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RESEARCH ARTICLE

HAND ASSISTED LAPAROSCOPIC COLORECTAL SURGERY: CURRENT STATUS IN ERA OF CONVENTIONAL LAPAROSCOPIC COLORECTAL SURGERY

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ABSTRACT

Introduction

Laparoscopic colectomy has significant patient benefits in terms of shorter hospital stay, less postoperative pain and less narcotic use but is technically challenging during learning curve. Hand-assisted laparoscopic surgery (HALS) which is a combination of open as well as laparoscopy, allows tactile feedback because the surgeon's hand used in retraction and dissection. This may decrease the technical difficulty and shorten the learning curve associated with performing laparoscopic colectomy.

Objectives

This study is designed to compare the Hand assisted laparoscopic colorectal surgeries with conventional laparoscopic colorectal surgeries with a view to ascribe relative advantage, Technical Proficiency and clinical outcomes.

Search Methods

Medline (Oct 2000 - August 2013) and the Cochrane Central Register of Controlled Trials (Cochrane library, 2010 issue 10), Google, Springer Link. Cross references from list of major articles on subject were read with other relevant journals from a laparoscopic research institute library.

Conclusion

Hand-assisted laparoscopic colorectal resection offers similar short and long-term MIS (Minimal Invasive Surgery) benefits to that of totally laparoscopic assisted procedures. It is safe, feasible in benign as well as malignant colorectal tumors, it is easy to learn, easy to teach and most useful in complex colorectal procedures.

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INTRODUCTION

BACKGROUND

A laparoscopic assisted colectomy (LAC) was first reported by Jacobs *et al.* in 1991^[1]. Numerous comparative studies of a LAC vs an open colectomy for both benign and malignant conditions have demonstrated many short-term clinical benefits of the LAC, including less postoperative pain, fewer wound and pulmonary complications, decreased need for blood transfusion, faster return of bowel function, and decreased length of hospital stay^[2].

Laparoscopically assisted colorectal surgeries are time-consuming, technically demanding, have a long steep learning curve. In the technical demand, surgeons need to handle a long mobile organ, the colon, and have to operate on multiple abdominal quadrants, most of the time with the need to secure multiple mesenteric vessels. Therefore, a new surgical innovation called hand-assisted laparoscopic surgery (HALS) was introduced as a useful alternative to totally laparoscopic procedures.

This hybrid operation allows the surgeon to introduce the non-dominant hand into the abdominal cavity through a special

hand port while maintaining the pneumoperitoneum. A hand in the abdomen can restore the tactile sensation which is usually lacking in laparoscopic procedures. It also improves the eye-to-hand coordination, allows the hand to be used for blunt dissection or retraction and also permits rapid control of unexpected bleeding. All of those factors can contribute tremendously to reducing the operative time.

Because of the above, hand-assisted laparoscopic surgical techniques have the potential to:

1. Facilitate laparoscopic surgery;
2. Reduce operative time;
3. Shorten the "learning curve" associated with laparoscopic surgical procedures;
4. Improve safety;
5. Allow accurate digital dissection of operative specimens

It is critical for all those involved in laparoscopy to recognize that different ways are available to perform laparoscopic surgery. Minimally invasive surgery does not inherently mandate a totally standard laparoscopic approach. All reasonable options that promote patient care and well-being

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should be investigated. For these reasons, the integration of hand-assisted laparoscopic surgery into the minimally invasive surgical armamentarium is necessary and should be explored.

Aims

This study is designed to compare the Hand assisted laparoscopic colorectal surgeries with conventional laparoscopic colorectal surgeries with a view to ascribe relative advantage, technical proficiency and clinical outcomes.

MATERIALS AND METHODS

Literature research was concluded using Medline, the Cochrane Central Register of Controlled Trials ([Cochrane library, 2010 issue 10](#)), Google and Springer Link. Search keywords were "HALS, HAL colorectal surgeries, Standard or Conventional Laparoscopic colorectal surgeries". A selection criterion for further reading was literature written in English language. Cross references from list of major articles on this subject and relevant journals from Laparoscopic Research Institute, India, were read.

