

PURE TRANSANAL AND TRANSVAGINAL LAPAROSCOPY (NOTES) FOR COLORECTAL CANCERS

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ABSTRACT

Objective: Natural Orifice Transluminal Endoscopic Surgery (NOTES) is an important evolution in minimally invasive surgery (MIS) nowadays. We would like to present the techniques and the early results of the pure transanal and transvaginal laparoscopies in treatment of colorectal cancer.

Material and method: Prospective study at Hue Central Hospital, Vietnam.

Patients: From December 2013 to October 2014, 16 colorectal cancers (13 rectum, 2 sigmoid and 1 descending colon tumors), adenocarcinoma, $T \leq T_3, N_1, M_0$.

Methods: The patients were placed in the lithotomy and Trendelenburg position, and the lone-star retractor was placed in anus (rectum cancer) or vagina (sigmoid cancer). Surgical cavity was inflated with CO₂ and set at 12 mmHg. Continue dissection until inside of the abdominal cavity (transanal technique), after that, the rectum was pushed into the abdominal cavity. The IMA, IMV were divided (TME included) in both techniques. After finishing dissection, specimens were pulled out through the anus or vagina to prepare anastomosis. The coloanal or colorectal anastomosis was performed by hand-sewn (6 cases) or by EEA staplers (10 cases).

Results: These procedures were performed completely by a transanal or vaginal approach. Only 4 patients, each needed one more 5 mm umbilical port in RLQ, 1 patient needed two 5mm trocars (post radiation hemorrhagy, lost control, fat patients, ...). There were not any serious intraoperative complications. The operation time was 217.4 ± 29.2 (170-270m). All patients required minimal analgesia. Bowel movement returned on the first day in 9 patients (average: 2 days, maximum: 3 days). The hospital stays were 5.5 ± 1.8 (4-8 days). Kirwan clasifications (sphinter function) were very good (stage I: 16).

Conclusions: Pure transanal and transvaginal laparoscopies in treatment of colorectal cancer are feasible and safe. It seems to be the first pure transvaginal laparoscopy for human in the world. However, a multicentric study in a large number of patients and a long follow-up will be necessary.

Key words: NOTES, laparoscopy, colorectal cancer

I. INTRODUCTION

From the first transgastric liver biopsy of Kalloo, appendectomy of Rao in 2004 and first transvaginal cholecystectomy of Jaques Maresceaux in 2007,

surgeries performing through natural orifices have been considered as a novel breakthroughs of minimally invasive surgery^[4]. In many centers in the world, NOTES (trans-anal via) were performed on

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Received: 29/11/2014;

Revised: 3/12/2014 by Le Loc

Accepted: 5/12/2014

cadavers, animals and later humans with promising preliminary results. However, studies (mostly case reports) on NOTES for colorectal cancer were limited^[3]. In Vietnam, there were only one case report (cholecystectomy) and some reports about Hybrid NOTES (transnatural via colorectal cancer extraction).

The aim of this study is to introduce our experiences and techniques in NOTES for resections of colorectal cancer

II. PATIENTS AND METHODS

2.1. Patients: From 1/12/2013 to 10/110/2014, 16 colorectal resections were performed by pure transanal and transvaginal laparoscopy. Male/female: 10/6. age: 62.4±19.1 (38-96) years old. Adenocarcinoma ≤T₃N₁M₀. BMI: 21.2±2.5 (17.3-27.3).

2.2. Methods: Patient preoperative preparation was similar to conventional laparoscopic colorectal resection. Surgeon and first assistant stood between two patient's legs. Laparoscopic system was placed at the patient's left side

Techniques:

After dissecting the anal region (rectal cancer) or the vagina (sigmoid, left colon cancer), specialized equipment was inserted by open procedure. A self-retaining retractor was placed to dilate the anus or vagina. The mesorectum was dissected following TME principles.

Transanal or transvaginal laparoscopy: CO₂ was insufflated at approximately 10-12mmHg. Mesorectal dissection continued until peritoneal cavity was reached. Inferior mesenteric artery and vein were dissected and ligated. Sigmoid and descending colons were freed from their attachments.

Anastomosis: EEA stapler for colorectal, hand-sewn for colo-anal anastomosis.

Outcomes: Intraoperative complications. Conversion to conventional laparoscopy. Resection margins, TME and postoperative TNM staging. Postoperative survey. Sphincter function (Kirwan) and long-term follow-up.

