Evaluation of pregnancy and foaling rates after reduction of twin pregnancy via transvaginal ultrasound-guided aspiration in mares

Jutta Klewitz, DVM, Dr med Vet; Natali Krekeler, DVM, Dr med Vet, DACT; Florian Ortgies, DVM, Dr med Vet; Antje Heberling, DVM, Dr med Vet; Corinna Linke, DVM, Dr med Vet; Harald Sieme, DVM, Dr med Vet, Dr habil

Objective—To assess pregnancy and live foaling rates after reduction of twin pregnancy via transvaginal ultrasound-guided aspiration (TUA) in mares and evaluate effects of gestational period, localization of conceptuses, fluid aspiration volume, and combination of TUA with embryonic or fetal puncture on these outcomes.

Design—Clinical trial.

Animals—44 mares pregnant with twins (25 to 62 days of gestation).

Procedures—TUA was performed in all mares and combined with embryonic or fetal puncture in 13. Follow-up ultrasonographic examinations were performed by referring veterinarians. Effects of gestational period and TUA-related variables on pregnancy and foaling rates were assessed.

Results—Singleton pregnancy (32/44 [73%]), persistent twin pregnancy (3/44 [7%]), or loss of both conceptuses (9/44 [20%]) was confirmed 5 to 7 days after TUA. Two mares with persistent twin pregnancy underwent another TUA, and 1 underwent prostaglandin F₂α-induced abortion; these were excluded from subsequent analyses. Eighteen of 24 mares reevaluated 3 to 4 weeks after TUA were pregnant with 1 conceptus. Twenty of 41 (49%) mares delivered live singleton foals. Gestational period of TUA did not affect early pregnancy rates. Foaling rate for mares that underwent TUA after day 42 (0/5) was lowest of all groups and was significantly lower than that of mares that underwent TUA between days 31 and 35 (9/14). Three of 13 mares that underwent TUA with embryonic or fetal puncture delivered live foals, compared with 17 of 28 that underwent TUA alone. Effects of other variables were nonsignificant.

Conclusions and Clinical Relevance—TUA was effective for reduction of twin pregnancy in mares, with best results achieved before gestational day 43. (J Am Vet Med Assoc 2013;242:527–532)

Advanced twin pregnancies in the mare typically result in abortion,1 stillbirth,2 or the delivery of weak foals.3 Although the incidence of abortion in twin pregnancies has been reduced with ultrasound-guided diagnosis and treatment in early gestation, management of such cases remains a major challenge in equine practice, with twin pregnancies accounting for 3% to 30% of abortions in mares.4–6 Furthermore, twin pregnancies and abortions in the last trimester are associated with an increased risk of dystocia,7,8 fetal membrane retention,7 and decreased live foaling rates in the following season.9

Results of previous studies1,10–13 revealed that fixation of both conceptuses in the same uterine horn, which is supported by asynchronous ovulations and differences in embryo size, occurs in approximately 70% of twin pregnancies in mares. Because of close apposition of the embryonic vesicles and decreased contact with the endometrium, approximately 85% of pregnancies involving twins located in the same uterine horn are naturally reduced to a singleton pregnancy during the embryonic phase. However, when conceptuses are located in separate uterine horns, the natural reduction rate is only 4%.

Different methods of twin pregnancy reduction are used in equine medicine, depending upon the gestational day, localization of the embryonic vesicles, and whether there is an opportunity to rebreed the mare in the same season. Twin pregnancies detected during the early mobility phase of embryos (prior to day 16 of gestation), separated twins in the same uterine horn between day 17 and day 20,14,15 and twins fixed in separate uterine horns (until day 25) are best managed via manual crushing of 1 embryonic vesicle, with survival rates for the remaining twin exceeding 90%.9,16,17 This technique has been shown to be less advantageous when vesicles cannot be separated and in advanced pregnancies (>25 days) with twins in the same uterine horn.2 Because success of manual crushing is limited beyond day 30, even with twins fixed in separate horns,14,17 alternative methods of twin reduction should be considered in advanced pregnancies.

