

CASE STUDY

Using saliva analysis to improve pediatric patient care.

By Boyd Simkins, DDS, AAPD



INTRODUCTION

One of the first aspects to personalized oral health care is understanding your patient's saliva. The SillHa Oral Wellness System by ARKRAY USA is a new salivary analysis technology to help your team objectively track the oral health of your patients and understand biomarkers of your patient's saliva. You can perform a chairside screening to look at seven biomarkers in less than five minutes with one test.

Collecting and analyzing saliva at their initial and subsequent appointments allows you to see and track the benefit of early treatment (e.g. periodontal therapy or caries control), preventive agents, and regular re-care appointments in achieving and sustaining health for your patients. Additionally, this procedure helps oral health professionals find a combination of preventive therapies to help patients achieve saliva that protects from disease, rather than placing a risk for it.

PEDIATRIC CASE

Patient AA is a 11-year-old female. No medications, other than fluoride supplement with multivitamins, no contributory health conditions. Birthdate: 12/12/2008

First Visit: August 2017

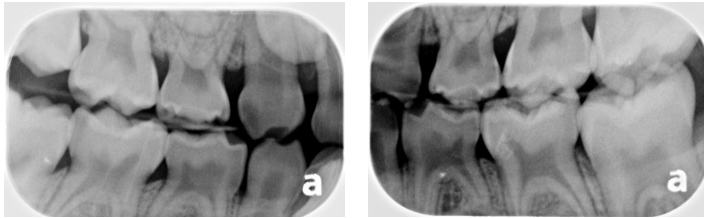
At first visit, patient presented with mother. The patient's behavior was age appropriate (Frankl 2). The parent received oral hygiene instructions including assistance with brushing and flossing until age 7, timing and education on the effect of frequent carbohydrate intake, trauma prevention practices, and fluoride status. Patient has been seen with regularity, approximately every 6 months. For this case study we will start the discussion in May 2016 and use that as "Appointment 1"

Our practice was using a simplified, non-documented CAMBRA approach to assess caries risk at the time. We also did not question specifically what carbohydrate sources were being consumed only focusing on the "grazing" and "sipping" overall. Generally, at that time, the "grazing" conversation was to limit food to mealtimes and a midmorning and midafternoon snack with water or other unsweetened liquid between meals. The "sipping" portion of the conversation was an attempt to bring awareness to parent to keep juices, milk, and any sugar sweetened beverage with meals and defined snack times.

Appointment 1 (May 2016): Recall appointment

Treatment: Oral exam, prophylaxis, fluoride varnish, bitewing radiographs.

Recommendations: Incipient lesions on the distal surface of teeth I and L. Discussed not restoring lesions due to size with the mother. Encouraged brushing/flossing and reducing carbohydrate frequency.



*Appointment 2 (November 2016):
Recall appointment*

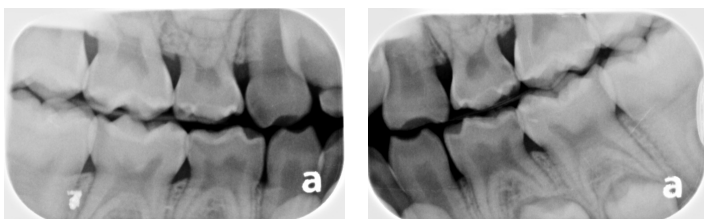
Treatment: Oral exam, prophylaxis, fluoride varnish.

Recommendations: First permanent molars had erupted at this time so recommended sealants. Discussed incipient lesions again with mother and emphasized carbohydrate control and brushing/flossing twice daily.

Appointment 3 (May 2017): Recall appointment

Treatment: Oral exam, prophylaxis, fluoride varnish, bitewing radiographs.

Recommendations: Recommended sealants again to mother. She had cancelled a previous appointment and forgotten to reschedule. On radiographs, lesions on distal surface of teeth I and L have progressed since the initial finding and so now restoration recommended. Continued to emphasize carbohydrate control and brushing/flossing twice per day.



Appointment 4 (September 2017):

Treatment: DO restorations placed on teeth I and L; sealants placed on 6-year molars.

Recommendations: Continued with routine education established at previous appointments.

Appointment 5 (November 2017):

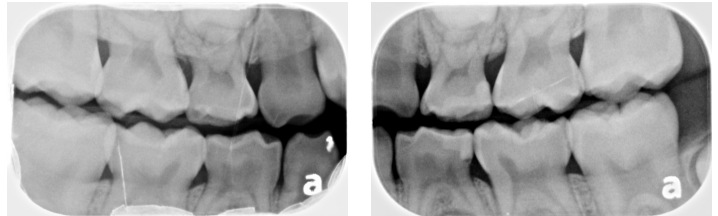
Treatment: Oral exam, prophylaxis, fluoride varnish treatment.

