In cleft palate (CP) patients, traditional palatoplasty seems to impair mid-facial growth due to the extensive mucoperiosteal flaps. In this study we aimed to develop a novel flapless procedure for cleft palate repair by injecting a BMP-2 containing hydrogel: the injection/adhesion technique.

We used the Old Spanish Pointer dog breed, which develops CP in 15-20% of the offspring. Twenty pups were included in 4 groups: A: normal palate controls (n=5), B: cleft palate controls (untreated) (n=4), C: cleft palate individuals repaired with 2-flap palatoplasty (n=6) and D: cleft palate individuals repaired with the injection/adhesion technique (n=5) as the novel experimental approach. The technique consisted in the injection of a hyaluronic acid-based hydrogel (Termira, Sweden), containing BMP-2 and nanosized hydroxyapatite, in the CP medial edges of pups aged 6 weeks, followed by the removal of the overlying mucosa and suture of the medial edges at week 10. Traditional 2-flap palatoplasty was performed in the individuals of group C. Occulusal photographs and CT scans were obtained at weeks 5, 8, 20 and 30. The two treatment options were compared in terms of results of repaired tissues, difficulty, duration, and complications.

In the experimental group, four weeks after the hydrogel injection the cleft palate margins had reached the midline and engineered bone enlarged the palatal bones. Removal of the medial edge mucosa and suturing allowed complete closure of the cleft. Compared to traditional palatoplasty, the injection/adhesion technique was easier, and the post-surgical recovery was faster and better, although it required two sessions. Lateral scar and denuded bone were avoided with the experimental approach. The palatal bones did not show overlapping or bone defects in the experimental or untreated controls, as observed in the 2-flap palaplasty group. No adverse effects were observed in the pups’ palates, although small fistulas appeared in the first experimental pups.

We present herein a feasible minimally invasive technique for cleft palate repair upon injectable scaffolds in a dog model of cleft palates, the injection/adhesion technique. Preliminary results suggest better maxillary growth. Therefore, this technique may represent an attractive clinical alternative to traditional palatoplasty for cleft palate patients.


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