

Myomectomy for Multiple or Giant Uterine Fibroids

Yuji Hiramatsu, MD, PhD¹

¹Department of Obstetrics and Gynecology, Okayama City General Medical Center, Kita-Ku, Okayama, Japan

Address for correspondence Yuji Hiramatsu, MD, PhD, Okayama City General Medical Center, 3-20-1 Kitanagase-Omotemachi, Kita-Ku, Okayama 700-8557, Japan (e-mail: kiki1063@cc.okayama-u.ac.jp).

Surg J 2020;6(suppl S1):S22–S34.

Abstract

Myomectomy for diffuse leiomyomatosis and giant fibroid exceeding 30 cm in length is a particularly difficult operation. For diffuse leiomyomatosis, what kind of incision is put in and nucleated, how to suture the wound is a problem. In the case of giant fibroids, the degree of difficulty varies greatly depending on the site, size, and number of fibroid. The points should be taken into account at the time of surgery are as follows: (1) how to incision because incision becomes long, (2) how to remove multiple fibroids together, reduce incisional wounds, and reconstruct the uterus, (3) how to reduce the bleeding, how to suture not to leave a dead space. From the preoperative magnetic resonance imaging findings for each case, we will conduct surgery as far as possible to simulate, but, in fact, it is necessary to judge instantaneously at the time of laparotomy. It is necessary to see many difficult operations and acquire the judgment ability.

Keywords

- ▶ myomectomy
- ▶ diffuse leiomyomatosis
- ▶ giant fibroid
- ▶ cervical fibroid

Surgical Steps

1. Determine the order of enucleation of multiple lesions by inspection.
↓
2. Pull the uterus with forceps, threads, etc.
↓
3. Inject vasopressin into the incision line.
↓
4. Enucleate the fibroids.
↓
5. Suture the incision.
↓
6. Wash the abdominal cavity with saline.
↓
7. Attach adhesion-prevention material.
↓
8. Insert a drain if necessary.
↓
9. Close the abdomen.

Preoperative Examination

The following items should be checked or performed before surgery:

- Anemia, blood biochemistry, urinalysis, electrocardiogram, chest X-ray examination, pulmonary function test.
- Cytology.
- Ultrasound examination and magnetic resonance imaging (MRI) examination should be performed in patients with multiple fibroids and giant fibroids. The size, site, possibility of malignancy, and degeneration of the fibroids must be confirmed. The position of the endometrium must also be checked.
- Intravenous pyelography should be performed when the fibroid grows retroperitoneally.
- Tumor marker: lactate dehydrogenase (LDH) measurement should be performed, especially in patients with large fibroids or degenerated fibroids to distinguish these fibroids from uterine sarcoma.
- D-dimers, soluble fibrin monomers: patients with large fibroids should be frequently examined for deep vein thrombosis because of frequent complications.

Preoperative Preparation

1. Autologous blood storage: autogenous blood should be stored in as much as possible. However, many patients' conditions are complicated by anemia, and sufficient blood storage is often impossible.
2. Preserved blood preparation: preserved blood should be prepared in all cases because of the possibility of massive bleeding.
3. Gonadotropin releasing hormone (GnRH) analog administration: this may be used to stop menstruation until surgery for the purpose of anemia treatment. However, in patients with diffuse leiomyomatosis, the use of a GnRH analog is not recommended because its use makes identification of small fibroids impossible. GnRH analogs are not used in patients with giant uterine fibroids because they have almost no effect on reduction of the fibroids in our clinical experience, and their use is associated with adverse effects.
4. When adequate autologous blood cannot be secured, the use of a cell-saver device can be considered.

Informed Consent

Since this is a very difficult operation, informed consent should be obtained several times. In addition to providing patients with an explanation of general laparotomy surgery, the following points must also be explained:

- This is a very difficult operation associated with a possibility of massive bleeding. If autologous blood alone is not enough, a blood transfusion may be required. If a blood transfusion is administered, there is a possibility of hepatitis after the transfusion.
- If bleeding cannot be controlled, total hysterectomy may be required, and this procedure may need to end with an exploratory laparotomy.
- Because the surgical wound site is large and complex, a postoperative hematoma is likely to form, and total hysterectomy may ultimately be required.
- Fallopian tube injury is possible.
- Bladder or ureteral injury is possible.
- Postoperative adhesion and ileus are possible because the incision is large and complicated.
- Postoperative reproductive outcomes include possible uterine rupture.
- Recurrence of fibroids is possible, especially in patients with diffuse leiomyomatosis.

Surgical Technique

Diffuse Leiomyomatosis

Case 1: 46-Year-Old Patient, G0P0

Myomectomy was performed because of excessive menstruation at the age of 37 years. After surgery, the symptoms improved. However, excessive menstruation subsequently recurred, frequent urination and left inguinal

regional pain appeared before and after menstruation, and the uterine fibroids recurred. The patient strongly desired to preserve her fertility and had been referred to our hospital because of the difficult operation. Several tens of fibroids were found in the preoperative MRI examination (→Fig. 1).

Explanation of Procedure

Uterus-Grasping Method

Because several tens of small anomalous tumors were present, it was difficult to grasp the uterus. Therefore, we first applied a 1-0 Vicryl thread to the uterine fundus for the purpose of holding the uterus until the end of the procedure (→Fig. 2). Ligation around the uterine isthmus with a Nelaton's catheter (Rubin's method) was also useful to reduce bleeding.

Incision Method and Enucleation of Fibromas

In cases like this, the number of incisions should be minimized. Vasopressin, diluted 100 times, is injected into the midline of the anterior wall of the uterus. To enucleate dozens of fibroids using as few incisions as possible, a longitudinal median incision is first made at the anterior-uterine wall, and as many fibroids as possible are removed from this incision (→Fig. 3). Fibroids are identified by visual inspection, palpation, and enucleated.

In patients with diffuse leiomyomatosis, several tens of small fibroids must be enucleated (unlike enucleation of several large fibroids with the correct incision layer). For this reason, injection of vasopressin diluted 100-fold (20 units/mL of Pitressin with 100 mL of physiological saline) to the incision site is essential to reduce bleeding. Because the effect of hemostasis disappears in approximately 20 minutes, an additional injection can be performed if necessary.

Severe adverse effects include hypotension, pulmonary edema, and cardiac arrest. Postoperative urinary loss is also a frequent complication; therefore, the urine output should be checked often and a diuretic should be used if necessary. It is important to ensure an accurate dilution ratio (i.e., 1 mL vasopressin/100 mL saline) and use only the minimum amount necessary. Additionally, the anesthesiologist must be informed of the use of the diuretic.

Reconstruction of Wounds

Usually, three layers of suture are used to close the incision. However, because a large number of fibroids are nucleated in patients with diffuse leiomyomatosis, a dead space is created, and this must first be repaired by suturing.

After closure of the dead space, interrupted sutures (1-0 Vicryl) are used to close the first layer of tissue. The second layer is continuously sutured with 2-0 Vicryl (→Fig. 4). The surface of the uterine wall is continuously sutured with 3-0 PDS II (monofilament polydioxanone). Because holding the muscle layer with tweezers may damage the surface and cause adhesions, suturing should be performed without forceps as much as possible.

