Hard to achieve orthodontic stability? Answer may be blowing in the wind

By Dr. Daniel Hanson, BDS
Sheffield, UK

The majority of children today exhibit some degree of malocclusion, and it has been well documented that this is related to soft tissue dysfunction. In fact, it is now so well accepted that the muscles of the tongue, lips and cheeks play a major role in tooth position and jaw development. There are contemporary pre-orthodontic clinics around the world using myofunctional philosophy to treat children between the ages of 5 and 15 (Myobrace® Pre-Orthodontic Center).

However, despite these evolutionary myofunctional treatment systems achieving outstanding results, a small percentage of cases that prove difficult to treat remains. This raises questions regarding what is causing these stubborn cases as well as best to treat them when all obvious poor myofunctional habits, such as digit sucking, tongue postural issues and dysfunctional swallowing patterns, have all been addressed in the myofunctional sense. It appears that answers may be uncovered by examining the child’s airways and breathing patterns.

Relevant literature explains how mouth breathing is a significant factor in the etiology of malocclusion. In short, when mouth breathing occurs, the tongue moves down in the mouth to allow the passage of air above it. Furthermore, an open-mouthed posture can affect the direction of growth as the muscles on the jaws are affected. However, the real details of why children habitually mouth breathe are not so well documented.

Breathing dysfunction factors

Factor 1: Tongue and head posture
Breathing through the mouth causes the tongue to lower and also alters the head posture. This low tongue posture then leads to reduced maxillary growth and increases in vertical growth (Figs. 1a, b).

Factor 2: The Bohr effect and cellular hypoxia
It is important to be mindful that breathing dysfunction includes more than just mouth breathing. It also includes habitual hyperventilation, which means the patient will constantly be breathing an excess of air. This will then cause the bond between haemoglobin and oxygen to be strengthened (Bohr effect), and while blood oxygen saturation can be normal, oxygenation at a cellular level may be reduced due to poor oxygen release from haemoglobin.

As a result, cells become stressed, and this leads to a cellular hypoxia.

Identifying habitual hyperventilators

Generally, habitual hyperventilators show:

• Mouth breathing, lips apart at rest.
• Shoulder/upper chest breathing at rest.
• Audible breathing at rest.
• Medical history of enlarged tonsils and/or adenoids, asthma, hay-fever, recurrent respiratory infections, snoring, teeth grinding or sleep apnea.
• Narrow upper arch form.
• Forward head/shoulder posture.
• Venous pooling. Typically, mouth breathers will exhibit venous pooling, which occurs as a result of the inferior orbital vein, which has to pass through the narrowed pterygomaxillary fissure. Deoxygenated or venous blood then pools beneath the eyes. When patients habitually breathe through their mouth and have a narrow maxilla, they will show symptoms of venous pooling.

Summary of factors associated with venous pooling. low blood CO2 caused by habitual hyperventilation, low N2O caused by a lack of nasal breathing, reduced vaso-dilation caused by low CO2 and N2O. Small pterygomaxillary fissure as a result of constricted maxilla, and low tongue posture.

Patients with narrow maxillae can be expected to have a smaller than average pterygomaxillary fissure. As a result of these two factors, there is less venous drainage from the inferior orbital vein, which has to pass through the narrowed pterygomaxillary fissure. Deoxygenated or venous blood then pools beneath the eyes. When patients habitually breathe through their mouth and have a narrow maxilla, they will show symptoms of venous pooling.

Figs. 1a, b: Mouth breathing and low tongue posture cause crowding and a narrow upper arch. Images/Provided by Myofunctional Research

Fig. 2: The central proposition of the Bohr Effect states oxygen affinity to hemoglobin depends on absolute CO2 concentrations, and reduced CO2 values decrease oxygen delivery to body cells. Habitual hyperventilation leads to reduced arterial CO2 and, therefore, less oxygen released to cells.
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Restoring the edentulous arch with BruxZir full-arch implant prosthesis

