

Reproductive outcomes after hysteroscopic septoplasty and comparison of different surgical techniques: A retrospective cohort study

Histeroskopik septoplasti sonrası gebelik sonuçları ve farklı cerrahi tekniklerin karşılaştırılması: Retrospektif kohort çalışma

Deniz Şimşek¹

Çağrı Güven²

Çağdaş Şahin³

Ali Akdemir³

Ahmet Mete Ergenoğlu³

Ahmet Özgür Yeniel³

Fatih Şendağ³

¹Ahlat State Hospital, Clinic of Obstetrics and Gynecology, Bitlis, Turkey

²Denizli State Hospital, Clinic of Obstetrics and Gynecology, Denizli, Turkey

³Ege University Faculty of Medicine, Department of Obstetrics and Gynecology İzmir, Turkey

Abstract

Aim: Uterine septum affects a large proportion of women, especially patients with recurrent abortion. Hysteroscopic septoplasty is a novel and minimally invasive method for its treatment. Pregnancy rates after hysteroscopy vary in different studies. We aimed to evaluate pregnancy outcomes after hysteroscopic septoplasty and to compare the beneficial effects of different hysteroscopic techniques.

Materials and Methods: Patients undergoing hysteroscopic septoplasty between 2007 and 2013 in Ege University were retrospectively reviewed. Patients' pregnancy outcomes were followed-up by using the university's registry system and telephone interviews. Live birth rates and miscarriages were determined. Different surgical techniques (resectoscope, cold scissors) were compared regarding live birth ratios.

Results: One hundred twenty two patients were included in this study. Ninety-four pregnancies occurred with an overall pregnancy rate of 77%. Seventy nine live births and 15 abortions had occurred. Sixty-six women (54%) gave at least one live birth. Hysteroscopic septoplasty was performed in 72 (59%) and 50 (41%) patients using resectoscope and cold scissors with 5mm hysteroscope, respectively. Forty two (58%) of patients undergoing septoplasty by resectoscope and 24 patients (48%) of patients undergoing septoplasty by cold scissors group had a live birth. There was no statistically significant difference among the pregnancy outcomes of the two surgical techniques.

Conclusion: Hysteroscopic septoplasty is a safe, effective and minimally invasive method for uterine septum treatment. There is no significant difference in the live birth rates according to whether the resectoscope or cold scissors were used. Infertile patients with uterine septum should be offered the option of hysteroscopy which is feasible with low complication rates and high pregnancy rates.

Keywords: Septate uterus, hysteroscopic septoplasty, resectoscope, hysteroscopy, cold scissor.

Öz

Amaç: Uterin septum kadınların büyük bir kısmını, özellikle tekrarlayan düşüğü olan hastaları etkilemektedir. Histeroskopik septoplasti tedavi için yararlı ve minimal invaziv bir tekniktir. Histeroskopi sonrası gebelik oranları değişik çalışmalarda değişkenlik göstermektedir. Çalışmamızda histeroskopik septoplasti sonrası gebelik sonuçları ve farklı histeroskopik tekniklerin yararlı etkilerini karşılaştırmayı amaçladık.

Gereç ve Yöntem: Ege Üniversitesinde 2007-2013 tarihleri arasında histeroskopik septoplasti gerçekleştirilen hastalar retrospektif olarak tarandı. Hastaların gebelik sonuçları üniversite bilgi sistemi ve telefon görüşmeleri ile takip edildi. Canlı doğum oranları ve düşükler değerlendirilmeye alındı. Farklı cerrahi teknikler (rezektoskop, soğuk makas) canlı doğum oranları baz alınarak karşılaştırıldı.

