 days respectively ($p = .050$, range LA: 3 – 37, OA: 3 – 38). Our audit showed

Table 5.
Telephone Survey Responses

How many days did you take the pain-killers after your discharge?	**Analgesia Duration (days)**	**# of Patients (%)**
	1 – 5	90 (59.21)
	5 – 7	36 (23.68)
	7 – 15	12 (7.89)
	15 – 20	5 (3.2)
	20 – 25	3 (1.97)
	25 – 30	3 (1.97)
	> 30	3 (1.97)
Was the quantity of analgesics prescribed excessive?	**Response**	**# of patients**
	Yes	130
	No	22
Was duration of hospitalization leave adequate, inadequate or more than adequate?	**Response**	**# of patients (%)**
	More than adequate	72 (47.36)
	Adequate	74 (48.68)
	Inadequate	6 (3.94)
Could you have gone to work earlier?	**Response**	**# of patients (%)**
	YES	72 (47.36)
	NO	80 (52.63)
Did you have any symptoms or residual pain during your follow-up clinic visit?	**Residual symptoms**	**# of patients (%)**
	Nil	114 (75)
	Surgical Scar discomfort	38 (25)
Would you prefer your post-surgery review to be a telephonic consult or a hospital visit?	**Response**	**# of patients (%)**
	Hospital visit required	90 (59.21)
	Teleconsult acceptable	62 (40.78)

that 36 LA and 3 OA patients required additional grant of light duty after completion of HL due to the strenuous nature of their occupation. Full return to work for these cases ranged from 21 to 115 days (mean 45.7 days) for LA and 38 to 120 days (mean 68.7 days; $p = .235$) for the OA cases. Outpatient hospital follow-up review showed a default rate of 14.97% (28/152) and 21.42% (3/14) for LA and OA respectively.

Table 5 shows the responses to the telephone survey questions. In the telephone questionnaire, about 76% (152/201 patients) answered the survey questions, 14% decline to take the survey, and 10% were not able to be contacted on the provided telephone numbers in our database.

The majority of patients interviewed (59%) consumed their prescribed analgesics for less than 5 days and nearly 83% did not exceed more than 7 days as shown in **Figure 1**.

Approximately 59% preferred the post-surgery review to be a hospital visit while 41% patients were comfortable with having only a telephone consultation. A significant proportion of the interviewed patients (47%) felt the duration HL granted was more than adequate and they could have resumed work earlier.

Of the 152 patients who answered the questionnaire and went in person for post-surgery reviews, 114 (75%) were completely asymptomatic, while 38 (25%) expressed mild discomfort over their surgical scars.

There were no statistically significant differences in analgesic requirements and duration of hospitalization leaves amongst the various ethnic groups (Chinese, Malay, Indian, and Others)

DISCUSSION

LA was first reported by Semm et al. in 1983.[11] It has since evolved to become the procedure of choice in patients needing emergency appendectomy in countries where minimally invasive surgery is well established.[6–9] The international literature over the last two decades reports a conversion rate between 4% – 27% in surgery for acute appendicitis.[12, 13] In our series we had a conversion rate of 5% with 93% undergoing successful LA and the remaining needing upfront open surgery.

The duration of symptoms before presentation correlated with the incidence of perforation. We had a 29% perforation rate compared to 17% – 25% in western studies.[14] The higher rate could be explained by the fact that many elderly Asians tend to avoid coming to hospitals until their condition has significantly deteriorated. Of the 68 patients (29%) presenting with perforation, majority, (67%) were ≥ 60 years of age who waited for an average of 2.87 days before coming to the hospital. Fifty-eight cases (85%) were still successfully performed laparoscopically. Ball CG et al. have suggested a benefit of choosing LA over OA even in complicated cases.[15] In Singapore, OA is now