By Michael McCracken, DDS, PhD, and Jonathan P. Ouellette, DMD

Fixed hybrid dentures have been used to successfully restore fully edentulous patients for decades. Their durability, however, leaves room for improvement. There are three issues that can complicate the long-term success of the traditional fixed hybrid denture: The acrylic teeth tend to wear; the teeth can fracture or dislodge from the acrylic base; and the acrylic base itself can fracture. The BruxZir® Full-Arch Implant Prosthesis (Glidewell Laboratories, Newport Beach, Calif.) eliminates these issues, providing a restoration that is more durable in the long term, while sacrificing nothing when it comes to esthetics. Milled from a single block of BruxZir Solid Zirconia — an exceptionally fracture-resistant material that exhibits flexural strength up to 1465 MPa — this fixed prosthesis utilizes advanced staining and glazing techniques, coloring the prosthetic teeth to closely mimic natural dentition and the gingival areas to match the shade of the patient’s soft tissue.

Case report
The patient is a 58-year-old male with no contraindications for implant treatment. The patient had a total of 11 BioHorizons® Internal Hex implants (BioHorizons; Birmingham, Ala.) placed, including six in the maxilla and five in the mandible (Figs. 1a, b). The implants integrated for more than six months, and the patient presented for restoration of his edentulous arches.

First, preliminary impressions of the implants were made. After removing the healing abutments, closed-tray impression copings were seated. The impressions were made in stock plastic trays, and the impression copings were placed back into the impressions before the case was sent off to the laboratory.

The laboratory poured casts from the initial impressions and fabricated bite blocks and occlusal rims for the centric jaw relationship (CJR) records. Each bite block contains two screw-retained temporary cylinders that allow the wax rims to be screwed down, producing a very accurate CJR. The contoured rims were returned to the laboratory with the initial casts.

Upon receiving the wax rims and jaw relation records, the laboratory and dentist decided that the patient required four multi-unit abutments in the anterior maxilla to ensure that the screw access openings were within the confines of the planned prosthesis, so at the next appointment, the patient’s healing abutments were removed, and the multi-unit abutments were transferred to the patient’s mouth and torqued into place.

Later, wax setups were tried in and evaluated for proper esthetics, phonetics, contours, occlusion and tooth arrangement.

The implant verification jig (IVJ), which precisely captures the depth and angulation of the implants in the final impression, was seated and tightened into place. After bonding the individual sections of the IVJ together, a final impression was made using an open-tray
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Fig. 2: The provisional prostheses fit well and afforded the patient a trial period to evaluate the proposed restoration for esthetics and function over a period of weeks. Note that the gingival shade was adjusted for the fabrication of the final restoration.

Fig. 3: The patient was extremely satisfied with the function and esthetics of the final restoration, which fit perfectly thanks to the precision of the CAD/CAM design process and the confirmation provided during the provisional trial period.

The patient was exceptionally pleased with the function offered by this fixed restoration, which he should be able to enjoy for a great number of years given the extraordinary durability of BruxZir Solid Zirconia.

DENTSPLY donates $55,000 in product to America’s ToothFairy

DENTSPLY International has donated more than $55,000 in oral care products to National Children’s Oral Health Foundation: America’s ToothFairy® (NCOHF) to support its nonprofit clinical network of oral health programs serving vulnerable children.

The donation, which included prophy paste, brush tips, polish and stain removal products, benefitted 25 America’s ToothFairy affiliates — community-based health-care facilities and outreach programs providing vital educational, preventive and restorative services to underserved populations.

“DENTSPLY proudly supports the America’s ToothFairy affiliate network for its smile-saving work helping children in need,” said Robert Size, senior vice president of DENTSPLY International and NCOHF Board member. “As a longtime supporter, we applaud their commitment to helping children receive the pediatric dental care they need to live healthy lives.”

“DENTSPLY’s steadfast underwriting and product support has helped America’s ToothFairy change thousands of young lives,” said Fern Ingber, NCOHF president and CEO. “This generous product contribution from DENTSPLY will support America’s ToothFairy programs that provide vital oral health services for children of our most vulnerable populations.”
As a patient, I expect the best care I can find. As a doctor, I want to deliver the best care possible. That takes us to the power of continuing education, and as doctors we are faced with many choices in continuing education.