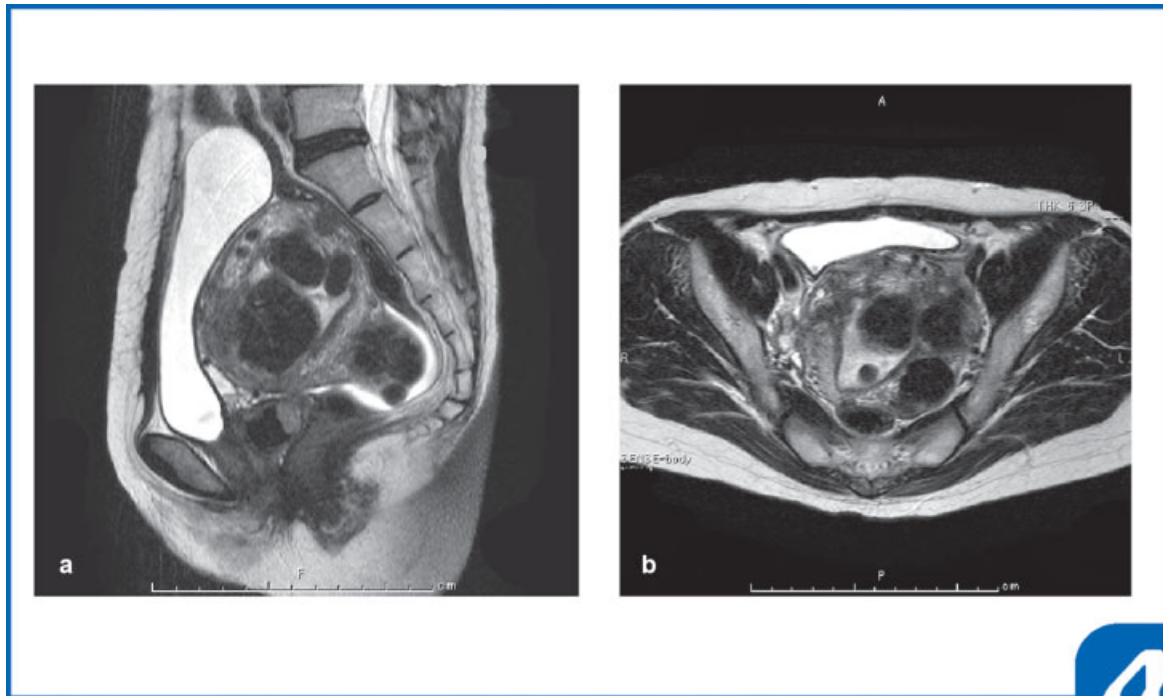


Fig. 1 (A, B) Magnetic resonance imaging (MRI) of diffuse leiomyomatosis (T2 weighted image): Several tens of fibroids were found in the preoperative MRI examination. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. *Mastering the Essential Surgical Procedures OGS Now*, No.13. *Function-preserving surgery* (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)



Fig. 2 Holding of uterus: It is difficult to grasp the uterus in usual method because there are several tens of small anomalous tumors. In such case, we first apply a 1–0 Vicryl thread to the uterine fundus for the purpose of holding the uterus. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. *Mastering the Essential Surgical Procedures OGS Now*, No.13. *Function-preserving surgery* (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

Enucleation of fibroids in the posterior uterine wall is performed in the same manner (►Fig. 5). If necessary, another incision is then added at the other part to enucleate the remaining fibroids (►Fig. 6).

Intra-abdominal Washing and Adhesion Prevention

The abdominal cavity is washed with saline, and blood clots are removed. An adhesion barrier such as Interceed® or Seprafilm® is then applied to prevent adhesion formation (►Fig. 7). ►Fig. 8 shows an enucleated myoma specimen.

Myomectomy for Giant Fibroma

Case 2: 33-Year-Old patient, P0G0

The patient visited the hospital because of lower right abdominal pain and an abdominal mass, and huge multiple uterine fibroids were found.^{1,2} She had been planning to get married and had a strong desire to preserve her uterus. However, she had been informed of the difficulty of the operation at major hospitals in three large cities and was thus referred to our hospital.

We performed GnRH analog therapy six times, but no change in the size of the fibroids was observed. At this time, the tumor reached two fingers under the xiphoid process, and its length was 35 cm. Multiple degenerative fibroids were observed by ultrasonography and MRI (►Fig. 9). Although tumor marker levels were normal, anemia was observed (hemoglobin level of 8.6 g/dl).

Preoperative Preparation

Because this case involved a particularly large fibroid, adequate preparations were important to avoid complications,

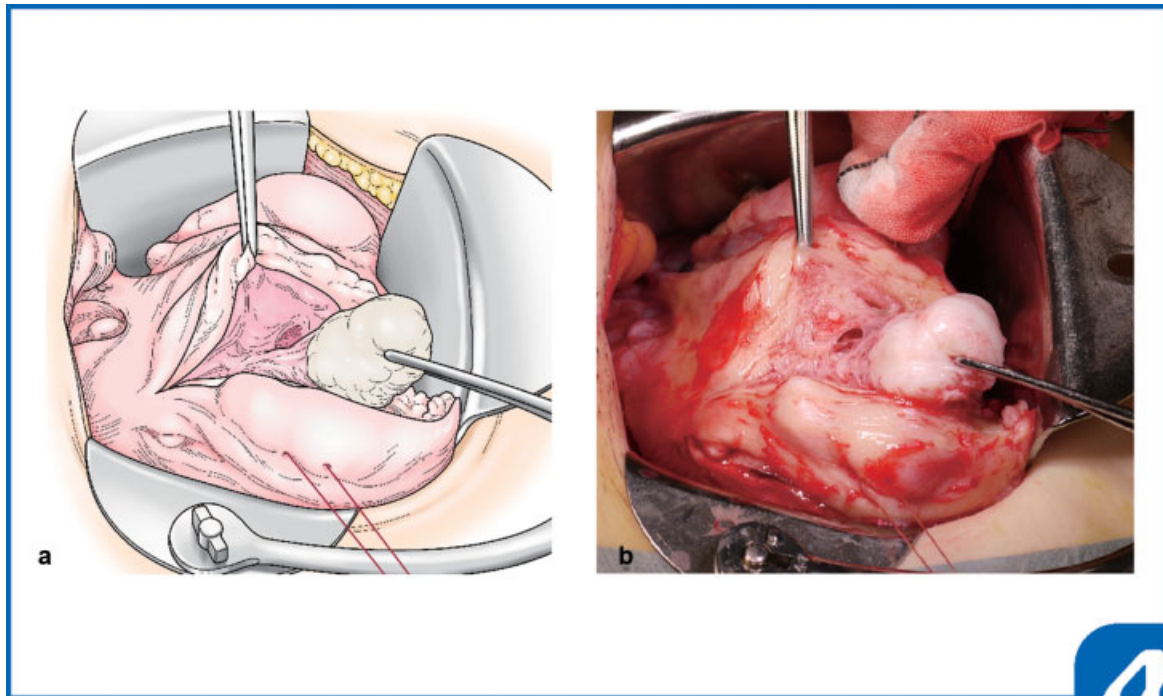


Fig. 3 Enucleation of fibroids from median longitudinal incision. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