Recommendations: No decay noted; continued to encourage good oral hygiene practices along with carbohydrate management.

Appointment 6 (July 2018)

Treatment: Oral exam, prophylaxis, fluoride varnish treatment, bitewing radiographs.

Recommendations: Incipient decay noted, opted to watch lesions with hope they would not progress. Encouraged good oral hygiene practices along with carbohydrate management.



Appointment 7 (January 2019)

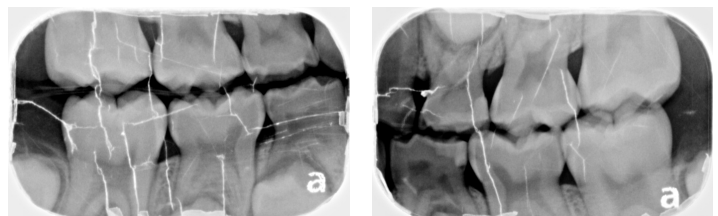
Treatment: Oral exam, prophylaxis, fluoride varnish treatment.

Recommendations: Continue to monitor incipient decay. Encouraged good oral hygiene practices along with carbohydrate management.

Appointment 8 (July 2019) Recall appointment

Treatment: Oral exam, prophylaxis, fluoride varnish treatment, bitewing radiographs.

Recommendations: On radiograph, incipient lesion now present on distal surface of teeth S and B along with mesial of tooth K. Recurrent decay present on tooth L. At this time, we had incorporated Silver Diamine Fluoride (SDF) into practice and discussed use with parent. She agreed to try SDF to halt the progress of the incipient lesions. Again, continued to encourage proper hygiene, especially flossing, and control of carbohydrate frequency.



Appointment 9 (August 2019)

Treatment: Placed SDF on mesial surface of tooth K, and distal surfaces of teeth B and S.

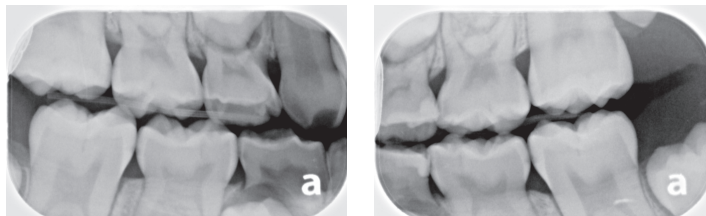
Appointment 10 (September 2019)

Treatment: Placed SDF again on mesial surface of tooth K, distal surfaces of teeth B and S, and restored tooth L with a DO resin.

Appointment 11 (February 2020)

Treatment: Oral exam, prophylaxis, fluoride varnish treatment, bitewing radiographs.

Recommendations: Scheduled for a 6-month SDF application, and also discussed 2-hour NPO and no brushing prior to appointment so we could perform a SillHa saliva analysis.



Appointment 12 (May 2020)

Treatment: SDF application distal surfaces of teeth S, B and T, mesial surface of tooth K. SillHa saliva analysis. (See figure 1).

Recommendations: Due to the high acidity (76), low buffer capacity (2) and low ammonia (9) levels, we spoke with mother and recommended a remineralizing toothpaste sweetened with Xylitol and probiotics. The patient was to use the toothpaste twice per day, do not rinse and nothing taken orally for 30 minutes after. The patient was also instructed to dissolve the probiotic lozenge every night right before bedtime with nothing taken orally after. Gingival inflammation markers, leukocytes, were high so recommended the mother watch to see if patient was adequately able to brush and floss. Scheduled a 3-month recall to check progress using the new items.

Appointment 13 (August 2020)

Treatment: SillHa salivary analysis (See Figure 2).

Recommendations: Recommended to continue with current course of treatment due to the fact that acidity (58), buffer capacity (18) and ammonia (66) were improving; continue to monitor brushing/flossing; however, increase in gingival inflammation was possibly caused by mobile primary teeth ready to exfoliate.

Tooth health	Cariogenic bacteria	25	Low Ave. :37
	Acidity	76	High Ave. :43
	Buffer capacity	2	Low Ave. :36
Gum health	Blood	27	Average Ave. :22
	Leukocyte	81	High Ave. :49
	Protein	24	Low Ave. :43
Oral cleanliness	Ammonia	9	Low Ave. :53

Figure 1.
SillHa analysis May 2020.

