To Assess the Safety of Morcellation for Removing Uterine Specimen During Laparoscopic and Vaginal Hysterectomies for Leiomyomas

Priti Agrawal¹ · Rishi Agrawal² · Joytirmay Chandrakar³

Received: 11 December 2015 / Accepted: 12 April 2016 / Published online: 3 May 2016
© Federation of Obstetric & Gynecological Societies of India 2016

About the Author

Priti Agrawal MD (Obstetrics and Gynecology), MCOG, FMAS, FICMCH, is currently working as senior consultant in the Department of Obstetrics and Gynecology, Aarogya Hospital and Test Tube Baby Centre, Raipur, Chhattisgarh. She did her MBBS from Pandit J.N.M Medical Collage, Raipur, in 1998 and MD from Gandhi Medical Collage, Bhopal, in 2001. She worked as Associate Professor in Pandit J.N.M Medical College, Raipur. Her fields of interest are minimal access surgery, infertility, and management of high-risk pregnancy. She is member of ICOG, fellow of association of minimal access surgeons and fellow of Indian College of Maternal and Child Health. She is actively involved in various academic activities.

Priti Agrawal is a Director and Consultant in Department of Obstetrics and Gynecology at Aarogya Hospital and Test Tube Baby Centre; Rishi Agrawal is a Director and Consultant in Department of General Surgery at Aarogya Hospital and Test tube Baby Centre; Joytirmay Chandrakar is a Consultant Anesthetist in Department of Anesthesia at Aarogya Hospital and Test Tube Baby Centre.

✉ Priti Agrawal
drpritiagrawal15@gmail.com

¹ Department of Obstetrics and Gynecology, Aarogya Hospital and Test Tube Baby Centre, Raipur, Chhattisgarh 492001, India

² Department of General Surgery, Aarogya Hospital and Test Tube Baby Centre, Raipur, Chhattisgarh, India

³ Department of Anesthesia, Aarogya Hospital and Test Tube Baby Centre, Raipur, Chhattisgarh, India

Abstract

Introduction The ability to offer less invasive surgery for leiomyomas to women often requires the removal of large tissue specimens through small incisions, which is facilitated by morcellation. Electromechanical morcellation may lead to dissemination of occult uterine malignancy throughout the intraperitoneal cavity and may worsen the prognosis.

Objectives To assess the safety of morcellation for removing uterine specimen during laparoscopic and vaginal hysterectomies for leiomyoma and to find incidence of leiomyosarcoma (LMS) in morcellated specimens.

Materials and Methods This study was a retrospective case series done at Aarogya Hospital and Test Tube Baby Centre, Raipur, from January 1, 2011 to November 30,

2015. Total 232 cases were analyzed to assess the safety of vaginal and laparoscopic morcellation technique. All histopathological reports were analyzed to find incidence of LMS in morcellated specimen.

Results In the study period 55.55 % hysterectomies were performed for fibroid uterus. All patients were multiparous and 82.75 % had not attained menopause. Preoperative cervical cytology and endometrial biopsy reports were not suggestive of malignancy in any case. Histopathology reports of all the morcellated specimens were consistent with leiomyoma.

Conclusion The risk of occult LMS is extremely low, especially in reproductive age group women. We believe that more studies and guidelines are required for Indian women.

Keywords Vaginal hysterectomy · Laparoscopic hysterectomy · Fibroid uterus · Uterine sarcoma · Morcellation · Leiomyoma

Introduction

The main advantage of laparoscopic and vaginal hysterectomy over abdominal hysterectomy is less postoperative pain, shorter hospital stay, faster return to normal daily activity, less blood loss, fewer postoperative complications, and reduced hospital cost. The ability to offer less invasive surgery to women often requires the removal of large tissue specimen through small incisions, which is facilitated by morcellation. Transvaginal morcellation has been described for more than a century, using manual morcellation with a scalpel. In 1990's the power morcellator was introduced as a method to remove large specimens through small incisions and quickly gained popularity in gynecological surgery. While the US FDA approved the first EMM device in 1995, it recently issued a statement discouraging the use of power or EMM in most women with myoma considering the fact that when occult malignancy is inadvertently encountered, EMM hinders the ability to perform a comprehensive histopathological evaluation of a uterine specimen. Additionally dissemination of tumor or uterine fragments either benign or malignant, throughout the intraperitoneal cavity may necessitate further surgical intervention or other treatment and may worsen prognosis.

