Effectiveness of obstetric procedures in miniature dogs

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Received: December 3, 2012 Accepted: September 13, 2013

Abstract

The aim of the study was to evaluate the course of labour, incidence, and causes of dystocia and effectiveness of obstetric aid for minimising the neonatal loss in bitches that belong to miniature breeds. Fifty parturitions proceeded under obstetric supervision from the first to last puppy born. Most of the bitches (n = 34) belonged to the Chihuahua breed. Others included Yorkshire terrier (n = 14), Shih Tzu (n = 1), and Miniature Schnauzer (n = 1). Obstetric procedures consisted of conservative aid in the form of medication, manual manipulations and combination of both, or caesarean section. The litter size was 3.58 on average. Dystocia occurred in 68% of cases, mostly caused by foetomaternal disproportion. The condition took place less frequently in multiparas than in primiparas. A caesarean section was performed in 20 cases (40%), while remaining 30 bitches delivered puppies through genital tract using manual assistance, oxytocin injections or both procedures simultaneously. The shortening of expulsive stage using conservative aid or timely performed caesarean section resulted in low stillbirth rate (5.59%). The kind of obstetric aid used in the study was related to the specificity of miniature dogs enabling successful conservative treatment. However, conservative obstetric procedures require skills, clinical experience, and are time-consuming. These may be the reasons for a frequent overuse of caesarean section. It was concluded that both surgical and conservative treatment methods, if chosen appropriately, are effective at the same level.

Key words: miniature dog, parturition, obstetric aid, caesarean section.

Introduction

Dystocia is a frequent problem in small animal reproduction, with regard to breed-specific factors, litter size, duration of expulsion, various intervals between puppies, and various causes of maternal, foetal or combined origin. The incidence of dystocia described for the bitch is around 5% (12). In Swedish bitches, an overall incidence rate of dystocia was estimated at 5.7 cases/1,000 dog-years at risk (1). In some breeds, parturition disorders are significantly more frequent than in the whole population (10). For instance, according to survey presented by Forsberg and Persson (8), the Boxer suffers a high frequency of dystocia, mainly due to uterine inertia, but also foetal malpresentation. It is generally admitted, that brachycephalic breeds, such as Bulldogs or Boston terriers, are prone to obstructive dystocia (7). The survey of 151 dog breeds indicated significant differences in the proportion of births solved by caesarean section (CS) from 0% to 92.3% (4). Miniature dogs may be more prone to whelping problems because of narrow birth canal and relatively small size of litters. Among 530 cases of dystocia investigated over 8 years, miniature and small breeds were represented in 315 (59.4%) cases (10). In general, the total length of parturition and the time required for puppy expulsion are commonly considered as the most important parameters affecting neonatal viability (3, 6, 10). Then, professional obstetric control of the delivery should be recommended in order to decrease periparturient puppy mortality. In the case of dystocia, immediate obstetric intervention should be undertaken. In one study digital manipulation including forceps delivery and/or medical treatment was successful only in 27.6% of cases of dystocia in dogs (3). On the other hand, surgical intervention was required in approximately 60%–80% of dystocia cases in the bitch and queen (1, 16).

The aim of the study was to evaluate the course of labour, incidence of dystocia, and effectiveness of obstetric procedures for minimising the neonatal loss in miniature dogs. The results of selected methods of conservative obstetric aid were compared to the surgical one.
Material and Methods

Animals. Fifty miniature bitches (body weight ≤5kg) at average age of 3.25 ±1.44 years (from 15 months to 6 years) were presented to an obstetric supervision at the beginning of the second stage of parturition. The dogs belonged to the following breeds: Chihuahua (n = 34), Yorkshire terrier, (n = 14), Shih Tzu (n = 1), and Miniature Schnauzer (n = 1).

Clinical examination. Clinical examination included the anamnesis (age, parity, former parturitions, details of current stage of delivery, treatments) and a short general clinical and thorough obstetric examination (exploration of the vagina and abdominal palpation). Manual exploration of the vagina using a lubricated finger gave information on dimensions of genital tract, degree of cervical dilatation, or the viability, presentation, position, and posture of puppies in the birth canal.

