

Hysteroscopic removal of uterine cysts in mares II – Follow-up and long term fertility analysis with regard to patho-histological findings

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Summary

Uterine cysts are a common finding during routine transrectal ultrasound examination, often associated with reduced fertility. The aim of this study was to analyse long term fertility of mares after hysteroscopic cyst removal regarding to patho-histological findings. In this study 251 transendoscopic intrauterine surgeries have been performed in 222 barren mares with uterine cysts during the last 11 years. Postoperative endometrial biopsy samples were taken in 83.6% (210/251) of the cases and were analysed and classified according to *Kenney and Doig* (1986). Pregnancy outcome of 74% of treated mares is known. A postoperative pregnancy rate of 79% (146/184) could be achieved. Especially in mares having biopsy category II b and III good pregnancy rates (70%/69%) could be reached. Cyst recurrence rate in years following treatment was 33.8% (60/177). We conclude that long term fertility can be improved after endouterine surgery, especially in mares having biopsy category II b and III.

Keywords: Uterine cysts, hysteroscopy, fertility, endometrial biopsy, mare, reproduction

Hysteroskopische Entfernung endometrischer Zysten bei der Stute II – Verlaufsuntersuchung und langfristige Fertilitätsanalyse unter Einbeziehung histopathologischer Befunde

Im Rahmen der gynäkologischen Untersuchungen bei Stuten können Endometriumzysten nicht selten im ultrasonographischen Befund festgestellt werden. Diese sind mit einer reduzierten Fertilität assoziiert. Ziel dieser Studie war es, die Fertilität von Stuten nach hysteroskopischer Entfernung von Endometriumzysten unter Berücksichtigung der patho-histologischen Ergebnisse entnommener Uterusbiopsien zu untersuchen. Dazu wurden die Ergebnisse von 251 Stuten nach endouteriner Operation zur Zystenentfernung nachverfolgt. Postoperative Endometriumbiopsien konnten von 83,6% (210/251) Stuten entnommen werden. Diese wurden patho-histologisch untersucht und nach einem Klassifizierungsschema (*Kenney und Doig* 1986) bewertet. Nach Besitzerumfrage konnten von 74% der Stuten Informationen über die weitere Fertilität erhalten werden. Nach dem hysteroskopischen Eingriff konnte eine Gesamtträchtigkeitsrate von 79% erzielt werden. Insbesondere bei Stuten mit deutlich chronisch degenerativen Veränderungen im Bereich des Endometriums (Kategorie II b /III) konnten gute Trächtigkeitsraten (70%/69%) erzielt werden. Rezidive von uterinen Zysten konnten in den folgenden Jahren bei 60/177 Stuten (33,6%) festgestellt werden. Zusammenfassend stellt die hysteroskopische Entfernung von Uteruszysten ein wertvolles Therapeutikum mit deutlicher Verbesserung der Fertilität dar.

Schlüsselwörter: Gebärmutterschleimhautzysten, Hysteroskopie, Fertilität, Endometriumbiopsie, Stute, Reproduktion

Introduction

Uterine cysts result from chronic degenerative changes in the endometrium leading to periglandular fibrosis, glandular lumen restriction and blockage of endometrial lymph drainage vessels following angiosclerosis. In 1986, *Kenney and Doig* proposed a four-category (I-III) additive prognostic system for uterine biopsy analysis. The expected foaling rates are approximately 80-90% in category I, 50-80 % in category IIa, 10-50% in category IIb and under 10% in mares with category III.