American Association of Gynecologic Laparoscopists (AAGL) guidelines [1] have given risk factors for uterine sarcoma, may not be applicable in India where cancer cervix is a major health issue. It is now required that in India we have our own guidelines as the US FDA recommendations if followed in India would deprive our patients of large uterine myomas of minimally invasive surgery (MIS) subjecting them to laparotomy.

In this study we have reviewed a single-institution experience with transvaginal or EMM for leiomyoma uteri.

Aims and Objectives

To assess the safety of morcellation for removing uterine specimen during laparoscopic and vaginal hysterectomies for leiomyoma.

To find the incidence of leiomyosarcoma through histopathology reports in all the morcellated specimens for leiomyomas.

Materials and Methods

This study was a retrospective case series done at Aarogya Hospital and Test Tube Baby Centre, Raipur, from January 1, 2011 to November 30, 2015. Analysis was started with 250 cases who underwent total laparoscopic hysterectomy (TLH), laparoscopy-assisted vaginal hysterectomy (LAVH) and non-descent vaginal hysterectomy (NDVH) for fibroid uterus. After initial analysis, 18 cases were excluded from the study as in these cases no morcellation was done and laparotomy was done due to some complication occurring intraoperatively like hemorrhage and injury to bladder. Also in some cases TLH was abandoned as we had suspicion of malignancy because of ill-defined margins of the tumor tissue, soft consistency, and marked vascularity. Data were extracted to find age, parity, obstetrical history, surgical history, and pelvic examination findings. Preoperative evaluation like hemoglobin status, colposcopic, cervical cytology, endometrial biopsy, ultrasonography, CT scan reports were evaluated thoroughly. The operative details were reviewed to identify the surgical approach, morcellation technique, estimated blood loss, operative time, and complications during surgery. Postoperative outcomes and final histopathology reports were analyzed.

Results

Total 450 hysterectomies were performed in the study period, out of which 250 were performed for fibroid uterus (Table 1), (232 cases (51.55 %) analyzed and 18 cases (4 %) excluded). This was the leading indication for hysterectomy in all the years attributing to 55.55 % cases. In total 68.96 % women were in the age group of 40–50 years. 82.76 % patients were Para 3 and more. 82.75 % had not attained menopause. None of the patients was on HRT. Various degrees of anemia were present in all the patients. 34.48 % patients had associated hypertension.

Table 1 Hysterectomy details (*n* = 450)

	Number	Percentage
Year-wise distribution		
2011	136	30.22
2012	90	20.00
2013	84	18.66
2014	84	18.66
2015	56	12.44
Indication for hysterectomy		
Fibroid uterus	232	51.55
Adenomyosis	65	14.44
Prolapse uterus	94	20.88
DUB	38	08.44
Cancer cervix up to stage II A	20	04.44
Carcinoma ovary	01	00.22

21.55 % cases had previous cesarean section, and 6.46 % cases had also undergone myomectomies in the past.

Two patients were treated cases of breast cancer and one of colon cancer. All cases were cured of the malignancies. No case was on tamoxifen therapy (Table 2).

A total of 68.96 % patients had endometrial thickness (ET) between 4 and 8 mm. NDVH was done in 47.41 % cases and EMM was required in 37.49 % cases of LAVH and TLH. 58.18 % cases had less than 50 ml blood loss. All these cases had no intraoperative complications, and 75.86 % cases were discharged uneventfully within 2 days. No major morbidity occurred and mortality rates were nil. In all cases histopathology reports were consistent with leiomyoma.

