Learn to use CO₂ laser for repair of oral-facial clefts

By William E. Schultz, DVM
For The Education Center

Introduction
Dentoalveolar cleft and cleft lip are congenital palatal defects resulting from incomplete merging or fusion of the two palatine shelves that normally unite in the fetal formation of the face and jaws.1,2 Cleft lip is established with a unilateral cleft lip and dentoalveolar cleft is associated with premaxillary deformity. The cleft extended into the right nares with the nose open dorsally. Teeth 50, 54, and 55 were missing, and the left central maxillary and soft tissue were skewed cranially (Figures 1 and 2). The owner brought the dog in with the complaint of nasal congestion after meals. We decided to not delay the surgery in order to avoid the potential development of a bacterial rhinitis (secondary to food passing into the nasal cavity through the defect).

Physical examination showed that Clifford had a sufficient amount of tissue to repair his defects. The availability of the CO₂ laser allowed the surgery to be performed on such a young patient.

Surgical Equipment
- 4030 flexible fiber waveguide Ascensight CO₂ laser with tipless adjustable spot size hand piece. (Hand piece is shown in Figures 4, 5, 6, 8 and 9.)
- Small osteotome (Figure 3).
- Stainless steel wire and 20-gauge needle.

Post-Operative Care Instructions
Following surgery, a blended diet was recommended for two to three weeks, followed by a gradual transition to soft food for about four weeks. Withholding chew toys and hard objects was advised for approximately six weeks.

Follow-Up Evaluation and Suture Removal
The three-week follow-up exam showed a normal closure and cutting. After trimming was completed, the gingiva was cut to allow the left upper lip to move to the nasal floor. Once this is achieved, the cleft lip may be corrected.

Patient
Clifford, a 6-week-old golden retriever, was admitted with a unilateral cleft lip and dentoalveolar cleft.

Figure 1. Pre-operative view
Figure 2. Ventral pre-operative view
Figure 3. The osteotome was used to elevate the deformed premaxilla.
Figure 4. Laser resection of the gingiva allowed access to the premaxillary area.
Figure 5. The bone was checked for placement of the stainless wire suture.
Figure 6. Excess bone was trimmed from the caudal aspect of the premaxilla to allow for normal placement of the incisors.

REFERENCES

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Dr. Will Schultz graduated from Michigan State University in 1973 and opened a companion animal practice in 1974. He has been a board member with the Symbiotics Reproductive Advisory Panel, the Society for Theriogenology and the Theriogenology Foundation. He has spoken at veterinary conferences and to associations and national specialties because of his special interest in canine reproduction. He has lectured and published articles on transvaginal and surgical inseminations using fresh, chilled and frozen semen. Soft tissue and orthopedic surgery are his other areas of interest, with laser surgery being an important modality for over 20 years. Schultz currently uses a 40-watt flexible waveguide CO₂ laser with constant wave and SuperPulse modes.
Learn to use CO₂ laser for repair of oral-facial clefts

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Introduction
Dentoalveolar cleft and cleft lip are congenital palatal defects resulting from incomplete merging or fusion of the two palate shields that normally unite in the fetal formation of the face and jaws.1,2 Cleft lip is defined as a fissure involving the upper lip, while the dentoalveolar cleft is a fissure involving the portion of the alveolar bone immediately around the tooth.1 Incomplete palatal cloisure is attributed to hereditary, nutritional, hormonal, mechanical or toxic causes.2

In some neonates, the degree of the cleft defect is so severe that they are unable to nurse and soon die. Many neonates with palatal defects develop rhinitis, various respiratory infections and middle ear disease.1,2

The main goal of the surgical repair of palatal defects is to separate the oral and nasal cavities by establishing the nasal floor. Once this is achieved, the rhinitis tends to resolve.2 Cleft lip may be corrected.1

Patient
Clifford, a 6-week-old golden retriever, was admitted with a unilateral cleft lip and dentoalveolar cleft with premaxillary deformity. The cleft extended into the right nares with the nares open dorsally. Teeth 502 was missing, and the left central premaxilla and soft tissue were skewed cranially (Figures 1 and 2). The wire sutures were removed from the bone, and the cleft lip repair was reviewed. (Figure 7)

Procedure
The premaxilla was elevated with an osteotome (Figure 3). Gingiva was incised to gain access to the bone (Figures 4 and 5). The osseous aspect of the premaxilla was trimmed with the laser to allow the teeth to be parallel with the mandibular incisors (Figure 6).

The 4030 Aesculight laser model is capable of producing 100 watts of peak SuperPulse power in combination with the elevated water content in the young growing bone, this allowed for accurate chisel-free aspiration and cutting. After trimming was completed, the bone was wiped with saline-soaked gauze. Then the premaxilla and dentoalveolar teeth were reattached with stainless steel wire using a 20-gauge needle as a manual drill (Figure 7).

The laser then was used to freshen the edges of the nares and the upper lip (Figures 8 and 9). The gingival margins were cut to allow the left upper lip to move to the right, thus filling in the defect. Closure was completed using 3-0 Monocryl suture in an interrupted pattern.

Follow-Up Evaluation and Suture Removal
The three-week follow-up exam showed a normal good apposition of the lip and nares (Figure 10). Tension mattress sutures were placed in the region of the philtrum. The immediate post-op picture shows very good apposition of the lip and nares (Figure 10).

Post-Operative Care Instructions
The patient was released the afternoon of the procedure. The owner was instructed to give him lidocaine Metacam for three to four days post-operatively, as needed, and a broad-spectrum antibiotic for 10 days. A blended diet was recommended for two weeks, followed by a gradual transition to soft food for about four weeks. Withholding chews and hard objects was advised for approximately six weeks.

The bone was checked for placement of the stainless wire suture. The wire sutures were removed from the bone, and the premolars were reattached. Clifford passed intakes and excursions well. Sevoflurane was discontinued and the endotracheal tube was wrapped in saliva-soaked gauze to prevent inadvertent laser puncture. The wire sutures were removed from the bone, and the cleft lip repair was reviewed.

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