As a way to introduce you to the Las Vegas Institute for Advanced Dental Studies, or LVI, I want to outline what LVI is about and what void it fills in your practice. The alumni who have completed programs at LVI were given an independent survey, and unlike the typical surveys, 99.7 percent said they love practicing dentistry, and of those surveyed, 92 percent said they enjoy their profession more since they started their training at LVI. That alone is reason enough to go to LVI and find out more.

While the programs at LVI cover the breadth of dentistry, the most powerful and life-changing program is generally reported as Core I, “Advanced Functional Dentistry: The Power of Physiologic-Based Occlusion.”

**Take control of your practice**

This program is a three-day course that is designed for doctors and their teams to learn together about the power of getting their patients’ physiology on their side. In this program, doctors can learn how to start the process of taking control of their practice and start to enjoy the full benefits of owning their practice and providing high-quality dentistry.

Whether he or she works in a solo practice or in a group setting, every doctor can start the process of creating comprehensive care experiences for his or her patients.

We will discuss why some cases that doctors are asked by their patients to do are actually dangerous cases to restore cosmetically. We will discover the developmental science behind how unattractive smiles evolve and what cases may need the help of auxiliary health care professionals to get the patient feeling better.

The impact of musculoskeletal signs and symptoms will be explored and how the supporting soft tissue is the most important diagnostic tool you have — not simply the gingiva, but the entire soft-tissue support of the structures not just in the mouth but also in the rest of the body.

**Comprehensive care**

A successful restorative practice doesn’t need to be built on insurance reimbursement schedules.

An independent business should stand not on the whims and distractions of a fee schedule but rather on the ideal benefits of comprehensive care balanced by the patients’ needs and desires. Dentistry is a challenging and thankless business, but it doesn’t have to be. Through complete and comprehensive diagnosis, there is an amazing world of thank-yous and hugs and tears that our patients bring to us, but only when we can change their lives. The Core I program at LVI is the first step on that journey. That’s why when you call, we will answer the phone, “LVI, where lives are changing daily!”

LVI Core I three-day course teaches comprehensive patient care process

By Mark Duncan, DDS, FAGD, LVIF, DICOI, FICCMO, Clinical Director, LVI
Teaming up with Little League Baseball and Softball, the annual contest calls on players ages 8-14 to create a compelling, 10-word phrase describing the dangers of spit tobacco for a chance to win a trip to the Little League Baseball World Series and a cash prize.

“It’s an awesome program, and I told him that the most important thing is that maybe you’ll convince someone not to start,” said Alex’s mother, Beth Smith. “That’s the whole key — if you don’t start, then you don’t have to quit.”

The recent tragic loss of Tony Gwynn to oral cancer highlights the fact that educating Americans about the dangers of spit tobacco is more important than ever. The latest numbers from the Centers for Disease Control and Prevention show that while cigarette use continues to decline, spit tobacco use remains the same. In addition, almost half of all new users start before the age of 18, with 8.8 percent of all high school students using smokeless tobacco as of 2013. Through the slogan contest and other advocacy and education efforts throughout the year, NSTEP works to educate people, especially young people, about spit tobacco and helps all users quit.

“NSTEP provides Little League athletes with an opportunity to start a dialogue about an alarming trend in tobacco use on and off the field,” said Beth Truett, president and CEO of Oral Health America. “We are thrilled about the enthusiasm of youth engaging their peers with an important message about the dangers of smokeless tobacco.”

As the winner of the slogan contest, Alex received an all-expense paid trip to the Little League Baseball World Series in South Williamsport, Pa., and a cash prize. In addition, OHA is donating $500 to Alex’s local Little League program, the Falls Church Kiwanis Little League.

“Little League is pleased to be a part of helping educate Little League players about the risks associated with the use of spit tobacco,” said Stephen D. Keener, Little League president and CEO. “We hope that by participating in the slogan contest we help increase awareness for Little League players, coaches and their parents. We thank Oral Health America and commend them on NSTEP’s efforts.”