From the Unit for Reproductive Medicine, Clinic for Horses, University of Veterinary Medicine, Hannover, 30559 Hannover, Germany (Klewitz, Ortgies, Heberling, Linke, Sieme); and Veterinary Faculty, University of Melbourne, Werribee, VIC 3010, Australia (Krekeler).

Address correspondence to Dr. Sieme (harald.sieme@tiho-hannover.de).

ABBREVIATION

TUA—Transvaginal ultrasound-guided aspiration
In recent years, various authors described the use of TUA for the reduction of advanced twin pregnancies with conceptuses fixed in the same or separate uterine horns.18–24 Success rates (determined by the survival of 1 conceptus for 5 to 14 days after twin pregnancy reduction or by live foaling rates) differed considerably in previous studies, ranging from 27.4% to 70.0%.22–24 Administration of NSAIDs23 were reported to influence these results.

The aim of the study reported here was to evaluate pregnancy and foaling rates after the use of TUA for reduction of twin pregnancy in mares and to analyze the effects of gestational period, volume of fluid aspirated, and puncture of the embryo or fetus on outcomes. We sought to determine an optimal time frame for the procedure as well as recommendations regarding the technique (eg, aspiration volume and combination with embryonic or fetal puncture) for use by equine practitioners.

Materials and Methods

Mares—Mares with ultrasonographically diagnosed twin pregnancies between gestational day 25 and 62 (day 0 = day of breeding) were prospectively enrolled in the study between April 10, 2008, and October 8, 2009. All mares were referred to the Unit for Reproductive Medicine at the University of Veterinary Medicine, Hannover, for reduction of twin pregnancy via TUA. Because standard treatment procedures were followed, approval from the university’s animal care and use committee was not required. Owner consent was obtained prior to inclusion of mares in the study.

TUA—Transvaginal ultrasound-guided aspiration18 was performed in all mares on an outpatient basis by 1 veterinarian (JK). After arrival, mares were restrained in stocks, and viability, size, and localization of conceptuses (to 1 or both uterine horns) were evaluated during transrectal ultrasonographic examination of the uterus and ovaries by use of an ultrasound machine equipped with a linear 5-MHz probe.

If 2 viable embryos were detected, flunixin meglumine (1.1 mg/kg [0.5 mg/lb], IV) and cefquinome (1.0 mg/kg [0.45 mg/lb], IV) were administered to the mare to counteract prostaglandin F2α release during uterine manipulation and as prophylaxis against bacterial infections that could result from perforation of the fornix of the vagina and uterus. Sedation was administered as needed but was generally avoided because of the potential for uterine relaxation and subsequent difficulty in fixing a conceptus against the head of the transducer. Very excited mares received detomidine hydrochloride (0.02 mg/kg [0.009 mg/lb], IV) and butorphanol (0.1 mg/kg [0.045 mg/lb], IV) immediately before TUA.

The TUA was performed with an ultrasound machine equipped with a convex, 7.5-MHz probe.5 The transvaginal probe and handle, originally designed for ovum collection procedures in cattle, includes a channel for a high-quality steel tube, which serves as a guide for the needle. A single-use, 60-mm, 18-gauge needle was connected to a polyethylene tube with an inner diameter of 0.6 mm, attached to a 60-mL syringe via a Luer-lock adaptor. The cranial part of the probe handle was protected by a sterile cover for use with vaginal probes, filled with sterile ultrasonography gel.

After manually removing manure from the rectum and cleaning the perineum, the probe holder was carefully inserted into the vagina and moved forward into the fornix dorsolateral to the cervix. The uterus was manipulated transrectally until the vesicles were visualized on the ultrasonography screen. One of the conceptuses, usually the smaller one (or, when these appeared to be of equal size, the 1 that was more readily accessible), was positioned against the head of the transducer to monitor the largest cross section of the nonechogenic yolk sac or allantoic cavity and the twin membrane (ie, shared chorionic membrane) where applicable. The steel tube was advanced and the needle easily penetrated the vaginal fornix, uterus wall, and embryonic vesicle (Figure 1). After identification of the echogenic needle tip in the yolk sac or allantoic cavity of the conceptus, as much fluid as possible was aspirated without endangering the second conceptus. Slowly pulling back the plunger during aspiration reduced the risk of aspirating the twin membrane when twins were located in the same uterine horn. Furthermore, care was taken not to aspirate other membranes, which could obstruct the needle lumen and block the fluid flow.

