

Hand-Assisted Laparoscopic Radical Cystectomy and Orthotopic S-Shaped Ileal Neobladder: Functional and Oncologic Outcomes

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ABSTRACT

Background & Objective: Open radical cystectomy is the standard procedure for the treatment of muscle-invasive bladder cancer. There has been a recent trend towards minimally invasive techniques aiming to decrease blood loss, hospital stay, and complications. Therefore, hand-assisted cystectomy (HAC) emerged as a rational choice, combining the merits of laparoscopic surgery with the feasibility of performing a continent urinary reservoir in a reasonable operative time and with reasonable treatment costs.

Patients & Methods: Forty patients with invasive bladder carcinoma were offered radical cystectomy with the HAC approach. Thirty-two men and 8 women underwent HAC. The mean age was 57.5 years. The mean operation time was 200 minutes for the extirpative part and 90 minutes for the reconstructive part of the procedure. Estimated blood loss was 450 ml. The mean hospitalization time was 17 days (range of 10 to 30). At a median follow-up of 2 years, no cases of port-site, incisional, or isolated pelvic recurrence was detected. The median DFS is 14.6 month (95%CI = 13.2–15.8).

Conclusions: HAC is a rational procedure that can be used to perform radical surgery of invasive bladder carcinoma and orthotopic urinary diversion.

INTRODUCTION

Open radical cystectomy is the standard procedure for the treatment of muscle-invasive bladder cancer [1, 2]. There has been a recent trend towards minimally invasive techniques aiming to decrease blood loss, hospital stay, and complications [3-5]. Several authors reported the technique of purely laparoscopic radical cystectomy (LRC) [6-12]. However, such a procedure entails increasing treatment costs and operative

times. Moreover, previous abdominal surgery, neoadjuvant pelvic irradiation, or morbid obesity may make LRC even more difficult [6-12].

Although several anecdotal reports described the performance of totally intracorporeal procedures [6-12], a mini-laparotomy is typically needed for safe specimen retrieval and for construction of the continent urinary reservoir when indicated. Therefore, hand-assisted cystectomy (HAC) emerged as a

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Figure 1. Illustration of the sites of laparoscopic ports.

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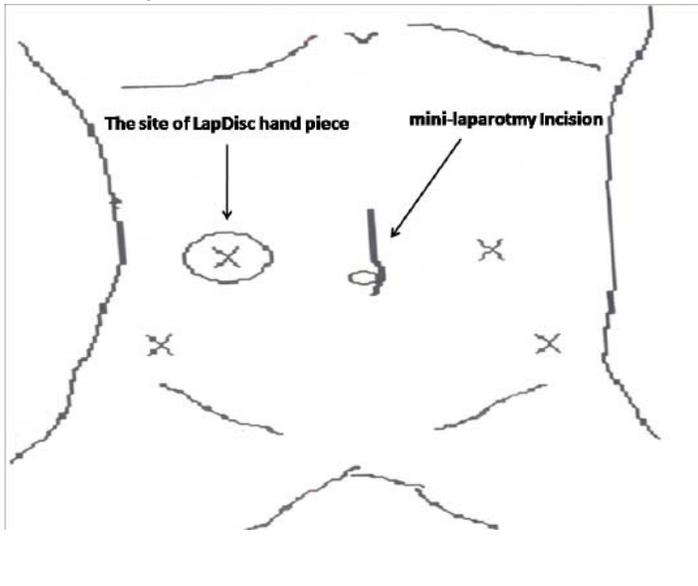


Figure 2. LapDisc hand piece.

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rational choice, combining the merits of laparoscopic surgery with the feasibility of performing a continent urinary reservoir in a reasonable operative time and with reasonable treatment costs. HAC gained wide acceptance and is comparable to open cystectomy regarding operation time [13, 14], lymph node harvest [13], and short-term oncologic results [14]. HAC is also equivalent to pure LRC in terms of mean operative time, blood transfusions, and time-to-oral intake [15]. However, most of the time the technique is adapted to perform ileal conduit diversion after radical resection [14-20]. The utility of the hand-assisted procedure to perform radical resection and orthotopic urinary reservoir is not yet characterized. Here we describe our results using HAC to perform radical cystectomy followed by a continent urinary substitute using our previously published orthotopic ileal neobladder [21].