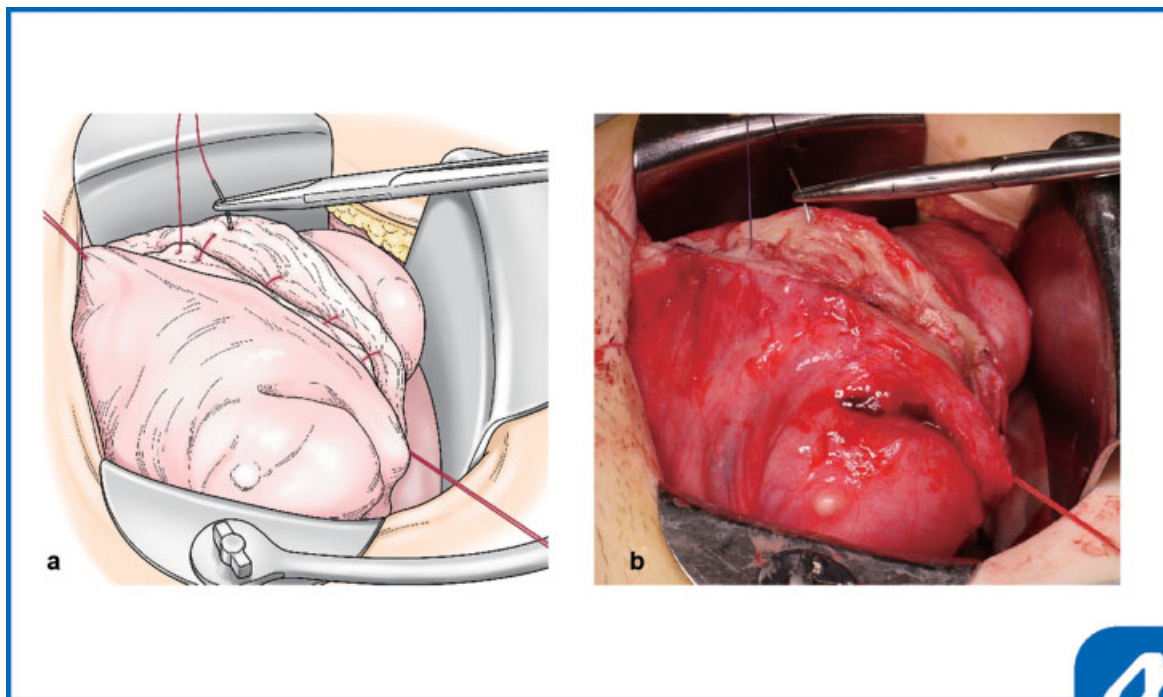


Fig. 4 Closure of the incision: After closure of the dead space, interrupted sutures (1–0 Vicryl) are used to close the first layer of tissue. The second layer is continuously sutured with 2–0 Vicryl. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

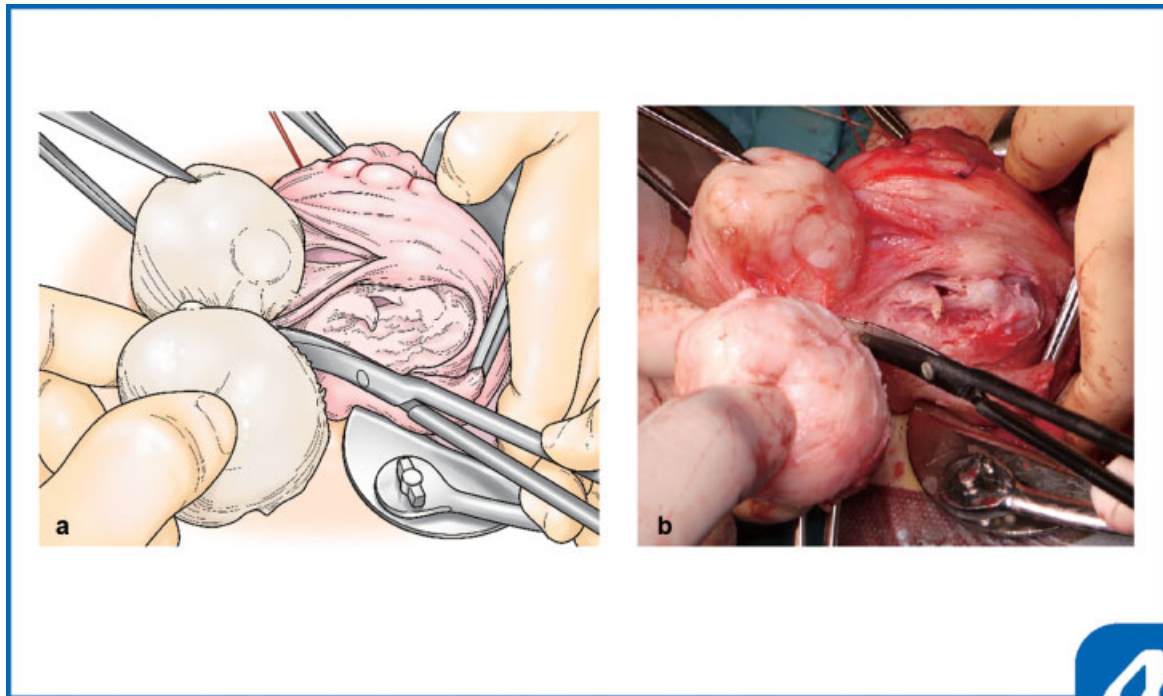


Fig. 5 Enucleation of fibroids in the posterior wall: Enucleation of fibroids in the posterior uterine wall is performed in the same manner as those in the anterior wall. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. *Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese)*. Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

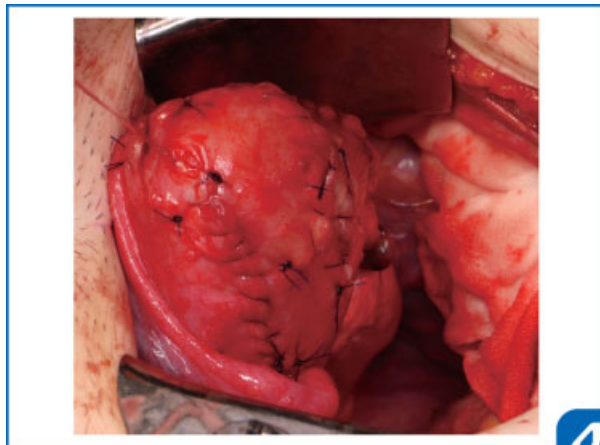


Fig. 6 Closure of the incision: If necessary, another incision is then added at the other part to enucleate the remaining fibroids. The surface of the uterine wall is continuously sutured with 3–0 PDS II. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. *Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese)*. Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

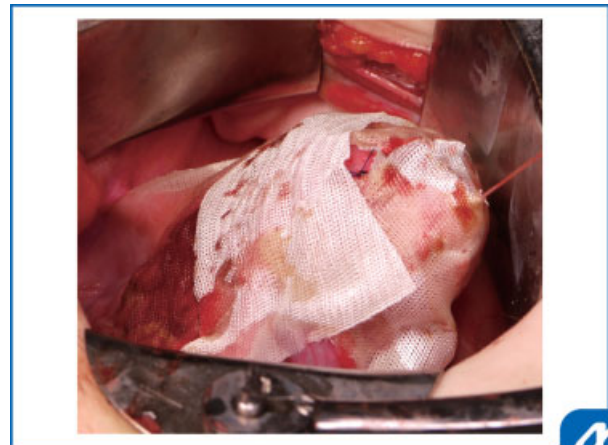


Fig. 7 Adhesion prevention: The abdominal cavity is washed with saline, and blood clots are removed. An adhesion barrier such as Interceed® or Seprafilm® is then applied to prevent adhesion formation. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. *Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese)*. Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

and careful consideration was needed regarding how to treat complications if they occurred. In such cases, the surgeon should perform an ultrasonic examination to observe the position, size, and number of fibroids and the location of the endometrium; these findings should then be confirmed by MRI examination (–Fig. 9). In addition,

the degree of bladder elevation, running of the ureter, and possibility of malignancy should be considered. Simulation of the incision site, the suturing method, and other surgical variables are based on these findings. In this case, we prepared 1,200 mL of both autologous and preserved blood for a possible transfusion.