Despite their potential indication of significant underlying endometrial pathology the relationship between presence of uterine cysts and fertility is still unclear and discussed controversially (*Ley et al.* 2002). While some authors assume that uterine cysts do not affect fertility in mares (*Eilts et al.* 1995), other authors observed a history of 10% lower fertility in mares with uterine cysts (*Leidl et al.* 1987) or significantly

lower pregnancy rates at day 14 and 40 in mares with cysts (77.6% and 71.4%) compared to mares without cysts (91.3% and 88%) (*Tannus and Thun* 1995). Although the presence of uterine cysts is no definitive hindrance for pregnancy (*Leidl et al.* 1987), they directly influence transuterine migration of the conceptus between days 6 and 17 after ovulation and lead to a reduction of total area of microcotyledonary contact resulting in lower fertility (*Allen et al.* 1997). Therefore it is recommended to remove large or numerous cysts in mares with a history of reduced fertility or in mares that lost pregnancy in absence of cytological or bacteriological evidence of acute endometritis (*Bartmann et al.* 1997).

Following Nd:YAG laser ablation of endometrial cysts in 22 barren mares having biopsy scores of between IIa and III 78% (14/18) conceived in the subsequent season and 61% (11/18) gave birth to a live foal (*Allen et al.* 1997). *Bartmann et al.* (1997) achieved a 66% (44/66) pregnancy rate in controlled mares after hysteroscopic electro surgery.

Materials and Methods

During the last 11 years (January 1996-December 2006) hysteroscopy and transendoscopic surgery have been performed in 222 non pregnant mares with uterine cysts with the hysteroscopic surgical technique described by *Bartmann et al.* (2008).

All mares included in this study had histories of reduced fertility for one or more years. Without any other obvious gynaecological problem including acute endometritis they did not become pregnant or were not able to maintain pregnancy.

All mares underwent a complete gynaecological examination including sonography, and uterine endoscopy with the objective of documentation of number, localisation, and type of endometrial cysts. Following the surgical procedures, a uterine biopsy was taken out of the uterine body in 210 cases, was analysed by a standard histological method (*Schoon et al.* 1992) and was classified into grade I, IIa, IIb, III according to *Kenney and Doig* (1986). Mare owners were asked to give a case history including the age of mare, number of foals, year of last foaling and years of barrenness. In all mares pregnancy rates and endometrial cyst recurrence were determined by telephone from the owners.

Results

During 11 years intrauterine cysts were diagnosed in 244 mares during gynaecological examination. 222 mares underwent endouterine surgery using hysteroscopy for intrauterine cysts removal. Treated mares were warmblooded horses (123) of different breeds, 73 English and 11 Arabic thoroughbred horses, three trotter and one Frisian horse, pony, Quarter horse and Russian horse each. From eight horses breed is not known. Twenty-five of the 222 mares were undergoing two and four of those mares also a third session of hysteroscopy in different years. Most mares (211) were treated as coming in patients and went home the same day. Mares that were hospitalised longer in the clinic ($n = 40$) were treated for another problem or were presented in oestrus necessitating induction of ovulation. Most surgeries (175/251) were performed from November to April, at the beginning of the season. Table 1 shows the proportioning of the age of the mares.

Postoperative endometrial biopsy samples were taken in 210 of 251 (83.6%) cases. In five of these samples a classification was not possible because the material was taken out of the cervix (4) and one biopsy was damaged. According to patho-histological classifications and clinical findings (time of barrenness, occurrence of endometrial cysts) the following results of 205 biopsies were obtained: Category I: 8.7% ($n = 18$), category II a: 34.1% ($n = 70$), category II b: 35.6% ($n = 73$), category III: 21.4 % ($n = 44$). Patho-histological categories in respect to the age of mares is showing table 2.

Pregnancy rates and recurrence of cyst development

Pregnancy outcome of 74% of mares (185 / 251 surgeries) is known. 146 mares of those 185 mares (79%) became pregnant at least the following breeding season after removal of endometrial cysts. 39 mares did not. The number of pregnancies regarding to the age is shown in table 3.

Regarding to the patho-histological classification the following pregnancy rates could be observed: category I: 85%, category II a: 83%, category II b: 70%, category III: 69%. Pregnancy outcome in respect to endometrium classification ($n = 185$) is shown in table 4. There was information from 177 of 251 treatments about cyst recurrence. In the next or consecutive years following treatment 60 out of 177 mares (33.8%) showed intrauterine cysts again.