Discussion

Uterine cancer is the most common gynecological malignancy in USA with over 50,000 new cases and almost 600 deaths from the disease each year [1]. In 2012 estimated 5, 28,000 cases of cervical cancer occurred with 2,66,000 deaths worldwide [2]. About 80 % of cervical cancer occurs in developing countries. We need to emphasize that in countries like India we have to be highly suspicious for cancer cervix rather than undiagnosed leiomyosarcoma (IMS). All the risk factors as given by AAGL [1] are not applicable in India. Even in high-risk group in USA, the incidence of LMS is 0.36 per 1,00,000 women years. In our series leiomyoma was the commonest indication for hysterectomy. In all cases preoperative per vaginum, per speculum examination, colposcopy, and cervical cytology were done, and all reports were normal. Endometrial biopsy was done in 68.96 % cases and was normal in all the cases. In our series we recorded retrospective

evaluation of all the patients as recommended by AAGL [1] and SOGC/GOC [3] (Society of Obstetricians and Gynecologists of Canada and the Executive of the Society of Gynecologic Oncology of Canada) technical update, and found that none of our patient was high risk of uterine sarcoma (Tables 2, 3). Fibroids are estrogen dependent tumor and so they may regress after menopause. 68.96 % of our patients were in the age group of 40–50 years and Para 2 or more. Quinian et al. [4] found mean age of 39 years and mean parity of 2 in their series of 85 women undergoing hysterectomy for fibroid uterus. Given the higher incidence of uterine cancer or sarcoma in postmenopausal women, increased caution should be exercised when considering morcellation. In our study 17.24 % women were postmenopausal, and none of the patient was on HRT or tamoxifen therapy, and endometrial sampling was normal, and hence we did not find any case of LMS even in this group. Our study is a review of our experience with different techniques of hysterectomy and morcellation. We had performed surgeries in all age group, in patients with previous cesarean section, hernioplasty, and myomectomies. Uterus up to 26 weeks size were successfully morcellated using combined transvaginal and EMM (Tables 4, 5. During the study period, there were no complications directly attributable to transvaginal or EMM like injury to viscera, hemorrhage, and vaginal lacerations, and no malignant entities were morcellated. In total, 18 cases (7.2 %) out of 250 cases in whom evaluation was started were excluded in the beginning from the study (Table 6) as no morcellation was done in these cases. Conversion to laparotomy because of hemorrhage and injury to bladder during hysterectomy gave a major complication rate of 2 % and minor complication rate of 11.2 % (Table 5), and cases of nausea and vomiting were because of drugs and anesthesia and not because of surgery, hence not included for minor complications. Donat et al. [5] reported major complication rate of 6.2 % and minor complication rate of 22 %. We would like to emphasize that uterine sarcomas may appear or feel different than leiomyomas during laparoscopy and morcellation. We abandoned the procedure due to suspicion in 5.2 % cases, but histopathology reports in all case came benign. This is because adenomyoma, degenerating fibroids or prior treatment with GnRH agonist or antagonist may mimic the feature LMS.). Tower et al. [6] reported a case of metastatic adenocarcinoma in a patient in whom 18–20 weeks size uterus was morcellated after getting a negative endometrial curettage frozen section report. We practice that if high index of suspicion for malignancy arises during surgery, we immediately abandon the procedure and proceed with a total abdominal hysterectomy with bilateral salpingo oophorectomy. In our analysis, we found that we were already practicing all the guidelines

Table 2 Baseline characteristics of the patients ($n = 232$)