Fig. 8 Enucleated myoma specimen: Forty-one fibroids were enucleated in this case. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)



Fig. 10 Findings at laparotomy: Very large fibroids can be confirmed. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

Explanation of Procedure

– **Fig. 10** shows the uterus after it had been pulled out of the abdominal cavity. The following three concerns arose at this time point: (1) Can the myomectomy be completed? Once an

incision has been made in the uterus, the operation must be performed. Should the procedure be stopped at this point? Should hysterectomy be performed? (2) What kind of incision should be used in this case, and how many fibromas will be enucleated in that layer? (3) How should the uterus be held?

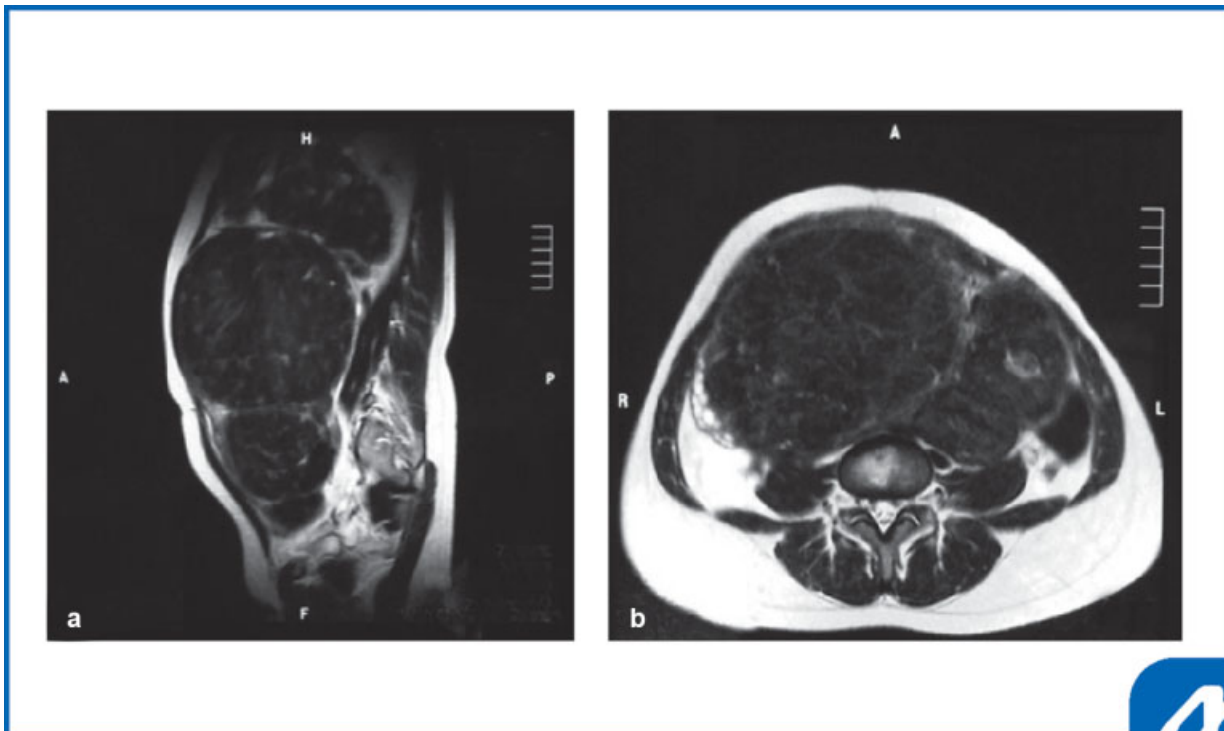


Fig. 9 Preoperative MRI findings (T2 weighted image): Giant multiple uterine fibroids that reaches the xiphoid process are observed. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

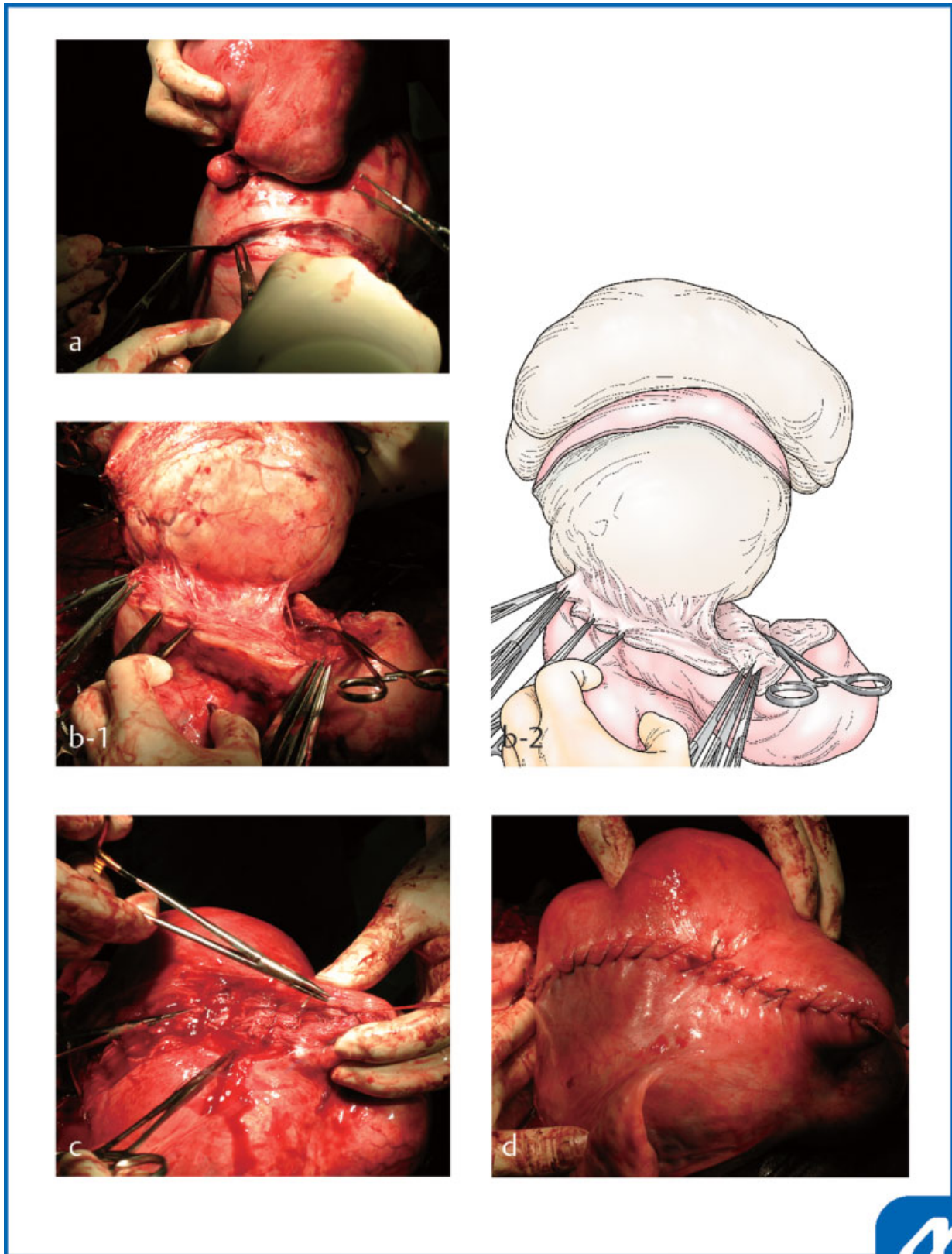


Fig. 11 Two giant fibroids at the fundus of the uterus were enucleated first as one mass. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