Overview

Patient Preparation

All patients should be consented for possible conversion to an open procedure and routine antithrombotic precautions should be taken with heparin and TED stockings. Routine bowel preparation is employed and all patients receive standard antibiotic prophylaxis.

Operative technique

A nasogastric tube and urinary catheter are passed when the patient is anaesthetized. All procedures are performed with the patient in the Lloyd Davis position. Pneumoperitoneum is created using a standard technique and is maintained at 12-15 mm Hg by an automatic CO₂ insufflator.

A 10 mm zero or thirty degree laparoscope is inserted through a subumbilical port, and initial diagnostic laparoscopy is performed. Following peritoneoscopy, the site for the HandPort placement is marked on the skin. The most common site for the incision is an infra-umbilical transverse or vertical midline incision. The size of the incision is usually the same size of that of the surgeon's glove. 10 mm endoscopic ports are utilized throughout, one subumbilical and epigastric port to the right of the falciform ligament.

An optional 12 mm port could be used to facilitate using an endoscopic stapling device for intracorporeal mesenteric and bowel division. At initial laparoscopy, the lesion to be resected is identified, and both surfaces of the liver and the remainder of the abdominal cavity are inspected.

The sequence of events in performing laparoscopic hand-assisted colonic surgery are as follows (Fig.1 to 11):

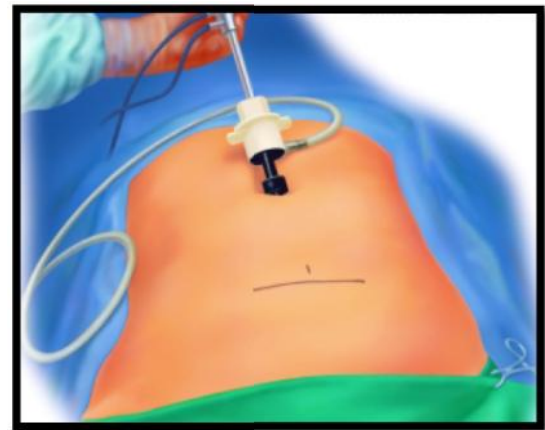


Fig. 1 Site and size of incision

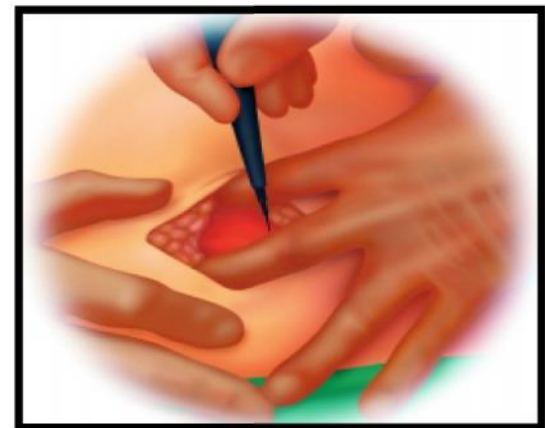


Fig. 2 Skin, subcutaneous tissue, fat, fascia divided.



Fig. 3 Hand port device inserted and inflated.

DISCUSSION

Indications For Hals Colorectal Surgery

- Benign as well as malignant conditions.
- The procedure is best suited for the obese especially those with body mass index (BMI) of 40 or more, as the conversion rate is high if the procedure is conducted laparoscopically^[3].
- Bulky pathology as conversion to open requires due to technical difficulty in dissection like taking down the splenic or hepatic flexures.
- In cases of total colectomy

HALC should be avoided in patients with low BMI, thin patients with a small abdomen, and in pediatric patients. It is

also contraindicated when the pathology is non-bulky and the surgeon's hand is huge.

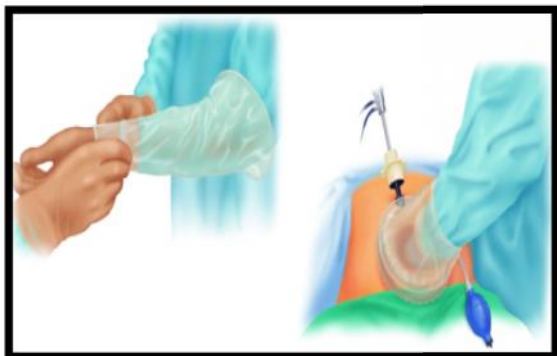


Fig 4a – 4b The bracelet is placed on the wrist and the sleeve is worn on the forearm. Hand inserted in abdomen through device.