PATIENTS AND METHODS

Patients

Forty patients with invasive bladder carcinoma were offered radical cystectomies with a hand-assisted laparoscopic approach. Patients with cardiovascular diseases, morbid obesity, or an ASA score above II were excluded. All patients were informed of the expected advantages and risks of the procedures. The internal committee of the Department of Surgery at Mansoura University approved the study protocol. In our work, we do

not stress on oncologic outcomes of SCC rather than TCC, but the main concern was oncologic safety of HAC regardless of tumor types, in addition to the feasibility of incorporating an orthotopic ileal neobladder to such a technique.

Procedure

Patients under general anesthesia were placed in a modified lithotomy position with pronounced head-down tilt. Yellow fin stirrups and appropriate padding were used to avoid peripheral neuropathies. Closed pneumoperitoneum with a Veress needle was established. Five ports were placed in the umbilical region, both lumbar regions at the mid-clavicular lines, and both iliac fossae. Initial inspection was performed with the camera through the umbilical port, which was then converted into an infra-umbilical minilaparotomy of 7 cm long (Figure 1). A LapDisc hand piece (Hakko Medical, Tokyo) was inserted (Figure 2). The first assistant standing on the left side of the patient introduced his right hand through the LapDisc (Figure 3). In case the LapDisc was not available, the LapDisc was substituted with a surgical glove that was sutured to the edges of the minilaparotomy (Figure 4). The operating surgeon and the second assistant stood on the right side of the patient. The peritoneum of the vesico-rectal pouch was opened and the incision was extended on both sides of the bladder into a U-shaped incision exposing the iliac lymph nodes. Bilateral lymphadenectomy was performed in the standard pattern

Figure 3. Introduction the right hand through the LapDisc.

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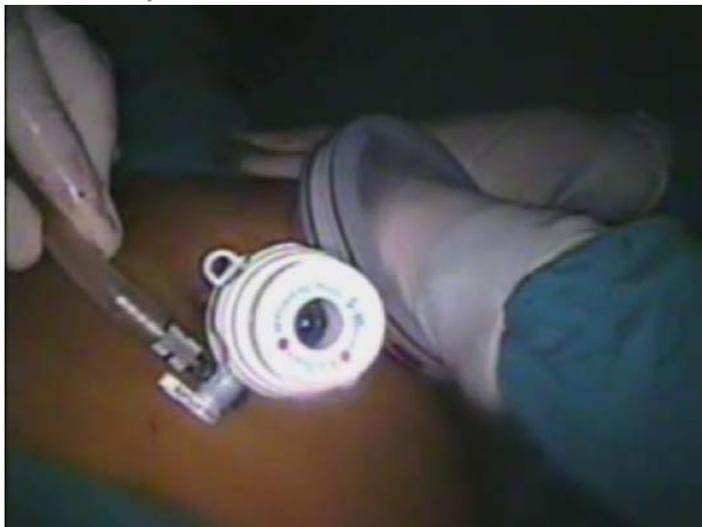


Figure 4. In case the LapDisc was not available, it was substituted with a surgical glove that was sutured to the edges of the minilaparotomy.

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(Figure 5a,b). In men, the vasa deferentia were transected at the internal ring and both ureters identified, mobilized, and transected 2 cm above their insertion (Figure 6a,b). Lateral vesical pedicles were skeletonised with the surgeon's hand and secured with LigaSure (Valleylab, Colorado). Posterior dissection continued into the vesic-rectal space, freeing the seminal vesicles. The surgeon's hand was used to retract the bladder inferiorly and open the retropubic space. The dorsal vein complex was secured with LigaSure. Combined finger dissection and electrocautry were used to skeletonise the prostate and prepare the urethral stump, which was transected distal to the prostatic apex. In women, anterior pelvic exentration was performed. Round ligaments, infundibulopelvic ligaments, and lateral pedicles were transected with LigaSure. Ureters were mobilized and transected 2 cm above their insertion. The vagino-rectal space and the lateral pelvic ligaments were dissected with the surgeon's hand. The urethra was divided at a lower level than the vagina. In both sexes, urethral and ureteric stumps were subjected to frozen section pathological examination. The specimen was retrieved through the hand port. The LapDisc was then removed and replaced with a Kelly retractor. The left ureter was then tunnelled beneath the sigmoid colon. Orthotopic urinary diversion was performed (Figure 7) as we described before [21].

