Laparoscopic metroplasty for bicorporeal uterus: surgical techniques and outcomes

Qiao-Yun Zhou1, Sotirios Saravelos2,3, Xiao-Wu Huang1, Ning Ma1, Tinchiu Li1,3, En-Lan Xia1

1Department of Hysteroscopic Center, Fuxing Hospital, Capital Medical University, Beijing 100038, China;
2IVF Unit, Department of Obstetrics & Gynaecology, Hammersmith Hospital, Imperial College London, UK;
3Assisted Reproduction Unit, Department of Obstetrics & Gynaecology, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong, China.

The incidence of congenital uterine anomalies (CUA) appears to be higher than previously thought owing to improved diagnostic imaging modalities.[1] A recent systematic review has estimated the prevalence to be 5.5% in the unselected population, 8.0% in infertile women, and 13.3% in those with a history of miscarriage. The commonest anomaly across all populations appear to be the septate variety (ie, canalization defects) followed by the bicornuate variety (ie, fusion defects).[2] Another meta-analysis has shown that several adverse reproductive outcomes associated with CUA, such as increased miscarriage rates, increased preterm delivery rates, and increased perinatal mortality rates.[3]

Among the various forms of congenital anomalies, one of the most easily amenable for correction is that of the septate uterus, with the most recent meta-analysis — albeit of non-randomized controlled trials (RCTs) — suggesting that the hysteroscopic resection of a septum may be associated with a significant reduction in the risk of subsequent miscarriage.[3] However, it should be highlighted that well-designed prospective RCTs are still lacking. Conversely, the traditional open Strassmann unification procedure for bicorporeal uterus (previously known as bicornuate uterus) has rarely been performed or published in the recent years. This is most likely due to the invasiveness of the procedure and lack of systematic studies with appropriate follow-up of reproductive outcomes.

However, it must not be overlooked that women with bicorporeal uterus have potentially worse reproductive outcomes than women with septate uterus.[4] It is, therefore, important to examine if effective treatment is available to correct the structural anomaly with a view to improve the reproductive outcomes. Indeed, when reviewing the literature, laparoscopic metroplasty for a bicorporeal uterus is considered as a safe and feasible procedure, with favorable reproductive outcomes.

With these encouraging preliminary reports in mind, we wish to present our experience of what we believe to be the largest series of laparoscopic metroplasty for bicorporeal uterus in the literature up-to-date.

Patients suspected to be suffering from bicorporeal uterus attending Fuxing Hospital, Beijing, China, with a poor reproductive history (in the form of two or more first-trimester miscarriages or at least one second-trimester miscarriage or preterm birth) were thoroughly assessed for causes that could explain their pregnancy losses, including immunological screening, thrombophilia screening, and metabolic and endocrinologic screening. CUA were assessed using 2D/3D ultrasound, hysteroscopy, and magnetic resonance imaging if necessary. A bicorporeal uterus was diagnosed in accordance with the European Society for Human Reproduction and Embryology/European Society for Gynecological Endoscopy classifications.[4] Patients were counseled extensively regarding future prognosis based on available data and were given the options of expectant management or the possibility of laparoscopic metroplasty. Women with bicorporeal septate uterus were generally offered hysteroscopic resection of the septum in the first instance, rather than a laparoscopic metroplasty.

This study was approved by the Institutional Review Board of Fuxing Hospital in Beijing, China (No. 2020FXHEC-KY017). All the patients provided written informed consent.

Patients electing to undergo laparoscopic metroplasty were placed in lithotomy position. All procedures were performed by or supervised by one of the three experienced surgeons (E.X., X.H., and N.M.). A saline hysteroscopy

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was first performed to assess the depth of the fundal indentation with respect to the internal cervical orifice (Os) and to ascertain the angulation of the uterine cavities. A 10 mm trocar was then inserted via an inframammary incision, and CO₂ was insufflated into the abdominal cavity to a pressure of 15 mmHg. Three additional 5 mm trocars were inserted under direct vision in the left and right lower quadrants and left middle quadrant, lateral to the epigastric vessels. Following thorough inspection and adhesiolysis if required, an intraperitoneal Foley catheter balloon was inserted into the right uterine cavity and insufflated with approximately 3 mL of saline. Vasoressin 3 units in 10 mL of saline was injected into the midportion of the medial aspect of the right uterine horn. Then, an incision was made approximately 1.5 cm medial to the right cornua using hook monopolar diathermy (40 W cutting current) and cold scissors until the cavity was entered and the intracavitory balloon was visualized. Once the horn incision was completed, the balloon was removed and inserted into the left uterine horn, and the same process was also repeated for the left horn. The uterine cavity was then unified using number 0 interrupted polyglactin sutures on the corresponding myometrial planes, while sparing the endometrial tissue plane. Following adequate suction, irrigation, and hemostasis, Interceed (Ethicon Sarl, San Lorenzo, Puerto Rico, USA) was applied on the sutured aspect of the newly formed unified uterus.

