



Research Article

Anterograde Transvaginal Total Hysterectomy: A Novel Surgical Approach to Hysterectomy

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Abstract

A novel transvaginal approach of hysterectomy known as Anterograde Transvaginal Hysterectomy (ATVH) was practiced by the authors. Our preliminary results showed that ATVH was a feasible, easy to master, and effective alternative surgery to remove the uterus. The common complications were vaginal and perineal lacerations (3.10%) that occurred during uterine exteriorization through a narrow vaginal orifice. A purposely designed surgical instrument called "Jia's auger" was useful to assist in this procedure. This paper described the detailed step-by-step surgical technique using the "Jia auger" to perform the ATVH. The advantages of this surgical approach were also elaborated.

Keywords: Anterograde transvaginal hysterectomy; ATVH; Jia's auger; Operative time; Surgical complication

Introduction

Hysterectomy is one of the most frequently performed gynecological surgeries in women, and it can be performed using various techniques and approaches, including vaginal, abdominal, or laparoscopic methods⁽¹⁾. With the recognition of the advantages of the natural orifice surgical approach, vaginal hysterectomy, as the early natural orifice surgery in gynecology, becomes increasingly interested by gynecologists. Its advantages are associated with a shorter operative time, hospital stay, rapid convalescence, fewer unspecified infections, and lower costs [1-4].

The Conventional Transvaginal Total Hysterectomy (CTVH) is performed retrogradely or in the reverse steps of the abdominal hysterectomy as the surgical sequence starting from the vagina to the top of the uterus. We have performed the hysterectomy using

an Anterograde Transvaginal Hysterectomy (ATVH) approach in the same steps as abdominal hysterectomy to remove the uterus. One of the authors (Jia) devised a surgical instrument resembling an auger and facilitated the procedure of ATVH. In this paper, we described a detailed step-by-step surgical procedure of ATVH. We also analyzed the clinical results for 612 patients having hysterectomies using this technique over the past three years.

Patients and Methods

Clinical Information

The Department of Gynecology at the Tai'an Maternity and Child Care Hospital had more than 200 patients with hysterectomies performed per year. After ethical approval from the local ethical committee, medical records data were studied from 675 patients who had undergone ATVH procedures between 1 January 2015 and 31 December 2017. Prof. Zhen-Xiang Jia and his colleagues in the Gynecology Department performed all these

surgical procedures.

Patient characteristics, including the age at the time of surgery, body mass index, history of vaginal delivery and prior Caesarean section, indications for surgery, surgical outcomes, and complications, were retrospectively retrieved from medical records. Surgical outcomes include operative time, estimated blood loss, uterine weight, and postoperative hospital stay before discharge. Complications that included intra- or major postoperative complications, such as reoperation, bladder injury, fever, vaginal vault hematoma, vaginal and perineal lacerations, and conversion to laparotomy were recorded and analyzed.

Surgical procedure for ATVH

After induction of general anesthesia via endotracheal intubation or combined spinal-epidural anesthesia, each patient was placed in the Trendelenburg position. The following key operative steps of ATVH were performed

(1) A semi-annular full-thickness incision was made from the 9- to the 3-o'clock at 0.5 centimeters above where the anterior vaginal rugae begin; The uterovesical peritoneal reflection was

incised, and the vesicouterine space was opened. Then the bladder was separated from the anterior cervix, revealing the anterior wall of the uterus (Figure 1A). (2) The “Jia’s auger” was used to drill into the uterus, and the uterus was rolled forward within the vaginal canal till its fundus was flipped out of the vagina (Figure 1B). For a large uterus with fibroids or adenomyoma, dissection of fibroids or piecemeal excision of the uterine body was performed if the roll-out maneuver proved difficult. Various techniques like myomectomy, morcellation, bisection, enucleation, myometrial coring, or a combination of these volume-reducing techniques were performed to reduce the uterine size, with the assistance of the “auger.” (3) After the uterus exteriorized of the vaginal canal, hysterectomy was performed starting on one side of the uterus, similar to the abdominal approach with the fallopian tubes, ovarian ligaments, round ligaments, uterine vessels, cardinal, and uterosacral ligaments were clamped, cut, and ligated in sequence (Figure 1C, 1D). (4) The same process as above (3) was performed on the other side of the uterus. (5) The uterus was eventually removed after posterior colpotomy was completed (Figure 1 E). Then, the peritoneum and vaginal vault were closed with resorbable sutures.

