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Case Report

Application of a temporary palatal prosthesis in a puppy suffering from cleft palate

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A 3-month-old Schnauzer was presented with congenital defects of the secondary palate. On the clinical examination, coughing, sneezing, drainage of nasal discharge from the external nares and poor growth were found. Vital signs and results of blood examination were within normal ranges. Thoracic radiography revealed mild pneumonia in the right lung lobes. In a puppy suffering from cleft palates, a palatal prosthesis was applied to the hard palate in order to protect the surgical wound, because a routine surgery was not successful. A palatal prosthesis was applied and held in place using the instant glue and plastic bands to protect the surgical wound following the third repeated surgery. Although a small oronasal fistula still remained, there was no functional defect. This prosthesis was easy to apply and helpful to protect the surgical wound. In addition, this implant could be placed or adjusted without or sedation/anesthesia.

Key words: cleft palate, palatal prosthesis, puppy

Cleft palate is abnormal communications between the oral and nasal cavities in young dogs. Secondary cleft palate occurs later in development and involves a hard palate and/or a soft palate [4]. Surgical treatment can be performed, but most affected puppies die from aspiration pneumonia or are euthanized [4]. Here we report the cleft palate was treated with surgery and palatal prosthesis.

A 3-month-old male Schnauzer puppy weighing 2.45 kg was referred to the Veterinary Medical Teaching Hospital of Chungnam National University for repair of a complete cleft of the secondary palate. The patient had suffered from aspiration pneumonia, which was treated with antibiotics for two weeks prior to referral. On physical examination, coughing, sneezing, presence of nasal discharge from the external nares and poor growth were found. Vital signs and results of blood examination were within normal ranges. Thoracic radiography revealed mild pneumonia in the right lung lobes. The cleft was located on the midline, from the incisive papilla to the posterior border of the soft palate. The size of the cleft was 5 mm in width and 30 mm in length in the hard palate and 10 mm in width and 20 mm in length in the soft palate (Fig. 1).

After premedication with atropine (0.04 mg/kg, SC, Daihan Pharm, Korea), anesthesia was induced by propofol (5 mg/kg, IV, Hana Pharm, Korea) and maintained with isoflurane. The patient was placed dorsal recumbancy with the mouth held maximally open. The surgical repair was performed by the mucoperiosteal and overlapping flap technique [11]. Briefly, the first incisions were made in the

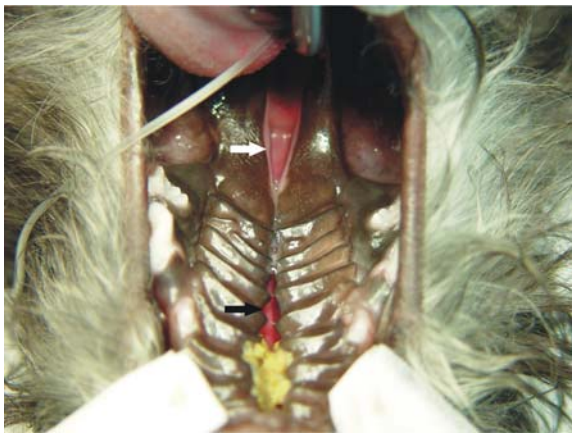

Fig. 1. The cleft is located on the midline, from the incisal papilla (black arrow) to the posterior border of the soft palate (white arrow).

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mucoperiosteum of the hard palate and the mucosa of the soft palate to create the mucosal flaps. Oral and nasal mucosal flaps were raised along the soft palate cleft. With the nasal mucosal flap reflected into the oral cavity, the oral mucosal flap was then sutured into the defect created by raising the nasal mucosal flap with a simple interrupted pattern. To close the hard palate, the mucoperiosteal flaps were undermined and moved toward the midline cleft. The tension-reducing incision was made just medial to the dental arcade, and closure of oral mucosa performed using of 4-0 monofilament (Maxon; Tyco Healthcare, UK) in a simple interrupted pattern.

After the surgery, a feeding tube was placed through a pharyngostomy. However, at 6 days following surgery, dehiscence and subsequent incomplete healing were seen at the part of rostral hard and soft palate. A second surgery was performed using the same technique with the graft of buccal mucosal flap, but failed again.

The third surgery was performed with a bone graft and the palatal prosthesis to protect the surgical wound from tongue movement. The cortico-cancellous bone graft was harvested from the ilium and placed between the palatal shelves without any fixation. The cleft was closed using the same technique. Before the surgery, the dental implant (resin) was made according to the method [5]. Briefly, normal setting alginate (Aroma Fine DF III; GC Tokyo, Japan) sets were mixed with water in a flexible rubber mixing bowl. The mixed alginate was transferred by spatula to a specific produced tray, then placed in the mouth and held steady until the alginate hardened under the general anesthesia of the patient. The dental stone (Mutsumi Chemical, Japan) was mixed with water and poured in impression using a vibrator to assist in the flow of dental stone. Once the dental stone had fully set, the model was removed from the impression. Finally, based on this model, the dental implant was made using the resin and wire (Fig. 2). After closure of rostral hard plate, the wire of the implant was fixed to both maxillary canine teeth using instant glue (Histoacryl; B. Braun, Germany) and plastic bands (Infusion Set; Korea Vaccine, Korea) (Fig. 3). After the surgery, a feeding tube was placed through the pharyngostomy and the implant was checked every two or three days.

