Ankylosed primary teeth with no permanent successors: What do you do? -- Part 1

March 3, 2015
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The clinical problem

You have a seven-year-old patient who comes to your office for a visit, and you notice that the mandibular primary first molar is in infraocclusion. Why? Because it is ankylosed and fused to the bone, just like an implant. What do you do with it? Your choices are as follows:

1. Watch it.
2. Place an onlay to put it back into occlusion, thus supporting the occlusal plane.
3. Extract the ankylosed tooth.

It is not without some frequency that we encounter **ankylosed** primary teeth in the adolescent patient. In one study, (1) ankylosis of primary molars have been found in 3.7% of an adolescent sample. This same study noted that mandibular primary first molars are ankylosed at an earlier age more frequently than any other tooth. The frequency of ankylosis of the second primary molar increases in older populations. In a similar study, Bacetti (2) noted that as ankylosis occurs in the primary dentition, infraocclusion not only results, but increases with further facial growth.

Both of these studies recommend that the earlier the ankylosis occurs, the more necessary it is to have the primary molar extracted to preserve the vertical alveolar bone. Extraction of the ankylosed primary tooth and space preservation is the most frequently recommended treatment. (3)

It would make sense that after removal of these teeth, the erupting permanent teeth would preserve the alveolar bone both vertically and horizontally as they emerge into the arch. But what about the patient in whom there is no permanent tooth successor? Does the alveolar bone continue to develop as normal growth continues, or does it atrophy like the edentulous ridge of an adult? The purpose of this paper is to answer these questions for you, and propose options of treatment for you to consider.

Figure 1: *This 9-year-old female had ankylosed primary 1st and 2nd molars, resulting in arrested alveolar bone development. She had been under routine observation by her dentist, who grew concerned with the development of the bilateral open bites.*

Figure 2: *The panoramic film reflected the ankylosis and the fact that none of these teeth had permanent successors.*

This nine-year-old patient had both maxillary and mandibular primary first and second molars bilaterally ankylosed. By age 9, the dentist became quite concerned that further observation might be the treatment of choice. Because of the ankylosis and its resulting hindrance of the alveolar bone development, there was a severe, bilateral open bite (Figure 1). The panoramic film (Figure 2) revealed an alarming feature: None of these teeth had permanent successors.

For comparison, her 12-year-old sister also came for a visit. She presented with ankylosis of the maxillary and mandibular primary first and second molars as well. Because she was three years older, her ankylosis was even more severe (Figure 3). She was also under observation, and her panoramic film (Figure 4) demonstrated what happens over time—the teeth were practically

submerged beneath the alveolar bone. It is clear that if left alone, her condition could possibly worsen.

This principle is illustrated in our next patient presented in Figure 5. This 24-year-old patient had ankylosed primary second molars with no permanent tooth successor. Since her dentist had chosen inaction, she was literally “watched” until the teeth were completely submerged (Figure 6)! In her case, removal of the primary teeth now obviously would produce a large alveolar defect, requiring bone grafting for an implant or orthodontic closure. Conceivably, had the teeth been removed during adolescence, her vertical alveolar bone would have been much better, although not at the same level as nonankylosed teeth would have. The order of patients was selected because they are illustrative of sequenced comparisons of the effects on nontreatment in these types of cases.

Figure 3: *Her 12-year-old sister also was examined, and she also presented with virtually the same set of developmental problems.*

Figure 4: *Her panoramic film demonstrated what would be expected—the ankylosed primary teeth were practically submerged beneath the alveolar bone.*

Figure 5: *This 24-year-old patient had ankylosed primary second molars, and without any suggested treatment, she presented with severe submergence of the teeth.*

Figure 6: *Since no intervention was ever suggested, she was literally "watched" until the teeth were completely submerged. Removal of the primary teeth now obviously would produce a large alveolar defect, requiring bone grafting for an implant or orthodontic closure.*

The biology

In a sample of patients who are missing mandibular second premolars, Ostler (4) extracted the ankylosed teeth and followed them for a seven-year period. He documented that alveolar width was reduced by 30%, but the edentulous ridge was documented to move occlusally as the adjacent teeth erupted. Donnelly and Swoope (5) demonstrated in primates that an upward pull on the periosteum in an edentulous area does result in vertical alveolar growth. In 1984, Malmgren and coworkers (6) introduced another option of treatment to consider—decoronation of the ankylosed primary tooth.

Figure 7: *In the decoronation technique, the crown of the tooth is removed to a depth of 2 mm*

beneath the cervical bone margin. The surgical area is left open and not sutured over. A new periosteum is formed and the erupting teeth are linked with the periosteum, covering the top of the alveolar socket, which induces bone formation during normal dental eruption. (7)
In this technique, rather than extracting the primary tooth, the crown of the tooth is removed to a depth of 2 mm beneath the cervical bone margin (Figure 7). The surgical area is left open and not sutured over. A new periosteum is formed over the decoronated root, and the interdental fibers that have been severed by the decoronation procedure are reorganized between the adjacent teeth. Continued eruption of these teeth mediates marginal bone apposition via the dental-periosteal fiber complex. The erupting teeth are linked with the periosteum covering the top of the alveolar socket, and are indirectly inserted into the alveolar crest and in the lamina propria and follows bone-inducing effects during normal dental eruption. (7) The advantage of decoronation is that this procedure, at the appropriate time, allows for the alveolar width to be maintained for years, while allowing additional vertical growth of the alveolus. (8,9)

The conclusion

When the clinician is faced with the dilemma of primary tooth ankylosis without permanent tooth successors, some action is required. Extraction of the ankylosed primary tooth will prevent further deformation of the alveolus, while gaining alveolar height during dentoalveolar development. Decoronation has the same effect, but has the probable advantage of retaining more alveolar width.

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