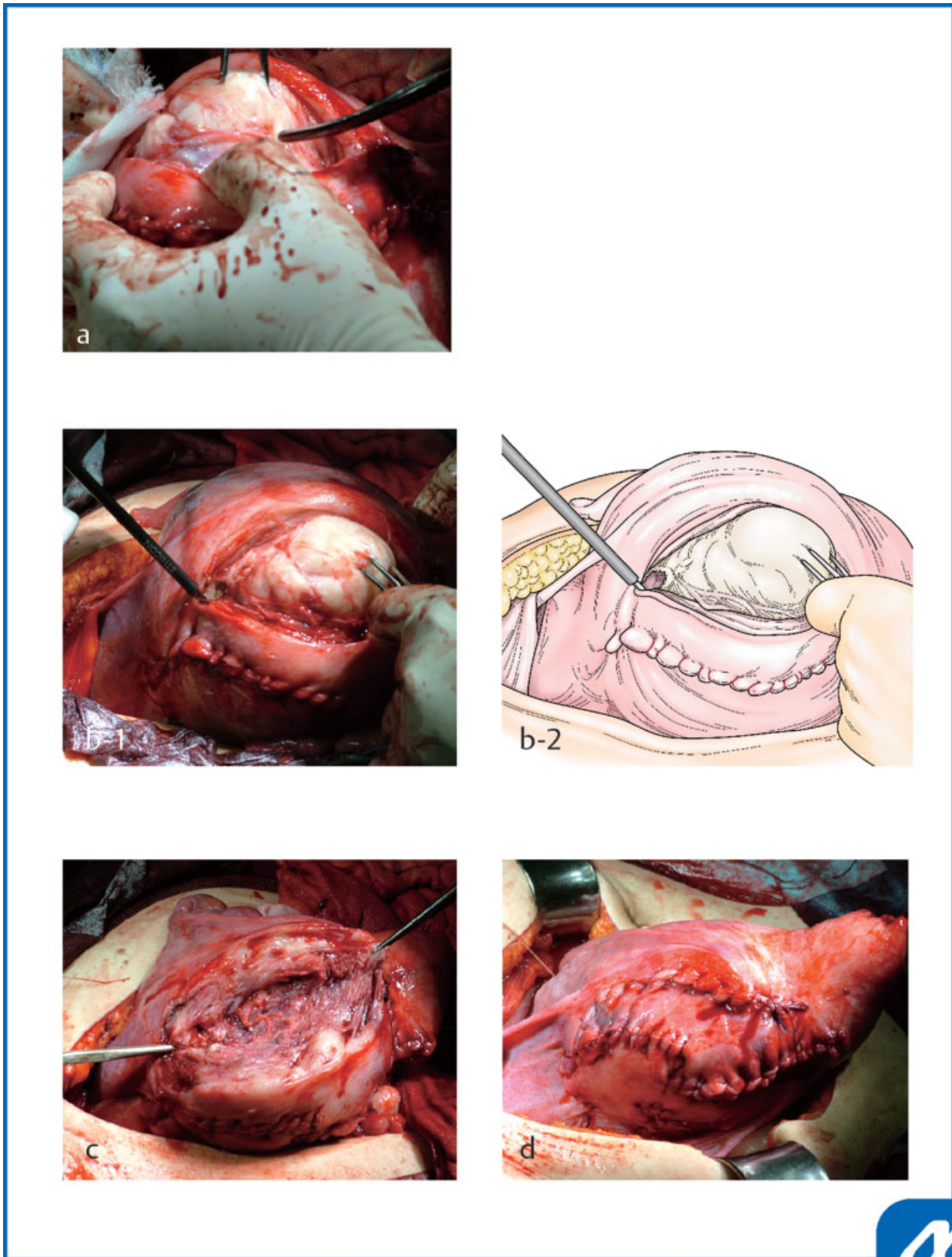


Fig. 12 Enucleation of fibroids in other part: If you enucleate fibroid at the correct layer with strong pulling, you can see that there is no bleeding. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

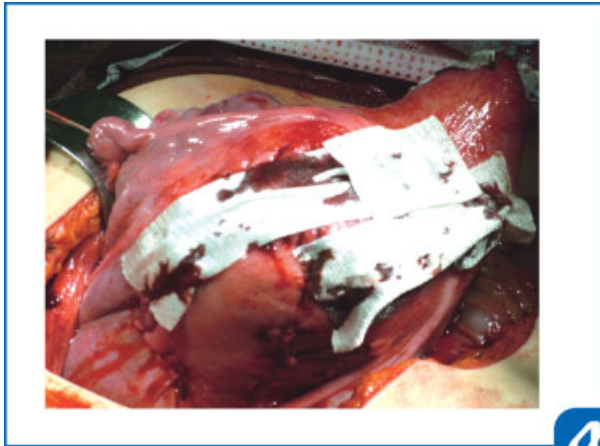


Fig. 13 Condition after myomectomy: Interceed® was attached to the surface layer because many large incisions had been made. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

Tips and Warnings

How to decrease bleeding

It is necessary to reduce bleeding, especially during giant fibroid enucleation.

- 1) If a large blood vessel is present on the incision line, the vessel should be ligated at two places and cut between them.
- 2) Vasopressin injection is ineffective if the fibroid is too large. Use of too much vasopressin can cause adverse effects. The use of vasopressin at selected points is recommended.

For these reasons, the following principles of myomectomy become important. First, enucleate the fibroid at the correct layer with strong pulling of the fibroid. Second, it is necessary to shorten the operation time as much as possible because the number and length of the incisions will increase in such cases. It is also important to reconfirm the role of the assistant before the operation.

When enucleating a fibroid, an incision is made on the same line with a cold knife while strongly pulling the fibroid node and finding the correct exfoliation layer (►Fig. 11). If the correct layer can be found in one place, the incision layer should be spread around the entire fibroid node with bipolar scissors. The normal muscle layer is then compressed with gauze, and the bottom is carefully treated so that the uterine cavity is not opened.

The patient in this case had many other large fibroids, so we sequentially enucleated in the right layer (►Fig. 12). Intercede was attached to the surface layer because many large incisions had been made (►Fig. 13). In total, 28 fibroids were enucleated and their total weight was 6.1 kg (►Fig. 14).

