

Reproductive Outcomes After Hysteroscopic Septolysis: A Single Center Experience

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ABSTRACT

Background: Hysteroscopic septolysis is a minimally invasive procedure aiming at improving reproductive outcomes in symptomatic women; however: the effectiveness of the procedure has been questioned recently. **Aim of study:** this study is designed to evaluate the reproductive outcomes of hysteroscopic septolysis in women diagnosed with partial and complete uterine septa. **Design:** a retrospective case series study. **Setting:** a private infertility treatment center in Annajaf El Ashraf governorate –Iraq. **Population of patients:** All patients proved to have partial or complete uterine septa during a period from February 2022 till April 2024 with variable period of patients follow up. **Patients and Methods:** A prospective case series of 32 patients with a confirmed diagnosis of a septate uterus (both partial and complete) who are undergoing hysteroscopic septolysis in one center in Annajaf AL Ashraf Governorate, Iraq, from February 2020 to August 2024. The study included women aged 18-40 years who attempted to conceive post-operatively. Data were collected through a specified questionnaire, clinical examinations, and relevant investigations. Reproductive outcomes, including the time to conception, pregnancy rates, and pregnancy outcomes abortion, preterm birth, and term live birth, are recorded and analyzed. **Results:** Spontaneous pregnancies occurred in 15.625% of patients, and 40.625% were still on postoperative hormonal treatment. Successful pregnancy was achieved in 43.75% of patients, with 78.6% delivering via cesarean section and 21.4% via vaginal delivery. The majority of successful pregnancies resulted in singleton births (85.8%), with 7.1% twin pregnancies and 7.1% miscarriages. The mean age of participants was 28 ± 3.93 years. The majority (65.6%) had primary infertility, with a mean infertility duration of 6.82 ± 3.80 years. Partial septum was present in 93.75% of cases, while 6.25% had a complete septum. Intraoperative and postoperative complications were minimal. Post-procedure, 43.75% of patients underwent ICSI, with a 64.3% clinical pregnancy rate. **Conclusion:** Hysteroscopic septolysis is a safe and effective procedure for improving reproductive outcomes in women with a septate uterus. The procedure is associated with improved pregnancy rate and outcomes, and with minimal complications, making it a valuable treatment option for women with this congenital anomaly.

Keywords: Hysteroscopic septolysis , Reproductive Outcomes, Spregnancies.

Article Information

Received: October 31, 2025; Revised: November 29, 2025; Online: December 2025

INTRODUCTION

Uterine septum (US) is the most frequently encountered Mullarian ducts congenital malformation⁽¹⁾, accounts for 80% to 90% of all female genital tract congenital malformations⁽²⁾. septa are classified into

complete when they are long enough to reach down up to level of internal cervical os, and incomplete when they end any point above the level of internal os^(3,4). According to the ASRM (American Society of Reproductive Medicine)

guideline of 2016, septate uterus is defined by the presence of an internal fundal midline indentation deeper than 15 mm and by an indentation angle less than 90°⁽⁵⁾, while ESHRE-ESGE (the European Society of Human Reproduction and Embryology European Society for Gynaecological Endoscopy) define septate uterus is any uterus with a normal outline and an internal indentation at the fundal midline exceeding 50% of the uterine wall thickness.⁽⁴⁾ the Congenital Uterine Malformation by Experts (CUME) classifies septate uterus; when the depth of the internal indentation is more than 10mm and the indentation angle is less than 140° or when the indentation-to-wall thickness ratio is greater than 110%⁽⁶⁾.

Fetal loss and adverse pregnancy outcomes like preterm births, prelabour rupture of fetal membranes, fetal abnormal presentations, and intrauterine fetal growth restriction^(7,8), most studies found that hysteroscopic septolysis is the standard care for symptomatic patients⁽⁹⁻¹²⁾; the European Society of Human Reproduction and Embryology (ESHRE), the National Institute for Health and Care Excellence (NICE) and the Royal College of Obstetricians and Gynaecologists (RCOG) do not support the routine use of this procedure^(13,14), these contradictory recommendations rise our interest to test the reproductive outcomes after hysteroscopic septolysis for women diagnosed with either partial or complete US in our current case series.

PATIENTS & METHODS

Study design, setting and data collection time; a prospective case series of 32 patients collected from single private infertility treatment center in Al-Najaf Al-Ashraf Governorate in Iraq operated by one surgeon (Dr. Batool-Alkhalidi), who's MD certified with more than five years' experience in minimal access gynecological surgery during a period from February 2022 till April 2024 with variable period of patients follow up. Study population; symptomatic patient (reported

miscarriage, preterm labour, IVF failure, primary and secondary infertility) whose diagnosed or suspected as partial or complete septum.