Diagnosis of dystocia. Symptoms that were used to diagnose dystocia: failure to start labour, lack of uterine contractions 2 h after the allantoic sac rupture, strong and persistent abdominal contractions for more than 30 min without expulsion of a foetus, weak and infrequent unproductive contractions for 1-2 h, more than 2 h after the expulsion of a last puppy without subsequent contractile activity, abnormal foetal presentation, position or posture, large quantities of greenish-black discharge before the first puppy was born, obvious signs of sickness of the dam.

Obstetric care. Fifty parturitions proceeded under obstetric supervision from the first to the last puppy born. The veterinary control of parturition was undertaken either as a routine procedure (n = 38) or in emergency cases (n = 12). Obstetric procedures consisted of conservative aid or caesarean section. Before initiation of conservative treatment, a significant obstruction of the birth canal was excluded. Conservative procedures included medication, manual manipulations, and combination of medication and manual mutation. Manual mutation was performed using an antiseptic lubricant (Bioacryl, Biowet, Drwalew, Poland). Manipulations of foetuses consisted of rotation, retropulsion, adjustment of the head or extremities, orientation towards the vagina, and forced traction. In order to induce episodes of straining, the pushing with the finger against the dorsal vaginal wall was used. Careful traction of the foetus was applied in a caudoventral direction. The obstetric forceps were not used in any case. Oxytocin (Inj. oxytocini, Biowet, Pulawy, Poland) was administered intramuscularly in singular or repeated doses of 0.5-2 IU per animal. During the conservative treatment, efforts were made to extract all the placentas. Caesarean section was performed as a ventral midline incision and one-side hysterectomy. The foetuses were removed beginning from the closest to uterine incision. All the placentas were separated from the uterine wall and removed. The uterine cavity was thoroughly inspected to determine the end of the parturition. In the case of uterine inertia and considerable bleeding from placental sites, 2-4 IU of oxytocin were applied into uterine wall. The uterine incision was closed with 4-0 absorbable material using two-layer Cushing suture. All the newborns delivered naturally or by CS were submitted to immediate resuscitation, and then examined for the presence/absence of visible congenital malformation.

Parameters for statistical analysis. Number of parturition (parity), incidence and causes of dystocia, and kind of obstetric aid and its influence on puppies’ survival were investigated. Furthermore, duration of expulsion stage and the time between deliveries of the puppies were measured. Duration of the complete expulsion stage was defined as the period from the first to the last puppy born. Average inter-puppy birth interval was counted for the parturitions through genital tract of more than one puppy. Data was compared in primiparous versus multiparous animals. For statistical analysis, the programme Statistica 10 (StatSoft, Warsaw, Poland) was used. For description of the data, an arithmetic mean (x) and standard deviation (SD) were used. To compare data, Mann-Whitney test and Kruskall-Wallis test were carried out.

Results

The size of the litter varied from one to six, on average 3.58 puppies. In four cases (8%) there were single-pup births. Delivery survival rates of the newborns born through genital tract or by caesarean section are shown in Table 1.

Table 2. The average parity number was 2.2 ±1.44 years (from 15 months to 6 years) were presented to an obstetric supervision at average age of 3.25 ±1.44 years (from 15 months to 6 years). In the case of uterine inertia and considerable bleeding from placental sites, 2-4 IU of oxytocin were applied into uterine wall. The uterine incision was closed with 4-0 absorbable material using two-layer Cushing suture. All the newborns delivered naturally or by CS were submitted to immediate resuscitation, and then examined for the presence/absence of visible congenital malformation.

The comparison of the course of deliveries in primiparous and multiparous bitches is presented in Table 2. The average parity number was 2.2 ±1.13 (from one to five). Dystocia, defined as inability to initiate labour, failure of progression during labour, and maternal or foetal compromises, occurred generally in 68% of the parturitions. As shown in Table 2, the condition took place in 66.6% and 76.5% of the parturitions in multiparas and primiparas, respectively.