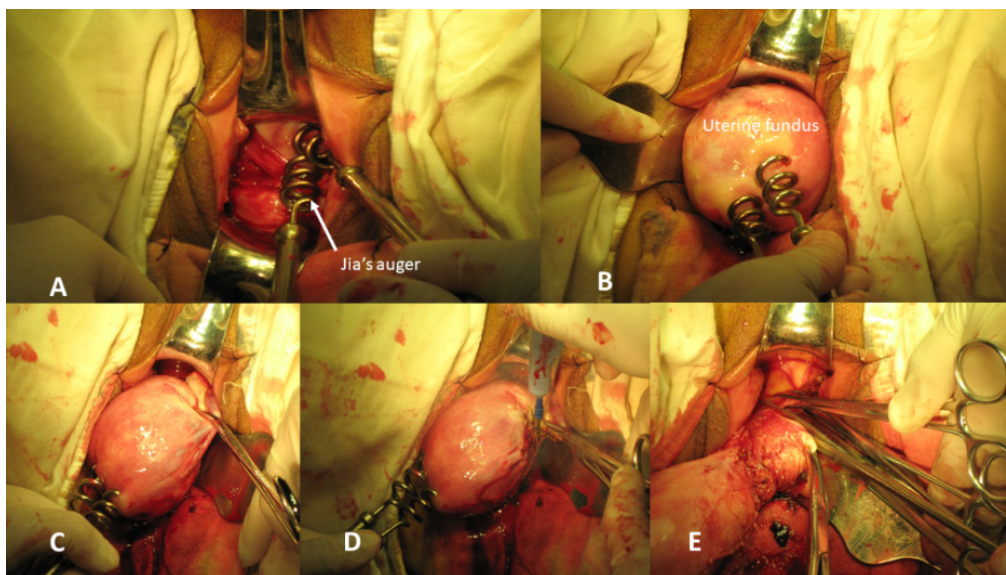


Figure 1: A) After the anterior peritoneal fold is opened, the “auger” is drilled into the uterus. B) The uterine fundus is flipped out of the vagina. C) The left fallopian tube, ovarian ligament, and round ligament are clamped. D) The left fallopian tube, ovarian ligament, and round ligament are cut. E) Posterior colpotomy is performed.

The “Jia’s Auger” Surgical Instrument

In this technique, rolling the uterus forward and flipping the uterine fundus out of the vagina are the most crucial steps. It is not difficult to exteriorize uteri less than 12 weeks in size, but it could be cumbersome for an enlarged uterus more than 12 weeks in size or with pelvic adhesions. An instrument purposely designed like an auger was used to facilitate the rolling forward of the uterus in the vagina. The Jia’s Auger is like a stainless steel “red wine corkscrew” with a triangular handle that can be maneuvered and screwed

smoothly into the uterus without the holding hand blocking the view of the vagina. Its longer screwing part can also strengthen the traction when pushing out the softer uterus. As it is not only used as a myoma screw, it is used for extracting the uterus. Thus it is called "Jia's auger" by the inventor. Figure 2 shows its features compared to other common myoma screws. With the help of this surgical instrument, rolling the uterus forward can be performed smoothly. The volume-reduction procedure can be performed for an enlarged uterus with Jia's "auger" stabilizing the fibroid for excision or myomectomy before uterine exteriorization. For mild or moderate omental or bowel adhesion on the uterine surface, careful adhesiolysis can be performed under direct vision.

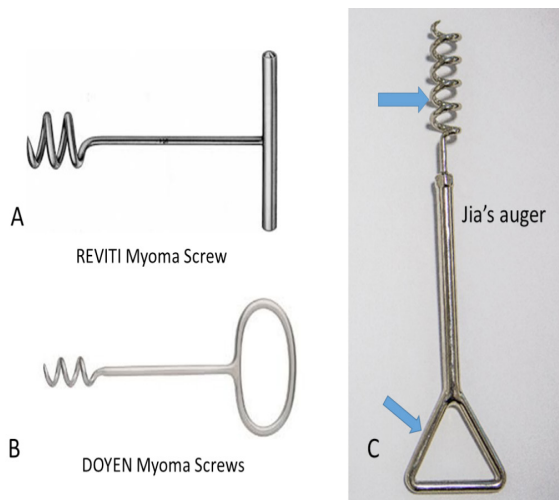


Figure 2: A) Reviti Myoma screw. B) Doyen Myoma screw C) Jia's auger. The different features of Jia's auger compared to other myoma screws are the longer screwing part and triangle handle (arrows).

Results

From 1 January 2015 to 31 December 2017, 675 women who underwent ATVH at the Maternity and Child Care Hospital of Tai'an were recruited into the study; six hundred and twelve patients met the inclusion criteria if they had a uterine size not greater than a 20-week gravid uterus, mobilizable uterus, no suspicions of malignant cervical or endometrial lesions, no large adnexal tumors, no history of pelvic infection, frozen pelvis or major pelvic gynecological surgery. The patient characteristics, indications for hysterectomy, perioperative outcomes, intra-, and postoperative complications were summarized in Table 1. Uterine leiomyoma accounted for more than 60% of the indications for hysterectomy. All uteri had less than 20 weeks' gravid size with a mean uterine weight was 273 +/- 121 gm. Only 17 (2.78%) patients had a uterus with more than 16 weeks gestational size, and the largest uterus weighed 1325 gm. The mean blood loss was 112.56±53.87 ml, and the average length of hospital stay was 4.4 days.