Chemoradiation: Adjuvant and neoadjuvant following Hue Oncology Center protocol

III. RESULTS

3.1. Lesions:

Table 1: Tumor location (13 rectums; 2 sigmoids; 1 descending colons)

Distance from anal margin	<5cm	5-6cm	>6-15cm	>15cm
N	4	5	4	3

Table 2: Classification

I	II	III	
T2N0M0	T3N0M0	T2N1M0*	T3N1M0*
5	3	5	3

*: 1≤N1≤3 nodes (+)

3.2. Techniques:

Table 3: Techniques of resection

Pull-through*	LAR	AR	Transvaginal *
6	4	3	3

*: Sigmoid colon

Method to perform anastomosis: Hand-sewn: 6 (coloanal). EEA stapler: 10 (colorectal)

Operative duration: 217.4±29.2 (170-270)mins

3.3. Complications/Conversion to conventional laparoscopy

Table 4: Causes of trocars addition (5 patients)

Reasons	NOTES	Number of trocars	N
Post-radiation/ hemorrhage	Anus	2	1
Limited working space/ Instruments	Anus	1	2
Disorientation/Loss of control	Anus	1	1
Fat/BMI: 27.3	Vaginal	2	1

3.4. Surgical outcomes: Safe margins: No residual tumor cells at resection margins is found in all cases. Mean time to first flatus: 2 days. Hospital stays: 5.5±1.8 (4-8) days. Sphincter functions: all patients were classified as Kirwan I after 1 month. No mortality (follow-up time: 1-12moths).

IV. DISCUSSION

Laparoscopic surgery has become increasingly popular in surgical practice and in the treatment of colorectal cancer nowadays. Although conventional laparoscopic surgery had already reduced significantly the invasiveness of the procedure, many researches^[5,6] are currently investigating to maximize its advantages of minimal invasiveness by reducing the number of working ports (single port surgery), the size of instruments (mini-laparoscopy) or by performing surgery via natural orifices (hybrid NOTES or pure NOTES).

Techniques: Regardless of the type of procedures, surgeons always have to ensure the surgical and oncologic safeties. Therefore, there are three important issues which need to be considered when we perform NOTES:

- Proper indications
- Technical competency
- Good outcomes (short-term as well as long-term)

Indications: Sylla P et al. applied laparoscopy-

assisted NOTES for rectal cancer staged T₁₋₃N0M0 in 5 patients^[7]. Zhang H et al also performed NOTES in 1 patient with T3 rectal cancer^[9], while De Lacy AM et al^[4] indicated it for all stages of rectal cancer (stage I through IV). Like conventional laparoscopy, we think that NOTES can be applied for all cases of the descending colon cancer in the absence of intestinal obstruction, perforation, abscess or invasion of sphincter apparatus. In this current study, we only indicated NOTES for tumors not exceeding stage T3.

Most published data focused on rectal cancer in which NOTES can be applied for tumor located at the upper, middle and lower rectum. For rectal cancer, we performed NOTES for tumor in all three parts of the rectum with 3 different procedures (anterior, low anterior and trans-sphincter resection) which were all initially feasible. Our remarks correspond to the opinions of Isha Ann Emhoff^[2] in a review on NOTES for colorectal cancer. Compared to the technique of TME in conventional laparoscopy, we also agree with other authors^{[1],[8]}, that NOTES using endo-GIA is a good option for male patients with narrow pelvis. However, this technique can also be applied in female patients.

In transvaginal coloretal resection, since the position of posterior vaginal fornix corresponds

to the level of the middle and upper rectum, we modified the technique. Specifically, we first performed resection of the upper rectum, followed by dissection and division of mesenteric vessels. One question is raised that whether the qualities of TME and lymphadenectomy of NOTES are equivalent to conventional methods. In our study, the number of lymph nodes dissected and the quality of resection margin were comparable to transabdominal surgery. There haven't been any studies published mentioning this technique except the ones conveyed on animals, cadavers or surgeries of other organs^[6].

Transanal via: There are many variations of colorectal cancer surgery through natural orifices. NOTES for colorectal cancer can be performed transanally or transvaginally. We can also use NOTES with transabdominal laparoscopy (hybrid NOTES). Other surgeries performed via natural orifices are NOSE (natural orifice specimen extraction) or MANOS (mini-laparoscopy assisted natural orifice surgery)^[4].

At Hue Central Hospital, we have been performing laparoscopy-assisted NOTES for ultralow rectal cancer since 2007 with results published on several domestic and international conferences. It could be considered as an intermediate step toward pure NOTES (13 rectal cancers done) at our hospital. In scientific records, there were only 2 reports with a total of 2 colorectal cancer patients treated with pure NOTES (1 patient of Leroy et al^[5] had a T2 tumor and 1 patient of Zhang et al^[9] had a T3N1 tumor). With our experience with transanal surgery in pediatric patients with Hirschsprung's disease as well as about 50 cases of hybrid NOTES, we think that pure transanal NOTES is totally feasible with a mean operative time of less than 4 hours and low complication rates.

Transvaginal via: There were 3 cases diagnosed with sigmoid and descending colon cancer treated with pure transvaginal NOTES. We first cut the lower end of the segment with tumor at the colorectal junction by endo-

GIA prior to inserting the single port. Later, the resection of mesorectum (TME) was totally practicable. There were only reports of several authors on the techniques of colorectal surgery with transabdominal laparoscopy and transvaginal specimen extraction (Hybrid NOTES), transvaginal surgery of other organs including gall bladder (J. Marexceau - 2007), kidney (RV Clayman và CS - 2007), liver (J. F. Noguera -2008)... Some authors used additional mini-trocar (2-3mm) or umbilical trocar to assist the operation^[6].