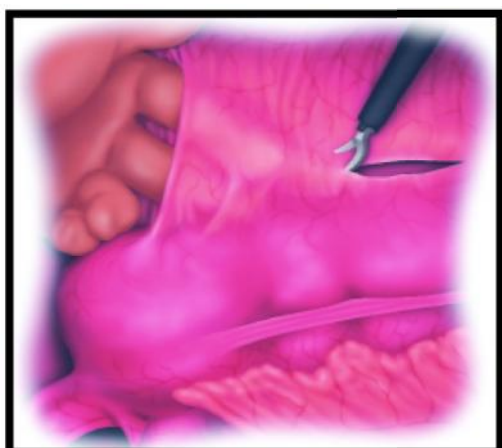


Fig.5 fingers are used to retract peritoneum

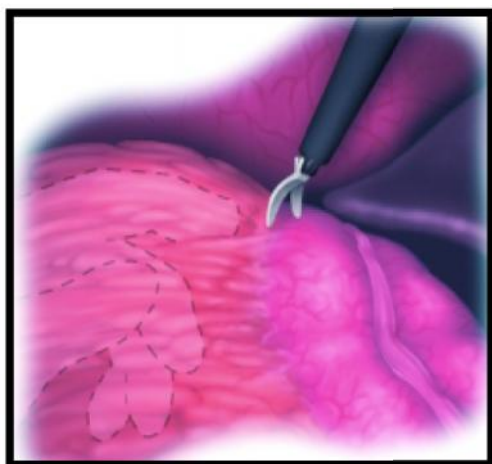


Fig.6 Omentum is retracted off the transverse colon by using gentle finger traction.

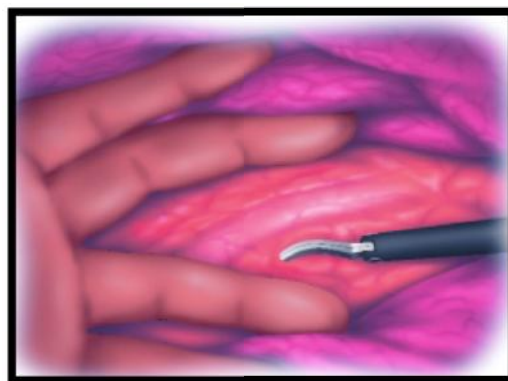


Fig. 7 Ureter identified

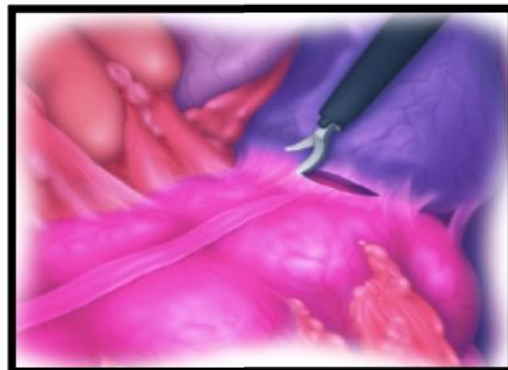


Fig 8 A view of the spleen and splenic flexure of the colon with the peritoneal attachments divided.

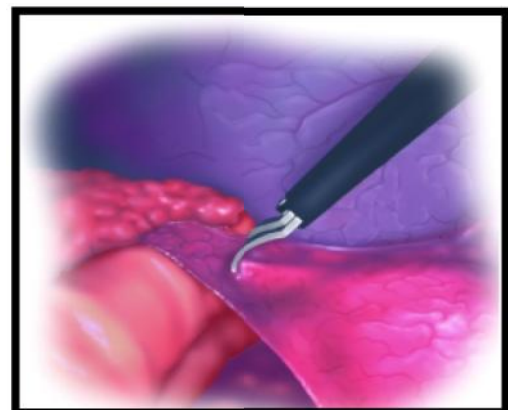


Fig. 9 The omentum and the remaining peritoneal attachments of the splenic flexure are elevated gently with finger retraction and are divided using endoscopic scissors