All women aged between 18-40 years, diagnosed with congenital US, who underwent hysteroscopic septoplasty hoping to conceive post-operatively were included, while, patients with other uterine malformations, myoma, symptomatic isthmoceles, or prior uterine surgery like myomectomy, patients with significant medical comorbidities (uncontrolled hypertension, diabetes or renal disease) were rolled out of study. Patients were informed about the nature of the study and verbal consent was taken from them, data were collected according to study questionnaire that included the following aspects:

history according to involving demographic information (age, gravida, para, abortion, infertility type and duration), clinical examination were checked according to patient history in case of chronic disease, uterine size, pelvic-abdominal mass, vulval-vaginalcervical inspection, evident abnormalities (vaginal septa, double cervix, palpable vaginal nodule of deep endometriosis), patient investigation were reviewed including their hormonal assay, ovarian reserve, husband semen analysis, hysterosalpingography(HSG), 2-D,3-D transvaginal sonography, patient MRI(if any). Surgical finding (regarding type of septum partial or complete, presence of other pathology like polyps, occluded tubal ostia, endometritis..... etc. were documented, no intraoperative complication reported during this case series; however: incomplete septolysis and other two-session septolysis was needed for two patients. Evaluating the effectiveness of hysteroscopic septoplasty was central to our study, which was addressed by the post-procedure reproductive outcomes documentation.

This tool was designed to chronicle of myriad of outcomes, from the span between procedure and conception to the instances of

full-term live births, preterm labour, miscarriage or other pertinent obstetric complications. Patients preparation, procedure, and postoperative care: Excluding the possibility of pregnancy by negative serum pregnancy test, schedule procedure during the early follicular phase for optimal visualization, typically used general anesthesia, administered prophylactic antibiotics before induction with patient positioning, under aseptic technique, hysteroscopy introduced into uterus through cervix, septum incised from caudal to cephalic direction using cold scissors, at end of procedure, single uterine cavity insured while preserving myometrium, taking tubal ostia visualization in one plane in one panoramic view from internal os level as land mark for complete procedure, normal saline is used for uterine cavity distention in all surgeries.

Copper intrauterine devices (IUD) are inserted for all patients while they are still anesthetized. monitored patients' post-procedure in the recovery room, in wards, pain relief given as required, all patient discharged same day, advised against sexual intercourse, tampon use, and douching for the first week with patient education to recognize complications: excessive bleeding, severe pain, or signs of infection, all patients supplied with contact mobile phone number to answer their enquiries. All participants put on postoperative hormonal therapy with oral estradiol valerate tailed with brief oral progesterone for two months. The first patient recall was two months later for IUD removal and cavity evaluation with 3-D sonography. The follow-up period varies from two years to recent postoperatively while patients are still on hormonal therapy.

Ethical considerations and official approvals

Formal consent was obtained from each patient prior to collecting data, and information was anonymous. Names were removed and replaced by identification codes. All information is kept confidential in a password-

secured laptop and data used exclusively for research purposes. Administrative approvals were granted from Al-Kufa University College of Medicine.

Statistical analysis All data were introduced into Microsoft Excel 16 and statistical analysis were conducted using IBM-SPSS (USA, Chicago) and data were presented in the form of counts, percentage, mean, standard deviation (SD), minimums (Min) and maximums (Max) and presented in the form of tables, charts, or graphs. The normality of the continuous variables was tested using the Shapiro-Wilk test. Student t test was used Normally distributed continuous variables with two categories. The Mann Whitney u test used non-normally distributed continuous variables with two categories. One-way ANOVA test was used for normally distributed continuous variables with more than two categories. The Kruskal-Wallis H test is used for non-normally distributed continuous variables with more than two categories.

RESULTS

The mean age of the cohort is 28 ± 3.93 years, ranging from 20 to 35 years old. Infertility Type: The majority of the sample had primary infertility (PI) 65.6%, with the remaining 34.4% having secondary infertility (SI).

Duration of Infertility:

The mean duration of infertility is 6.82 years, with a standard deviation of 3.80, ranging from 1 to 15 years. Causes of Infertility: 75% of the participants had no identified cause for infertility. PCOS was found in 12.5%, low ovarian reserve at 3.125%, endometriosis at 6.25%, and IVF failure also at 3.125%.

Intraoperative Findings:

Partial septum were noted in 93.75% of surgeries, a polyp and septum in one case (partial septum), and a complete septum in 6.25%. No intra- and post- operative complications reported.