Discussion

Uterine cysts are commonly diagnosed during routine ultrasound examination. They are thought to be more frequent in older and multiparous mares (*Leidl et al.* 1987, *Merkt et al.* 1991) but have been found in the current study in 15 mares under 10 years of age.

Endometrial cysts can histologically be differentiated into glandular cysts, lymphangiectasies, lymph cysts and phlebotasies (*Schoon et al.* 1993). Etiopathogenesis of endometrial cysts is not completely understood yet, but pregnancy-induced angiopathies (*Grüniger et al.* 1998) and decrease in lymph drainage are having a special signification (*Schoon et al.* 1993).

Patho-histological examination of uterine biopsies from 205 mares with uterine cysts showed a higher percentage of chronic degenerative changes (endometrosis, angiosclerosis) than showing signs of endometritis. This can not be seen in the classification of *Kenney and Doig* (1986) because angioscleroses are not included.

All mares undergoing endouterine surgery in the clinic had a history of reduced fertility for one or more years. All other gynaecological problems as endometritis or poor genital conformation had been treated before. After endouterine surgery a pregnancy rate of 79% (146/185) could be achieved within the current or following breeding season. From this follows that contrary to other studies (*Eilts et al.* 1995) uterine cysts do have a wide negative influence on fertility and we concluded that fertility of mares can be improved following endouterine surgery.

The pregnancy rates in barren mares treated with endouterine surgery are comparable to those of a normal mare population (*Flüge* 1984) and especially in mares with moderate to severe chronic degenerative changes and biopsy classification of II b and III remarkable good pregnancy rates (70%

Table 1 Age of mares with surgically treated endometrium cysts (surgeries $n = 251$). *Altersverteilung der Stuten nach operativer Entfernung von Uteruszyste (251 Eingriffe)*

Age in years	5-10	11-15	16-20	20-26
Number of mares	15	89	121	26

Table 2 Patho-histological classification of mares of various age groups with endometrium cysts (n=205). *Patho-histologische Klassifizierung der einzelnen Altersgruppen mit Endometriumzysten (n=205).*

Age	Category (Kenney and Doig 1986)			
	I	Ila	Ilb	III
5-10	1	6	1	4
11-15	10	31	25	8
16-20	7	30	38	23
> 20	0	3	9	9
Total	18	70	73	44
%	8.7	34.1	35.6	21.4

Table 3 Number of pregnancies regarding to the age (n=185). *Anzahl der Trächtigkeiten im Bezug auf die Altersverteilung.*

Age	5-10	11-15	16-20	21-26	total
Number pregnant mares	8	48	74	16	146
Number non pregnant mares	4	16	17	2	39

Table 4 Number of pregnancies in respect to the classification of the endometrium (n= 185). *Anzahl der Trächtigkeiten in Bezug auf die patho-histologische Klassifizierung der Endometriumbiopsien (n=185).*

Category	I	Ila	Ilb	III	no biopsy	total
Number pregnant mares	11	44	38	24	29	146
Number non pregnant mares	2	9	16	6	6	39
Total	13	53	54	30	35	185

and 69%) could be reached. However, no information can be given about the resulting foaling rate which is the fertility parameter of the Kenney and Doig (1986) system. The expected foaling rate according to category II b is 10-50% and to category III lower than 10% (Kenney and Doig 1986). In this study there was a cyst recurrence rate of 33.8% (60/177). Due to the aetiology of the underlying angiosclerosis ("pregnancy-sclerosis") it can be supposed that more than 33.8% of mares could show new endometrial cysts after treatment again. Nevertheless a yearly or follow-up treatment in mares with cyst recurrence is possible and advisable.

In summary, we have established hysteroscopic endouterine surgery for uterine cyst removal as a standard procedure in our hospital and believe it to be of great therapeutic value in the equine gynaecologic patient. Although, any treatment of uterine cysts needs to be recognised as a symptomatic therapy of an underlying angiosclerosis.

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