

■ **Original Article**

## **Feasibility, safety and benefit of no drip after cholecystectomy: a prospective observational study**

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### **Abstract**

**Background:** traditionally intravenous fluid is continued after cholecystectomy till resumption of oral intake. This practice seems unnecessary given the fast recovery following uncomplicated cholecystectomy. **Objective:** To observe feasibility, safety and benefit of no drip after cholecystectomy. **Methods:** After ethical approval, one hundred cholecystectomy patients were prospectively enrolled in the study. Complicated gall stones were excluded. In consultation with anesthetists, intravenous fluid was calculated based on body weight, maintenance etc. and infused till completion of surgery. Drip was discontinued. Patients were shifted out of operation room with IV lock. Nurses, family members and patients were detailed about this change in practice. Patients were monitored as per our existing standard practice. Anesthetists compulsorily signed out patients to the ward. After 4 hours of surgery patients were encouraged to start oral fluid. Data on fluid requirement, post operative complications and satisfaction of patients were analyzed. **Results:** One hundred cholecystectomy patients were studied. Average age was 39.8 years, weight 57 kg. Female were 85. Elective cases were 86 and acute 14. Average surgery time was 66 minutes and fluid required was 1313 ml. Open cholecystectomy was 71, laparoscopic 28 and 1-conversion. One laparoscopic patient was reopened due to bleeding. Four patients required drip, 2 for low blood pressure, 1 for vomiting and 1 for low oral intake. There was no mortality in this series. All concerned welcomed this change in practice. **Conclusion:** discontinuing intravenous drip after uncomplicated cholecystectomy is safe, and well accepted by all concerned.

**Keywords:** early oral feeding, intravenous fluids, cholecystectomy

### **Background**

Our memory is still afresh of practice at our hospital and other centers on nasogastric decompression, nil orally till appearance of bowel sound to allow sips of clear liquid then gradually liquid, to soft and finally to full diet after routine gall bladder surgeries. Patients were kept on IV drips and restricted diet for 3 days or longer. This has changed, so much so that laparoscopic cholecystectomy

(LC) and mini incision open cholecystectomy (OC) have become day case surgeries.

The evidence is lacking on amount and duration of peri-operative fluid administration in most major surgeries. The trend to minimize intravenous (IV) fluid, both amount and duration in peri-operative period of cholecystectomy to allow the patients oral feed as early as tolerated. In clinical practice, more variations are seen in duration and amount of IV fluid 'after' cholecystectomy in different institutions and also among surgeons of same institutes. Even with recent modifications, the traditional practice of overnight IV fluid is common despite development of new evidences.

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Despite its importance in clinical practice, IV drip is seen as the most 'misused drug'. Enthusiastic fluids over load in major surgeries have deleterious effect and early resumption of oral feeding is beneficial in terms of work load, cost, patients comfort and morbidity due to IV drip.<sup>1-5</sup>

Cholecystectomy is the common major surgery in most general hospitals. Major bleeding is rare and is detected during or within hours of surgery. Bile duct injury is another rare event usually detected at the time of surgery in major injuries or not until after several days later in minor leak. These are the basis why stable patients can be safely discharged from hospital after 4-6 hours of observations following uncomplicated cholecystectomy. This practice of ambulatory surgery is now considered safe and economic with high level of patient satisfaction.<sup>6-8</sup> Safe and less invasive procedures with decreased cost and convenience to the patients is the overall goal of innovative evidence based surgeries.

In a prospective observational study at our institute we found that early oral feeding by 4 hr and discontinuing IV fluid in LC was safe and feasible in scenario of developing world. This is common practice to keep one member of patient's family by bedside to keep an eye on IV drip to call nurse before the drip dries off. The change in practice of early oral feed and omission of drip drastically decreases demand on family members and nursing staff and reduces drip related morbidity and cost. This further enhances patient's psychological wellbeing by not being bound to bed with running IV drip.

Following our earlier successful observation we are now practicing early oral feed and stop IV drip 4 hours after uncomplicated cholecystectomy. In present study we aim to further decrease the unnecessary burden of IV drip. After consultation with anesthetists on optimum IV fluid requirement, and further taking the confidence of recovery room staff and ward nurses our aim is to observe prospectively the feasibility and safety of omitting IV drips after the completion of cholecystectomy so that patient will be going to the ward with IV lock and not the running IV drip. This will further reduce the burden to patients, family, nursing staff and the institution.

## Methods

This cross-sectional prospective study was carried out from Sep 2010 to Feb 2011 at Patan Hospital, a

university teaching hospital. All symptomatic LC/OC patients of the American association of Anesthesiologist (ASA) physical fitness classification, ASA-1 and ASA-2 (without diabetes) who consented for the study were included. Complicated gall stones (cholangitis, choledocholithiasis and pancreatitis), patients with unstable vitals during surgery, prolonged surgery beyond 3-hours were excluded. The study was Ethical approval was obtained from the institutional review committee.

