

Clinical effectiveness of Strassman operation in the treatment of bicornuate uterus

Efektywność kliniczna operacji Strassmana w leczeniu pacjentek z macicą dwurożną

Rechberger Tomasz, Monist Marta, Bartuzi Aleksandra

II Katedra i Klinika Ginekologii Uniwersytetu Medycznego w Lublinie

Summary

Objective: To evaluate the impact of conventional metroplasty on the reproductive outcome of symmetric uterine anomalies and to determine the complications of this procedure.

Material and methods: A prospective clinical analysis of 13 consecutive women who underwent classical abdominal metroplasty according to Strassman technique in II Dept. Obstet&Gynecol in Lublin from April 2001 till January 2008.

Results: The fetal survival rate increased from 0% before surgery to 80% after the operation. No intraoperative and postoperative complications were observed as well as no uterine rupture and other intrapartum complications were noticed.

Conclusions: Conventional transabdominal metroplasty seems to be a safe and efficient procedure in women with symmetric uterine anomalies – class IV AFS. Even in the era of operative hysteroscopy, transabdominal metroplasty remains the only approach in cases of bicornuate uterus.

Key words: **uterus - surgery / safety / treatment outcome /**

Streszczenie

Cel pracy: Ocena wpływu klasycznej metroplastyki sposobem Strassmana u pacjentek z macicą dwurożną w aspekcie jej bezpieczeństwa oraz efektywności klinicznej.

Materiał i metodyka: Prospektywna analiza 13 pacjentek u których wykonano klasyczną przezbrzuszną metroplastykę sposobem Strassmana w okresie od kwietnia 2001 do stycznia 2008.

Wyniki: Przeżywalność płodów wzrosła od 0% przed operacją do 80% po operacji. Nie stwierdzono żadnych istotnych powikłań śród- i pooperacyjnych. U żadnej z operowanych nie zaobserwowano pęknięcia macicy oraz innych powikłań śródporodowych.

Adres do korespondencji:

Tomasz Rechberger
II Katedra i Klinika Ginekologii Uniwersytetu Medycznego w Lublinie
20-054 Lublin
ul. Jaczewskiego 8
e-mail: rechbergt@yahoo.com

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Rechberger T, et al.

Wnioski: Klasyczna przezbrzuszną metroplastyka jest bezpieczną i wysoce efektywną klinicznie operacją u kobiet z macicą dwurożną – klasa IV AFS. Nawet obecnie, przy wysoce rozwiniętych technikach histeroskopowych, przezbrzuszną metroplastyka jest jedynym rozsądnym rozwiązaniem w przypadkach niepowodzeń położniczych u pacjentek z macicą dwurożną.

Słowa kluczowe: **macica – operacje / bezpieczeństwo / efektywność kliniczna /**

Introduction

Müllerian abnormalities are not infrequently encountered in an obstetrician–gynecologist practice. These include the miscellaneous group of anomalies that result from the abnormal formation, incomplete fusion, or arrested development of mesonephric ducts. The prevalence rate of müllerian duct anomalies are difficult to assess because it is strongly dependent on analyzed population and range from 0.16% to 10% [1, 2, 3, 4].

The frequency of 0.4% has been found in women being evaluated with ultrasonography [1], while occurrence rate as high as 10% has been reported among patients with recurrent pregnancy loss [4, 5]. It should be stressed that majority of women with müllerian duct anomalies have little or even no problem conceiving, while they experience higher rates of spontaneous abortion, premature delivery, abnormal fetal lie and dystocia at delivery associated with uterine abnormality [6, 7]. Several studies approximate the frequency of associated reproductive problems for patients with müllerian abnormalities for around 25%, whereas the general population has estimated rate more than twice lower (around 10%) [7, 8].

However usually primary infertility in these women has an extrauterine cause and is not considered as attributable to müllerian duct anomalies alone [9]. The majority of müllerian duct anomalies are considered to be sporadic or multifactorial in nature; however, several underlying causes are taking into consideration: the insufficient production of antimüllerian hormone within the fetal gonads, lack of estrogen receptors within the Müller ducts, teratogens and improper apoptosis due to mutation of Bcl2 gene [10]. First clinical classification of müllerian duct anomalies based on the degree of failure of normal development was published in 1979 [6]. This classical work of Buttram and Gibbons was later modified in 1988 by a subcommittee of the American Fertility Society [11].

This widely accepted clinical classification remains the most popular tool to describe uterovaginal anomalies and recognize VII classes of abnormalities:

- Class I anomalies consist of segmental agenesis and variable degrees of uterovaginal hypoplasia.
- Class II anomalies are unicornuate uteri that represent partial or complete unilateral hypoplasia.
- Class III is composed of uterus didelphus in which duplication of the uterus results from complete nonfusion of the müllerian ducts.