Follow-up

Patient follow-up protocol involved physical examination, renal ultrasonography, intravenous pyelography, ascending pouchography, and pelviabdominal CT. Urethropouchoscopy was performed in select patients complaining of voiding symptoms, hematuria, or incontinence. Postoperative continence was evaluated according to Stein et al [22].

RESULTS

Patient and tumor characteristics

Thirty-two men and 8 women underwent HAC. The mean age was 57.5 years. Follow-up of at least 1 year was available for all patients. Tumor characteristics are described in Table 1.

Operative results

The mean operative time was 200 minutes for the extirpative part and 90 minutes for the reconstructive part of the procedure. Estimated blood loss was 450 ml. Most patients received 1 unit of whole blood intraoperatively. Conversion to open surgery was not required in any case. Postoperative analgesic use consisted of 1 dose of meperidine at the first postoperative night only. In this series, none of the patients necessitated

Figure 5. (A) The peritoneum of the vesico-rectal pouch was opened and the incision was extended on both sides of the bladder into a U-shaped incision exposing the iliac lymph nodes.

(B) Bilateral lymphadenectomy was performed in the standard pattern.

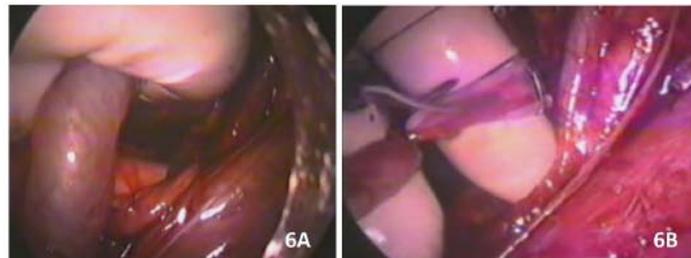
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Figure 6. (6A) In men, the vasa deferentia were transected at the internal ring.

(6B) Both ureters identified, mobilized and transected 2 cm above their insertion.

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continued narcotic use. Oral intake was resumed by the fourth day. Mean hospitalization time was 17 days (range of 10–30).

Post-operative complications

There was no perioperative mortality. Early complications (within 3 months of surgery) included pneumonia and prolonged ileus in one patient each. Three cases developed urine leaks. Late postoperative complications included 1 patient developing an adhesive intestinal obstruction and 1 patient developed a poucho-urethral stricture that was managed with dilatation. Table 2 describes postoperative results.

Continence and voiding

Daytime continence was good in 33 patients and satisfactory in 5 patients. Two patients had unsatisfactory daytime continence. Nighttime continence was good in 30 patients, satisfactory in 5 patients, and unsatisfactory in 5 patients. Thirty patients voided to completion without the need for catheterization. Ten patients necessitated intermittent catheterization.

Oncological results

At a median follow-up of 2 years, no cases of port-site, incisional, or isolated pelvic recurrence were detected. Median lymph node harvest was 11 nodes (range 10 to 16). However, none of the patients had infiltrated lymph nodes at postoperative pathology as with most of our patients from rural areas, who usually have bilharsial cystitis with bladder cancer. Hence, there is fibrosis that hinders lymphatic spread.

Three patients developed distant metastases; 2 of them also have pelvic recurrence. The median DFS is 14.6 months (95%CI = 13.2–15.8) (Figure 8).

DISCUSSION

In the present study, we performed radical cystectomy for bladder cancer in 32 men and 8 women. We used a hand-assisted laparoscopic approach to accomplish radical resection and orthotopic urinary diversion. In this series, disease-free survival was 14.6 months and the median lymph node harvest was 11 nodes.