In consultation with anesthetists, IV fluid was calculated for individual patient based on body weight [30 (30-35), 40, 50, 60, 70 (66-75) kg], hours of fasting (average 10 hours), compensatory intravascular volume expansion (CIVE at 5 ml/kg), maintenance (4 ml/kg for 1<sup>st</sup> 10 kg, 2ml/kg for 2<sup>nd</sup> 10 kg, and 1ml/kg for subsequent per 10 kg), deficit (maintenance x hours of fasting), blood loss and 3<sup>rd</sup> space loss (5 ml/kg). For a 50 kg patient the fluid calculation in surgery lasting for 1-hr was 1000 ml, 1.5-hr 1300 ml, 2 hr 1600 and so on. Details are given in 'Table 1'.

Calculated fluid was started 1 hr before surgery when putting in the IV line for prophylactic antibiotic given within 60 to 30 minutes before incision so as the duration of calculated fluid was infused over 'the time of time of surgery (incision to closure) plus 30 to 60 minutes to take into consideration not to overload IV fluid with short period. If the calculated amount was not infused by the end of surgery, the drip was continued to finish up in the recovery area before patient was transferred out. Running drip was discontinued. The IV cannula kept locked before patient was shifted out of operation room.

During and after surgery patients were monitored as per our existing standard surgical practice. Patients were monitored in recovery area which is inside the operating room complex and run by dedicated paramedics and nurses under supervision of anesthetists. In recovery room vitals (blood pressure, heart rate, and SpO<sub>2</sub>) were checked continuously for a minimum of 30 minutes or till patients became conscious and obeyed verbal command. Anesthetists compulsorily signed off the patients to the ward.

Ward nurses monitored patients regularly as per our existing practice of recording vitals at intervals of 15 min (x4), 30 min (x2), 60 min (x2) and 4 hourly thereafter if stable. Morphine 4-6 mg (0.1 mg/kg) and Phenergan 25 mg intramuscular 4 hourly as required was given for pain control. Oral

Paracetamol 500 mg and Ibuprofen 400 mg (once oral feeding was started) were given. After 4 hours of surgery patients were encouraged to start oral fluid, beginning with plain water and gradually increasing to full liquid. IV cannula was kept locked in situ overnight (we still do not practice day case surgery routinely) in case of urgent need. Information

on vitals, nausea-vomiting, anti-emetics and re-starting of IV fluid were prospectively recorded in pre designed data sheet. Nurses, family members and patients were detailed about this change in practice of early oral feeding without running IV drip after cholecystectomy.

**Table 1: Fluid requirement of cholecystectomy patients based on body weight and duration of surgery**

Body weight (Kg)				60
				(56-65)
CIVE (compensatory intravascular volume expansion) ml/kg = wt*5				300
Maintenance fluid				120
	1st 10 kg 4ml/kg (10*4)			40
	2nd 10kg 2ml/kg (10*2)			20
	remaining kg 1 ml/kg (1*1)			40
Deficit (Maintenance*fasting hr (average 10 hr))				1000
Blood loss (ml)= mild <100, moderate 100-500, severe >500				
3rd space loss 5 ml/kg (4-6) = wt*5				300
Fluid required in 1 <sup>st</sup> hr (Maintenance + ½ of Deficit + 3 <sup>rd</sup> space loss)				910
Fluid required in 2 <sup>nd</sup> hr (Maintenance + ¼ of Deficit + 3 <sup>rd</sup> space loss)				670
Fluid required in 3 <sup>rd</sup> hr (Maintenance + ¼ of Deficit + 3 <sup>rd</sup> space loss)				670
Total fluid for 1 hr surgery (CIVE + fluid in 1st hr)				1200
Round figure				1200
Total fluid for 1.5 hr surgery (Total fluid in 1 hr surg + ½ of 2 <sup>nd</sup> hr)				1605
Round figure				1500
Total fluid for 2 hr surgery (CIVE + fluid in 1st hr + fluid in 2nd hr)				1850
Round figure				1800
Total fluid for 2.5 hr surgery (Total fluid in 2 hr surg + ½ of 3 <sup>rd</sup> hr)				2175
Round figure				2200
Total fluid for 3 hr surgery (CIVE + fluid in first 1 <sup>st</sup> hr + 2 <sup>nd</sup> hr + 3 <sup>rd</sup> hr)				2500
Round figure				2500

Data on amount of fluid required during surgery, need of re-start fluid, post operative nausea vomiting, complications and satisfaction of patients, family members and nurses were recorded in predesigned data sheet. Microsoft Excel was used for data analysis.

### Results

One hundred patients were enrolled in the study during five months period starting Oct. 2010. Average age was 39.8 years (19 to 81), weight 57 kg (38-86) and majority (96%) in ASA-1 category. Female were

85 (85%). Table 2. Surgery time was 66 min (35 to 180) requiring 1313 ml (1000 to 2500) IV fluid. Acute calculous cholecystitis patients were 14 and 86 chronic. Seventy one patients underwent open cholecystectomy, 28 laparoscopic cholecystectomy (LC) and one laparoscopic converted to open due to difficult anatomy. The high percentage of OC during this period was due to equipment problem; otherwise the number of LC far exceeds OC at our institute. One patient following LC had low blood pressure in ward two hours after surgery. Drip was restarted.

