Praca oryginalna *Original paper*

Retrospective analysis of 193 cases of obstetrics assistance in singleton pregnancies in bitches

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Received 30.05.2025 *Accepted 10.07.2025*

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Summary

The aim of this study was to analyze the 193 cases of obstetrics assistance in singleton pregnancies in bitches. The female dogs were divided into two groups: Group A and Group B. The 164 bitches in group A experienced spontaneous labor that was interrupted due to dystocia. They underwent either conservative obstetrical intervention (pharmacological and/or transvaginal fetal extraction) or surgical intervention (emergency caesarean section). In contrast, the 29 bitches in group B showed no signs of labor, and an elective caesarean section was performed either because of prolonged pregnancy and/or prevention of birth complications in brachycephalic bitches. Most of the investigated bitches were of the small dog breed (i.e. Miniature Pinscher and Dachshund) and mongrel breeds. Age of the females ranged from 12 months to 16 years, but the majority of the animals (58 bitches – 30.1%) were 8 years of age or older. Only in the 129 cases (66.8%) the date of the first mating was confirmed. It is noteworthy that in 74 cases (57.4%), gestation lasted 68 days or longer. From Group A (n = 164), where the onset of delivery was spontaneous and dystocia occurred, the newborn death was reported in 131 cases (79.9%), including 50 cases of macerated fetuses in the advanced state of decomposition. On the contrary in Group B (elective caesarean section) dead fetuses were obtained only in 5 females (17.2%). Based on our data, two main conclusions can be drawn. First, in bitches with singleton pregnancies, waiting for spontaneous labor leads to very high puppy losses. Second, elective caesarean section – performed even before the onset of labor – is the best approach for managing such cases.

Keywords: singleton pregnancy, obstetric assistance, dogs

In some cases of parturition in bitches, obstetric intervention is required. Birth assistance should always be considered an emergency. Inadequate medical management, particularly when surgical intervention is indicated, can lead to complications or even death of the dam and fetuses (4, 10, 13, 23, 24). Therefore, assisting a bitch in labor always presents a challenge for the veterinarian.

In some cases, the health of the parturient bitch and the newborn puppies is particularly at risk. One such situation is a single-puppy pregnancy, in which dystocia is almost always expected (6, 9, 11, 15). Single-puppy pregnancies in bitches typically fail to initiate natural parturition, thus prolonging the pregnancy (7, 13, 22). This is most likely due to the lack of an adequate hormonal signal from the fetus to initiate the parturition (9, 11). Another complication associated with unifetal pregnancy is primary myometrial atony (13).

Several articles in the available literature present retrospective reviews of dystocia in bitches (5, 8, 17, 21, 26). These studies provide detailed analyses of the causes of birth complications and obstetric management strategies. However, none focus exclusively on obstetric interventions in cases of singleton pregnancies. Consequently, the true extent of neonatal loss in single-puppy pregnancies remains unclear. To address this gap, we retrospectively analyzed 193 such cases seen at our clinic between 1981 and 2005.

Material and methods

The retrospective analysis included 193 cases of obstetric interventions in privately owned bitches from the city of Wrocław and the Lower Silesia region. These animals were patients of the Obstetrics Clinic, Department of Reproduction, Faculty of Veterinary Medicine in Wrocław, over a 25-year period (1981-2005). All bitches had singleton pregnancies and were divided into two groups: Group A and Group B.

In 164 bitches (group A), spontaneous labor occurred, but was accompanied by signs of dystocia. This necessitated veterinary intervention, which was either conservative (pharmacological and/or transvaginal fetal extraction using delivery forceps) or surgical (emergency caesarean section). According to current assumptions (12, 13), the symptoms of dystocia were considered: strong and frequent abdominal straining that fails to produce a pup within 30 minutes, presence of greenish-blackish vulvar discharge (both in the case of delivery at a date considered normal and in the case of excessively prolonged gestation length), partial delivery of a puppy, systemic illness at the end of pregnancy (e.g. in the case of uterine torsion or septic metritis).

In the remaining 29 bitches (group B), no signs of labor were observed (i.e., no abdominal straining, no vaginal discharge, no signs of discomfort in the female), and an elective caesarean section was performed. Indications for the procedure included prolonged gestation (exceeding 67 days from the first mating) and/or the prevention of labor complications in brachycephalic breeds, such as English and French bulldogs.

