

## CLEFT PALATES IN BRACHYCEPHALIC DOGS

Dorin ȚOGOE<sup>1</sup>, Nicoleta Andreea MINCĂ<sup>1\*</sup>, Alexandru DIACONESCU<sup>1</sup>

<sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Veterinary Medicine, 105 Splaiul Independentei, 5<sup>th</sup> District, 050097, Bucharest, Romania

\*Corresponding author email: nicoleta\_andreea\_m@yahoo.com

### Abstract

*This study aimed to assess the quality of life and survival rate of brachycephalic puppies with congenital orofacial clefts (cleft palate and lip) during their first month of life. Conducted at the Faculty of Veterinary Medicine in Bucharest, the research included 12 puppies from brachycephalic breeds, with a majority of French Bulldogs. The study found that 4 puppies died immediately after birth, 2 within the first 48 hours, and the remaining 6 were monitored for 30 days. The puppies faced significant health challenges, including feeding difficulties, aspiration pneumonia, and malnutrition, leading to a high mortality rate. The results emphasize the need for better breeding controls, genetic screening, and early intervention to reduce congenital defects and improve outcomes for these dogs.*

**Key words:** cleft palates, brachycephalic, dog.

### INTRODUCTION

Brachycephalic breeds such as the English Bulldog, French Bulldog, Shih Tzu, and Pug have become extremely popular both in Romania and globally. These breeds are highly appreciated due to their docile temperament and affection towards their owners. However, this popularity is accompanied by a series of health problems induced by their lack of genetic diversity. As demand for such dogs has increased, so have health issues, often due to the disorganized breeding of these dogs, with inadequate control (Estevam, Marina et al., 2022).

Brachycephalic breeds are characterized by a short skull shape and flat nose, and are prone to a variety of congenital malformations, most frequently in the cranial area. Orofacial clefts may occur during embryonic or fetal development as a result of incomplete fusion of the anatomical structures in this area (Van den Berghe et al., 2010; Bar-Am, 2013). The upper lip and the incisive bone form the primary palate, while the secondary palate consists of the palatal fold and hard palate which is represented by palatal process of the maxilla and the palatine bone (Warzee et al., 2001; Nelson, 2003; Dyce et al., 2009; Van den Berghe et al., 2010). As a result, a cleft palate is defined as a congenital oro-nasal fistula caused by incomplete fusion of the structures that separate the oral cavity from

the nasal cavities (Krzyżewska & Max, 2008; Fossum 2009).

Cleft disorders include cleft lip (cheiloschisis), characterized by the lack of union between the maxillary prominence and the medial nasal process, and cleft palate (palatoschisis), which can be primary or secondary. Primary palatoschisis is caused by incomplete fusion of the medial nasal processes and affects the incisive bone, almost always accompanied by cheiloschisis. Secondary palatoschisis affects the palatal process of the maxilla and the palatine bone, leading to incomplete fusion of these structures. Both defects can occur simultaneously, with varying severity, from incomplete unilateral to complete bilateral (Bar-Am, 2013).

Cleft palate can occur separately or alongside developmental abnormalities of other organs, leading to comorbidities that threaten the survival of the puppies (Nelson, 2003; Ingwersen, 2012).

This study aimed to investigate the quality of life and survival rate of brachycephalic canines with palatoschisis during their first month of life.

### MATERIALS AND METHODS

The study was conducted at the University Emergency Hospital of the Faculty of Veterinary Medicine in Bucharest and included 12 female brachycephalic dogs that required

assistance during delivery or needed an emergency cesarean section. These 12 females gave birth to a total of 53 offspring, of which 16 presented primary and secondary cleft palates of varying degrees (Figures 1 and 2).



Figure 1. Primary cleft palate

The offspring included in the study were subjected to the APGAR test immediately after resuscitation manoeuvres. The test included 5 parameters, and based on the obtained score, the offspring were categorized into 3 risk groups: 0-3 points, puppies with low vitality; 4-6 points, puppies with moderate vitality; and 7-10 points, puppies with normal vitality.



Figure 2. Incomplete primary cleft palate

A total of 6 offspring, from the moment of extraction, were classified in Group I (with low vitality) and died within the following 6-10 hours due to respiratory failure and severe bradycardia (63-82 rpm and heart rate under 70 bpm). All remaining offspring in the study were weighed and hospitalized for a 48-hour period for care and monitoring. Feeding was provided using milk replacers (Royal Canin 1st Age Milk), ensuring a comfortable position for the

puppies to prevent the occurrence of complications related to aspiration.

After 48 hours, the offspring were discharged and handed over to the owners, who were given instructions on feeding methods, proper feeding position, the need for daily weighing, and maintaining a body weight chart. Communication with the owners occurred daily or at least once every 3 days to monitor the offspring's progress and identify any potential medical issues requiring immediate attention. Out of the 10 offspring discharged after 48 hours, the sudden death of 4 was reported, seemingly without clinical symptoms during the first 6 days after discharge. Another 3 offspring presented to the hospital as emergencies 10 days after discharge, with acute respiratory failure that developed suddenly, hypothermia, increased heart rate, weak pulse, and apathy. The daily body weight chart for these 3 offspring showed a sawtooth pattern, with 2 of them remaining stationary, and the third offspring's weight dropped below the discharge limit. After clinical and radiological evaluation, it was determined that these 3 offspring had developed aspiration pneumonia.

