



# Optimizing Braces Treatments with DentalMonitoring's Archwire Passivity Feature to Match the Patient's Biological Response



By Dr. Barry Benton

Dr. Barry received his Bachelor of Science degree in Biology from Furman University and went on to receive his Doctorate of Medical Dentistry degree from the University of Alabama at Birmingham.

Dr. Barry continued his education at the Louisiana State University School of Dentistry where he received his Certificate in Orthodontics and Master of Science in Dentistry. In the summer of 2016, Dr. Barry joined Dr. Benton (his father) at Designer Smiles by Benton.

Dr. Barry is board-certified and one of the youngest practicing orthodontists in the nation to be a Diplomate on the American Board of Orthodontics at the time of certification.

## Case study review

Recent advancements in materials have transformed fixed orthodontics, aiming to deliver light, continuous forces over extended periods to enhance the efficiency of tooth movement by allowing continuous blood supply to the periodontal ligament while minimizing patient discomfort and adverse effects on the teeth and surrounding structures. However, traditional workflows often overlook individual physiological responses to the various archwires used in treatments. Operating without this crucial insight can lead to overtreatment, unnecessary or frequent archwire changes, which may prevent the wire from fully expressing its working range, thus limiting its biomechanical benefits. Furthermore, orthodontic-related emergencies remain common across all bracket types, potentially delaying treatment progress. This case study demonstrates how DentalMonitoring (DM), an AI-powered remote monitoring system, was utilized to continuously track treatment progress, enabling timely intervention when clinical incidents occurred or specific treatment objectives were met.

## Initial situation

### Case history

The patient states she had a prior orthodontic treatment for 5 years. She did not wear her retainer and as a result, her teeth have shifted.

### Patient concern and motivation

The patient doesn't like her lower teeth.

### Initial diagnosis

Class I malocclusion with moderate overbite, moderate crowding in the lower arch, and mild crowding in the upper arch.

## Initial records



**Figure 1** - Pretreatment extraoral photographs

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**Figure 2** - Pretreatment intraoral photographs