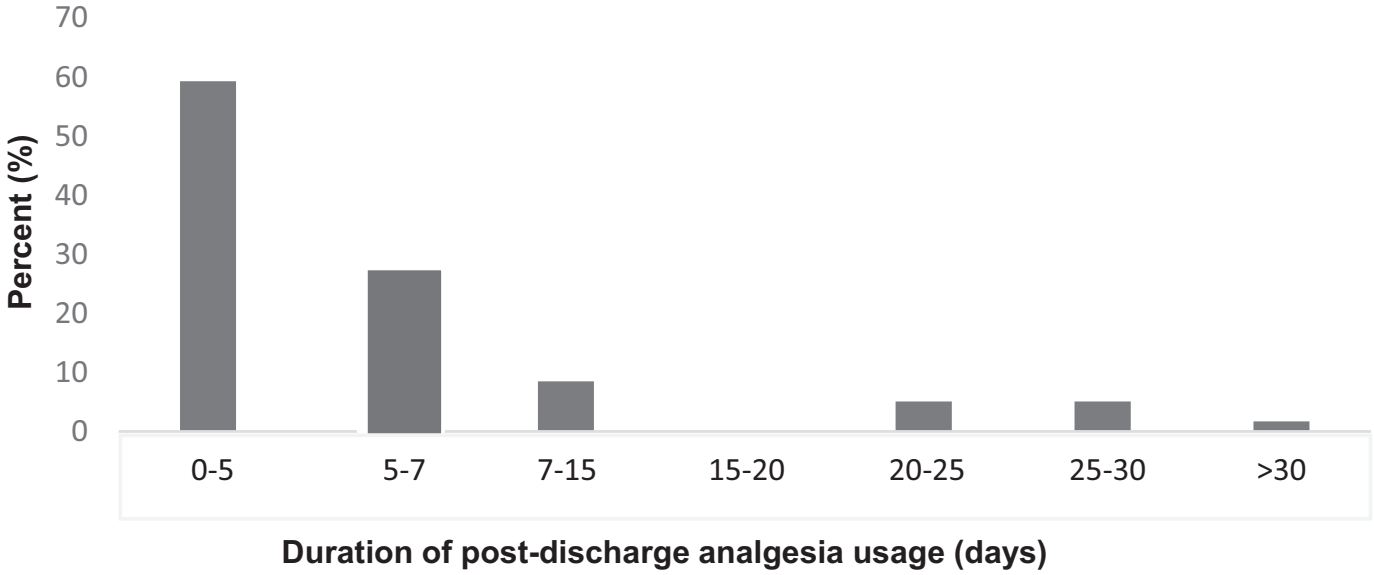

Figure 1. Percentage of patients and number of days of analgesia usage after discharge.

reserved for the technically challenging cases and in very ill patients presenting with shock and peritonitis.

Patients undergoing OA reported greater mean postoperative pain scores compared to LA which supports the data from several other studies.[16–18] As there were very few OA patients, it is difficult to make any meaningful comparisons of pain scores in our study, though intuitively laparoscopic procedures would have less pain. The purpose of this study was to show that the duration of analgesics prescribed was excessive based on pain scores for the LA group and patient responses in the telephone survey. Surgeons' experience and expertise was not an independent factor in the outcomes, conversion rate, and analgesic requirement. The operations were performed by senior resident trainees. Cases which required conversion were supervised in person by the consultant surgeon on duty who agreed with the decision for conversion. Analgesic requirements were not based on individual surgeon preference and patients were managed postoperatively according to our hospital's standard Emergency Appendectomy Pathway Protocol. Older literature shows a longer operative time for LA compared to OA.[19] However, in our study, OA had longer operative times. This can be explained by the fact that most of the OA cases were complex.

The historical values of LOS in LA ranges between 2.4 to 2.7 days.[20] Our longer mean LOS in LA (3.09 days) compared to that quoted in the paper by Long et al.[21] maybe due to an interplay of social, cultural factors, and interval to full diet. Return to work or normal activity was measured by the number of days of HL granted. This was one of our primary outcome measures and our audit showed that it clearly fell short of international standards. Western studies have shown mean HL for LA and OA as 11 and 21 days respectively.[22, 23] In another study by Biondi A et al.[24] mean return to work was 11.5 days and 16.1 days for LA and OA respectively. In our study, return to work for LA and OA was 17.9 and 21.8 days respectively.

Our telephone survey (**Table 5**) revealed some surprising information. Approximately 47% of the interviewed patients felt that the duration of HL granted by doctors was more than adequate and they could have returned to normal work and activity earlier. This raises the question whether there is a tendency among healthcare professionals in Asia to grant excessive leave and may require a mindset change. Moreover, the practice of prescribing excessive analgesics on discharge also needs a review. The survey showed that nearly 83% of the patients did not complete the prescribed 2-week duration of analgesics with 59.21% taking them for less than 5 days. This clearly shows that blindly prescribing a 2-week course of analgesics for all patients is not necessary and analgesia dosage needs to be tailored down.

It is noteworthy that 75% of operated patients had no residual symptoms at their hospital clinic follow-up and were only informed about their histology reports. This begs the question whether there is a need to physically review these patients in the hospital setting. This is of particular importance in the current COVID-19 pandemic as it can save valuable time, logistics, and help to reduce patient footprint in acute care hospitals. Our survey showed that 47% felt that they could have returned to work earlier and 41% of the interviewed patients were happy to conduct a telephone postoperative consult. These were younger patients who were digitally savvy and comfortable with online consults. We believe that many of the uncomplicated LA patients maybe candidates for telephone consults alone. A study by Y Ma et al.[25] has shown that such telephone consultations are cost-effective and safe. The best time to select patients and counsel them for teleconsult planning is in the hospital at the time of discharge.

CONCLUSION

The majority of LA patients do not need 2 weeks of analgesics and their HL can be shortened for faster return to work thereby realizing the true benefits of minimally invasive surgery. Selected cases can be offered postoperative teleconsultation thereby reducing the hospital clinic burden.

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