In 13 randomly chosen mares, TUA between gestational days 28 and 62 was combined with puncture of the embryo or fetus.6 After positioning of the embryo or fetus against the probe, multiple needle punctures of the embryonic or fetal thorax or abdomen were performed by moving the steel tube back and forth. Fetal stress was monitored via Doppler ultrasonography as a rapid increase in fetal heart rate. In 3 randomly chosen twin pregnancies, 2 to 5 mL of penicillin G procaine was administered into the abdomen, allantoic cavity, or heart of the conceptus after aspiration of fluid as described (Figure 2).

In addition to anti-inflammatory and antimicrobial treatment on the day of TUA, mares received flunixin meglumine (1.1 mg/kg, IV) on the following day and cefquinome (1.0 mg/kg, IV) on the 2 days following the procedure.

Figure 1—Transvaginal ultrasonographic image during TUA for reduction of twin pregnancy in a mare with both conceptuses fixed in the same uterine horn on gestational day 31. Notice the echogenic needle tip (arrow).
Follow-up information—Referring veterinarians were asked to assess viability of the remaining conceptus via ultrasonography 5 to 7 days and 3 to 4 weeks after TUA. Observation of the ongoing pregnancy and further treatments were conducted by the referring veterinarian unless a mare was referred for a second TUA procedure at the owner's request if 2 viable conceptuses were detected at the first follow-up examination; the second TUA procedure was recommended 10 days after the first procedure. The results of these evaluations as well as the foaling data were communicated via telephone.

Statistical analysis—Results were assessed for mares grouped according to gestational period in which procedures were performed (days 25 to 30, 31 to 35, 36 to 42, and 43 to 62 of gestation). Mares were further grouped according to volume of fluid aspirated from the conceptus (0 to 9 mL, 10 to 19 mL, 20 to 29 mL, 30 to 39 mL, and ≥ 40 mL) for descriptive analysis. A χ² test was used to assess effects of gestational period, localization of the conceptus, aspiration volume, and puncture on pregnancy rates 5 to 7 days and 3 to 4 weeks after the procedure and on live foaling rate. Analysis was performed with statistical software. A Fisher exact test was used to evaluate differences for sample sizes < 10. A P value < 0.05 was considered significant.

Results

Transrectal ultrasonographic examination revealed twins located in the same uterine horn in 39 mares, whereas 5 mares had twins located in separate uterine horns. In total, TUA was performed in 44 mares between gestational days 25 and 62. The procedure was repeated 10 days later for 2 mares in which both conceptuses still had a heartbeat. The twin pregnancy of a third mare was terminated via administration of prostaglandin F₂α. In total, TUA was performed in 44 mares between 25 and 62 days of gestation. The results of these evaluations as well as the foaling data were summarized for mares grouped according to gestational period in which the procedure was performed (Table 1). One viable conceptus was detected at this follow-up examination in 32 of the 44 (73%) mares, whereas both conceptuses were viable in 3 (7%), and neither was viable in 9 (20%). In 1 mare with 2 viable embryos detected at follow-up examination after a TUA performed on day 33, the procedure was repeated on day 45. Another mare with 2 viable embryos after the first TUA on day 45 had the procedure repeated on day 53. The TUA was combined with embryonic or fetal puncture in these 2 mares, and each maintained a singleton pregnancy at the first follow-up examination after the second TUA, but neither delivered a live foal.

Twenty-four of 34 mares with 1 viable conceptus at the time of the first evaluation after TUA were reexamined 3 to 4 weeks after the procedure by the referring veterinarian. Eighteen (75%) of these mares remained pregnant with 1 viable conceptus.