The winning slogan was chosen out of nearly 1,500 submissions from Little Leaguers from across the country, a contest record.
‘Adaptive Image Noise Optimizer’ results in noise-free 3-D imaging

Crystal clear images support precise diagnostics

The ProMax® 3Ds and 3D units from Planmeca (California Dental Association exhibit hall booth No. 1636/1936) are designed for capturing the smallest anatomical details with precision. High-resolution images with a 75 μm voxel size and efficient artifact removal make these units ideal for effective case planning and precise diagnostic capabilities, according to the company.

Versatile, selectable volume sizes on the ProMax ensure observance of the ALARA radiation principle; these include 5-by-5 and 5-by-8 cm for the ProMax 3Ds and 4-by-5, 4-by-8, 8-by-5 and 8-by-8 for the ProMax 3D.

Noise-free images

The Planmeca AINO™ (Adaptive Image Noise Optimizer) is an intelligent 3-D noise filter that removes noise from CBCT images without losing valuable details. The result is a crystal clear, highly diagnostic image, according to the company. Features include:

• Analyzes the reconstruction exposure data during reconstruction and adaptively differentiates noise and fine details.
• AINO filter is enabled in Planmeca Romexis® 3D capturing screen, while the original image is also stored and accessible.
• Improves image quality in endodontic mode where noise is inherent because of small voxel sizes.
• Also useful in ultra low-dose images.

Artifact removal

Planmeca ARA™ artifact removal algorithm removes shadows and streaks from the 3-D image, such as those caused by metal and root fillings, according to Planmeca.

Ideal patient support

The adjustable patient support keeps the patient firmly and comfortably in place, providing high-quality images without artifacts caused by movement, according to Planmeca.

Comprehensive Planmeca Romexis software

All ProMax™ units include Planmeca Romexis open-architecture software with versatile tools for endodontic diagnostic and treatment planning needs, such as true measurements and 3-D visualization of root canals. CBCT applications in endodontics include:

• Assessment of endodontic treatment complications.

• See NOISE-FREE, page A16
Conclusions

It is clear a correctly functioning tongue acts as a natural retainer, but when a patient habitually breathes through his or her mouth, the tongue is prevented from functioning in this correct way. In contrast, when the mouth remains closed and the tongue sits correctly, increased orthodontic stability can be expected.

Furthermore, when a patient maintains a closed-mouth posture and high-tongue posture, treatment time can be expected to lessen as forces exerted on the teeth and jaws will work favorably. Finally, it has been well-documented mouth breathing is not in the best interests of health, growth and correct development.16,17 Therefore, it is reasonable to assume encouraging correct functional breathing patterns will have a much more far-reaching effect than just correcting crooked teeth and jaws. Simply fixing the teeth and jaws is potentially missing a huge piece of the puzzle at the expense of possible health gains and future orthodontic stability.

References


Planmeca AINO removes noise from CBCT images without compromising diagnostic quality (top image uses filter, lower doesn’t).

• STABILITY, page A8

• Noise-Free, page A15

- Diagnosis of periapical pathosis.
- Root canal system anomalies.
- Determination of root curvature.
- Trauma diagnosis, such as root fractures, luxation, displacement of teeth and alveolar fractures.
- Localization of root resorption.
- Determination of exact root apex location in pre-surgical planning.

True all-in-one units

The Planmeca ProMax 3D and 3D offer the following, according to Planmeca:

- CBCT, panoramic, anatomically accurate extraoral bitewings and optional cephalometric imaging.
- Optional 2D SmartPan™ so 2-D and 3-D images can be taken with the same sensor.
- Optional Planmeca ProFace™ 3D facial photo for advanced case presenta-
  tion, operation pre-planning and treat-
  ment follow-up.

You can visit Planmeca in the Califor-
nia Dental Association exhibit hall in booth Nos. 1636 and 1936, learn more on-
line at www.planmecausa.com, or call the company at (855) 245-2908.

(Source: Planmeca USA)