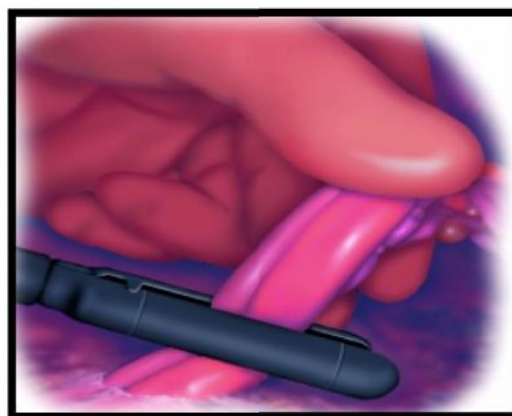


Fig.10 Inferior mesenteric vessels are divided intracorporeally using endoscopic staples



Fig. 11a and Fig.11b Specimen delivered through the HandPort Device.

Technical Proficiency and Operative Time In Hals Colorectal Surgery

Previously, it was reported that the outcomes of HALS in colon

and rectal surgery are similar to LAC [4-6]. While HALS is accepted as an alternative to laparoscopic surgery by some surgeons, others view it as a stepping-stone to LAC proficiency, while others specifically use this technique for more complex cases.

In a retrospective study of 719 patients of colorectal HALS [7], it was found that the learning period and skilled period were similar with respect to age, sex, body mass index, prior abdominal surgery, medical comorbidities, and American Society of Anesthesiologists class. Mean overall operative time decreased ($P=.001$). There was a decrease in mean operative duration for specific resections like Right colectomy, Left colectomy, sigmoid colectomy, anterior resection, Coloanal anastomoses, Subtotal colectomy, and Total proctocolectomy with ileal reservoir. Overall morbidity, infectious complications, readmissions, and length of stay were all significantly lower during the skilled period.

A.G.J. Aalbers *et al*, in his two randomized control trials and eleven non randomized control trials, including total 1017 patients concluded that in segmental colectomy group and total proctocolectomy group a significant difference was seen in favour of HALS regarding operating time with less conversion rates [8].

Rakesh Kumar Gupta *et al* [15], performed 103 HALS malignant colorectal procedures. The mean HALS time was 105 minutes. The conversion rate was 2.7%. The median of return of gastrointestinal function was 2.5 days. The median length of hospital stay was 9 days. The postoperative complication and mortality rates were 10.7% and 0.97%, respectively. Four incisional hernias (3.9%) were seen at a mean follow-up of 7.0 ± 3.4 months. None of the patients had trocar or hand-port site recurrence.

Clinical outcome in Hals – HALS assisted colorectal surgery

Study yr	Patients (HALC vs LAC)	OT (min)	Incision length (cm)	Complication rate (%)	Conversion rate (%)	LOS (d)	Bowel Function (d)	Conclusion
HALS study 2000 ^[9]	18 vs 22	142 vs 151	7.4 vs 7.0	4.5 vs 5.5	14 vs 22	7 vs 6	NA	HALC retains the benefits of MIS
Targarona et al, 2002 ^[10]	27 vs 27	120 vs 135	NA	26 vs 22	7 vs 23	POD 3: 6 vs 6	NA	Inflammatory markers such as interleukins – 6 & C- Reactive proteins were raised in HALC group
Chang et al, 2005 ^[11]	66 vs 85	189 vs 203	8.1 vs 6.2	21 vs 23	0 vs 13	5.2 vs 5	2.5 vs 2.8	No difference in return of bowel function, LOS or complications. Significant difference in OT & Conversion rate in favour of HALC. Incision scar less in LAC.
Ringley et al 2007 ^[12]	22 vs 18	120 vs 156	7 vs 5.5	Similar	NA	4vs4	NA	HALC is associated with shorter OT and greater lymph node harvest, but equal I.O blood loss, pedicle length and LOS
Marcello et al, 2008 ^[13]	47 vs 48	163 vs 210	8.2 vs 6.1	19 vs 21	2 vs 12.5	5 vs 4	2.5 vs 3	The OT can be reduced by > 30 min and 60 min in SC and TC; respectively if conducted by HALC
Hassan et al, 2008 ^[14]	109 vs 149	176 vs 211	NA	18 vs 11	15 vs 11	6 vs 5	3 vs 3	HALS facilitates expansion of a MIS colectomy to include challenging procedures while maintaining short-term benefits of LAC
Polle et al, 2008 ^[14]	30 vs 35	214 vs 298	NA	Major 16.5 vs 20	NA	10 vs 9	6 vs 5	No significant short-term benefits for total laparoscopic compared with HALRPC with respect to morbidity, OT, QOL, costs, and LOS