	Number	Percentage
Age (in years)		
30–40	20	08.62
40–50	160	68.96
50–60	50	21.55
60–70	02	00.86
>70	Nil	Nil
Parity		
2	40	17.24
3	120	51.72
4	60	25.86
>4	12	05.17
Menopause status		
Premenopausal	192	82.75
Postmenopausal	40	17.24
Patients on HRT	Nil	Nil
Medical history		
Anemia		
Mild	102	43.96
Moderate	50	21.55
Severe	80	34.48
Diabetes mellitus	40	17.24
Hypertension	80	34.48
Previous surgical history		
Cesarean section		
One	10	04.31
Two	30	12.93
Three	10	04.31
Myomectomy	15	06.46
Hernioplasty	04	01.72
Cholecystectomy	10	04.31
Appendectomy	13	05.60
History of previous malignancy (treated and cured cases)		
Breast cancer	02	00.86
Colon cancer	01	00.43
On tamoxifen therapy	Nil	Nil
Pelvic irradiation	Nil	Nil
Personal history		
Hereditary leiomyomatosis	Nil	Nil
Renal cell carcinoma	Nil	Nil

issued except the informed consent on tissue morcellation. Now from January 2015, we have also included the discussion on tissue morcellation and take informed consent stating that morcellation is an acceptable option for retrieval of benign uterine specimen and may facilitate a minimally invasive surgical approach, which is associated with decreased operative risks, but also there is a possibility of dissemination of benign tissue, undiagnosed

Table 3 Preoperative evaluation ($n = 232$)

	Number	Percentage
Estimated uterine size (in weeks)		
06–10	48	20.68
10–14	120	51.72
14–18	42	18.10
18–22	12	05.17
22–26	10	04.31
Relevant USG findings		
Uterine volume		
50–100	40	17.24
100–200	42	18.10
200–300	110	47.41
>400	40	17.24
Position of myomas		
Submucosal	66	28.44
Intramural	124	53.44
Subserosal	42	18.10
ET (in mm)		
<4	42	18.10
4–8	160	68.96
8–12	18	07.75
>12	12	05.17
Ovaries		
Normal	180	77.58
Benign cyst	52	22.41
Cervical cytology reports		
Normal	110	47.41
CIN I	45	19.39
CIN II	50	21.55
CIN III	27	11.63
Endometrial biopsy reports		
Normal	160	68.96
Suspicious of malignancy	Nil	Nil
Not done	40	17.24

malignant tissue, and injury to adjacent organs unique to technique of morcellation. We have not used specimen retrieval pouches for containment of benign or malignant tissue in any case. The use of morcellation within specimen retrieval pouches requires skill and experience and is still under evaluation. Trivedi et al. [7] published their experience of 21 cases of laparoscopic in-bag morcellation of fibroid to reduce the risk of inadvertent tumor morcellation. In this study they stated 0.2 % risk of LMS with EMM and 0.3 % who underwent laparotomy. We also want to emphasize that in all the 450 cases who underwent hysterectomy for various indications, no case of LMS was detected.

Table 4 Intraoperative details (*n* = 232)

	Number	Percentage
Type of hysterectomy		
TLH	52	22.44
LAVH	70	30.17
NDVH	110	47.04
Operative time (in min)		
(A) for hysterectomy		
30–40	52	22.41
40–50	56	24.13
50–60	110	47.41
>60	14	06.03
(B) for morcellation		
<10	35	15.08
10–30	83	35.77
30–60	96	29.74
>60	45	19.39
Type of morcellation		
Vaginal with scalpel	145	62.50
Vaginal and EMM	65	28.01
Only EMM	22	09.48
Type of anesthesia		
Spinal anesthesia	130	56.03
General anesthesia	102	43.96
Estimated blood loss during surgery (in ml)		
<50	135	58.18
50–100	36	15.51
100–150	29	12.50
150–200	15	06.46
>200	17	07.32
Complications	Nil	Nil

No intraoperative complications in all these cases. If any complication occurred cases were excluded

Conclusion

The benefits of minimally invasive approaches are now well established in terms of postoperative comfort, length of hospital stay, and patient safety [8]. The risk of occult LMS is extremely low, especially in women of reproductive age group. The current controversy is about morcellation of specimen (not only laparoscopic EMM) as Leung et al. [9] and Seidman et al. [10] found that even if a LMS is removed by open en block surgery still, there is 50 % of risk of spread compare to 60 % risk when done by EMM. We believe that more studies and guidelines are required for Indian women. The incidence of unanticipated malignancy may be reduced with appropriate patient selection, cervical cytology, and endometrial biopsy, and if any suspicion arises intraoperatively, then immediate conversion to laparotomy prevents dissemination of morcellated

