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Day Care Laparoscopic Cholecystectomy: A Review

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Abstract **Review Article**

Gallstones, small solid formations within the gallbladder (GB), often necessitate intervention when symptomatic. The conventional approach involves their removal through a minimally invasive laparoscopic cholecystectomy (LC). Traditionally, patients undergo overnight observation post-surgery to detect potential complications. However, this practice results in unnecessary extended hospital stays, leading to delays in resuming daily activities, heightened risks of nosocomial infections and morbidity, increased financial burden, and a strain on hospital resources. In contrast to this, many developed nations have embraced a more efficient model where carefully selected patients can be discharged on the same day as the operation, eliminating the need for overnight admission. Recognizing the advantages of a shorter duration of surgery, a brief postoperative period, and a reduced incidence of complications, the concept of Daycare Laparoscopic Cholecystectomy (DCLC) has gained prominence. Beyond the medical benefits, patients benefit from early discharge, recovery in a familiar home environment with personalized care, minimal disruption to personal life, and decreased overall costs. Despite over a decade of global research confirming the feasibility and safety of DCLC, this approach has not been widely adopted in India. This review emphasizes the necessity for its integration into routine practice in developing countries like India. Embracing DCLC can significantly alleviate the burden on healthcare resources, enhance patient experience, and contribute to more efficient healthcare delivery.

Keywords: Day Care Laparoscopic Cholecystectomy, Daycare Surgery, Laparoscopic Cholecystectomy.

INTRODUCTION

Laparoscopic cholecystectomy (LC) stands as the established standard of care for benign gallbladder conditions such as gallstones and GB polyps. Typically, the perioperative journey for patients undergoing LC in developing countries like India involves a preoperative day of admission to the surgical ward, followed by overnight monitoring in the hospital. Discharge is contingent upon a satisfactory overnight stay. This conventional practice has been ingrained in the surgical landscape. However, the increasing acceptance and adoption of DCLC in the Western world have prompted a reconsideration of these norms in developing countries. To integrate DCLC into routine practice, a fundamental shift in the mindset of clinicians, surgeons, anesthesiologists, and even patients is imperative. This review aims to raise awareness and prevent healthcare professionals from veering away from the potential benefits that DCLC can offer in terms of efficiency, resource optimization, and patient experience. Embracing this evolution in surgical practice can contribute to improved healthcare delivery and outcomes in developing nations.

Review

In 1420, a Florentine pathologist named Antonio Benevieni provided the initial description of gallstones, detailing a case involving a woman who expired due to abdominal pain [Shehadi WH, 1979]. Subsequent centuries witnessed a growing acknowledgment of biliary colic. The initial correlation between gallstones and surgical intervention can be traced back to 1687, when Stal Pert Von Der Wiel, during a procedure for a patient with purulent peritonitis, incidentally discovered the presence of gallstones [Beal JM, 1984]. Various procedures were tried for the management of gallstone disease until, in 1882, Carl Langebuch (1846–1901) of Germany executed the first cholecystectomy [Litynski GS, 1996]. Langenbuch's open cholecystectomy held the status of the gold standard in managing symptomatic cholelithiasis for more than a century. Nevertheless, the advent of laparoscopic approaches for cholecystectomy has fundamentally transformed this procedure. The inaugural LC was conducted by Prof. Dr. Erich Mühe of Germany in 1985 [Litynski GS, 1996]. Since then, LC has established itself as the internationally accepted standard for managing gallstone disease.

There are four standard ports used for conventional LC, with a 10 mm telescope typically used at the umbilicus, either infra, intra, or supraumbilical, contingent upon the patient's habitus and surgeon's preference. The primary functional right port for the surgeon is usually a 10 mm trocar inserted in the epigastric area, and a 5 mm trocar is placed in the right lumbar region for manipulating the GB fundus. Additionally, another 5 mm trocar is positioned in the right hypochondrium to serve as a left-hand working port. Nevertheless, several alterations have been implemented since the first performed LC, such as decreased port diameter (e.g., from 10 mm to 5 mm or 5 mm to 3 or 2 mm) or a decrease in the quantity of ports (i.e., 3 ports, 2 ports, Single Incision LC, or NOTES) [Haribhakti SP *et al.*, 2015]. The aim of all these modifications is to decrease post-op pain and improve cosmesis. The recovery progress has been under observation since then, and now it is known that LC has one of the most simple and straightforward courses, except in some rare cases, which has the potential to be anticipated based on preoperative clinical and radiological findings. A shorter duration of the surgery and postoperative period, along with the minimal occurrence of intraoperative and immediate postoperative complications, have thus led to the adaptation of daycare surgery (DCS) for LC. Many studies [Narain PK *et al*., 1997; Lau H & Brooks DC, 2002; Ammori BJ *et al*., 2003; Leader PC *et al*., 2004; Skattum J *et al*., 2004; Vuilleumier H *et al*., 2004; Jain PK *et al*., 2005; Victorzon M *et al*., 2007] have shown Daycare laparoscopic cholecystectomy (DCLC) as a safe and feasible option in selected patients.