Corresponding Author: Deniz Şimşek

Ahlat State Hospital, Clinic of Obstetrics and Gynecology,
Bitlis, Turkey

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Bulgular: Yüz yirmi iki hasta çalışmaya dahil edildi. Doksan dört gebelik %77 oran ile gerçekleşti. Yetmiş dokuz canlı doğum ve 15 düşük saptandı. Altmış dört (%54) kadın en az bir canlı doğum gerçekleştirmişti. Histeroskopik septoplasti; 72 (%59) hastada rezektoskop, 50 (%41) hastada 5 mm histeroskop ve soğuk makas kullanılarak gerçekleştirildi. Rezektoskop ile işlem gören hastalardan 42'sinde (%58) ve soğuk makas ile gerçekleştirilen hastalardan 24'ünde (%48) canlı doğum gerçekleşti. Cerrahi tekniklere göre canlı doğum oranları karşılaştırıldığında istatistiksel anlamlı fark saptanmadı.

Sonuç: Histeroskopik septoplasti; uterin septum tedavisinde güvenli, yararlı ve minimal invaziv bir yöntemdir. Rezektoskop ve soğuk makas kullanımına göre canlı doğum oranları arasında istatistiksel anlamlı fark saptanmamıştır. Uterin septuma sahip infertil hastalara histeroskopi seçeneği düşük komplikasyon oranları ve yüksek gebelik sonuçları ile önerilebilir.

Anahtar Sözcükler: Uterin septum, histeroskopik septoplasti, rezektoskop, histeroskopi, soğuk makas.

Introduction

Congenital uterine malformations due to Müllerian fusion defects are the most common anomalies of the reproductive system. However, the true incidence and the prevalence of Müllerian duct anomalies are difficult to evaluate as different studies have been conducted on different patient populations, using non-standardized classification systems and diagnostic procedures resulting in widely disparate estimates with a prevalence of 6.7%, 7.3%, and 16.7% in the general, infertile, and recurrent miscarriage populations, respectively (1,2).

A recent review on Müllerian anomalies has reported arcuate uterus as the most common uterine malformation in the general and recurrent miscarriage populations, followed by septate and bicornuate uteri. However septate uterus is the most common anomaly observed in the infertile population, followed by arcuate and bicornuate uteri (2). Other reviews have concluded that septate uterus is the most common anomaly in infertile and recurrent miscarriage populations (3-5).

Septate uterus results from partial or complete failure of the resorption of the uterovaginal septum after fusion of the paramesonephric ducts. Although it is associated with some poor reproductive outcomes and obstetric problems, the involved mechanisms are still the subject of debate. Uterine septum may influence infertility by hindering embryo implantation via ultra-structural mucosal alterations. These changes may cause poor response to oestrogens in the septal mucosa, abnormal placentation, or uncoordinated contractility (6). The association between septate uterus and spontaneous miscarriage is well known, with spontaneous miscarriage rates of approximately 60% (7). Septate uterus is also associated with the worst obstetric outcomes in Müllerian duct anomalies, with overall premature birth and foetal survival rates ranging from 9% to 33%, and 10% to 75% respectively (8-10). Although being suggested as a potential cause of infertility (9,11,12), surgical intervention in all women with septate uterus, including those with no history of adverse pregnancy outcomes, remains controversial (13).

Hysteroscopic metroplasty is the appropriate therapeutic option for septate uterus. It is a minimally invasive technique with shorter operative and hospitalization times and lower morbidity and mortality. After the approval of hysteroscopic metroplasty, laparotomy is no longer preferred for uterine septum treatment.

Hysteroscopic septoplasty is definitely beneficial for achieving conception with pregnancy and live birth rates ranging from 39% to 81% (12,14) and from 26% to 73% (15,16), respectively. There is lack of evidence of prospective randomized studies comparing surgical intervention and no intervention in patients with uterine septum because of ethical reasons. Although numerous studies investigating reproductive outcomes after hysteroscopic septoplasty have been conducted, studies comparing reproductive outcomes in patients who underwent hysteroscopic septoplasty, performed with different surgical instruments (electrosurgery or cold scissors) are limited.

The primary aim of this study was to assess patients' reproductive outcomes after hysteroscopic septoplasty and the secondary aim was to compare patient characteristics and reproductive outcomes achieved with the two different surgical techniques.