After 5-hours blood pressure further fell down to 90/50 mmHg despite fluid bolus, patient progressively became pale with heart rate 110/min. Blood was arranged and emergency laparotomy performed which revealed bleeding from a prominent vein in gall bladder bed which was sutured with catgut 2/0. A tube drain was kept in sub-hepatic space. Patient recovered well.

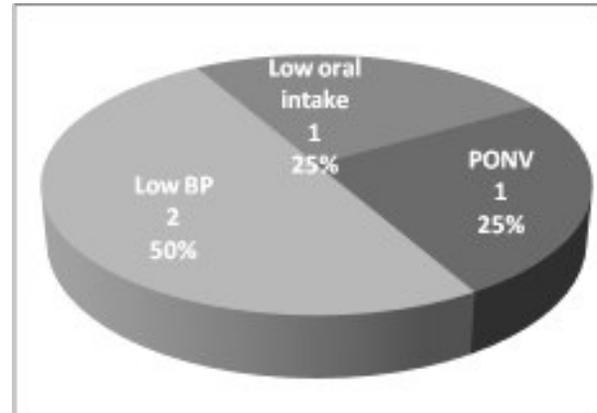
**Table 2: Demographic features of 100 cholecystectomy patients with no IV after surgery**

Patient profile	Number
Male	15
Female	86
Age (years)	39.8 (19 to 81)
Weight (kg)	56.8 (38 to 86)
Duration of surgery (minutes)	66.35 (35 to 180)
Total IV fluid (ml)	1313 (1000 to 2500)
ASA 1	96
ASA 2	4 (all had hypertension)
Acute	14
Chronic	86
LC	27
OC	71
LC to OC	2
Re-laparotomy	1
PONV	5
Resumption of IV fluid	4
LC = laparoscopic cholecystectomy, OC= open cholecystectomy, PONV = post operative nausea vomiting, ASA = American association of anesthesiologist	

Postoperative nausea and vomiting (PONV) was observed in 5 patients (3 did not require intervention, 1 received IV metoclopramide and 1 required metoclopramide together with a bottle of normal saline and IV).

Four patients (4%) required resumption of IV drip, 2 due to low blood pressure (one required laparotomy), 1 had PONV and 4<sup>th</sup> was for low oral intake with less urine output. There was no mortality in this series.

All concerned, patients, family and nursing staff welcomed this change in practice. Figure 1.



*Figure 1: Reasons to re-start IV fluid in 4 post cholecystectomy patients among 100 who had no IV fluid after surgery.*

### Discussion

Maintenance of fluid and electrolyte balance is important necessary part of surgical care and one need to be careful not to unnecessarily put patient on IV fluid.

Caution is required not to over or under hydrate patients in per-operative period. Surgical patients differ because the body's mechanism is altered to 'retain salt and water with water in excess' due to metabolic and hormonal response after surgical stress and trauma during 48-72 hours 'phase of injury' which may lead to fluid overload affecting cardio-pulmonary functions.<sup>9-14</sup> Administration of 'scientifically' calculated fluid combined with early feeding in present series of 100 patients was safe and satisfactory to allow us to omit IV fluid after cholecystectomy and freeing the patient from burden of continuous running drip. Thus approach of liberal fluid is not justified as observed by other researcher.<sup>2-5</sup> Early oral feeding after moderate severity of abdominal surgery is feasible and safe.<sup>2,6,7,8,xxx</sup> Successful outcome in 100 cholecystectomy patients without running IV drip and only IV lock for administration of anesthetic drugs had better outcome in terms of shorter hospital stay.<sup>15</sup> In prospective randomized clinical trial in cholecystectomy without drip and early oral feeding were comparable the standard IV drip.<sup>5</sup>

Despite preference for LC, studies have demonstrated 'LC and MC' are comparable and like LC, MC can be safely performed as a day surgery procedure<sup>16</sup>

ever since the report of successful discharge after 3-10 hours following open cholecystectomies in a series of 200 by Ledet<sup>17</sup> in 1990.

After our previous successful study of oral feeding 4-hours after cholecystectomy, we have now changed our practice and no longer give routine overnight IV drip. In present observation of prospectively enrolled patients, we found it was safe to stop IV fluid after completion of cholecystectomy in routine, uncomplicated patients. We believe, this study will further benefit patients by not having drip after the uncomplicated cholecystectomy and is another addition to the development of minimal invasive surgery, together with decrease in cost and demand on resources.

### Conclusion

Discontinuing IV drip after completion of routine cholecystectomy in uncomplicated patients is safe, economic and well accepted by patients, family and nursing staff.

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