[HALC: Hand assisted laparoscopic colectomy, LAC: Laparoscopic assisted colectomy, LOS: Length of stay, QOL: quality of life, OT: Operative time, NA: Not applicable]

Long term complications

HALS requires a larger incision compared with SLS. Whether this leads to more longterm complications, such as incisional hernia (IH) and small bowel obstruction (SBO), has not been studied to date.

Toyooko Sonoda *et al* ^[16], in his study of Hand assisted laparoscopic colectomy (HALS) vs Single incision surgery (SLS) in which 536 pateints followed up, concluded that despite the larger wound, the incidence of IH was similar between both approaches (HALS, n=16 [6.0%] versus SLS, n=13 [4.8%]; p= 0.54). Rate of SBO was also comparable (HALS, n = 11 [4.1%] versus SLS, n = 20 [7.4%]; p = 0.11). Wound infections occurred similarly between both groups (HALS, n=18 [6.8%]; SLS, n= 13 [4.8%]; p=0.33). Converted patients had a higher rate of IH compared with nonconverted ones (25% versus 5%; p = 0.02), although the rate of SBO was similar (8.3% versus 5.7%; p = 0.51).

Hand-assisted laparoscopy in restorative proctocolectomy resulted in a significant reduction in operative time without detriment to bowel function, length of stay, or patient outcome. The hand-assisted approach is likely to replace conventional laparoscopic procedure for restorative proctocolectomy as the preferred laparoscopic approach for this technically challenging procedure.

In a comparative study of hand assisted restorative proctocolectomy and conventional laparoscopic method the median operative time was significantly shorter in the hand-assisted group compared with the conventional laparoscopic group (P < 0.01). The length of stay was similar between groups (hand-assisted: 4 (range, 3–13) days vs. conventional: 6 (range, 4–17) days). Complications occurred in four hand-assisted patients (40 percent; 2 ileus, mechanical obstruction, and dehydration) and in four patients undergoing conventional laparoscopic method (31 percent; 2 anastomotic leak, ileus, and mechanical obstruction) ^[17].

CONCLUSION

Based on the available evidence, hand-assisted laparoscopic colorectal resection offers similar short and long-term MIS (Minimal invasive surgery) benefits to that of totally laparoscopically assisted procedures. It combines the advantages of both laparoscopic (minimally invasive) and open surgery. It is safe and feasible in benign as well as in malignant colorectal tumors. Furthermore, it is easy to learn, easy to teach and most useful in complex colorectal procedures. Hence, hand-assisted colorectal surgery is advocated first as a 'bridge' and later as an adjunct to laparoscopically assisted colorectal procedures. Moreover, it can be used as an alternative to laparoscopic colectomy in the complex colorectal procedures.