Materials and Methods

We retrospectively evaluated all patients admitted from 2007 to 2013 to our clinic in the hospital of Ege University Faculty of Medicine after the approval of the institutional review board of the university. All patients' data were collected through the university's registry system. Data from patients undergoing hysteroscopic resection of the uterine septum were reviewed. A total of 122 patients who had a normal endocrinological evaluation (Follicle Stimulating Hormone on the 2-5th and progesterone levels on the 21st menstruation day) and partners with normal semen analysis were included in the study. Patient characteristics, duration of involuntary childlessness, number of miscarriages, data on surgical operations, intraoperative and postoperative complications were retrospectively reviewed. All patients were telephoned and informed about our study. During the telephone interview, questions were asked about their ability to

conceive after hysteroscopic septoplasty; the time interval between the operation and conception; number of pregnancies, miscarriages, ectopic pregnancies, spontaneous miscarriages; number of live births and information on their gestational week and form of delivery.

The initial diagnosis of septate uterus was made by three-dimensional ultrasound (3D US). All operations were performed in the in-patient surgery department. Uterine septoplasty was performed under general anaesthesia in the follicular phase of the menstrual cycle, usually within seven days after the end of menstruation.

Hysteroscopic septoplasty was performed with resectoscope or scissors. Same operators performed all the operations. The operator chose the operation technique based on the thickness and length of the septum. A 26-French resectoscope (Karl Storz, Tuttlingen, Germany) with a monopolar cutting knife electrode was used with the cutting current set at 50–70 W. After distending the uterine cavity with 5.0% mannitol, the septum was divided in an upward direction until both tubal ostia became equally visible in the resectoscope group. A 5.5-mm hysteroscope (Karl Storz, Tuttlingen, Germany) and scissors were used. Saline was used as a distending medium in the scissors group. Septal incision was carried out using a thinning technique by which incisions were made along each side of the septum alternately, gradually thinning the septum until a remaining short, broad notch was then incised, from one cornual end to the other (17). Prophylactic antibiotics were administered and intrauterine prosthetic devices or hormonal preparations were not used postoperatively. The aim of the procedure was to accomplish a triangular and symmetric uterine cavity, which was achieved in all patients.

Patients without complication were discharged on the same day, returning for a follow-up visit approximately 2 months later for surgical outcome assessment by 3D US.

Variables were described as frequencies, mean \pm standard deviation of the mean, and median with ranges. Differences between groups were analysed using Fisher's exact and Mann Whitney tests and a p-value <0.05 was considered statistically significant. Statistical analysis was performed using the SPSS 21.0 software for Windows.

Results

One hundred and forty patients underwent hysteroscopic septoplasty between 2007 and 2013, of whom 122 were included this study and 18 were excluded due to an anomaly in her partner's semen analysis or additional pelvic pathologies. The mean age was 29.2 ± 5.6 years and mean duration of involuntary childlessness was 5.5 ± 3 years. The median number of miscarriages was one (range 0-7). Hysteroscopic septoplasty was performed with resectoscope in 72 (59%) patients and office

hysteroscope and scissors were used in 50 (41%) patients. Ninety four pregnancies occurred after hysteroscopic septoplasty with an overall pregnancy rate of 77%. Eighteen patients had two pregnancies.

In Table-1 we presented all the pregnancy rates including patients who had more than one pregnancy.

Patients were subdivided into two groups based on delivery of a live born baby or not. Group 1 had 66 patients (54%) with at least one live birth and Group 2 had 56 patients (45%) who did not give live birth. The mean ages of Group 1 and Group 2 were 27.9 ± 5.1 and 31.2 ± 6.1 years, respectively with a statistically significant difference ($p=0.002$). The mean duration of involuntary childlessness was 4.06 ± 2.58 years and 5.6 ± 3.4 years in Group 1 and Group 2, respectively, which significantly differed between the two groups ($p=0.007$). There was no statistically significant difference in the previous miscarriage numbers of these two groups ($p=0.91$).

Table-1. Reproductive Outcomes of 122 Patients Who Underwent Hysteroscopic Septoplasty.