Studies on transvaginal colon resection were only conducted in some centers, primarily on cadavers and animals. Antonio M. Lacy et al (2008) performed the first transvaginal sigmoid colon resection with additional mini umbilical trocars (2mm)^[3,4,6]. Therefore, we considered that this is the first publication in the world of pure transvaginal resection of colon cancer.

Conversion rate: 5 patients were converted to conventional laparoscopy (31.25%), it's reasons due to: disorientation or loss of control (on fat patient), limited working space (in man), hemorrhage (post-radiation). In first stage, we had problems as: working ports, optic, long instruments and especially was our scanty experience.

Anastomosis: Both Leroy^[4] and Zhang^[7] performed colo-anal anastomosis by hand-sewn interrupted suture. In our study, 5 tumors were in very low position, hand-sewn technique was performed to conserve the sphincter. In the other 8 patients with AR and LAR, anastomosis was performed by EEA and PPH stapler. Specially, we successfully performed transvaginal AR (3 colons) and the anastomosis with stapler.

Results: Since NOTES is a new surgical procedure, most studies including ours were introductory or technical application study with a small sample size. Therefore, long-term oncologic results were not available. However, a study on 20 patients of Atallah S et al^[11] investigating 20 colorectal cancer patients treated with hybrid NOTES showed no local recurrence after a 6-month

follow-up. Similar results were seen in 5 patients in a study of Patricia Sylla^[7] after a 3-month follow-up. Although the duration of follow-up was still short (1-12months), similar results were found in our study as well as others in which post-operative pathologic findings showed very good quality of TME and resection margins. The number of lymph nodes was comparable to traditional laparoscopic surgery, which predicts a similar outcome of NOTES as traditional method.

Sphincter function in 16 patients is very good (Kirwan I), no incontinence disorder over 1 month postoperative follow-up. Some patients had short recovery time (2 days on average), the overall rate of postoperative recovery is usually rapid and convenient in this study group.

V. CONCLUSION

Pure NOTES for colorectal cancer in Hue Central Hospital showed its feasibility and safety. All surgeries were performed trans natural via with single port principles.

Pure transvaginal colon resection at Hue Central Hospital can be considered the first reported cases.

The intraoperative complications were not severe and could be solved by trocars addition (1-2). There were no intra and postoperative mortality. The hospital stay duration and recovery time were short. Sphincter function was well preserved.

Multicentric studies with larger size and longer follow-up of oncologic results will be necessary.

REFERENCES

1. S.Atallah, B.Martin-Perez, M.Albert et al: *Transanal minimally invasive surgery for total mesorectal excision (TAMIS-TME): results and experience with the first 20 patients undergoing curative-intent rectal cancer surgery at a single institution*, Tech Coloproctol DOI 10.1007/s10151-013-1095-7
2. Isha Ann Emhoff, Grace Clara Lee and Patricia Sylla: *Transanal colorectal resection using natural orifice transluminal endoscopic surgery (NOTES)*, Digestive Endoscopy 2013; 26: doi: 10.1111/den.12157
3. Antonio M. Lacy, S. Delgado, Oscar A. Rojas, R. Almenara, Anabel Blasi, Josep Llach. *MA-NOS radical sigmoidectomy: report of a transvaginal resection in the human*. Surgical Endoscopy (2008), V. 22, Issue 7, pp 1717-1723
4. Antonio M. de Lacy, David W. Rattner, Cedric Adelsdorfer et al: *Transanal natural orifice transluminal endoscopic surgery (NOTES) rectal resection: "down-to-up" total mesorectal excision (TME)—short-term outcomes in the first 20 cases*, Surg Endosc (2013) 27:3165–3172
5. Joe Leroy, Brian Donncha Barry, Armando Melani et al: *No-Scar Transanal Total Mesorectal Excision – The Last Step to Pure NOTES for Colorectal Surgery*, JAMA SURG/VOL 148 (NO.3), MAR 2013
6. J. F. Noguera, C. Dolz1, A. Cuadrado, J. M. Olea and A. Vilella: *Transvaginal liver resection (NOTES) combined with minilaparoscopy*. REV ESP ENFERM DIG (Madrid- 2008), Vol. 100. N.º 7, pp. 411-415.
7. Patricia Sylla, Liliana G. Bordeianou, David Berger et al: *A pilot study of natural orifice transanal endoscopic total mesorectal excision with laparoscopic assistance for rectal cancer*, Surg Endosc (2013) 27:3396–3405
8. S.Velthuis, P.B. van den Boezem, D.L. van der Peet et al: *Feasibility study of transanal total mesorectal excision*, British Journal of Surgery 2013; 100:828–831
9. H.Zhang, Y.-S.Zhang, X.-W.Jin et al : *Transanal single- port laparoscopic total mesorectal excision in the treatment of rectal cancer*, Tech Coloproctol (2013)17: 117–123