In bitches from both groups, caesarean sections were performed via a midline or right flank approach. Two anesthetic protocols were used: sedation with propionylpromazine or promazine combined with local anesthesia (procaine or lignocaine), or general anesthesia with xylazine and ketamine, with or without local block. The length of gestation was calculated from the date of the first mating.

Statistical analysis was performed using the Fisher test to compare results between groups of singleton puppies presented with dystocia vs. planned cesarean section operations to check if there was a difference between the mortality of newborn. p value < 0.05 was considered significant.

Similarly to previous retrospective studies by other authors (5, 8), the data collected from each case varied due to differences in the animal's condition upon presentation, the clinician managing the case, the availability of certain diagnostic modalities, and the completeness of the medical record.

Results and discussion

Among the bitches with singleton pregnancies (n = 193), spontaneous labor occurred in 164 cases (85%). In the remaining 29 bitches (15%), an elective caesarean section was performed prior to the onset of labor (Tab. 1). The bitches included in the analysis represented 20 breeds (Tab. 2), with mongrels, Dachshunds, and German Shepherds being the most common. The age distribution of the parturient bitches ranged from 12 months to 16 years (Tab. 3). Gestation length was documented in 129 cases and is summarized in Table 4. While, the condition of the delivered puppies in relation to the timing of obstetric intervention is presented in Table 5.

In Group B (elective caesarean section, n = 29), dead fetuses were extracted in 5 bitches (17.2%), including

Tab. 1. Bitches with singleton pregnancies with different obstetrics assistance (n = 193)

Group A (n = 164)	Group B (n = 29)
Delivery assistance (manual, pharmacological, emergency cesarean section) during spontaneous parturition	Elective cesarean section prior of natural parturition

Tab. 2. Overview of breeds of dogs included in the study (n = 193)

Breed		Number of animals
Mongrel	up to 10 kg b.w.	29
	10-20 kg b.w.	24
	over 20 kg b.w.	21
Miniature Pinscher		45
Dachshund		24
German Shepherd		11
Miniature Poodle		6
Doberman		5
English Bulldog		4
Great Dane		4
Boxer		3
Pekingese		3
Poodle		3
Spaniel		3
Borzoi		1
Chow-chow		1
Dalmatian		1
English Mastiff		1
French Bulldog		1
German Pointer		1
Irish Setter		1
Mastino napolitano		1

Tab. 3. Range of age distribution of the parturient bitches (n = 193)

Age	Number of animals
1 year	11 (5.7%)
2 years	24 (12.4%)
3 years	18 (9.3%)
4 years	22 (11.4%)
5 years	28 (14.5%)
6 years	16 (8.3%)
7 years	16 (8.3%)
8 years	17 (8.8%)
9 years	15 (7.8%)
10 years	4 (2.1%)
11 years	3 (1.6%)
12 years	11 (5.7%)
13 years	4 (2.1%)
14 years	2 (1%)
15 years	1 (0.5%)
16 years	1 (0.5%)

Tab. 4. Pregnancy duration in 129 cases with a recorded date of the first mating

	Day of delivery or elective caesarean section – counting from the first mating																
	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	80
Number of animals	1	6	9	8	7	13	11	23	17	14	4	5	6	2	1	1	1

Tab. 5. Newborn vitality in relation to the timing of obstetrics assistance

Group	Condition of the newborns	
	alive	dead
A (n = 164)	33 (20.1%)[a]	131 (79.9%)[c] Including 50 autolyzed (macerated)
B (n = 29)	24 (82.8%)[b]	5 (17.2%)[d] Including 2 autolyzed (macerated)

Explanations: a, b, c, d – different letters in columns indicate statistically significant difference at $p \leq 0.0001$

2 cases with fetuses in an advanced state of decomposition (maceration).

In Group A (n = 164), where labor occurred spontaneously, emergency caesarean section was performed in 109 cases. In 21 of these, surgery was preceded by unsuccessful administration of oxytocin. The remaining 55 bitches received conservative obstetric assistance (oxytocin administration and/or use of delivery forceps), resulting in vaginal delivery. Among these, 15 bitches delivered following oxytocin administration alone (5 live and 10 dead puppies), while in 40 cases, delivery required forceps extraction. Caesarean section resulted in the extraction of 84 dead puppies, 34 of which were in an advanced state of decomposition (macerated). Conservative obstetric management yielded 47 dead fetuses, including 16 that were macerated. Overall, among the 164 cases of dystocia, neonatal death occurred in 131 cases (79.9%).