Outcome	Subgroup	Number	Percentage
Total pregnancies		94	77%
Live births	Total	79	84% of total pregnancies
	Full term	61	
	Preterm	18	
Patients having babies	Total	66	55%
	One baby	53 (37 full term, 16 preterm)	
	Two babies	13 (24 full term, 2 preterm)	
Patients with miscarriages	Total	15	15 %
	One miscarriage	8	
	Two miscarriages	2	
	Three miscarriages	3 (and 3 term pregnancies)	
Caesarean section		46	70%

After hysteroscopic septoplasty 76 of 122 patients were able to achieve pregnancy, of these 66 giving a live birth and 10 patients experiencing a miscarriage (Table-2).

Table-2. Number of Patients Achieved Pregnancy.

Outcome	Number	Percent age
Patients undergoing hysteroscopic septoplasty	122	
Total number of patients achieving pregnancy	76	62%
Patients giving live birth	66	54%
Patients having only miscarriage(s)	10	8 %

From a total of 72 patients operated with resectoscope and from 50 operated with office hysteroscope and scissors, 42 (58%) and 24 (48%) had live births, respectively, with no significant difference between the

two operation techniques ($p=0.274$). There were no significant differences between two groups regarding age, duration of involuntary childlessness and miscarriage history. Their comparison is shown in Table-3. Uterine perforation occurred in two patients in the scissors group and pulmonary edema occurred in one patient in the resectoscope group as complications. No mortality had occurred.

The majority of patients underwent caesarean section ($n=46$, 70%). None of the pregnancies were complicated by uterine rupture during the course of the pregnancy or delivery. The mean time interval between uterine septoplasty and the first conception was 11 ± 8 months.

The two patients who having uterine perforation in the scissors group had live full-term births via caesarean section. Similarly, the one patient with pulmonary edema in the resectoscope group had a live birth via caesarean section.

Table-3. Comparison of the Surgical Techniques.

Surgical technique	Scissors	Resectoscope	p value
Number (n)	50	72	
Mean duration of involuntary childlessness (year)	4.9	4.7	0.697
Age (mean \pm std)	29.1 \pm 5.9	29.6 \pm 5.85	0.668
Live birth	24 (48%)	42 (%58)	0.274
Miscarriage (median number) (range)	1 0-8	0 0-6	0.326
Complication	2 uterine ruptures	1 pulmonary edema	

Discussion

Uterine septum affects a large proportion of women but especially those experiencing infertility and miscarriages. The etiology of reproductive failure, i.e. the mechanism that causes early pregnancy loss and infertility is not yet established, and whether septate uterus is a cause of infertility is still a subject of debate. Patients with uterine septum usually can conceive, they can have and unproblematic pregnancy resulting in a live birth but the majority of the patients have missed or spontaneous miscarriage in late first trimester or early second trimester. Thus, we evaluated the time period between unprotected intercourse and operation. World Health Organization has defined this period as involuntary childlessness (18). Furthermore, surgical intervention in all patients with septate uterus presenting no adverse pregnancy outcomes is controversial (13). Although prospective randomized studies comparing pregnancy outcomes in patients undergoing or not undergoing surgical intervention would theoretically

clarify this issue further probably it would not practically be possible due to ethical reasons. Nevertheless, in a study in which reproductive outcomes were evaluated in 102 and 25 patients who accepted and rejected undergoing a hysteroscopic septoplasty, respectively, a significant difference of pregnancy and full-term delivery rates between the groups. Despite the small number of patients who refused surgery and the lack of randomization (9), this is the only study comparing operated and non-operated patients.