The technique of LRC was first reported in 1995 when Puppò et al. described 5 cases of transvaginal laparoscopically assisted cystectomy [23] and Sanchez de Badajoz described a case of laparoscopic cystectomy with 2 minilaparotomies in both flanks [24]. In 2001, Turk et al. reported a totally intracorporeal cystectomy and rectosigmoid diversion [7]. The following year, Abdel-Hakim et al. reported orthotopic ileal neobladder using intracorporeal suturing in 6 patients [25].

The oncologic outcome of the standard open cystectomy for invasive cancer is well-described. The procedure is associated with a perioperative mortality of 2 to 3% (26 to 27). Most of the treatment failure occurs in the first 3 years after surgery with a median recurrence time of around 12 to 16 months (26 to 28). Stein et al. reported 68% 5-year disease-free survival in a large cohort of 1054 patients with invasive bladder cancer [27]. In this series, extra-vesical tumor extension and lymph node metastases significantly decreased the 5-year disease-free

Figure 7. Orthotopic urinary diversion was performed.

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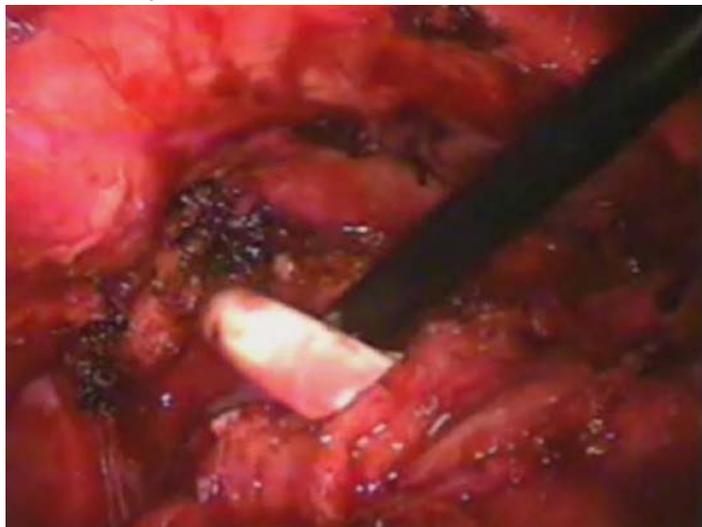
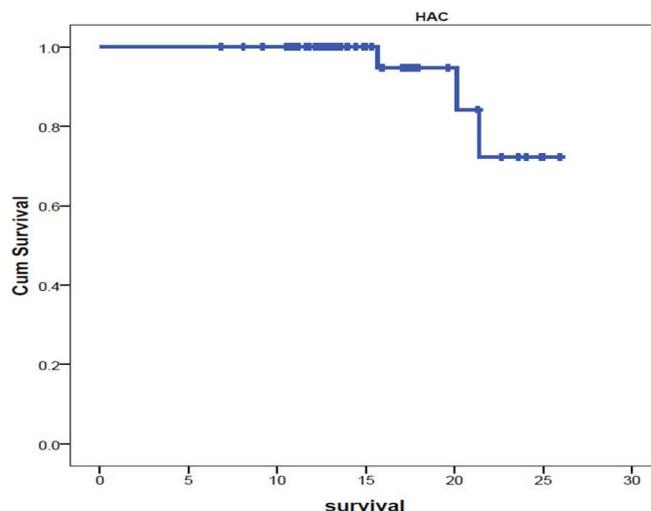


Figure 8. Kaplan-Meyer illustration of the survival.

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survival down to 46% and 35%, respectively [27]. Similar results were reported by other groups [26, 28, 29].