Only 3 offspring survived without major medical issues until the age of 30 days. The body weight chart assessment revealed a very slow but favourable development, with the animals remaining below the average weight for their age (Table 1, Figure 3).

Table 1. The body weight chart over the course of the 30 days of monitoring.

| Day | Puppy 1<br>(Weight in g) | Puppy 2<br>(Weight in g) | Puppy 3<br>(Weight in g) |
|-----|--------------------------|--------------------------|--------------------------|
| 0   | 177                      | 192                      | 208                      |
| 3   | 182                      | 194                      | 210                      |
| 6   | 184                      | 200                      | 218                      |
| 9   | 186                      | 202                      | 223                      |
| 12  | 191                      | 212                      | 224                      |
| 15  | 202                      | 217                      | 230                      |
| 18  | 207                      | 222                      | 238                      |
| 21  | 205                      | 225                      | 241                      |
| 24  | 215                      | 232                      | 245                      |
| 27  | 222                      | 235                      | 253                      |
| 30  | 225                      | 242                      | 257                      |

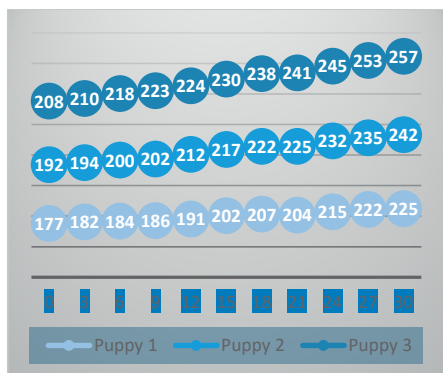


Figure 3. The body weight chart over the course of the 30 days of monitoring

## RESULTS AND DISCUSSIONS

Cleft palate, both primary and secondary, requires surgical correction to prevent chronic respiratory infections and to facilitate proper food intake. Numerous authors have suggested that the optimal age for surgery is between 3-5 months of life.

Throughout this period, the puppies require special care and a specific diet to meet their metabolic needs and support necessary physical development. Feeding in a vertical position and the systematic cleaning of food debris are extremely important to ensure quality of life and enable the puppies to reach the appropriate age for corrective surgery.

An extremely important aspect is the physiological characteristics of canine offspring. Canine newborns are born with minimal fat reserves, with most of their energy provided through glycogenolysis. The depletion of glycogen concentration in muscles and the liver after birth occurs very quickly, and hepatic gluconeogenesis is limited due to the immaturity of the liver. At the same time, thermogenesis is absent during the first 7 days after birth. These characteristics make newborn puppies highly sensitive to hypoglycaemia and hypothermia, indicating their dependence on proper feeding capacity and, consequently, an upward trend in their daily body condition score.

## CONCLUSIONS

Cleft palate is a huge challenge in veterinary medicine due to the feeding difficulties of the offspring. Respiratory failure with severe cyanosis occurs during or immediately after feeding. Associated complications, such as aspiration pneumonia and malnutrition, lead to exhaustion of the puppies and are one of the main causes of sudden death within the first 30 days postpartum.

## REFERENCES

- Bar-Am, Y. (2013). Cleft lip and palate. In E. Monnet (Ed.), *Small Animal Soft Tissue Surgery* (pp. 159–166). Wiley–Blackwell.
- Dyce, K. M., Sack, W. O., & Wensing, C. J. G. (2009). *Textbook of Veterinary Anatomy* (4th ed.). Saunders Elsevier.  
<http://books.google.pl/books?id=Hb1BXjgb0McC> (Accessed: 01.09.2013).
- Estevam, M., Beretta, S., Smargiassi, N., Apparicio, M., Toniollo, G., & Pereira, G. (2022). Congenital malformations in brachycephalic dogs: A retrospective study. *Frontiers in Veterinary Science*, 9. <https://doi.org/10.3389/fvets.2022.981923>
- Fossum, T. W. (2009). *Small Animal Surgery* (3rd ed.). Elsevier.
- Ingwersen, W. (2012). Congenital and inherited anomalies of the mouth. *The Merck Veterinary Manual*.  
[http://www.merckmanuals.com/vet/digestive\\_system/congenital\\_and\\_inherited\\_anomalies\\_of\\_the\\_digestive\\_system/congenital\\_and\\_inherited\\_anomalies\\_of\\_the\\_mouth.html](http://www.merckmanuals.com/vet/digestive_system/congenital_and_inherited_anomalies_of_the_digestive_system/congenital_and_inherited_anomalies_of_the_mouth.html) (Accessed: 15.08.2013).
- Krzyżewska, A., & Max, A. (2008). Rozszczep podniebienia u szczeniąt [Cleft palate in puppies]. *Życie Weterynaryjne*, 83(3), 214–216.
- Nelson, A. W. (2003). Cleft palate. In D. H. Slatter (Ed.), *Textbook of Small Animal Surgery* (3rd ed.), pp. 814–823. Saunders.
- Van den Berghe, F., Cornillie, P., Stegen, L., Van Goethem, B., & Simoens, P. (2010). Palatoschisis in the dog: Developmental mechanisms and etiology. *Vlaams Diergeneeskundig Tijdschrift*, 79(2), 117–123.
- Warzee, C. C., Bellah, J. R., & Richards, D. (2001). Congenital unilateral cleft of the soft palate in six dogs. *Journal of Small Animal Practice*, 42, 338–340.