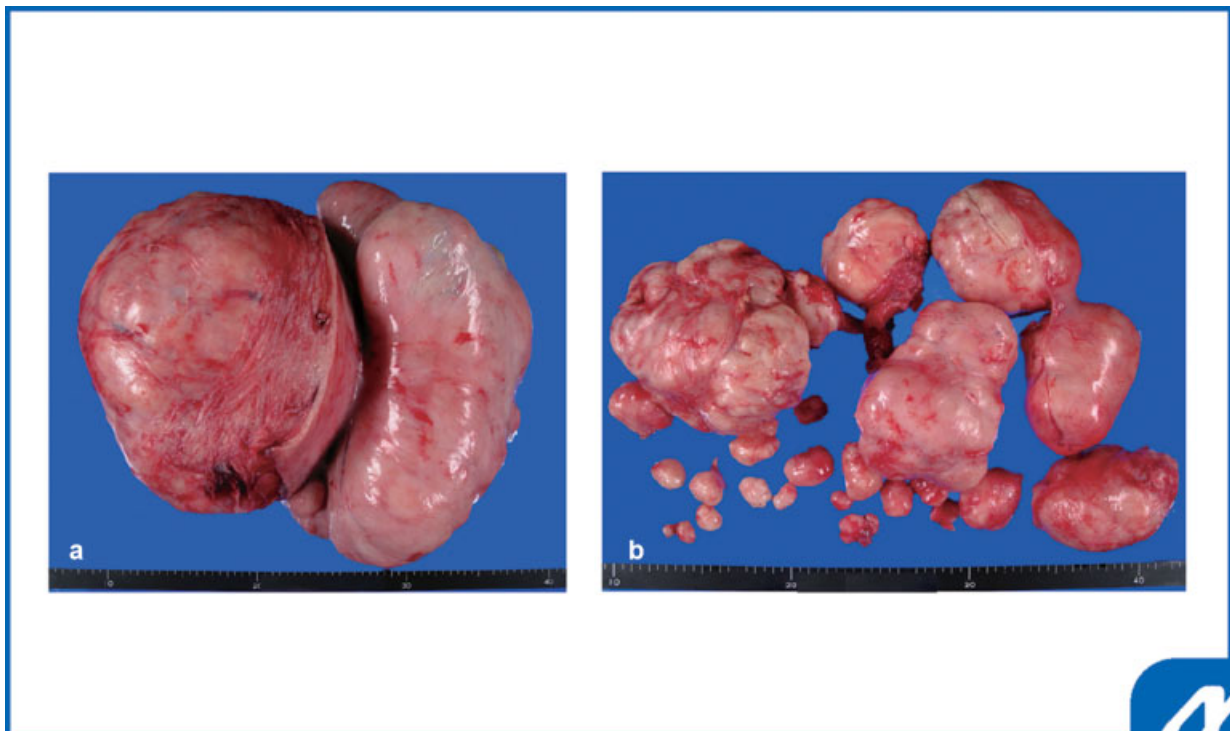


Fig. 14 Enucleated fibroids: In total, 28 fibroids were enucleated and their total weight was 6.1 kg. a; 26x21x13cm, 4.47 kg. b; 372 g, 348 g, 336 g, etc. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

Tips for Giant Fibroid Enucleation

1. Although a lip-shaped incision line is inserted for enucleation, it is important to carefully design the width and length of this incision line. If the incision width is too narrow, too many muscle layers will remain, and the central part will rise when suturing, resulting in dirty sutures. However, if the incision width is too wide, suturing becomes difficult.
2. It is important to pull the fibroid strongly at the time of enucleation. This procedure makes it easier to find the correct exfoliation layer between the fibroid and normal myometrium, and it is possible to create hemostasis by pulling and to reduce the amount of bleeding.
3. The direction of the incision should be such that the operator can easily suture the tissue, avoiding tubal injury.

Enucleation of Multiple Intraligamental Cervical Fibroids

Case 3: 37-Year-Old patient, G0P0, Unmarried

The patient visited a hospital because of lower abdominal pain, and huge multiple cervical uterine fibroids were found (► Fig. 15). She was scheduled to get married soon and had strong desire to preserve her uterus. However, because of the site, size, and number of fibroids, she was told that myomectomy would be difficult in three major hospitals, and she was finally referred to our hospital. Deep vein thrombosis of the lower thigh was also observed by preoperative examination.

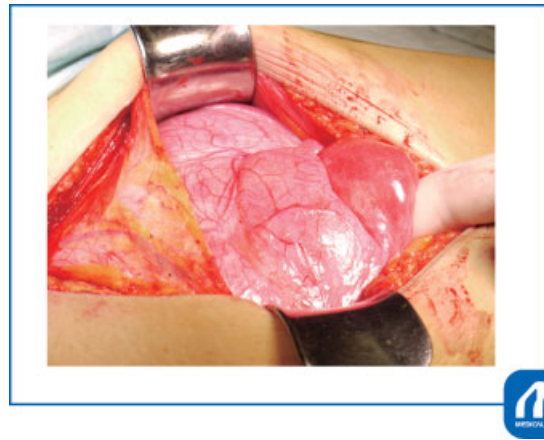


Fig. 16 Findings at laparotomy: After laparotomy, all fibroids were found to have developed in the retroperitoneal space. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

Preoperative Preparation

1. Treatment of deep vein thrombosis
2. Preparation of cell-saver device and preserved blood. Autologous blood could not be prepared because of the treatment of thrombosis.