In total, 20 of 41 (49%) mares that underwent TUA for reduction of twin pregnancy delivered live singleton foals. Actinobacillus spp infection was diagnosed in 1 foal; otherwise, all foals were healthy and had no evidence of developmental abnormalities. Referring veterinarians who examined the placenta (n = 14) did not report any placental abnormalities. The 12 of 32 mares with loss of a singleton pregnancy after the first ultrasonographic examination (3 to 7 days after TUA) did not have apparent signs of abortion that were noticed by the owners.

The gestational period in which TUA was performed was not significantly (P = 0.39 and 0.26, respectively) associated with pregnancy rate at follow-up 5 to 7 days or 3 to 4 weeks after the procedure. However, the live foaling rate for mares that underwent TUA after day 42 was significantly (P = 0.022) lower than that of mares that underwent the procedure between days 31 and 35 (Table 2). Of 8 mares that underwent TUA between days 36 and 42 and had a viable conceptus detected at both follow-up examinations, 4 produced a live foal. No mares that underwent TUA after day 42 (n = 5) delivered a live foal. The live foaling rate for all mares that underwent TUA on or before day 42 was 20 of 36 (56%).

Table 1—Results of ultrasonographic examination to detect viable conceptuses in 44 mares 5 to 7 days after TUA for reduction of twin pregnancy.

<table>
<thead>
<tr>
<th>Gestational period (d)</th>
<th>No. of mares</th>
<th>No. of viable conceptuses</th>
</tr>
</thead>
<tbody>
<tr>
<td>25–30</td>
<td>15</td>
<td>10 (67%) 1 (7%) 4 (27%)</td>
</tr>
<tr>
<td>31–35</td>
<td>15</td>
<td>11 (73%) 1 (7%) 3 (20%)</td>
</tr>
<tr>
<td>36–42</td>
<td>8</td>
<td>8 (100%) 0 0</td>
</tr>
<tr>
<td>43–62</td>
<td>6</td>
<td>3 (50%) 1 (17%) 2 (33%)</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>32 (73%) 3 (7%) 9 (20%)</td>
</tr>
</tbody>
</table>

Mares were grouped according to gestational period in which TUA was performed for analysis; number and percentage of mares with 0, 1, or 2 viable conceptuses are shown.
Localization of conceptuses to 1 or both uterine horns was not significantly \( P = 0.20 \) associated with pregnancy rate at follow-up examinations. Mares with twins located in separate uterine horns underwent TUA between gestational days 30 and 42 with evidence of successful reduction to a singleton pregnancy \( (5/5) \) 5 to 7 days after the procedure. Three of the 5 mares had follow-up examinations 3 to 4 weeks after TUA with 1 viable conceptus detected and subsequently delivered live foals; the remaining 2 mares had fetal loss without the owner detecting signs of abortion.

The volume of fluid removed from the yolk sac or allantoic cavity via TUA was evaluated for mares grouped according to gestational period at the time of the procedure. Aspirate volumes ranged from 0 (when the needle was obstructed and fluid could not be aspirated after puncturing the yolk sac or allantoic cavity) to 190 mL (overall mean \( \pm SD, 27.9 \pm 20.2 \) mL). Whereas up to 80 mL of fluid was aspirated from the selected conceptus in mares with twins located in separate uterine horns between gestational days 31 and 35, the maximum aspirate volume during the same period was 20 mL when twins were located in the same uterine horn. Mean \( \pm SD \) fluid volume was 14.1 \( \pm 11.3 \) mL for days 25 to 30, 14.3 \( \pm 19.8 \) mL for days 31 to 35, 25.3 \( \pm 13.3 \) mL for days 36 to 42, and 58.0 \( \pm 36.3 \) mL for days 43 to 62; the volume of fluid aspirated was not apparently associated with pregnancy rates after TUA performed during different gestational periods. However, the number of mares in each group was too small for statistical evaluation (range, 1 to 8).