History of Daycare Surgery

James Nicoll (1864 – 1921) established the fundamentals of contemporary surgery during his contributions to the Sick Children's Hospital in Glasgow, Scotland [Jarrett PEM & James H Nicoll, 1999]. He conducted a multitude of pediatric surgical procedures, encompassing hernias, phimosis, mastoid disease, cleft palate, talipes equinus, and spina bifida, achieving success in 8,988 cases as reported in 1909 [Nicoll JH, 1909]. Farquharson pioneered day surgery in 1955 by promoting early ambulation for adult hernia repair [Farquharson EL, 1955]. Nicoll's idea of a specifically designed day unit was put into practice in 1962 at the University of California, Los Angeles [Cohen D & Dillon JB, 1966]. The expansion of day surgery prompted the establishment of organizations, such as the Federated Ambulatory Surgery Association (FASA) in 1974 and the International Association for Ambulatory Surgery (IAAS) in 1995. The IAAS comprises a diverse group of professionals, including surgeons, anesthetists, nurses, and managers, with a comparable approach adopted by the associations within its membership. The consensus is that collaborative teamwork is crucial for achieving optimal outcomes in day surgery. The growth of outpatient surgery has been inconsistent, marked by significant variations in activity levels both between countries and within hospitals in the same country.

Definitions of DCS

The definition of DCS as per the Royal College of Surgeons is “when the surgical day-case patient is admitted for investigation or operation on a planned non-resident basis and who nonetheless requires recovery facilities” [Britainireland AO, 2011]. However, within the United Kingdom, DCS is characterized as the hospital admission of carefully chosen patients for a scheduled surgical procedure, with the patients being discharged and returning home on the same day [Kaman L *et al*., 2011]. Similarly, in the United States the patient is kept for observation for 23 hours also categorized under DCS. This condition of having multiple definitions was resolved in 2007 at the International Congress of IASS. Different terms related to DCS were defined as per the consensus among the participating members. (Table 1)

Table 1: Internationally agreed terminology and definitions as proposed by the IAAS [Castoro C *et al*., 2007]

S.N.	Terminology	Synonyms
1.	Day surgery	Ambulatory Surgery, same-day surgery, day-only surgery
2.	Extended Recovery	23h, overnight, single night Treatment requires an overnight stay before discharge
3.	Short Stay	Treatments requiring 24-72 hours in hospital before discharge
4.	Office-based Surgery	An operation or procedure performed in a medical surgery/ office or practitioner's professional premises that provides appropriately designed, equipped service rooms for its safe performance

Advantages of DCLC: The LC performed as a DCS is called a DCLC. The advantages of DCLC are as follows:-

Benefits to the Patients and Families

- More personalized care
- Recuperate in a familiar home setting
- Pre-booked date and less likely to be canceled
- Shorter waiting lists and less uncertainty of a long wait
- Easier domestic arrangements
- Earlier mobilization
- Low complications
- Better outcomes
- Minimal disruption of the patient's personal life
- Earlier return to a familiar environment

- High patient satisfaction

Benefits to the Hospitals

- Lesser cost than similar inpatient procedure;
- Reduced requirement of nursing and medical supervision.
- Ease of scheduling for both the patients and the surgeons
- A large number of patients can be treated