Table 5 Postoperative period details (*n* = 232)

	Number	Percentage
Hospital stay (in days)		
<2	176	75.86
2–4	34	14.65
4–6	22	09.48
Morbidity		
Pyrexia	20	08.62
Hemorrhage	Nil	Nil
Nausea, vomiting ^a	40	17.24
Postoperative ileus	02	00.86
Pneumonitis	02	00.86
Venous thrombosis	02	00.86
Fistula urinary or fecal	Nil	Nil
Re-exploration	Nil	Nil
Mortality	Nil	Nil
Histopathology reports consistent with leiomyoma	232	100
Leiomyosarcoma	Nil	Nil

^a Due to drugs and anesthesia

Table 6 Relevant details of cases excluded from the study-18 (*n* = 250)

	Number	Percentage
Requiring laparotomy		
To control hemorrhage	04	1.60
To repair bladder injury	01	0.40
Procedure abandoned because of suspicion of malignancy		
Cervix torn with traction by Allis forceps	04	1.60
Absence of bulging surface when capsule of leiomyoma incised	04	1.60
Suspected ovarian malignancy	03	1.20
Soft consistency making morcellation difficult	02	0.80
Histopathology report consistent with leiomyoma	18	100

malignant tissue. It must be concluded that the technique of contained morcellation will help minimize the dissemination of an unanticipated malignancy in the tissue specimen. Also it is important to highlight that the incidence of LMS is lower than Western standards, in the cohort of population under consideration.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Statement All procedures followed were in accordance with the ethical standards of the responsible committee on human

experimentation (institutional and national) and with the 1975 Declaration of Helsinki, as revised in 2008(5). Informed consent was obtained from all patients for being included in the study.

References

1. AAGL, Advancing Minimally Invasive Gynecology Worldwide. AAGL practice report: morcellation during uterine tissue extraction. *J Minim Invasive Gynecol.* 2014;21(4):517–30.
2. World Cancer Report 2014, World Health Organization: 2014. Chapter 5.12. ISBN 9283204298.
3. SOGC/GOC. Technical update on tissue morcellation during gynecologic surgery: its uses, complications, and risks of unsuspected malignancy. *J Obstet Gynaecol Can.* 2015;37(1):68–78.
4. Quinian D, Quinian DK. Vaginal hysterectomy for the enlarged fibroid uterus : a report of 85 cases. *JOGC.* 2010;32:980–3.
5. Donat CL, Clark M, Tower AM, et al. Transvaginal morcellation. *JSLs.* 2015;19(2):1–7.
6. Turner T, Secord AA, Lowery WJ, et al. metastatic adenocarcinoma after laparoscopic supracervical hysterectomy with morcellation: a case report. *J Minim Invasive Gynecol.* 2013;5:19–21.
7. Trivedi PH, Patil SS, Parekh NA, et al. Laparoscopic morcellation of fibroid and uterus in-bag. *J Obstet Gynecol India.* 2015;65:396–400.
8. Lee J, Jennings K, Borahay MA, et al. Trends in the national distribution of laparoscopic hysterectomy from 2003–2010. *J Minim Invasive Gynecol.* 2014;21(4):656–61.
9. Leung F, Terzibachian JJ. Re, the impact of tumor morcellation during surgery on the prognosis of patients with apparently early uterine leiomyosarcoma. *Gynecol Oncol.* 2012;124:172–3. doi:[10.1016/j.ygyno.2011.08.035](https://doi.org/10.1016/j.ygyno.2011.08.035).
10. Seidman MA, Oduyebo T, Muto MG, et al. Peritoneal dissemination complicating morcellation of uterine mesenchymal neoplasms. *PLoS One.* 2012;7(11):w50058. doi:[10.1371/journal.pone.0050058](https://doi.org/10.1371/journal.pone.0050058).