In 13 of 41 evaluated mares, TUA was combined with puncture of the embryo or fetus. Use of the puncture technique was not significantly \( P = 0.50 \) and 0.34, respectively) associated with pregnancy rate at 5 to 7 days or 3 to 4 weeks after TUA. Although reduction to a singleton pregnancy was successful in all of these mares, the live foaling rate \( (3/13) \) was significantly \( P = 0.027 \) lower than that of mares that underwent TUA alone \( (17/28) \).

In 3 mares with advanced twin pregnancies (gestational days 45 to 62), embryonic or fetal puncture was combined with injection of 2 to 5 mL of penicillin G procaine into the abdomen (day 45), allantoic cavity (day 47), or heart (day 62) of the embryo or fetus after aspiration of 40 to 190 mL of fluid. Although each of these mares was pregnant with a viable singleton at the second follow-up examination 3 to 4 weeks after TUA, none delivered a live foal.

### Discussion

A precise definition of success rate is important when comparing results of different studies on reduction of twin pregnancy in mares. In the present study, the success rate of TUA for reduction of twin pregnancy was 32 of 44 (73%) when success was defined as ultrasonographically confirmed pregnancy with 1 viable conceptus 5 to 7 days after the first procedure. This result and the results of follow-up examination in 24 of these mares 3 to 4 weeks after TUA (18 confirmed pregnant) were comparable with results of another study,\(^23\) in which survival rate for the remaining embryo was 59.2% 10 to 14 days after twin pregnancy reduction via TUA. In a retrospective study,\(^23\) other investigators reported a success rate of 57.1% 3 days after TUA, which decreased to 51.4% 10 days after the procedure.

The authors of a report\(^11\) in which success was defined as delivery of a live foal found that in unsuccessful cases, loss of the remaining conceptus typically occurred between 10 and 14 days after reduction of twin pregnancy via TUA. However, some mares in that study\(^23\) carried viable fetuses for 3 to 9 months after the procedure before aborting. In the present study, the success rate of TUA was 20 of 41 (49%) when success was defined as delivery of a live foal. Loss of the remaining conceptus in 12 of 32 (38%) mares after the first follow-up examination (5 to 7 days after TUA) suggests that the mechanisms of resorption of 1 conceptus can influence viability of the remaining twin for weeks after the procedure. Because follow-up information was provided by the referring veterinarian, only 24 mares were reexamined after 3 to 4 weeks. Further monitoring of ongoing pregnancies after TUA might reveal more information about the time and process of resorption.

Although results of another study\(^22\) indicated a promising live foaling rate \( (14/20 \ [70\%]) \) when TUA was performed between 16 and 25 days of gestation, there is a high probability of natural reduction to a single conceptus in this interval if twins are located in separate uterine horns.\(^23\) In the same study,\(^22\) TUA after gestational day 40 was followed by loss of both conceptuses in 4 of 4 mares (1 and 3 with twins located in the same or separate uterine horns, respectively).

In contrast to results of other investigations,\(^9,22,23\) the gestational period in which TUA was performed did not have a significant effect on pregnancy rates 5 to 7 days or 3 to 4 weeks after the procedure in the study reported here. Eight of 8 mares in which TUA was performed between gestational days 36 and 42 maintained a single viable embryo or fetus 5 to 7 days after the procedure in the present study, compared with results of a study by Bracher et al,\(^18\) in which only 1 of 4 mares had a successful result 10 days after TUA was performed between gestational days 36 and 45. However, live foaling rate was significantly \( (P = 0.022) \) reduced in our study when TUA was performed after day 42, compared with the rates for TUA between day 31 and 35, indicating an increased number of embryonic or fetal losses after the