**Figure 3** - Pretreatment lateral cephalogram

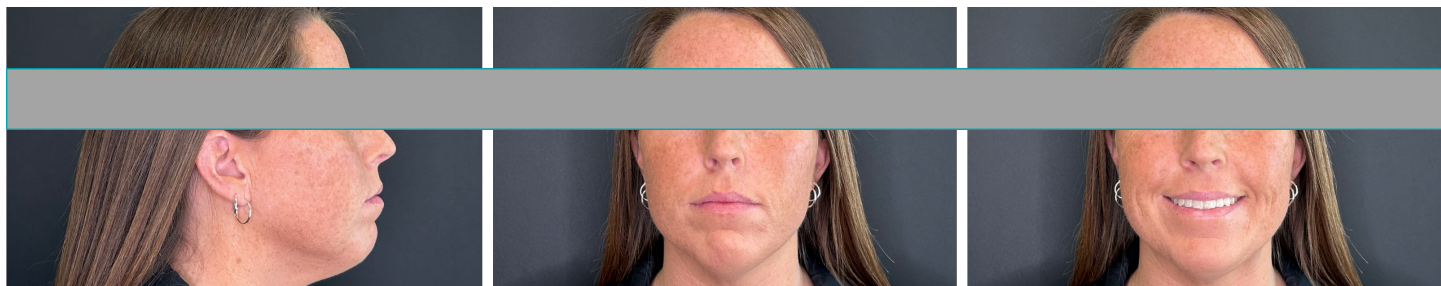


**Figure 4** - Pretreatment OPG



**Figure 5** - Treatment progress OPG

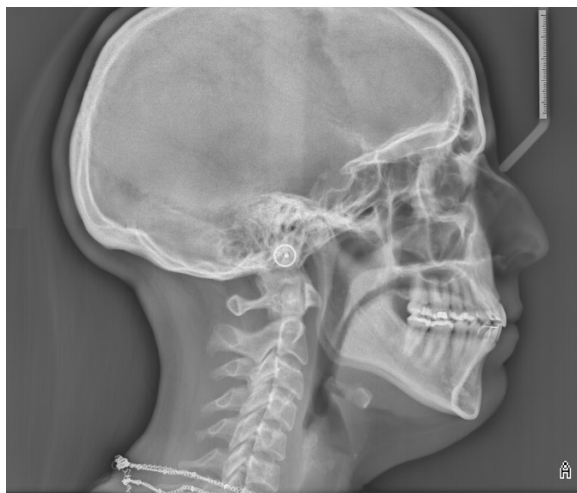
## Final records



**Figure 6** - Post-treatment extraoral photographs



**Figure 7** - Post-treatment intraoral photographs



**Figure 8** - Post-treatment lateral cephalogram

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## Final situation

### How did DM help me treat this case better?

#### 1. Adapting the treatment to the patient's biological response

- By combining DM's archwire passivity feature with the Damon Ultima bracket system, we were able to treat her case with biologically appropriate forces. This approach allowed us to maintain low forces throughout treatment and change the archwires only once they had fully expressed, minimizing the need for wire adjustments. The reduced forces also supported the development of a natural arch form with the teeth upright over the bony anatomy and minimized proclination of the lower incisors, even with a non-extraction treatment plan. Maintaining biologically sensible forces allows the teeth to align into a natural arch form in equilibrium with the surrounding soft tissues. Figure 10 shows how we were alerted through the DM dashboard when the first archwire passivity goal was achieved, after which the patient was scheduled for an appointment via DM chat.

#### 2. Early detection of clinical incidents

- DM's artificial intelligence capabilities allow for the early detection of clinical issues, triggering an alert on the dashboard that enables us to respond quickly (Figures 11-12).

#### 3. Managing clinical issues remotely

- The DM annotation feature enables us to highlight problem areas for patients and provide remote instructions for managing these issues. Figure 13 demonstrates how an open self-ligating clip was successfully addressed without requiring an in-office visit.

#### 4. Patient reassurance

- The DM chat feature provides a smooth and efficient communication channel between us and our patients. It allows patients to reach out with any concerns, and we can respond quickly, offering reassurance and reducing the number of calls to the front office.

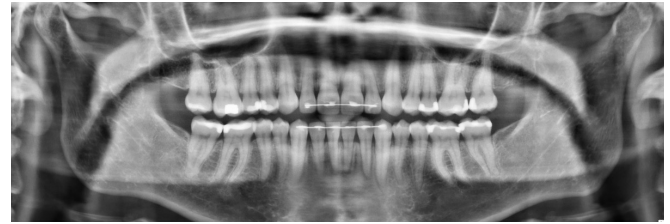


Figure 9 - Post-treatment OPG

## Treatment summary

|                                                  |                                                                                                                                          |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Treatment duration                               | 20 months                                                                                                                                |
| Total number of appointments                     | 10                                                                                                                                       |
| Emergency appointments                           | 1 (replacing the bite-opening composite)                                                                                                 |
| Number of DM scans                               | 83                                                                                                                                       |
| Number of clinical incidents detected by DM's AI | 6 (Archwire distortion, open self-ligating clip, bite-opening composite debonding, gingivitis, dental calculus & dental plaque presence) |