Most cases of dystocia were caused by foetomaternal disproportion (n = 23; 67.65%), while the others were functional disorders (n = 6; 17.65%), foetal malposition (n = 2; 5.88%), or combined (n = 3; 8.82%). In 19 cases (38.0%), primary CS (all foetuses delivered by CS) was performed, and in one case (2.0%) the secondary one.
Indications for CS included considerable foetomaternal disproportion (n = 14; 70.0%), owner’s decision (n = 5; 25.0%) and primary functional disorders (n = 1; 5.0%). Remaining 30 bitches (either with or without dystocia) delivered puppies through genital tract with manual assistance only (n = 19; 63.3%) or oxytocin injections combined with manual assistance (n = 11; 36.6%). In six puppies out of 169 (3.55%) serious congenital malformations were found, in particular cleft palate (n = 3), abdominal fissure (n = 2), and underdevelopment of hind limbs (n = 1).

**Discussion**

The mean litter size of 3.5 ± 0.04 puppies in miniature breeds reported by Borge et al. (2) is comparable to the 3.58 puppy per litter in the study. Most bitches were young. Only five of them (10%) were ≥5-years-old. Obstetric supervision was implemented not only as an intervention in the cases of dystocia, but also during the normal course of labour as a planned obstetric care. Its goals were as follows: shortening the overall time of the parturition, increasing the proportion of living newborns, determination of the completion of the parturition, and prophylaxis of early postpartum disorders, e.g. postpartum metritis as the result of placenta retention. In the study, dystocia occurred overall in 68% of births, which is consistent with the data presented by Männich and Küchenmeister (10), who have reported high incidence for dystocia in the dams of miniature and small breeds. Therefore, dystocia is considered to be of maternal or foetal origin, the former being more common (3, 8, 11). However often, like in this study, a combination of different causes, including the foetal size, is responsible for dystocia. This is mainly observed in the miniature dogs where litter size is numerically small and individual foetal size is often large. In such breeds, a considerable variation in the size of litter mates has been reported with some foetuses passing easily through the pelvis whereas others are unable to do it. Depending on the particular situation, either the foetal head or shoulder may be too large, or the maternal pelvis too narrow, or both the foetus is too big and the birth canal is too narrow. Miniature dogs seem to be particularly prone to foetomaternal disproportion. An absolute oversize of foetus is common when single foetus is present. Three out of four single-pup births in the study were solved by CS. In one analysis, the occurrence of dystocia did not reveal a relationship with the age of the bitch or the number of previous litters (15). In the study, the incidence of dystocia was 10% greater (P < 0.05) in primiparas than in multiparas (Table 2). It may be influenced by the narrowing of birth canal in miniature bitches before its distention by the first foetus and/or relatively lower age of the start of reproduction in comparison to larger dogs.

According to Smith (14), parameters for the identification of dystocia include prolonged parturition, collapse of the dam, abnormal vaginal discharge, prolonged labour, prolonged interval between delivery of neonates, uterine inertia, malpresentation of the foetus, and large litter sizes. Resolution of parturition emergencies may be achieved through manipulative, medical, or surgical methods. Moreover, the knowledge of predisposing factors and causes of dystocia in different morphological dog types is important. The kind of the obstetric aid used in the study was partly related to the specificity of miniature dogs making the possibility of successful conservative treatment. These features include a small number of foetuses, foetuses readily reachable through the vagina, easier manipulation through the abdominal wall, and easier two-handed manipulations – simultaneously through the vagina and abdominal wall. The manual obstetric aid hastens the course of parturition preventing this way, at least partially, from the stillbirth. Morphological conformation of foetal body, which depends on the breed, is a very important factor. In the study, Chihuahua breed was overrepresented. It is not typically brachycephalic, but apple headed individuals tend to be more than mesaticephalic. It makes manual manipulations difficult or ineffective in some cases.

Functional disorders include primary or secondary uterine inertia, deterioration of abdominal muscles activity, or both uterine inertia and inadequate abdominal straining. The use of oxytocin injections given intramuscularly is safe and effective aid in some cases of functional disorders. Medical or manipulative management is appropriate if the dam is in good health, labour has not been excessively protracted, the cervix is dilated, and foetal size is consistent with the likelihood of vaginal delivery. Before initiation of medical