### Table 2—Live foaling rates (number [%]) in 41 mares that underwent TUA for reduction of twin pregnancy.

<table>
<thead>
<tr>
<th>Gestational period (d)</th>
<th>No. of mares</th>
<th>Live foals born</th>
<th>No foal born</th>
</tr>
</thead>
<tbody>
<tr>
<td>25–30</td>
<td>14</td>
<td>7 (50%)(^a)</td>
<td>7 (50%)</td>
</tr>
<tr>
<td>31–35</td>
<td>14</td>
<td>9 (64%)(^b)</td>
<td>5 (36%)</td>
</tr>
<tr>
<td>36–42</td>
<td>8</td>
<td>4 (50%)(^a)</td>
<td>4 (50%)</td>
</tr>
<tr>
<td>43–62</td>
<td>5</td>
<td>5 (100%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>20 (49%)</td>
<td>21 (51%)</td>
</tr>
</tbody>
</table>

Mares were grouped according to gestational period in which TUA was performed for analysis. Forty-four mares underwent the procedure; 2 of 3 mares with persistent twin pregnancy after TUA on gestational days 35 and 45 underwent a second procedure 10 days later. These mares and 1 mare with persistent twin pregnancy following TUA on gestational day 28 that underwent prostaglandin \( \text{P} \_2 \)–induced abortion on day 38 were excluded from the analysis.

\(^a\) Different superscript letters indicate significantly \( P < 0.05 \) different values within a column.
second follow-up examination. When TUA was performed between days 36 and 42, 4 of 8 singleton pregnancies confirmed 3 to 4 weeks after TUA resulted in delivery of live foals, whereas no foals were produced from the 5 mares in which TUA was performed after day 42.

Furthermore, the use of TUA for reduction of twin pregnancy in mares between gestational days 30 and 35 can be recommended for practical reasons. Especially in mature, multiparous mares, the transrectal manual positioning of 1 conceptus against the ultrasound probe is more challenging between days 43 and 50 than at earlier time points. Additionally, if both conceptuses are lost after day 35, a new breeding effort during the current season is compromised by the formation of endometrial cups.23 Resulting high circulating concentrations of equine chorionic gonadotropins persist for several months and usually prevent return to normal estrous cyclicity for the remainder of the breeding season.

The TUA procedure was combined with embryonic or fetal puncture for reduction of twin pregnancy in 13 of 41 evaluated mares in the present study. In another study, 10 of 26 (38.5%) mares in which twin pregnancy reduction was attempted via TUA alone delivered live foals, compared with 20 of 72 (27.8%) in which the procedure was combined with fetal puncture. In the present study, combination of the puncture technique with TUA did not influence pregnancy rates 5 to 7 days or 3 to 4 weeks after the procedure. However, a significant (P = 0.027) negative effect was detected on the live foaling rate (3/13 for mares in which TUA was combined with puncture of the embryo or fetus, vs 17/28 [61%] for mares that had TUA performed alone). This effect may have resulted from increased manipulation of the uterus to ensure precise positioning of the conceptus against the probe to perform multiple punctures without movement.

In the present study, the TUA procedure did not result in reduction of twin pregnancy in 3 of 44 mares. Although TUA can be combined with puncture of the embryo or fetus to ensure termination of 1 conceptus in a second procedure performed at least 10 days after the initial TUA, live foaling rates were low for mares in the present study in which TUA was combined with fetal puncture. Two mares in the present study underwent TUA twice, indicating the possibility of a successful repetition of the procedure up to gestational day 42; these mares each had 1 viable embryo at the first follow-up examination, although neither delivered a live foal. The effects of injection of penicillin G procaine after embryonic or fetal puncture in mares with advanced twin pregnancies should be evaluated further with a larger number of cases. Although each of the mares that underwent this procedure was pregnant with a viable singleton at the second follow-up examination 3 to 4 weeks after TUA, none delivered a live foal.

As an alternative method for reduction of twin pregnancy between days 35 and 90, use of a transrectal craniocervical dislocation technique has been described.24,25 5 of 8 mares in which this procedure was performed delivered live singleton foals of normal size. In a more recent study,26 24 of 38 (63%) mares each delivered 1 healthy foal after craniocervical dislocation was performed in the less viable fetus via an intrabdominal surgical procedure.