- Class IV anomalies are bicornuate uteri that demonstrate incomplete fusion of the superior segments of the uterovaginal canal.
- Class V anomalies are septate uteri that represent partial or complete nonresorption of the uterovaginal septum.
- Class VI anomalies are arcuate uteri that result from near complete resorption of the septum.
- Class VII anomalies comprise sequelae of in utero DES exposure.

From the clinical point of view it is important to recognize that the American Fertility Society classification system is a framework for the description of anatomical anomalies which enables proper communication between clinicians, and what is also of critical importance for comparison among various therapeutic modalities. Based on symptoms associated with given abnormality we introduced our own classification of therapeutic surgery in patients with congenital abnormalities of the utero-vaginal canal [12]. We divided all the operations performed due to müllerian abnormality into III classes:

Class I – surgery is imperative because of pain and discomfort (transverse vaginal septum, cervical agenesis, rudimentary non-communicating uterine horn with active *endometrium*, unperforated hymen – it should be stressed that this!!! pathology could not be classified according to AFS classification system since hymen doesn't arise from müllerian ducts.

Class II – surgery influencing woman quality of life – creating a neovagina in patients with Rokitansky syndrome and

Class III – surgery due to associated reproductive problems – hysteroscopic surgery among women from class V AFS and classical abdominal metroplasty in patients from group IV and III AFS.

Recently, a recommendations of Polish experts has been published concerning treatment modalities due to certain pathology during pregnancy and in the section dedicated uterine anomalies the panel stated that in cases of bicornuate uterus (class IV AFS) hysteroscopy is not advocated but classical "open" metroplasty has very little clinical effectiveness?! [13].

Therefore the aim of our clinical study was to reevaluate the clinical effectiveness of "open" Strassman metroplasty in patients with bicornuate uterus – class IV AFS.

Material and methods

From April 2001 till January 2008 thirteen patients aged from 22 to 39 mean age 29 ± 4.96 underwent Strassman metroplasty due to bicornuate uterus in our department. Diagnosis was based on preoperative HSG and confirmed by USG and additionally verified during laparotomy based on the contour of uterine body. Therefore only patients from group IV AFS were included into the study group.

One patient was lost of follow up and therefore only twelve cases will be analyzed. There had been occurred 19 late spontaneous/recurrent abortions and 1 preterm delivery in whole group before operation. The average operation time was 54 ± 23.9 minutes. No intraoperative and postoperative complications were observed as well as no uterine rupture and other intrapartum complications were noticed.

After surgery two patients aborted pregnancies in 8 and 9 weeks, which probably was unrelated to previous uterine pathology.

Two patients did not conceive after the operation whereas eight delivered term babies (one patient twice). That gives efficacy of 66.7% in terms of successful pregnancy outcome. When we exclude two patients, who did not conceive after metroplasty, the efficacy rate is 80.0%. (Table I).

Discussion

For proper diagnosis of bicornuate uterus (class IV AFS) the configuration of the external uterine contour is crucial, because widely different clinical interventions are assigned to each anomaly [14]. (Figure 1).

A septate uterus (class V AFS) is often treated with hysteroscopic resection of the septum, while bicornuate uteri, in cases of repeated pregnancy losses, might be effectively treated with Strassman metroplasty with wedge resection of the medial aspect of each uterine horn and subsequent unification of the two cavities [16].

It should be stressed that diagnostic accuracy of HSG alone (utilizing the angle between two horns) is only 55% for differentiation of septate from bicornuate uteri [17]. An angle of less than 75° is suggestive of a septate uterus while an angle of more than 105° is more consistent with bicornuate uteri [17, 18]. (Figure 2).

It has been proved that accuracy of USG in conjunction with HSG enables correct diagnosis in 90% of cases [17, 19]. A 100% accuracy in proper diagnosis of given müllerian anomaly could be obtained by using MRI and this modality should be always employed in any doubtful cases, especially before planned surgery [20, 21]. In the literature there is bulk of evidence suggestive for clinical efficacy of Strassman operation in class IV AFS uterine anomaly. The reproductive outcome in 22 women with a bicornuate uterus who underwent Strassman metroplasty was reported by a Greek team [22].

Among women who had metroplasty, 88% achieved pregnancies that ended with the birth of a viable infant. A total of 19 infants were born and the "take-home-baby" rate was 100% for the first postoperative pregnancy. A retrospective clinical analysis of 157 consecutive women with a subseptate, septate or bicornuate uterus and history of recurrent abortions (124 cases) or infertility (33 cases) who underwent surgery during a 25-year period was reported by Papp et al [23].

The fetal survival rate increased from 0.0% before surgery to 81.9% postoperatively in the recurrent abortion group and to 92.8% in the infertility group. On the other hand Heinonen evaluated reproductive performance in 404 women (247 had complete or partial septate uterus or partial bicornuate uterus) with a confirmed uterine anomaly treated by abdominal or hysteroscopic metroplasty, or by no surgical procedure [24].