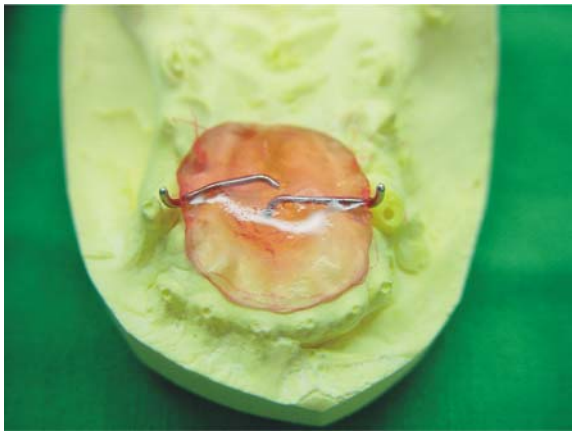

Fig. 2. Dental implant (resin) and stone.

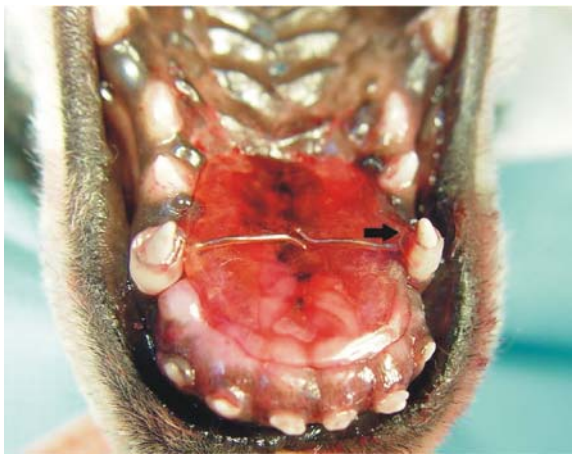

Fig. 3. Application of the dental implant (resin) to the suture line in the hard palate. The wire of implant was fixed with both canine tooth using instant glue and plastic band (Black arrow).

At 2 weeks after surgery, the cleft of the rostral hard palate had reduced considerably but a small defect remained. The prosthesis was maintained in for an additional week. Although the cleft of the hard palate did not completely close, the defect was minimal and the dog had no signs of sneezing, coughing, or nasal discharge. The patient was able to eat and drink in a normal manner. At present, 30 months following the last surgery, the patient is weighting of 6.5 kg and its general physical condition is good.

Cleft palate is an uncommon congenital abnormality in young dogs [6,13]. Cleft palate in the dog is attributed to inherited, nutritional, hormonal, mechanical, and toxic factors [6,11,13]. Puppies with cleft palate, if left untreated, may suffer malnutrition and aspiration pneumonia. These complications, or other concomitant congenital diseases, may cause death or dictate euthanasia [9].

Cleft palate surgery has been reported to be associated with a high rate of surgical failure [3]. In an earlier study, about 58% of dogs with a cleft palate required a second or even a third surgical procedure to attempt a clinical cure [6].

Repeated operations were also performed in this case. Tension at the surgical site was considered the most common reason for failure. Buccal mucosal flaps have been used for the correction of congenital soft palate defects in dogs [12]. At the second surgery in this case, a buccal mucosal flap was used to cover the suture line and the relaxing incision site, but the flap was not tolerated by irritation of the tongue movement. The method used most frequently to close cleft palates in dogs is the mucoperitosteal or mucosal flap. However, this method has been met with surgical dehiscence and palate and dental abnormalities.

Some investigators have attempted to use a free bone graft to fill the space of the cleft [7] or using a palatine prosthesis that fits to the cleft palate [14]. These surgical techniques were successful cure for 10 months [14] and 6 years [7] respectively. In this study, we used a protective palatal prosthesis. This is a report of this technique applied to repair of canine congenital cleft palate to the author's knowledge. In addition, a bone graft harvested from the ilium was placed in the third operation. However, the bone graft was not successful and didn't unite the palatine bone. It is thought that the blood supply from the surrounding environments to the bone graft might be not enough to survive at the wound region. Therefore the bone remodeling couldn't succeed at the wound area. The reduction of the cleft size might be the result of the combination of the prosthesis and bone graft, protecting both sides of the oral wounds. It is thought that the palatal prosthesis might be effective on protecting wounds and provide better blood supply into surgical wounds. Palatal prosthesis also prevent the tongue's irritation and inflammatory reactions, and it might be support the wound healing procedures.

In the early study, the prosthesis made of thermoplastics or alloy as cobalt and chromium was used to cover the suture line or traumatic cleft palate [7,14]. And the prosthesis was fixed bilaterally to the canines and premolars or molars with stainless steel wire that had been passed through the alveolar bone below the tooth roots. Those surgeries needed sedation or anesthesia when the prosthesis was applied and removed. The prosthesis used in this study was made of resin and was constructed without using wire to fix the implant through the alveolar bone. Instant glue and plastic bands were used to fix the implant. It seemed to be comfortable for the patient and also practical because it can be removed without sedation or anesthesia.

Primary concern in treating palatal clefts in a growing patient is to avoid inhibition of maxillary growth as a result of the operation [1,2,8,10]. However, investigators have reported conflicting results in the repair of experimentally induced cleft palate. Some investigators reported clear inhibition of facial bone growth [1,2,8,10] and others reported no measurable inhibition [6]. Fortunately, examination of the maxillary growth in this case showed that the upper incisors were slightly behind the lower incisors, but the premolars and molars were in a normal position and provided good occlusion.

Most of the patients suffering from a cleft palate usually do not survive the young period due to malnutrition or complications as pneumonia and inflammation. Hereditary problems are very important to transmission of disease. Thus, in this case the patient was naturalized at second surgery. Most of all intensive care of the patient for the complications and protection of the operating site is imported for a cure of cleft palate.

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