To our knowledge, no previous studies have investigated the effects of aspiration volume on successful reduction of twin pregnancy via TUA. Depending on the gestational period, localization of the conceptus, and factors associated with the allantoic sac and yolk sac, fluid aspirate volumes varied in the present study. Between gestational days 31 and 35, up to 80 mL of fluid was aspirated from the selected conceptus when twins were located in separate uterine horns and a maximum of 20 mL was aspirated when twins were located in the same uterus horn to reduce the risk of aspiration of the twin membrane. In the present study, no influence of aspiration volume on the pregnancy or live foaling rates following TUA was apparent, although the numbers in each group were too small to perform statistical comparison on the basis of different aspiration volumes.

Recommendations for successful management of twin pregnancy in mares vary according to gestational day, localization of conceptuses, and the prospect of rebreeding during the current season. As previously mentioned, twin pregnancies detected in the early mobility phase of the embryo, separated twins in the same uterine horn between gestational days 17 and 20,14,15 and twins fixed in separate uterine horns (up to day 25) are best managed via manual crushing of 1 conceptus. If the vesicles cannot be separated or pregnancy with twins fixed in the same uterine horn is diagnosed after day 20, the examination should be repeated 8 to 10 days later (before formation of the endometrial cups [day 35]), because natural reduction occurs in approximately 85% of such pregnancies (until approx day 45), especially in twin pregnancies that result from asynchronous ovulations.31

When twin pregnancy persists, a decision to attempt reduction or prostaglandin F2α-induced abortion should be made before endometrial cup formation. The decision will be influenced by the time of the breeding season, potential value of the offspring, and fertility of the mare. In the present study, the singleton pregnancy rate following TUA was 32 of 44 (73%) 5 to 7 days after the procedure, and 20 of 36 (56%) mares that underwent TUA up to gestational day 42 subsequently delivered live singleton foals. By careful needle penetration of the embryonic vesicle and controlled aspiration of a small volume of fluid to avoid endangering the second conceptus, pregnancy with twins located in the same uterine horn can be successfully reduced to a singleton. Although TUA was successful up to day 42 (with confirmed singleton pregnancies at follow-up in 8/8 mares that underwent the procedure between days 36 and 42 and subsequent delivery of live foals from 4), in our opinion, the optimal time frame for use of TUA to reduce twin pregnancy when both conceptuses are fixed in 1 uterine horn is between days 30 and 35 to allow time for natural reduction and potentially allow rebreeding in the current season if both conceptuses are lost.

References
3. LOGIQ e. General Electric, Munich, Germany.
From this month’s AJVR

Comparison of inversion recovery gradient echo with inversion recovery fast spin echo techniques for magnetic resonance imaging detection of navicular bone marrow lesions in horses

Julien Olive et al

Objective—To compare navicular bone marrow lesion (BML) conspicuity in the feet of horses as determined via 2 fat-suppressed MRI techniques, including standard short tau inversion recovery (STIR) and inversion recovery gradient echo (IRGE).

Sample—Feet (n = 150) of horses with lameness referable to the distal portion of the digit.

Procedures—STIR and IRGE sequences were obtained prospectively in all feet with a standing low-field equine MR system. Presence of a BML was ascertained by identification of a characteristic combination of marrow alterations in T1-weighted, T2*-weighted, T2-weighted, and STIR images. Signal-to-noise and contrast-to-noise ratios were calculated on STIR and IRGE sequences for 56 feet with a navicular BML.

Results—Signal-to-noise and contrast-to-noise ratios of both sequences correlated linearly (r = 0.87 and r = 0.92, respectively) but were significantly higher for STIR images (mean ± SD, 22.6 ± 12.7 and 12.4 ± 11.4, respectively), compared with IRGE images (13.7 ± 8.0 and 5.9 ± 7.2, respectively).

Conclusions and Clinical Relevance—Results suggested that the IRGE sequence revealed BMLs significantly less conspicuously, compared with the standard STIR sequence. The 2 techniques cannot be used interchangeably, and IRGE is therefore not recommended as the sole fat-suppressed sequence for routine equine standing MRI protocols. (Am J Vet Res 2013;74:232–238)