**Table 2.** Comparison of the course of delivery in primiparous and multiparous miniature bitches (n = 50)

<table>
<thead>
<tr>
<th>Parity</th>
<th>Incidence of dystocia (%)</th>
<th>Obstetric procedures</th>
<th>Duration of the complete expulsion stage (min) X ± SD</th>
<th>Average inter-puppy birth interval (min) X</th>
<th>Proportion alive/dead puppies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primiparas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 17</td>
<td>13 (76.47)</td>
<td>7 (41.18)</td>
<td>91 ± 53.2</td>
<td>35</td>
<td>48/3</td>
</tr>
<tr>
<td>n = 33</td>
<td>21 (66.64)</td>
<td>13 (39.39)</td>
<td>94 ± 60.9</td>
<td>32</td>
<td>121/7</td>
</tr>
<tr>
<td>Statistical analysis</td>
<td>P ≤ 0.05</td>
<td>P ≥ 0.05</td>
<td>P ≥ 0.05</td>
<td>P ≥ 0.05</td>
<td>P ≥ 0.05</td>
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</table>
treatment, obstruction of the birth canal, as well as soft tissue abnormalities such as neoplasms, vaginal septa, or fibrosis must be excluded. Vaginal septum formation constituted 0.5% of the dystocia cases in bitches (3). Abnormalities mentioned above were not observed in the study. In general, the administration of oxytocin increases the frequency of uterine contractions, starting 5-15 min after injection. When using oxytocin, the main expectation was not necessarily spontaneous expulsion of the foetus by the bitch. A positive result of oxytocin activity was the displacement of the foetus in the reproductive tract towards the vagina so that it was accessible for manual manipulation. Sometimes only a slight shift of the foetus towards the vulva allows an effective solution of delivery with the use of combined methods.

When medical and manual management of dystocia have failed or are inadvisable, prompt surgical intervention is recommended. The conservative (non-surgical) obstetric aid needs some degree of skills and clinical experience. Moreover, the procedure is time-consuming. These may be the reasons for an overuse of the caesarean section observed sometimes. There should be emphasised some circumstances in favour of conservative obstetric aid, such as reluctance of some owners of the animals to caesarean section, limitation of the number of surgical treatments in one animal, risk associated with surgery, and potential reduction of reproductive capability after CS as result of uterine scars or adhesions of the uterus to other organs.

Moon et al. (9) have showed that in 614 (76%) litters out of 807 analysed, all puppies delivered by caesarean section were born alive and maternal mortality rate was 1%. In this study no bitch died at the course of parturition through genital tract neither by CS. Funkquist et al. (5) reported that 106 (26%) out of 411 stillborn puppies were delivered by caesarean section. The overall stillbirth rate of 5.59% in our study was low, probably due to the comprehensive supervision of the labour. There were no differences in the proportion of alive and dead newborns between parturitions resolved by CS or through genital tract. Rosset and Buff (13) reported 91.89% survival rate of newborns delivered by planning caesarean section performed 59-63 d post ovulation, and namely 34/37 living pups 15 d after the surgery vs. 25/40 in emergency CS group. However, according to the author’s statement, planning CS should only be recommended for bitches with a high risk of dystocia as parturition is important to facilitate attachment of the dam to the puppies.

Indications for CS partly depend on the breed. Caesarean section was performed in 22.8% of all the whelpings and in 80.1% of the cases of dystocia in Boxer bitches (8). In a review of 151 breeds, the proportion of births solved by caesarean section was 34.4% in Chihuahua dogs, which is comparable to the result presented in the study (4). All, except one CS in the study were performed as primary ones (no puppy born before CS) and the stillbirth rate was 5.97% only. The planned obstetric supervision gave the chance to introduce a prompt surgery in the case of dystocia or owner’s decision.

The most important factor in the management of dystocia is time, as rapid intervention is crucial to optimise foetal survival. Duration of expulsion stage had the highest influence on puppy survival (3, 6, 10). In the study, the shortening of expulsive stage by conservative aid and timely performed CS resulted in low stillbirth rate.

In conclusion, the characteristics of the course of parturition in dogs should take into account breed differences and predispositions to dystocia in different morphological types of dogs. Obstetric aid should take into consideration the size of the dog as within species there is too much variation to treat the problem in a general way. The obstetric supervision over course of parturition and well-timed obstetric intervention assure efficient course of delivery and high percentage of living newborns in miniature dogs. CS and conservative treatment, if chosen appropriately, have the same level of effectiveness.

References