Reproductive outcomes post procedure:

Spontaneous pregnancies occurred in 15.625%, ICSI was performed in 14 cases (43.75%), negative pregnancy test in 35.7%, while 64.3% had successful clinical pregnancy, and 40.625% of participants still on follow up, of 43.75% who conceived, 78.6% delivery by

Caesarean section (CS), and 21.4% delivered normally. The majority of successful pregnancies resulted in a singleton live births (85.8%) and twin pregnancies accounted for 7.1%, miscarriage reported in 7.1%. All the cases born at term.

Table 1: Results summary.

Section	Description	Number/Percentage
Demographics	Mean Age (years)	28 ± 3.93 (20-35)
	Primary Infertility	21(65.6%)
	Secondary Infertility	11(34.4%)
	Mean Duration of Infertility (years)	6.82 ± 3.80 (1-15)
Causes of Infertility	No Identified Cause	24(75%)
	PCOS	4(12.5%)
	Low Ovarian Reserve	1(3.125%)
	Endometriosis	2(6.25%)
	IVF Failure	1(3.125%)
Intraoperative Findings	Partial Septum	30(93.75%)
	Complete Septum	2(6.25%)
Reproductive Outcomes Post Procedure	ICSI Performed	14(43.75%)
	Negative Pregnancy Test	5 (35.7%)
	Successful Pregnancy (Post-ICSI)	9 (64.3%)
	Spontaneous Pregnancies	5(15.625%)
	Follow-up.... Ongoing	13(40.625%)
Successful Pregnancy Outcomes	Successful Pregnancy	14(43.75%)
	Cesarean Section (C/S)	11(78.6%)
	Vaginal Delivery	3(21.4%)
	Singleton Births	12(85.8%)
	Twin Pregnancies	1(7.1%)
	Miscarriage	1(7.1%)
	Term Deliveries	100%

ID	Age	Type of infertility	Duration of infertility	Preop history	Intraoperative findings	Intraoperative Complications	Post op complications	Post op follow up	Reproductive outcome	Mode of delivery	Number Of fetuses	Miscarriage
1	21	1°	6	No cause	Partial septum	-Ve	-Ve	On treatment	-Ve		No	
2	28	1°	9	PCOS OI	Partial septum	-Ve	-Ve	ICSI	+ve	C/S	Singlet on	
3	31	2° P1A1	12	No cause	Partial septum	-Ve	-Ve	No treatment or follow up from the patient				
4	32	1°	11	PCOS OI	Partial septum	-Ve	-Ve	ICSI	-Ve			
5	26	1°	11	No cause	Partial septum	-Ve	-Ve	ICSI	+Ve	C/S	Twin	
6	27	1°	10	No cause	Polyp and septum	2 session septolysis	-Ve	ICSI	+Ve			Missed 8 weeks
7	32	1°	7	Endometriosis	Partial septum	-Ve	-Ve	ICSI	+Ve	C/S	Singlet on	Term delivery
8	30	1°	2	No cause	Partial septum	-Ve	-Ve	ICSI	-Ve		No	
9	24	1°	13	No cause	Partial septum	-Ve	-Ve	No treatment or follow up from the patient				
10	35	1°	15	No cause	Partial septum	-Ve	-Ve	Still on follow up				
11	30	1°	7	No cause	Partial septum	-Ve	-Ve	ICSI	-Ve			
12	25	2° P0A1	1	No cause	Partial septum	-Ve	-Ve	Spontaneous pregnancy	+Ve	VD	Singlet on	Term delivery
13	27	1°	5	Endometriosis Low ovarian reserve	Partial septum	-Ve	-Ve	ICSI	+Ve	C/S	Singlet on	Term delivery
14	34	2° P0A5	10	No cause	Partial septum	-Ve	-Ve	ICSI	-Ve			
15	35	1°	3	No cause	Partial septum	-Ve	-Ve	Spontaneous pregnancy	+Ve	C/S	Singlet on	Term delivery
16	29	2° P0A1	3	No cause	Partial septum	-Ve	-Ve	ICSI	-Ve			
17	27	1°	2	No cause	Partial septum	-Ve	-Ve	Spontaneous pregnancy	+Ve	VD	Singlet on	Term delivery
18	28	2° P0A3	11	Low ovarian reserve	Partial septum	-Ve	-Ve	Spontaneous pregnancy	+Ve	CS	Singlet on	Abortion
19	28	2° P0A1	8	No cause	Complete septum	-Ve	-Ve	Spontaneous pregnancy	+Ve	C/S	Singlet on	Term delivery