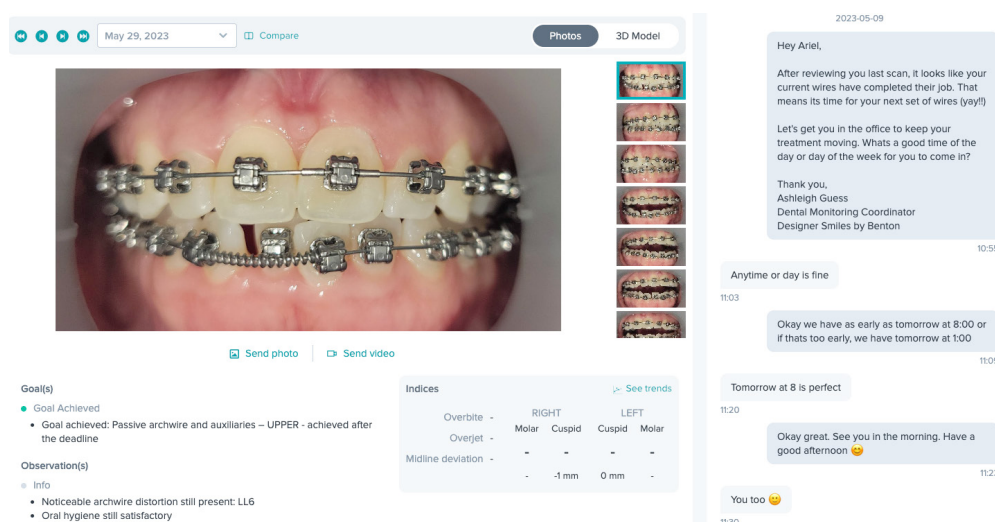


Figure 10 - Archwire passivity goal achieved

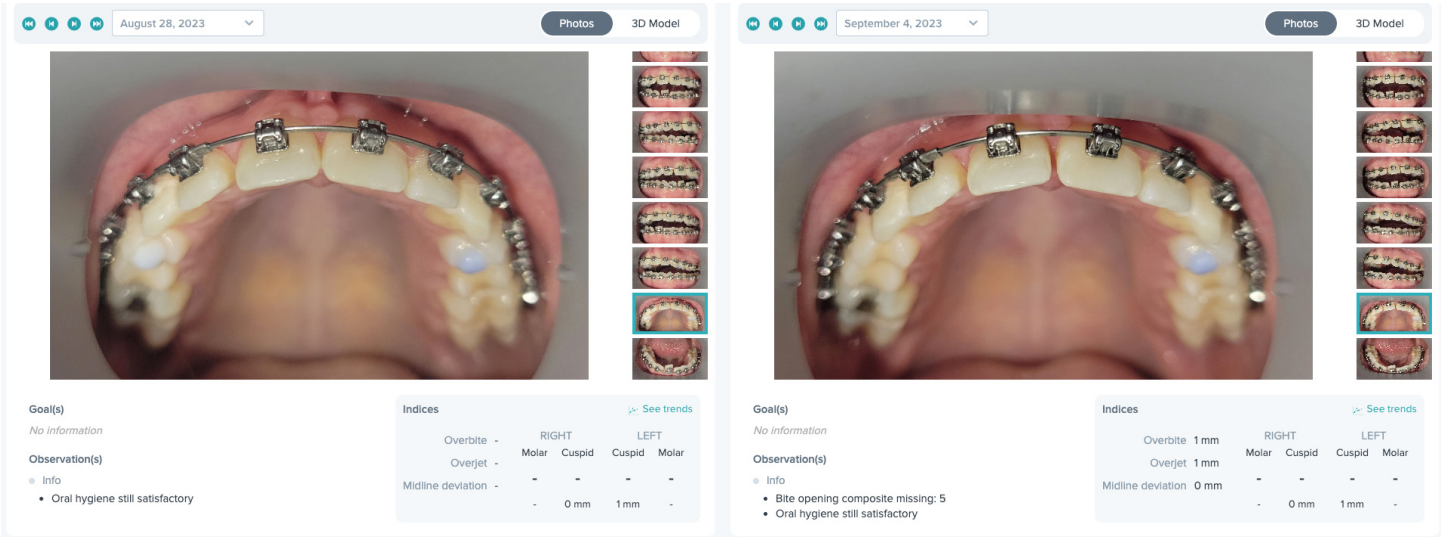


Figure 11 - AI's detection of a missing bite-opening composite on the upper right first premolar