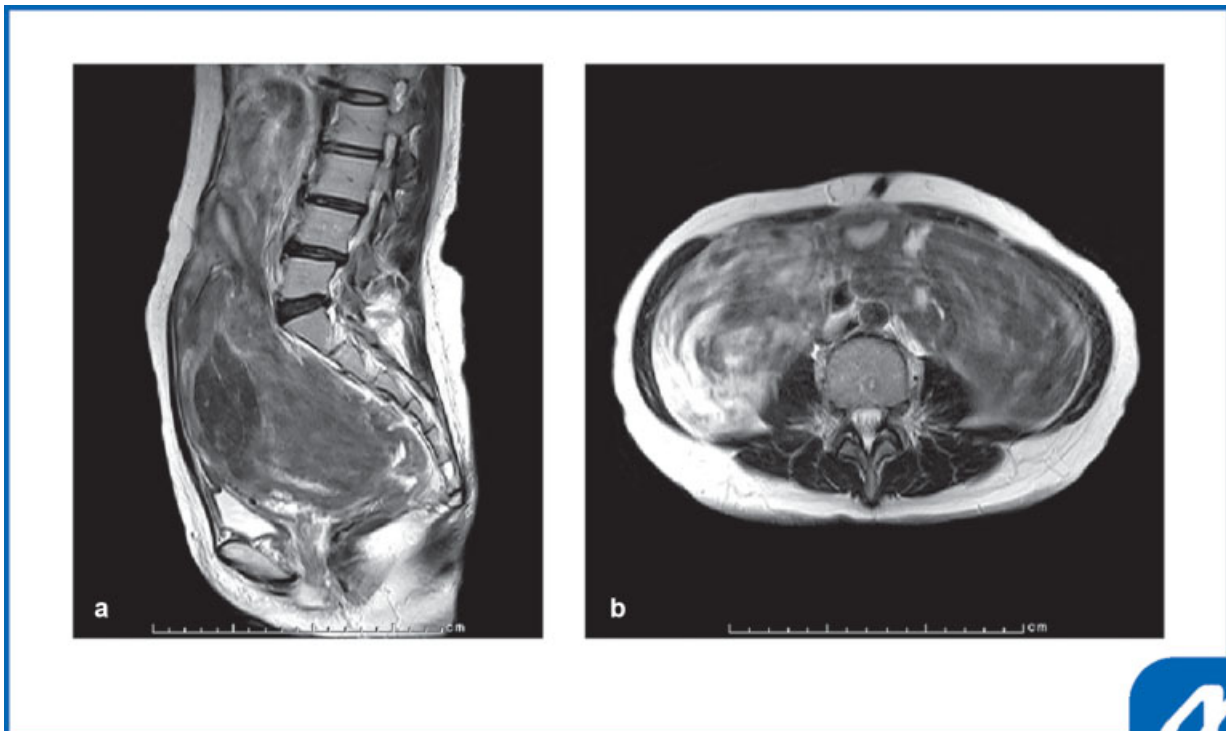


Fig. 15 Pre-operative MRI (T2 weighted image): Multiple large cervical fibroids were found. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

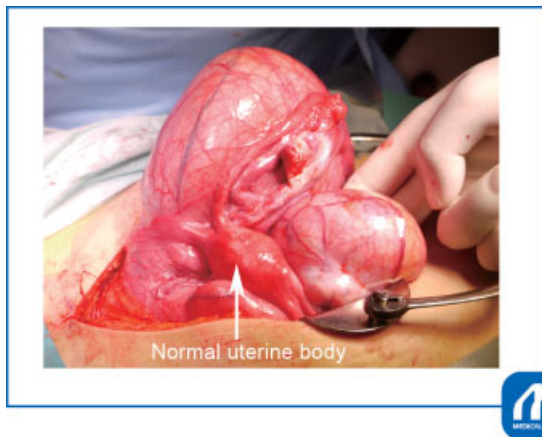


Fig. 17 Lift up the fibroids ①: We opened the broad ligament, peeled the fibroids from the uterine cervical region sequentially, and lifted it. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. *Mastering the Essential Surgical Procedures OGS Now*, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

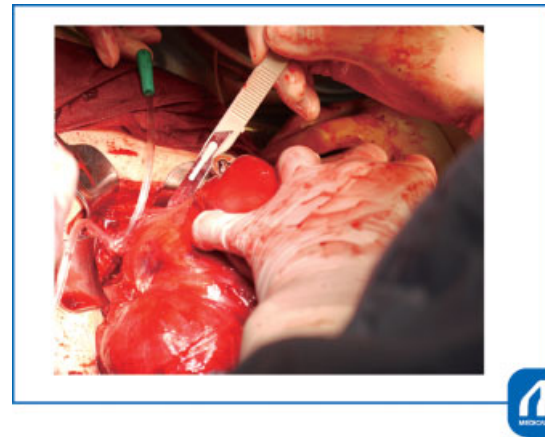


Fig. 19 Myomectomy ①: The fibroid neck was extremely thick, and a large amount of bleeding was predicted at the time of incision. Therefore, the uterine cervix was ligated with a Nelaton catheter and the thick stem was cut. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. *Mastering the Essential Surgical Procedures OGS Now*, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)



Fig. 18 Lift up the fibroids ②: The ureter and uterine artery were identified and taped, and then the adhesion around the whole fibroid was peeled off. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. *Mastering the Essential Surgical Procedures OGS Now*, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

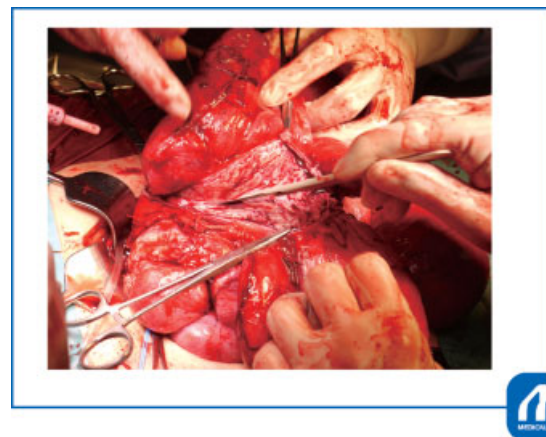


Fig. 20 Myomectomy ②: Since the neck was extended by pedunculated fibroids, careful incision was made not to open the cervical canal. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. *Mastering the Essential Surgical Procedures OGS Now*, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

Considerations at Laparotomy

1. Large blood vessels and the ureters should not be damaged because all fibroids occur in the retroperitoneal space.
2. The fibroid stem is thick, and from where it originates in the cervix is unclear. The stem should be treated after clarifying the situation of all fibroids around the uterus.
3. Large superficial blood vessels should be treated with ligation or LigaSure (Medtronic, Minneapolis, MN) to reduce bleeding.
4. Because the neck is very thick and a large amount of bleeding is expected to occur at the time of incision, the uterine cervix should be ligated with a Nelaton's catheter (Rubin's method),

and bulldog forceps should be applied to the infundibulo-pelvic ligaments before cutting the fibroid stem.

5. The cervical canal and the vagina may be opened when the stem is resected because the cervical region is stretched and the fibroid stem is thick and multiple. In the most severe cases, total hysterectomy is needed.

Explanation of Procedure

After laparotomy, all fibroids were found to have developed in the retroperitoneal space (► Fig. 16). We opened the broad ligament, peeled the fibroids from the uterine cervical region sequentially, and lifted it (► Fig. 17). The ureter and uterine artery were identified and taped, and the operation proceeded.



Fig. 21 Myomectomy ③: Large pedunculated fibroids were enucleated. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

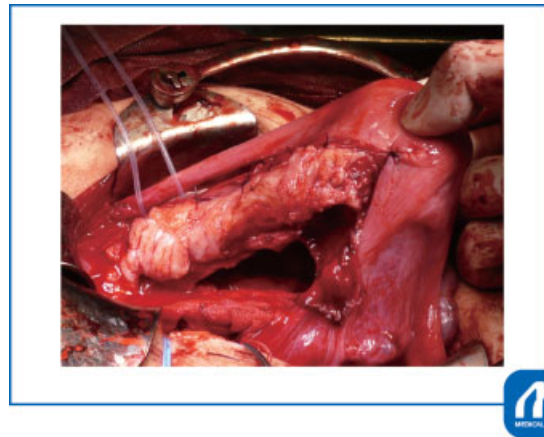


Fig. 23 Repair of elongated cervix: The surrounding cervical tissue was brought together and sutured to reinforce the uterine cervix. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

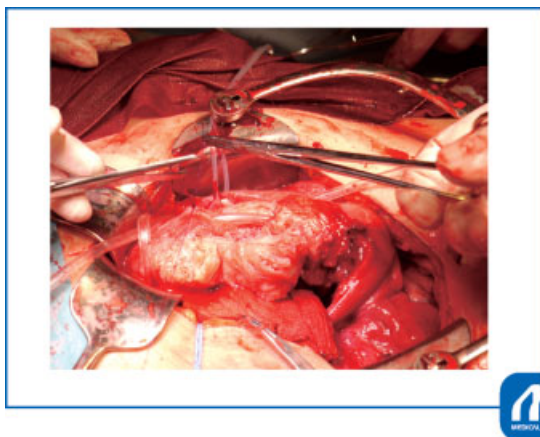


Fig. 22 Repair of opened cervical canal: Because part of the cervical canal was opened during the operation, a thick Nelaton tube was inserted from the uterine cavity to the cervical canal, and the cervix was repaired with 3-0 PDS II. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