ID	Age	Type of infertility	Duration of infertility	Preop history	Intraoperative findings	Intraoperative Complications	Post op complications	Post op follow up	Reproductive outcome	Mode of delivery	Number Of fetuses	Miscarriage
20	22	1°	6	PCOS IO	Partial septum	-Ve	-Ve	ICSI	+Ve	C/S	Singlet on	Term delivery
21	25	2° P0A4	2	No cause	Partial septum	-Ve	-Ve	Still on follow up				
22	27	1°	3	No cause	3 wall septolysis B/L wall metroplasty	-Ve	-Ve	ICSI	+Ve	C/S	Singlet on	Preterm
23	30	2° Preterm P2	8	PCOS IO	Partial septum	-Ve	-Ve	ICSI	+Ve	C/S	Singlet on	Term delivery
24	27	1°	4	No cause	Partial septum	-Ve	-Ve	ICSI	+Ve	C/S	Singlet on	Term delivery
25	30	1°	7	IVF failure	Partial septum	-Ve	-Ve	Still on follow up				
26	23	2° A2	5	No cause	Complete septum	-Ve	-Ve	Still on follow up				
27	20	1°	3	No cause	Partial septum	-Ve	-Ve	Still on follow up				
28	31	1°	7	No cause	Partial septum	-Ve	-Ve	Still on follow up				
29	23	1°	3	No cause	Partial septum	-Ve	-Ve	Still on follow up				
30	31	2° A2	10	No cause	Partial septum	-Ve	-Ve	Still on follow up				
31	25	1°	7	No cause	Partial septum	-Ve	-Ve	Still on follow up				
32	23	2° A6	3	No cause	Partial septum	-Ve	-Ve	Still on follow up				

DISCUSSION

This study is designed to investigate the outcome of hysteroscopic septoplasty and its effect on pregnancy outcome. The current study included 32 patients with a confirmed diagnosis

of a uterine septum, seeking intervention at an IVF clinic. The mean age of these patients was 28 ± 3.93 years, which falls within the reproductive age range most commonly associated with uterine anomalies. Chang et

al⁽¹⁵⁾ highlighted the importance of addressing uterine anomalies in a timely manner to enhance fertility prospects, also found the median age of diagnosis was 30 years with mean age being 30.1 ± 4.2 years. Our study delineates a significant distinction between primary and secondary infertility within the studied group. This distribution is noteworthy as it underscores the diverse fertility challenges faced by women with septate uteri, as women failed to conceive (primary infertility) or had recurrent pregnancy loss with possible occasional pregnancy as these the features of uterine septum as suggested by Spagnol et al⁽¹⁶⁾.

The high prevalence of primary infertility in our cohort aligns with findings from Török et al⁽¹⁷⁾ found that 65% of cases of primary infertility in their study had uterine septum. The mean duration of infertility among the patients was 6.82 ± 3.8 years, highlighting a prolonged struggle with fertility issues. The extensive range of infertility duration, from one to fifteen years, further illustrates the variability in patients' experiences and outcomes when dealing with uterine anomalies. Abuzeid et al⁽¹⁸⁾ had the mean duration of infertility of 2-3 years, this variation dependent non multiple factors first this could be due to patient selection that different between the current and previous studies, secondly this variation highlights the under diagnosis of uterine septum in our community due to delayed use of the diagnostic approaches such as 3D-ultrasound. Different patients cultural believes delay recourse to specialized fertility clinics this inturn delay screening of sub fertile women by diagnostic imaging (HSG and 3D ultrasound) and may be explained by differences among the infertile clinics including initial work up policies in management of infertile couples with lack of agreement on different diagnostic criteria of uterine septum. A significant number of participants had no identifiable cause for their infertility beyond the septate uterus, suggesting that the uterine anomaly may be a primary factor

in their reproductive challenges. Polycystic ovary syndrome (PCOS) and male factors, low ovarian reserve and endometriosis were less common, These conditions could potentially complicate the fertility landscape and should be considered when planning the management of septate uterus patients.

The co-existence of multiple factors contributing to infertility necessitates a comprehensive approach to fertility treatment. In cases where no other cause is identified, the role of the uterine septum as a solitary factor in infertility is underscored, justifying the use of hysteroscopic septoplasty. For patients with additional factors such as PCOS, male factor infertility, or low ovarian reserve, a systematic treatment was provided and the septoplasty was advised as it could be a potential additive factor to infertility, as expected even in cases that had multiple causes of infertility the rate of successful pregnancy was high suggesting that septoplasty have a good impact on improving fertility in women with uterine septum. This result supported by Sevindik et al⁽¹⁹⁾ who studied uterine dimensions and the effect of infertility and found women with small anteroposterior diameter and those with septum had significantly lower fertility rates. Also by the result of Pabuccu et al⁽²⁰⁾ who found women underwent septoplasty for septate uterus had a higher rate of spontaneous pregnancy also higher rate of successful ART.