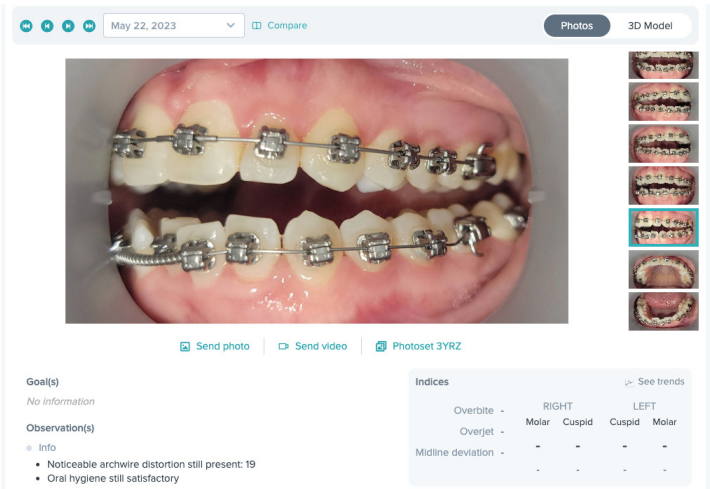


Figure 12 - AI's detection of a distorted archwire on the lower left first molar

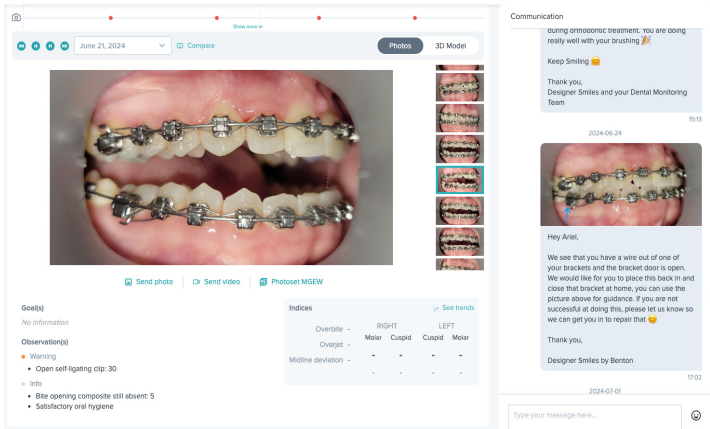


Figure 13 - AI's detection of an open self-ligating clip and communication with the patient via the DM chat

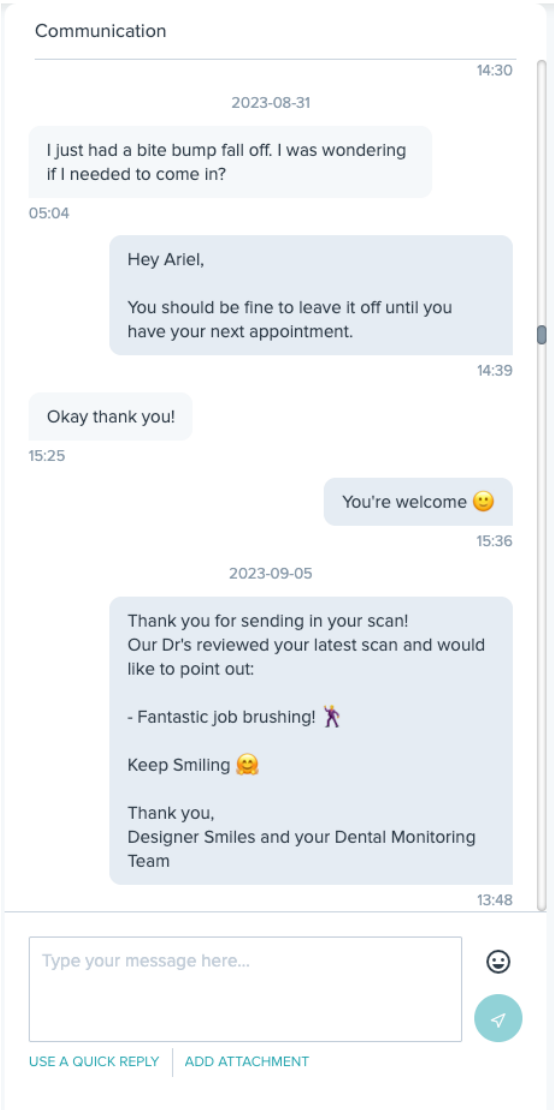


Figure 14 - The DM chat

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## Conclusion

In conclusion, integrating DM with braces offers substantial benefits throughout the treatment process. The archwire passivity feature customizes treatment to each patient's biological response at every stage, while the AI's high accuracy serves as a dependable safety measure for detecting clinical issues early on. DM's interactive tools enhance communication, improve patient experience, and increase compliance.

Additionally, DM significantly boosts treatment efficiency, as demonstrated in this case with only ten in-office visits required, showcasing its streamlined approach. Overall, DM is a game-changing tool in orthodontics, optimizing procedures, reducing in-office visits, and improving the patient experience, setting a new standard for efficiency and effectiveness in the field.



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Smarter Orthodontics