Tooth health	Cariogenic bacteria	61	High Ave. :37
	Acidity	58	High Ave. :43
	Buffer capacity	18	Low Ave. :36
Gum health	Blood	57	High Ave. :22
	Leukocyte	73	High Ave. :49
	Protein	75	High Ave. :43
Oral cleanliness	Ammonia	66	High Ave. :53

Figure 2.
SillHa analysis August 2020.

LEARNING EXPERIENCE

- 1) Proactive vs. Reactive: When treating this patient for the first 5-6 years, I, like many dentists managed caries with reaction after reaction. It is possible, had I used saliva analysis with this patient from day 1, I could have noticed the environmental changes that favored disease over health prior to evidence of disease process.
- 2) Listening to the patient and family: During the early years of practice, we focused on doing rather than listening. At this patient's initial appointment, we did not have an adequate dental history form that included the medical and dental history detail needed to truly assign risk status. With more detail, I believe we would have recognized clues to help us understand the higher risk for dental caries, and then, target therapies to address this risk. We learned later that the older sibling of this patient was referred for treatment from a general practitioner due to their severity of disease.
- 3) Never Watch! Certainly, one of the downfalls in our management of this case was "watching" the cavities. I do not feel the lesions were restorable at first discovery, but we did not find a way to help stop the progress. SDF certainly was coming on the scene at the time we discovered the first incipient lesions, but research and widespread use was lacking compared to today. Additionally, we

could have continued to address risk in innovative ways at each appointment instead of “staying the course.” One, the patient may not understand or want to participate in the previous goal, and 2) setting new goals will help them acquire multiple health habits over time. An example might be instead of having the same conversation about decreasing carbohydrate exposure, we could have made a goal to eat more protein snacks (hard cheese, nuts), or having a Basic Bite® for a snack after lunch. When patients set new goals at each appointment, they are more likely to stick to them because we, as humans, operate best in setting less than three 90-day goals. Over time, these goals will become habits and the patients will not only be decreasing their carbohydrates, but will be eating high protein foods, etc. The combination of 3-5 habits over the course of a year (high risk patient seen quarterly) will drastically decrease the patient’s caries risk, instead of the one goal of decreasing carbohydrate exposure.

4) Family involvement. Another observation in hindsight, was not involving the parent and patient adequately in the decision-making process. Luckily in this situation, the mother was motivated to adopt the changes we recommended, but I have not always had that type of response. We have now acquired a menu to help the family choose what type of intervention they prefer. We also learned that focusing on limiting the carbohydrate frequency is difficult for all families to accomplish. We are now using options that allow for frequent snacking but altering the snack content for better oral and overall health. (Source: Novy, B, Kennedy, E, Donahoe, J, Fournier, S. Minimizing Aerosols with Non-Surgical Approaches to Caries Management. Journal of the Michigan Dental Association. July 2020: 48-56.)

5) Saliva analysis breakdown. The analysis gives us seven biomarkers that describe the patient’s oral environment in a way that we cannot visually see. For this patient, we noticed success after recommending the use of probiotics. Her ammonia levels were increased after starting the treatment likely indicating the probiotic was working and the increase of commensal (healthy) bacteria were producing more ammonia. However, gram negative bacteria that contribute to gingival inflammation also produce ammonia. Therefore, we will be able to discern the contribution to ammonia after the teeth exfoliate. The fall in acidity and rise in buffer capacity are optimistically viewed as moving

toward a healthier oral environment. While we see an increase in cariogenic bacteria in the second analysis, it cannot be explained. We often see differing levels based on diet, drinks, or the patient could have had a carbohydrate rich snack or drink before their appointment that altered these numbers. Overall, the markers for acidity, buffer capacity and ammonia gave the best indication early on to indicate we are heading in the right direction.

DISCUSSION

This case had many important lessons to learn from the beginning with the child not visiting us until age 3 and to the eventual progression of disease. The first visit occurring at 6 months after the eruption of the first tooth or by age 1 certainly has become more important than ever. We know that proactivity is best and to begin early with appointments including preventive care. Becoming comfortable with merely the absence of disease is one of the most problematic issues I can see. By performing in a reactive mode, we are losing the opportunity to create good oral health which we know is a direct link to overall health. By seeing changes in the oral environment, we can work collectively with the family to help change course to more complete oral and overall health. The importance of continual development and education in the dental practice is paramount to continued health for our patients.



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