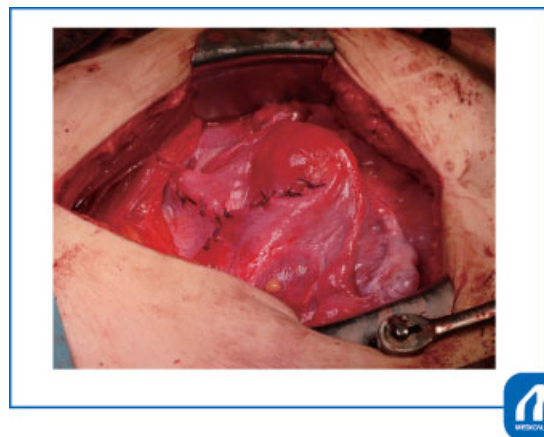


Fig. 24 Condition after myomectomy: After confirming that the ureter and large blood vessels were not damaged, peritoneal sutures were applied. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese). Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

The adhesion around the whole fibroid was peeled off, indicating that the whole uterus had been lifted (► Fig. 18). The fibroid neck was extremely thick, and a large amount of bleeding was predicted at the time of incision. Therefore, the uterine cervix was ligated with a Nelaton's catheter, bulldog forceps were applied to the infundibulopelvic ligaments, vasopressin was injected into the uterine cervix, and the thick stem was cut (► Figs. 19–21). Because part of the cervical canal was opened during the operation, a thick Nelaton's tube was inserted from the uterine cavity to the cervical canal, and the cervix was repaired with 3-0 PDS II (► Fig. 22). The surrounding cervical tissue was brought together and sutured to reinforce the uterine cervix (► Fig. 23).

After confirming that the ureter and large blood vessels were not damaged, peritoneal sutures were applied (► Fig. 24). We washed the abdominal cavity sufficiently with saline, placed a Penrose's drain in the Douglas fossa, and finished the surgery. The specimen is shown in ► Fig. 25. It contained subserosal fibroids with a very thick stem mainly generated from the cervical anterior wall.

Postenucleation Treatment

Three difficult cases have been presented in this report. In these cases, the uterine incision was large and suturing of the wounds was complicated. It was necessary to thoroughly wash the site

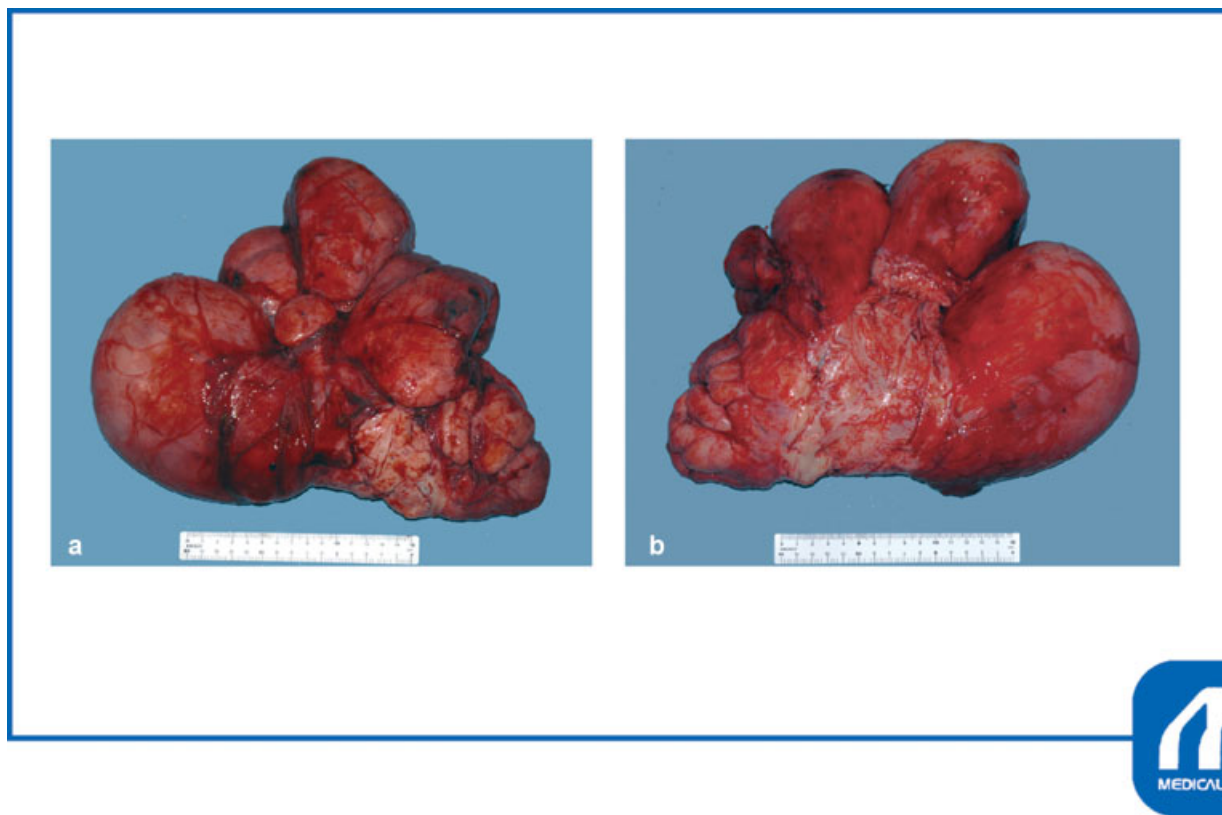


Fig. 25 Enucleated cervical fibroids: Subserosal fibroids with a very thick stem mainly generated from the cervical anterior wall. a, front side; b, reverse side. (Reproduced with permission from Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. *Mastering the Essential Surgical Procedures OGS Now, No.13. Function-preserving surgery (Japanese)*. Tokyo: Medical View; 2013: 28–39. Copyright © Medical View.)

to remove blood clots, attach adhesion barrier material, and insert a drain. Abdominal closure was done in the usual way.

Postoperative Examination and Follow-up

The presence or absence of a hematoma should be confirmed by transvaginal ultrasound. If the uterine cavity or cervical canal is opened, the vagina should be thoroughly washed to avoid postoperative infection. After surgery, the patient should be followed-up on an outpatient basis several times to check the repair status of the uterus.

Conflict of Interest

None.

Acknowledgment

I thank Angela Morben, DVM, ELS, from Edanz Group (www.edanzediting.com/ac), for editing a draft of this manuscript.

References

- 1 Hiramatsu Y. Myomectomy for multiple and giant uterine fibroma. In: Hiramatsu Y, Konishi I, Sakuragi N, Takeda S, eds. *Mastering the Essential Surgical Procedures OGS Now, No.13 Function-preserving surgery (Japanese)*. Tokyo: Medical View; 2013:28–39
- 2 Hiramatsu Y. Myomectomy. In: Hiramatsu Y, ed. *Management of Uterine Fibroid (Japanese)*. Tokyo: Medical View; 2008: 167–173