The breed distribution in our observations was naturally influenced by the popularity of specific breeds in the region. Notably, there was a relatively high number of small-breed bitches, including Miniature Pinschers, Pekingese, and Miniature Poodles (30 animals), as well as mongrels weighing under 10 kg (29 animals). Norwegian authors (2) in an analysis of over 10,000 litters, reported that the smallest litter sizes occur in small and miniature breeds.

Notably, a relatively large proportion of the bitches giving birth (58 animals, 30.1%) were 8 years of age or older. More than half of these older bitches (35 animals) were mongrels, often poorly supervised during estrus. This was partly due to owners' misconceptions that advanced age would prevent pregnancy. Additionally, the lack of proper monitoring during estrus and failure to determine the optimal time for mating or insemination often contributes to reduced litter size (11, 13). Currently, the participation of mongrel dogs in breeding has significantly declined, primarily due to the widespread use of surgical sterilization and hormonal contraception.

The interval from mating to parturition in bitches is generally assumed to range from 57 to 72 days (3). In our study, the gestation length recorded in 129 cases ranged from 61 to 80 days (calculated from the date of the first mating). Notably, in 74 cases (57.4%), gestation lasted 68 days or longer. This finding aligns with reports by other authors (7, 22), who also observed prolonged pregnancies in cases with small litter sizes. This phenomenon is most likely due to insufficient fetal signaling in singleton pregnancies, which fails to adequately trigger the hormonal cascade leading to luteolysis and the onset of parturition (12).

The high neonatal mortality rate during spontaneous delivery (79.9%) is not unexpected. Most of the cases presented in this study date back to a time when imaging techniques – such as radiography and ultrasonography – were not routinely used for monitoring pregnancy in bitches, beyond basic confirmation. Today, however, advances in knowledge and diagnostic technology allow for precise monitoring of pregnancy and more accurate prediction of the timing of parturition (7, 11-14, 18, 19). This contributes to a reduction in perinatal puppy losses. However, when supervising parturition in bitches, it is important to remember that in cases of singleton pregnancy, progesterone levels may not decrease to below 2 ng/ml at term (11).

Currently, the availability of new anesthetic agents and advances in anesthetic techniques have made caesarean section the most common method for managing canine dystocia (1, 4, 5, 8, 21, 25-27). Caesarean sections can be classified as either emergency or elective (scheduled). Emergency caesarean sections are performed in response to dystocia, while elective procedures are carried out to prevent anticipated complications during parturition (13, 20, 24). Elective caesarean section has enabled a high survival rate of newborns: exceeding 80%. The procedure can be scheduled after day 63 of pregnancy, counted from the LH surge, or on the day when progesterone levels fall to 2 ng/ml (25). Caesarean section can also be performed before the prepartum progesterone decline by administering a progesterone receptor antagonist (16). When ultrasound monitoring is used in late pregnancy, signs of fetal stress – such as a reduced heart rate – clearly influence the decision to proceed with caesarean section (4, 19). From an animal welfare perspective, waiting for spontaneous delivery in a singleton pregnancy is generally unjustified. However, such delays may occur when an irresponsible owner fails to prioritize the survival of the fetus.

The selected time frame for our analysis was intentional, as it holds significant cognitive value. This period reflects the time when US examination of pregnant bitches was not yet a routine or widely available practice. To date, there are no published veterinary reports specifically addressing neonatal mortality in spontaneous deliveries of singleton pregnancies. Therefore, we believe this retrospective analysis fills an important gap in the literature. Today, modern imaging techniques in veterinary medicine allow for accurate determination of litter size as well as assessment of fetal viability, both of which are critical for appropriately timing surgical intervention. This is especially important in elective caesarean sections for singleton pregnancies, which are the most logical and effective method of management. Based on our data, two main conclusions can be drawn. First, in bitches with singleton pregnancies, waiting for spontaneous labor leads to very high puppy losses. Second, elective caesarean section – performed even before the onset of labor – is the best approach for managing such cases.

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