Benefits to the Medical System

- Containing costs whilst obtaining high-quality, accessible, and effective treatment
- Personnel and resources are primarily unnecessary during nighttime, weekends, and public holidays.
- Less staff is needed for a DCS facility than for comparable in-patient surgery.
- If a procedure that is appropriate for DCLC is instead performed as a hospitalized, it leads to the occupancy of costly hospital beds, resulting in the increased utilization of capital equipment, patient resources, and administrative time
- Utilizing a DCS facility decreases the requirement for in-patient beds and lowers the potential for cross-contamination.
- Preventing disruptive overnight stays in hospital wards
- Reduced work time loss
- Reduced psychological distress

Disadvantages of DCS

- Requiring a designated individual to supervise the at-home care of the patient for the initial 24-48 hours.
- DCS is limited to skilled senior personnel, providing limited chances for junior staff to gain experience.
- Additional responsibilities for the general practitioner after the operation, with patients frequently contacting them for guidance or medical care
- The cost-effectiveness of the facility decreases when it handles less intricate cases daily

Patient Selection

Social Factors

The patient must understand the planned procedure and postoperative care and give informed consent to DCLC. Patients should have a responsible adult to accompany them home and remain with them for 24 hours after surgery. It is preferable for the hospital to be at a close close physical distance.

Medical Factors

Fitness at pre-anesthetic assessment and not by ASA physical status, age, or body mass index. Patients with a stable chronic disease such as diabetes can be well considered for DCLC [Rasmussen LS *et al*., 2015].

Surgical Factors

Thorough consideration should be given to the selection of the patient and patients with high-risk factors of difficult cholecystectomy are better excluded from the DCLC [Bhardwaj R *et al*., 2018]. (Table 2)

Table 2: Risk factors of difficult cholecystectomy

S.N.	Risk factors of difficult cholecystectomy	
1.	History	Male gender, >65 years, the interval between onset and presentation (>72–96 hours) in acute cholecystitis, previous multiple attacks, previous upper abdominal surgery, a prior attempt at Cholecystectomy
2.	Physical Examination	Morbid obesity, high ASA score
3.	Laboratory tests	Abnormal LFTs
4.	Imaging (USG/CT/MRI–MRCP)	Thick-walled GB (>4–5 mm) Contracted GB Distended GB with impacted stone in the neck, Gangrenous GB/GB perforation, Mirizzi's syndrome/cholecystoenteric fistula, Cirrhosis/extrahepatic portal vein obstruction (portal cavernoma) with portal hypertension

Facilities Needed for DCLC

It is advisable to establish a distinct category or subdivision specifically for daycare surgery, complete with its independent administrative framework for overseeing patient logistics and scheduling. This entails having dedicated surgical and anesthesiology consultants, as well as a specialized team and operating theaters, preferably in a standalone daycare center [Smith I *et al*., 2006].

Postoperative Recovery and Discharge

Recovery from anesthesia and surgery includes three phases, each playing a crucial role in ensuring a patient's smooth transition from the surgical theater to full consciousness and postoperative well-being.

Phase 1 (Ward Readiness)

It involves the initial emergence from anesthesia and immediate recovery within the surgical suite or recovery room [Bailey *et al*., 2019]. During this stage, healthcare professionals closely monitor vital

signs, such as heart rate, blood pressure, and oxygen levels, ensuring the stability of the patient and responding well to the anesthesia reversal agents. Any immediate postoperative complications or issues are promptly addressed, and pain therapy is initiated to provide comfort.

Phase 2 (Home Readiness)

During this stage, pain management strategies are adjusted as needed, and the medical team remains vigilant for any signs of complications or adverse reactions. The focus shifts to assessing the patient's overall condition, ensuring pain control, and implementing measures to prevent complications such as infection or thrombosis. The evaluation is conducted utilizing the Post-Anesthesia Discharge Scoring System (PADSS). Patients attaining a score of 9 or higher are eligible for discharge, provided they have an accompanying adult [Gangadhar S *et al*., 2012]. Health education and postoperative instructions are provided to both the patient and their caregivers, outlining necessary precautions, medications, and follow-up appointments.

Phase 3 (Late Recovery)

It usually occurs at home post-discharge. This is where comprehensive functional and psychological recuperation of the patient occurs, a process that can extend over weeks to months.

Thus, the three recovery phases post-anesthesia and surgery create a framework prioritizing patient safety, comfort, and a successful return to normal activities. Seamless coordination among healthcare professionals and careful phase management contribute to overall surgical success and the patient's path to full recovery.