Variable	Value*
Patient demographics (n = 612)	
Age (years)	48±6.23
BMI (kg/m ²)	24.1 (19.8-29.2)
Without a history of vaginal delivery	81 (13.24%)
Previous cesarean section	76 (12.42%)
Main indications	
Uterine leiomyoma	382 (62.42%)
Adenomyosis	123 (20.10%)
Pelvic organ prolapse	68 (11.11%)
AUB	6 (0.98%)
CIN	17 (2.87%)
Atypical endometrial hyperplasia	11 (1.63%)
Others	5 (0.98%)
Main surgical outcomes	
Operative time (min)	49±22.1
Blood loss (ml)	112.56±53.87
Uterine weight (g)	273 ±121
Length of postoperative stay (days)	4.4±0.45
Complications	
Reoperation	0
Bladder tearing	1 (0.16%)
Pyrexia	25 (4.08%)
Vaginal cuff hematoma	1 (0.16%)
Vaginal and perineal laceration	19 (3.10%)
Conversion to AH	1 (0.16%)
BMI = body mass index; AUB = abnormal uterine bleeding; CIN = cervical intraepithelial neoplasia; AH = abdominal hysterectomy. * Values are shown as the mean ± standard deviation (SD) or number.	

Table 1: Patient characteristics, indications for hysterectomy, main surgical outcomes, and complications.

Complications included bladder injury (n = 1), postoperative fever (n = 25), vaginal vault hematoma (n = 1), vaginal and perineal lacerations (n = 19), and conversion to abdominal hysterectomy (n = 1). A bladder injury with tearing occurred due to severe adhesions and was repaired uneventfully at operation time. First- or second-degree vaginal and perineal lacerations occurred in 19 (3.10%)

patients. Conversion to abdominal hysterectomy was performed in one patient due to severe adhesion between the cervix and bladder. No patient required re-laparotomy for complications.

Discussion

Conrad Langenbeck successfully performed the first deliberately planned vaginal hysterectomy in 1813 for a patient with an ulcerated, possibly cancerous cervix [5]. Since then, various transvaginal surgery procedures have been developed. Jones detailly described the standard procedure for Conventional Total Transvaginal Hysterectomy (CTVH) in 2015 [6]: It started with an initial vaginal incision made circumferentially, followed by separating the bladder, entering the vesicouterine space, and finally, ending with the transection of round ligaments, fallopian tubes, and ovarian ligaments. The CTVH procedure is performed in the reverse order in the surgical sequence when compared to total abdominal hysterectomy. It could be termed a “retrograde” procedure of abdominal hysterectomy. CTVH has many advantages as a mature technique, including safety, effectiveness, practicality, and doctors having adequate surgical experience. The principal problem of CTVH is the difficulty to operate within the vagina, to mobilize the entire uterus into the vaginal introitus, especially for large uteri with adenomyosis or fibroids. Moreover, for patients with suspected pelvic adhesions, CTVH is not the most suitable approach.

One of our authors, Zhen-Xiang Jia, developed this unconventional Anterograde Vaginal Total Hysterectomy (AVTH) approach. The procedure was popular in the central regions of China, where we learned to use this surgical approach. In particular, we used his purpose-made instrument called “Jia’s auger,” which was similar to a myoma screw. The maneuver of the uterine corpus was made easy to make a turn-over maneuver to roll out the uterine corpus from the vagina. The narrow and longer screw of the instrument provided secure and strong traction, together with its smaller triangle handle sparing the obstructed vision of the holding hand; both have proven useful and more effective than the conventional myoma screw in our hands. Of course, other myoma screws can also be useful for the same purpose.

Li et al. had recently reported his technique for supracervical hysterectomy using an anterograde vaginal subtotal hysterectomy approach [7]. In this paper, we continued to put forward the concept of anterograde transvaginal total hysterectomy (ATVH). Compared with the conventional vaginal hysterectomy, it offered a broader surgical field under the direct vision that hysterectomy can be easily performed by a gynecologist familiar with open abdominal

hysterectomy. As described in this paper, the procedures followed the same surgical steps as abdominal hysterectomy, starting from cutting round ligaments, ovarian pedicles till the closure of the vaginal vault. After uterine exteriorization through the vagina, any uterine adhesions and obliterated Pouch of Douglas can also be easier to separate under direct vision. Therefore it can also broaden the indications of transvaginal hysterectomy in these situations. We retrospectively assessed the clinical results of 612 patients who underwent ATVH during the last three years. Our result showed that the procedure is feasible, acceptable blood loss, and effective with minimal complications. However, due to this study’s retrospective nature and short-term follow-up, a larger randomized multicentre clinical trial should be performed to further compare ATVH with abdominal, laparoscopic, and conventional transvaginal hysterectomy.

Conclusion

A novel transvaginal approach to hysterectomy termed anterograde transvaginal total hysterectomy (ATVH) was described in this paper. It was an effective and feasible surgical technique for hysterectomy, even for large or adherent uterus. Our preliminary results suggest that ATVH is safe and encouraging as an alternative for removing the uterus.

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