Although no consensus exists on the most appropriate diagnostic method; hysterosalpingography, two-dimensional ultrasound, MRI, hysteroscopy and 3D US are widely used for uterine septum diagnosis (5,19-21). 3D US enables and appropriate visualization of both the internal and external contour of the uterine fundus which is useful in the diagnosis of congenital anomalies. Compared with other imaging techniques, the sensitivity and specificity of 3D US are above 90% (22,23). In our study, all patients were evaluated using 3D US before the operation and during the post-operative follow-up. However, we were not able to differentiate between uterine septum and bicornuate uterus in one patient, and had to perform laparoscopy to distinguish between these two anomalies. In our hospital, all the patients with uterine septum were performed 3D US to identify the uterine fundus appropriately and the length of the septum and the distance between the uterine serosa and transvers plane extending between tubal ostiums. Metroplasty could be performed under laparoscopic vision, intraoperative transrectal ultrasonography (24) or abdominal ultrasound guidance (25) to avoid uterine perforation. In our study, we did not need to use any of these additional procedures. Recently, Malik et al. (25) represented a new hysteroscopic septoplasty technique using MyoSure Tissue Removal System. This is a novel technique used to treat submucous fibroids and polyps. However authors have showed that it could also be used for septoplasty.

The suggested conventional surgical intervention for septate uterus was transabdominal metroplasty as Strassman operation (27), but it has been replaced by hysteroscopy because of the former's high complication rates associated with postoperative adhesions potentially leading to infertility. Resectoscope and scissors are the mostly preferred techniques to perform uterine septoplasty. These techniques differ from each other by distending media, cervical dilatation and need of general anaesthesia. However, the experience of the surgeon is the most important factor in choosing the technique. In our study the operator chose the operation technique based on the thickness and length of the septum.

Hysteroscopic metroplasty obviously benefits pregnancy outcomes nevertheless different techniques have not

been compared circumstantially. In a study, authors had compared resectoscope and cold scissors on pregnancy outcomes. They determined more pregnancies by cold scissors however they included only 70 patients and only 17 of them were operated by scissors (28). In another study authors stated the benefit of metroplasty on pregnancy rate regardless of the technique yet, the weakness of the study was the lack of equal distribution among the groups including 102 patients (29). Our study is unique in evaluating the pregnancy outcomes and comparing the techniques. There were 72 patients in the resectoscope group and 50 in the scissors group. The number of the included patients was one of the largest among relevant studies in the literature. The two groups did not have a statistically significant difference in pregnancy outcomes and live birth rates.

In our study, the overall pregnancy rate after hysteroscopic septoplasty was 77% and sixty-six of 122 patients (55%) had at least one live birth, similar to already published results (27). However, fifty-six (45%) patients were not able to have live birth after hysteroscopic septoplasty. There was a significant difference in age and involuntary childlessness duration between patients who had a live birth and patients who did not have a live birth. Older age adversely affected pregnancy rates after hysteroscopic septoplasty. Although we found no difference in pregnancy outcomes and history of miscarriage before hysteroscopic septoplasty, in a recent study authors stated that women with a history of recurrent miscarriages had a significantly higher pregnancy rate after uterine septoplasty compared to women without a history of recurrent miscarriages (30). Extra-uterine pathologies, including endometriosis, uterine receptivity and quality of oocyte may have played a role in the fecundity of the patients.

Despite the simplicity and minimal intraoperative and postoperative morbidity of the hysteroscopic approach, uterine perforation and pulmonary edema were two notable complications in our study, but no mortality occurred. Women undergoing hysteroscopic septoplasty are known to have a higher risk of uterine rupture in a subsequent pregnancy. In a recent study, a total of 14 cases of uterine rupture occurred after hysteroscopy (31), but none of our patients experienced uterine rupture during their pregnancies. It is possible that higher Caesarean section rates may have reduced the risk of uterine rupture in our study. Caesarean section was not recommended to any of the patients, however most of the patients' decision was Caesarean section due to fear and anxiety of harming the baby.

Conclusion

Hysteroscopic septoplasty appeared to be a safe and effective method resulting in subsequently high pregnancy rates. No significant difference was observed between the use of resectoscope and scissors to conduct the procedure. Experience of the surgeon is the most important factor in choosing the technique. All patients, including asymptomatic women with incidentally diagnosed uterine septum, should be informed in detail and thoroughly on its possible adverse effects on pregnancy and that it can cause infertility and missed miscarriages. The option of an operation should be kept in mind especially for women who want to conceive unless they have a history of adverse reproductive outcomes. Metroplasty with hysteroscopic cold scissors which is a less invasive technique should be primarily performed

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