Discharge and Postoperative Care

Upon discharge, it is essential that every patient is provided with postoperative advice both oral and written, highlighting potential symptoms like PONV, severe pain, surgical site bleeding, and jaundice that they might encounter. Ideally, these instructions should be delivered in the presence of the responsible individual assigned to escort the patient home. An optimal approach involves having a support hotline available for a minimum of 24 hours post-discharge and scheduling a follow-up call the following day. It offers assistance in the event of immediate complications and proves beneficial for evaluating postoperative symptoms, gauging patient satisfaction, and addressing other quality assurance concerns.

Factors That Delay Early Discharge and the Required Interventions

Residual Effect of Anesthesia

It is imperative to steer clear of profound anesthesia, as it has the potential to hinder the process of awakening from anesthesia. Anesthetic approaches should be designed to minimize physiological stress and maximum comfort for the patient and should take into consideration the risks and benefits of the individual technique. The standardized anesthetic protocols regarding DCLC will improve outcomes [Clarke MG *et al*., 2011].

Postoperative Pain

Inadequate pain control affects sleep, hinders a patient's ability to mobilize, and might result in a prolonged duration in the recovery area. Lack of proper health infrastructure. The latest approach involves embracing preemptive analgesia, wherein analgesic is administered around the perioperative duration with an extended period of analgesia, utilizing various techniques for opioid-sparing multimodal pain control [Vadivelu N *et al*., 2014].

Postoperative Nausea and Vomiting (PONV)

DCLC is a brief procedure associated with a lower incidence of PONV. Nevertheless, if PONV occurs, it could potentially prolong the discharge process. Therefore, prophylactic multimodal therapy is recommended for patients at an elevated risk of PONV using at least two agents, including 5-HT3 receptor antagonists, corticosteroids, phenothiazines, or anticholinergics [Gan TJ *et al*., 2014].

Surgical Complications

Unforeseen complications during surgery or in the immediate postoperative period like surgical site bleeding, suspected bile duct injury, dense intraoperative adhesions, and intraoperative drain placement may necessitate a more extended observation before discharge [Sarala BBN *et al*., 2020].

Patient-Specific Factors

Patient-specific factors like age, comorbidities, and overall health may influence the speed of recovery and discharge readiness. Hence, the patients should be carefully selected for DCLC.

Logistical Issues

Administrative and logistical factors, such as availability of transportation and caregiver support, can impact the timing of discharge. A proper dedicated surgical unit should be established to streamline the discharge pathway and patients residing near the hospital should be prioritized.

Psychosocial Considerations

Patient comfort and confidence in their ability to manage postoperative care at home play a role in discharge. It necessitates proper preoperative counseling and a patient's strong mindset toward DCLC.

Efforts to minimize these factors, including proactive pain management, early ambulation protocols, and clear discharge criteria, contribute to a smoother daycare lap chole experience, optimizing patient outcomes and resource utilization.

DCLC in Developing Countries

The idea of DCLC is advantageous for a developing nation as it not only helps control costs but also enhances the efficient utilization of healthcare resources.

In the preceding period decades, LC has become a routine daycare procedure in numerous global facilities. Nevertheless, in India, only a limited number of centers have established exclusive DCS units [Zirpe D *et al*., 2016; Khemchand AK *et al*., 2020]]. There is a noticeable lack of broad acceptance of DCLC or the whole DCS concept in India. The reasons being the absence of insurance coverage from insurance providers, lack of awareness in the patient population, poor communication and transport, poor facilities for proper training of doctors in DCS specialty and sidelining the surgical specialties by the government, and the apprehension among patients in India regarding early discharge.

Increasing public awareness about DCLC is crucial for fostering informed decision-making and understanding the advantages of this outpatient surgical approach. Public awareness initiatives can include: conducting public awareness campaigns, organizing community workshops and seminars, collaborating with media outlets for feature articles, interviews with medical experts, and public service, partnering with patient advocacy groups to share information and personal experiences, and creating a supportive community. Apart from this setting a dedicated daycare unit in the tertiary care hospitals and addressing the issues outlined above may help a developing country like India to take a leap in the DCLC

CONCLUSION

Recognizing the advantages of DCLC for developing nations, it is imperative to promote and adopt this approach as a standard practice. The successful establishment of DCLC as part of routine surgical care hinges on addressing the aforementioned issues diligently.

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