Hysteroscopic metroplasty was performed in 32 patients with septate or subseptate uterus. Twenty women underwent classical abdominal metroplasty and 140 had no operative treatment.

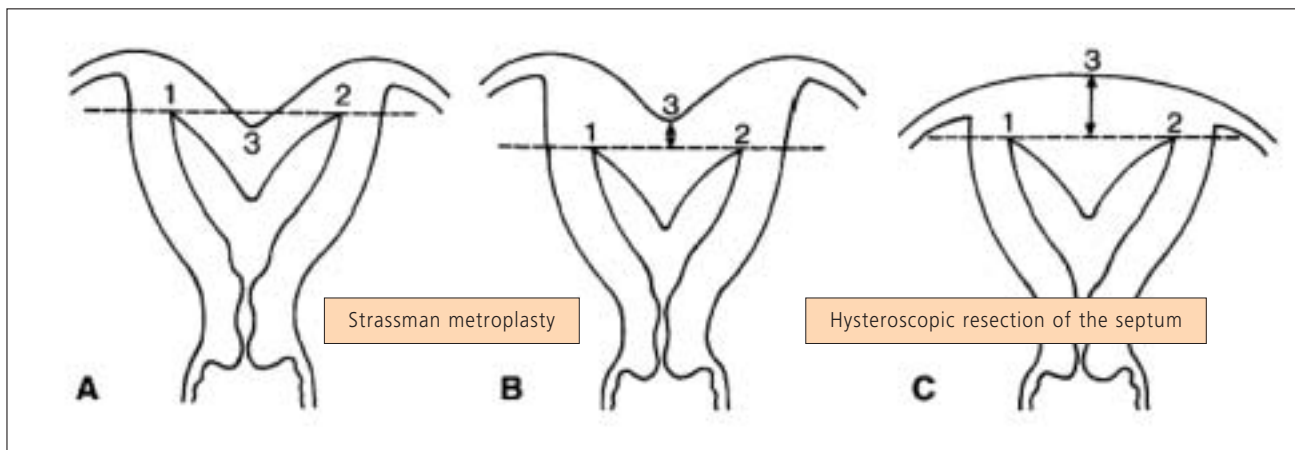
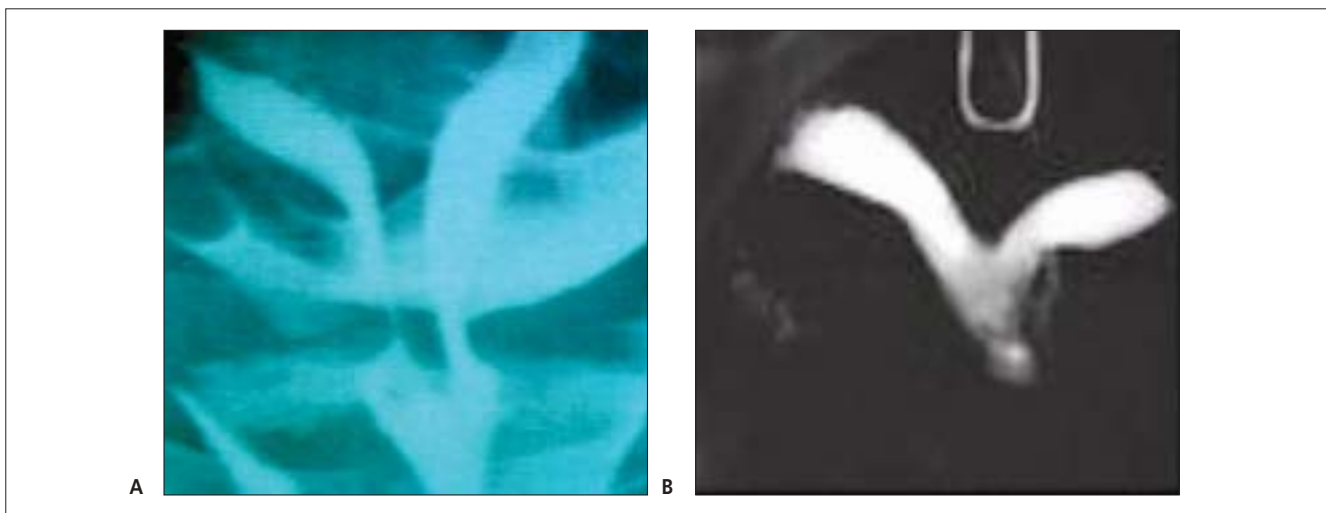


Figure 1. Classification criteria for USG differentiation of septate from bicornuate uteri.
A – when apex (3) of the fundal external contour occurs below a straight line between the tubal ostia (1, 2) or,
B – 5 mm (arrow) above it, the uterus is bicornuate.
C – when apex is more than 5 mm (arrow) above the line, uterus is septate.
 It is obvious that hysteroscopic resection is possible only in case C, while in case A and B classical metroplasty (if necessary) should be performed [modified from 15]

Table I. Clinical outcome after Strassman metroplasty.