Bibliography

1. Chang YJ, Marcello PW, Rusin LC, Roberts PL, Schoetz DJ. Hand-assisted laparoscopic sigmoid colectomy: helping hand or hindrance? *Surg Endosc* 2005; 19: 656-661
2. Cima RR, Pattana-arun J, Larson DW, Dozois EJ, Wolff BG, Pemberton JH. Experience with 969 minimal access colectomies: the role of hand-assisted laparoscopy in expanding minimally invasive surgery for complex colectomies. *J Am Coll Surg*. 2008;206(5):946-950, discussion 950-952.
3. Cima RR, Pendlimari R, Holubar SD, *et al*. Utility and short-term outcomes of hand-assisted laparoscopic colorectal surgery: a single-institution experience in 1103 patients. *Dis Colon Rectum*. 2011;54(9):1076-1081.
4. David E. Rivadeneira, Peter W. Marcello, Patricia L. Roberts, Lawrence C. Rusin, John J. Murray *et al* : Benefits of Hand-Assisted Laparoscopic Restorative Proctocolectomy: A Comparative Study, *Diseases of the Colon & Rectum*, 2004, Vol. 47 (9),1371-1376
5. G. J. Aalbers, S. S. A. Y. Biere, M. I. van Berge Henegouwen, W. A. Bemelman: Hand-assisted or laparoscopic-assisted approach in colorectal surgery: a systematic review and meta-analysis, *Surgical Endoscopy* August 2008, Volume 22, Issue 8, pp 1769-1780,
6. Hand-assisted laparoscopic surgery vs standard laparoscopic surgery for colorectal disease: a prospective randomized trial. HALS Study Group. *Surg Endosc* 2000; 14: 896-901
7. Hassan I, You YN, Cima RR, *et al*. Hand-assisted versus laparoscopic-assisted colorectal surgery: practice patterns and clinical outcomes in a minimally invasive colorectal practice. *Surg Endosc*. 2008; 22(3):739-743.
8. Jacobs M, Verdeja JC, Goldstein HS. Minimally invasive colon resection (laparoscopic colectomy). *Surg Laparosc Endosc* 1991; 1: 144-150
9. Marcello PW, Fleshman JW, Milsom JW, Read TE, Arnell TD, Birnbaum EH, Feingold DL, Lee SW, Mutch MG, Sonoda T, Yan Y, Whelan RL. Hand-assisted laparoscopic vs. laparoscopic colorectal surgery: a multicenter, prospective, randomized trial. *Dis Colon Rectum* 2008; 51: 818-826.
10. Noel JK, Fahrbach K, Estok R, Cella C, Frame D, Linz H, *et al*. Minimally invasive colorectal resection outcomes: short-term comparison with open procedures. *J Am Coll Surg* 2007; 204:291-307.
11. Polle SW, van Berge Henegouwen MI, Slors JF, Cuesta MA, Gouma DJ, Bemelman WA. Total laparoscopic restorative proctocolectomy: are there advantages compared with the open and hand-assisted approaches? *Dis Colon Rectum* 2008; 51: 541-548
12. Rajesh Pendlimari, Holubar, SD; Eric J. Dozois,; David W. Larson, John H. Pemberton, Robert R. Cima: Technical Proficiency in Hand-Assisted Laparoscopic Colon and Rectal Surgery, www.archsurg.org doi:10.1001/archsurg.2011.879
13. Rakesh Kumar Gupta, Audrius Dulskas, Darius Kazanavicius, Kestutis Petrulis, Raimundas Lunevicius: Clinical Outcomes of 103 Hand-Assisted Laparoscopic Surgeries for Left-Sided Colon and Rectal Cancer: Single Institutional Review, *Ann Coloproctol* 2013;29(6):225-230
14. Ringley C, Lee YK, Iqbal A, Bocharov V, Sasson A, McBride CL, Thompson JS, Vitamvas ML, Oleynikov

- D. Comparison of conventional laparoscopic and hand-assisted oncologic segmental colonic resection. *Surg Endosc* 2007; 21: 2137-2141
15. Stein S, Whelan RL. The controversy regarding hand-assisted colorectal resection. *Surg Endosc* 2007; 21: 2123-2126
16. Targarona EM, Gracia E, Garriga J, Martínez-Bru C, Cortés M, Boluda R, Lerma L, Trías M. Prospective randomized trial comparing conventional laparoscopic colectomy with handassisted laparoscopic colectomy: applicability, immediate clinical outcome, inflammatory response, and cost. *Surg Endosc* 2002; 16: 234-239
17. Toyooki Sonoda, Sushil Pandey, Koiana Trencheva, Sang Lee, Jeffrey Milsom: Longterm Complications of Hand-Assisted Versus Laparoscopic Colectomy, *J Am Coll Surg* 2009;208:62–66

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