Prophylactic intravenous antibiotic (cefoxitin) was administered for all patients 30 min pre-operatively and for 48 h post-operatively. Oxytocin 10 units intramuscularly twice a day was given post-operatively for about 3 days. A second-look hysteroscopy was performed at 8 weeks to confirm the successful unification of the cavities, to assess and treat potential intrauterine adhesions. The patients were advised not to conceive for 12 months.

The blood loss, duration of operation, and rates of intrauterine adhesions at follow-up were recorded for all patients. In addition, reproductive outcomes, namely conception rate (defined as proportion of women conceiving after 12 months of attempting for a pregnancy), ectopic pregnancy rate, early and late miscarriage rate, preterm labor rate, and term live birth rate were determined at follow-up, along with obstetric outcomes/complications, such as mode of delivery, uterine rupture, intrauterine growth restriction (IUGR), placental abruption, retained placenta, placenta accreta, and placenta previa.

Approximately 32 women (30 women were diagnosed with complete bicorpreal uterus and the other two women were diagnosed with partial bicorpreal uterus) with a mean age of 29.9 ± 3.9 years were included in the present series between 2007 and 2019. All women completed the surgery successfully and no immediate complications were reported. The mean duration of the operation was 143.2 ± 43.8 min, and the median (range) blood loss of the operation was 50 (30–100) mL. At follow-up hysteroscopy 30/32 (93.8%) patients were found to have a satisfactorily unified cavity. About 2/32 (6.3%) patients were found to have intrauterine adhesions, which were successfully divided [Supplementary Table 1, http://links.lww.com/CM9/A397].

A total of three patients were lost to follow-up, two patients did not manage to conceive, and nine patients were still using contraceptive due to less than a year after surgery. However, among patients who attempted conception and were followed-up for at least 1 year (62 ± 56 months) after initial surgery, 14/18 women become pregnant. The mean time from operation to conception was 21 ± 9 months. Among patients achieving pregnancy, 13/14 (92.9%) completed follow-up (ie, data was available until the conclusion of their pregnancy). For these, the rates of ectopic pregnancy, early miscarriage, late miscarriage, preterm labor, and term delivery were 0/13, 0/13, 1/13, 3/13, and 9/13, respectively [Table 1].

All of the new-borns survived. Of the 11 pregnancies resulting in live births delivered by cesarean section, no incidence of uterine rupture, IUGR, placental abruption, retained placenta, or placenta accreta was reported. One of the 12 subjects had placenta previa and was delivered in our center with a good neonatal and maternal outcome.

Our preliminary data suggests that this is a feasible procedure for women with a poor reproductive history, with a favorable reproductive outcomes in subsequent pregnancies. In particular, in the present series, there were no intraoperative complications and a satisfactory unification of the uterine cavities at follow-up hysteroscopy in 30/32 (93.8%) of cases. Furthermore, the conception rates after 12 months were 14/18 with term delivery rates of 9/13, which is comparable to the outcomes of women with unexplained recurrent pregnancy loss received supporting care.[5]

It is worth noting that given the high incidence of cervical weakness in women with uterine anomalies and particularly bicorpreal uterus, in our series six women received a laparoscopic transcervical cerclage and one received a transvaginal cerclage.

Our present report summarizes that the largest series of laparoscopic metroplasty for bicorpreal uterus up-to-date.

Table 1: Reproductive outcomes among 13 women who conceived following laparoscopic metroplasty, n/N.

| Items                                      | Results |
|--------------------------------------------|---------|
| Ectopic pregnancy                          | 0/13    |
| Early miscarriage                          | 0/13    |
| Late miscarriage                           | 1/13    |
| Preterm labor                              | 3/13    |
| Stillbirth                                  | 0/13    |
| Term birth                                  | 9/13    |
| Mode of delivery                                                                          |
| Cesarean section                            | 11/12   |
| Vaginal delivery                           | 1/12    |
| Reproductive complications                  |         |
| Uterine rupture                             | 0/12    |
| IUGR                                        | 0/12    |
| Placental abruption                         | 0/12    |
| Retained placenta                           | 0/12    |
| Placenta accreta                            | 0/12    |
| Placenta previa                             | 1/12    |

IUGR: Intrauterine growth restriction.
Additionally, it provides reassuring data regarding surgical outcomes (ie, blood loss, duration of operation, and rates of intrauterine adhesions), reproductive outcomes (ie, conception rates, ectopic pregnancy rates, early and late miscarriage rates, preterm labor rates, and term live birth rates), and obstetric outcomes (ie, uterine rupture, IUGR, placental abruption, retained placenta, placenta accrete, and placenta previa) [Supplementary Table 2, http://links.lww.com/CM9/A398]. We believe that the encouraging outcomes reported in this series should be of relevance to centers contemplating such procedure in the future.

However, the total number of laparoscopic metroplasties reported in the literature, including our series, is only of 61, of which the information on reproductive outcomes was available among 23 cases. Therefore, further series are required to confirm these preliminary findings.

In conclusion, we believe laparoscopic metroplasty for bicorporal uterus is indeed a feasible substitute to the traditional laparotomic approach. Future prospective trials are required to confirm these preliminary findings.

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Conflicts of interest

None.

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