Patient	Before Strassman metroplasty			After Strassman metroplasty		
	Age	Spontaneous abortion	Recurrent abortions/preterm deliveries	Preterm delivery	Births	Postoperative abortion
1	24	-	3	-	1	-
2	24	1	-	-	-	-
3	22	1	-	-	2	-
4	39	-	3	-	1	-
5	27	1	-	-	-	1 (9 weeks)
6	32	1	-	-	1	-
7	36	-	2	-	-	1 (8 weeks)
8	28	2	1	-	-	-
9	29	1	-	-	1	-
10	29	-	-	-	1	-
11	29	-	4	-	1	-
12	29	-	-	-	1	-
13	35	-	-		Lost of follow up	

**Figure 2.** HSG differentiation between septate and bicornuate uteri.

A – An angle of less than 75° between uterine horns is suggestive for a septate uterus.

B – An angle of more than 105° between uterine horns suggests bicornuate uteri.

Fetal survival improved from 13% to 91% after hysteroscopic metroplasty and from 3% to 86% after the abdominal procedure. A living child was born in 67% of 264 pregnancies in 116 women with septate uterus with no surgical treatment. When 19 patients with hysteroscopic metroplasty were matched by age, gravidity, and type of uterine anomaly with 19 women not subjected to metroplasty, the rates were 86% and 68%, respectively ($p=0.089$). In another study fifteen patients with double uterus (13 septate and two bicornuate) and three with T-shaped uterine cavities after diethylstilbestrol

exposure were evaluated after abdominal metroplasty (Jones or Strassman techniques) [25]. Thirteen of 16 patients attempting pregnancy conceived and delivered postoperatively. The fetal wastage rate decreased from 87.9 percent before metroplasty to 9.1 percent after metroplasty. Based on these results authors concluded that abdominal metroplasty (Jones or Strassman techniques) continues to yield gratifying results in patients with bicornuate, T-shaped and septate uteri and for the bicornuate condition still remains the only reasonable approach.

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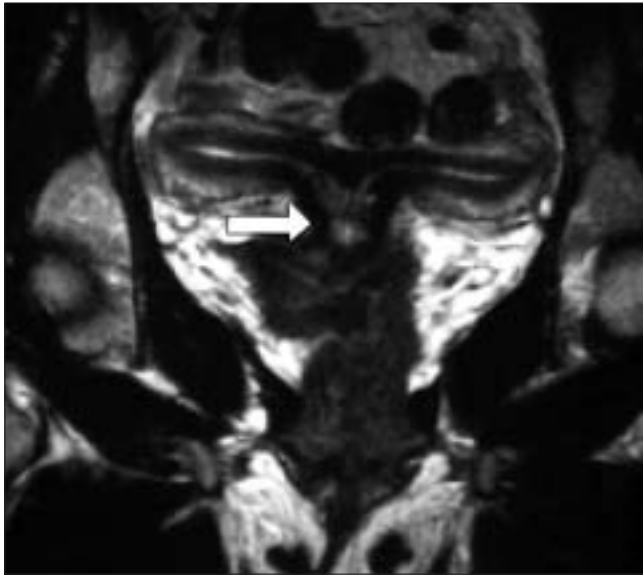


Figure 3. MRI image of bicornuate uterus – (class IV AFS). The arrow indicates the partial fusion of both uterine horns in the lower uterine segment. Note that the angle between both uterine horns is close to 180°.

In another series of 102 women with symmetrical müllerian anomalies the fetal survival rate has increased from 3.7% before operation to 75.0% afterwards however in two patients uterine rupture was observed [26]. Surgical intervention for müllerian anomalies is definitely indicated in women with pelvic pain, endometriosis, obstructive anomalies, recurrent pregnancy loss, and preterm delivery. Open surgery remains the only major intervention for uterine anomalies class III and IV (uterus didelphus and bicornuate) whereas the uterine septum is preferentially managed with a hysteroscopic procedure. Controversies still exist concerning management in infertile women with müllerian, especially uterine, anomalies [27].

Based on our own results as well as on the literature data we can not agree with the statement of experts that abdominal metroplasty is of little clinical value in the treatment of class IV AFS symmetrical uterine anomalies and therefore we propose to revise this recommendation [13].

Conclusion

Conventional transabdominal metroplasty seems to be a safe and efficient procedure in surgical treatment of women with symmetric uterine (class IV AFS) anomalies. Even in the era of operative hysteroscopy, transabdominal metroplasty remains the only approach in patients with recurrent pregnancy loss due to bicornuate uterus.

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