For laparoscopic cystectomy, reports of oncological outcomes are sparse. Haber et al. described the results of laparoscopic radical cystectomy in 37 consecutive patients. [30]. Twenty-three male patients had radical cystoprostatectomy and 14 women had anterior pelvic exenteration. Of those patients, 73% had organ-confined tumors (pT1: pT3a). The median lymph node yield was 6 with limited lymphadenectomy (11 patients) and 21 with extended lymphadenectomy (26 patients). The 5-year-overall and cancer-specific survivals were 58% and 68%, respectively. None of the patients developed port-site recurrence. These authors performed orthotopic neobladder or ileal conduit for diversion (30). Deger et al. reported the follow-up data for 20 patients who received rectosigmoid diversion (12 patients), orthotopic neobladder (5 patients), or ileal conduit diversion (3 patients) after laparoscopic radical cystectomy [8]. The lymph node harvest averaged 10. Two patients had extra vesical tumor extensions and 3 patients had nodal metastases. At a median follow-up of 33 months, no patient developed a local recurrence and 3 patients developed systemic relapse. Huang et al. performed 85 laparoscopic cystectomies, pelvic lymphadenectomies, and extracorporeal constructions of the orthotopic ileal neobladder. At an average follow-up period of 21.3 months, 3 local recurrences and 1 port-site recurrence were observed [31]. Cathelineau et al. performed 84 radical

cystectomies and extracorporeal reconstructions, and followed their patients for a mean period of 18 months. They observed 5 cases of pelvic recurrence and no port-site recurrence [32].

The addition of a minilaparotomy with a laparoscopic cystectomy retained the main advantages of laparoscopic surgery in the form of earlier returns to oral diets while avoiding the longer operative time and the technical difficulties associated with the pure intracorporeal laparoscopic approach. Cathelineau et al. retrospectively compared 70 open cystectomies to 84 laparoscopic cystectomies and extracorporeal reconstructions (ileal conduit in 33 patients and neobladder in 51 patients). An open cystectomy resulted in double the volume of blood loss while operative times were comparable in both groups [32]. Taylor et al. prospectively compared the hand-assisted laparoscopic technique to open cystectomy [14]. In their report, 16 consecutive patients underwent open [8] or hand-assisted laparoscopic [8] cystectomy and ileal conduit. HAC achieved an operative time similar to the open approach while maintaining the benefits of laparoscopic surgery in the form of less analgesic use, an earlier return of bowel functions, and a shorter hospital stay. Similar results were reported by Wang et al. These authors retrospectively compared 31 HAC patients with 39 open cystectomy patients. Operative times were comparable while blood loss was less and a return to a normal diet was earlier in HAC group [13]. Haber et al. performed a laparoscopic radical cystectomy and orthotopic neobladder in 28 patients. The

Table 1. Patients' demographics and tumor's characteristics in 40 patients.

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Patients' demographics	Number of patients
Age	
50–60 years	30
60–70 years	10
Sex	
Male	32
Female	8
Tumors characteristics	Number of patients
Pathologic diagnosis	
PT2N0	8
PT3N0	24
PT4N0	8
Mean number of lymph nodes removed	11 (range 10–16)
Mean follow-up (months)	24
Median DFS (months)	14.6

extirpative part of the procedure was done laparoscopically while the diversion part was performed intracorporeally in 9 patients and through a mini-incision in 19 [33]. In their experience, adoption of the open-assisted approach for orthotopic diversion significantly decreased the incidence of major postoperative complications requiring secondary surgery (11% vs. 44%).

Our early postoperative results are similar to other reports of HAC. Wang et al. performed 31 HAC procedures, including 7 cases of orthotopic diversion. They reported an average operation time of 365.7 minutes, an average blood loss of 250.9 cc, and an average hospital stay of 19.7 days [16]. The oncologic outcome in this series is comparable to reported DFS after radical cystectomy although we cannot correct for the bias introduced at the case selection. Moreover, the cost for

Table 2. Early and late postoperative complications in 40 patients.

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Complications	Treatment	
	No. pts	No. conservative
Diversion unrelated complications:		
Wound infection	0	0
Fascial dehiscence	0	0
Prolonged ileus	1	1
DVT	0	0
Pneumonia	1	1
Incisional hernia	0	0
Adhesive intestinal obstruction	1	1
Diversion related complications:		
Urinary leakage	3	3
Urethral stricture	1	1
Ureteroileal obstruction	0	0
Pyelonephritis	0	0

this procedure, compared with open and pure laparoscopic cystectomies, will be of great value in our future randomized study.

CONCLUSION

Hand-assisted cystectomy is a rational procedure that can be used to perform radical surgery of invasive bladder carcinomas and orthotopic urinary diversion. In this series, HAC retained many of the advantages of minimally invasive approaches and achieved acceptable oncologic control.

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