Our study found that the vast majority of septum cases were partial, while a small number were complete. The prevalence of partial septum observed in our study is in line with the findings by Rikken et al⁽²¹⁾, which did not find a significant difference in live birth rates between women with resected septa and those with expectant management, suggesting that the impact of septum resection may vary depending on the extent of the septum. This highlights the ongoing debate on the benefits of surgical intervention for septate uterus. The rationale for the improved pregnancy rates and reduced

miscarriage rates post-treatment in our study could be attributed to the restoration of normal uterine architecture following hysteroscopic septoplasty. This procedure likely creates a more favorable environment for implantation and reduces the risk of pregnancy complications typically associated with septate uteri.

The significant reduction in miscarriages and increase in term deliveries after treatment observed in our study is also supported by a large body of literature suggesting that septoplasty can effectively reduce the rate of spontaneous abortions and increase live birth rates in patients with a septate uterus. Similar results found by Carrera et al⁽²²⁾, the benefits of hysteroscopic septoplasty were seen in reducing the risk of miscarriage, particularly in patients with complete septa, which may suggest a greater benefit of surgical intervention in complete septum cases. The predominance of partial septum in our cohort might reflect a selection bias where patients with less severe septal anomalies are more likely to seek treatment, or it could suggest that partial septa are more common in the population presenting for fertility treatment. The conclusion that we disagreed with their study believed that a complete septum may work as a bicornuate uterus, and this explained pregnancy completion was more likely with a complete long septum.

The surgical correction of partial septa may be less invasive and may lead to fewer intraoperative and postoperative complications, which could account for the high rate of partial septum cases undergoing septoplasty. Furthermore, complete septa might be associated with a higher risk of uterine scarring or Asherman's syndrome post-surgery, which could affect reproductive outcomes and hence the decision for surgical intervention as suggested by Ludwin et al⁽²³⁾. A large portion of the participants undergoing ICSI, and no serious intraoperative and postoperative complication, however, most patients complained of postoperative pain and abdominal cramps that can be attributed to cervical grasping with

tenuclae or the spasmodic abdominal cramps caused by IUD insertion. All types of pains respond to oral or parenteral simple analgesia (acetamophene). Among the patients, successful pregnancy reported in 53.6% resulted in successful outcomes, while 46.4% did not result in pregnancy. The distribution of outcomes in terms of fetuses was predominantly singleton (66.7%), with a small number of twin pregnancies (6.7%). Among those who got pregnant, a significant majority (81.8%) eventually achieved term delivery, while a minority (18.2%) experienced miscarriage. Recent studies provide context for these findings.

A systematic review and meta-analysis by Noventa et al⁽²⁴⁾ found that untreated septate uterus was associated with lower pregnancy rates and live birth rates and higher rates of spontaneous abortion and preterm labor compared to women without a septate uterus. This suggests that the presence of a septate uterus can significantly impede reproductive success, which aligns with our findings of improved outcomes following treatment. Rikken et al⁽²¹⁾ in their cohort study, however, report that septum resection did not increase live birth rates nor decrease rates of pregnancy loss or preterm birth compared with expectant management. This highlights the ongoing debate on the benefits of surgical intervention for septate uterus. The rationale for the improved pregnancy rates and reduced miscarriage rates posttreatment in our study could be attributed to the restoration of normal uterine architecture following hysteroscopic septoplasty. This procedure likely creates a more favorable environment for implantation and reduces the risk of pregnancy complications typically associated with septate uteri. The significant reduction in miscarriages and increase in term deliveries after treatment observed in our study is also supported by a large body of literature suggesting that septoplasty can effectively reduce the rate of spontaneous abortions and increase live birth

rates in patients with a septate uterus. Similar result was found by Carrera et al ⁽²²⁾.

CONCLUSION

We concluded from our case series study that hysteroscopic septoplasty is safe day case procedure with no serious intraoperative or postoperative complications, with short postoperative recovery and short hospital stay period (2-4) hours. It can be quite important step in improving overall reproductive outcome, especially when being the only cause of intervention, and can be a beneficial additive intervention that may consolidate an established treatment plan.

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