

Can We Increase Patient's Compliance by Improving Quality and Efficiency of Functional Appliances?

The PUL Concept

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4D Harmonizer: functional, sagittal, transversal and vertical.

The PUL characteristics:

"Propulseur Universal Light".

The PUL is a new-generation multi-tasking removable appliance :

- **Better compliance:** it has been lightened, thanks to its laser welded frame, its miniaturized mandibular advancing system and using TMA wire.
- **Comfortable, light, aesthetic:** It allows a good diction, can be worn at school.
- **Physiological:** gentle propulsion thanks to inserted coil springs (TMJ shocks absorbers).
- **Universal:** it is indicated to all Classes II, all facial typologies.
- **Multi actions:** thanks to its Laser welded frame, it allows several simultaneous actions, saving treatment time.

(fig. 1, 2, 3, 4, 5, 6)

Fig 1

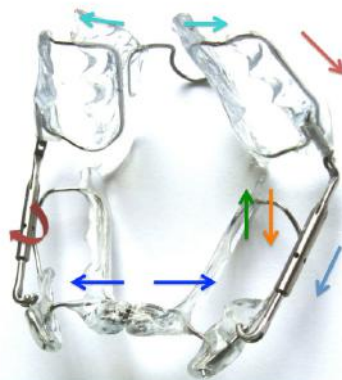


Fig 1: PUL multi-tasks with TMA loop

Fig 2



Fig 2: PUL multi-tasks with anterior elastic and expansion screws

Fig 3



Fig 4





Fig 5



Fig 6

Clinical Effects

4D harmonization of malocclusions : sagittal, transversal, vertical and functional.

1- In young patients with **hyperdivergent** (dolichofacial) growth and multiple dysfunctions: oral breathing, deglutition and mastication (hypotonia).

a. The mandibular propulsion helps bi-labial contact and increases the pharyngeal space, improving nasal breathing.

b. The posterior occlusal contact induces a proprioceptive stimulation and contraction of the masseter temporal fibers, improving mastication.

c. Improvement of the lingual function (position and deglutition) and natural correction of open-bites.

This leads to a change in growth direction, from dolicho to mesofacial. (fig. 7, 8)



Fig 9

Fig 9: Correction of Class II by mandibular anchorage

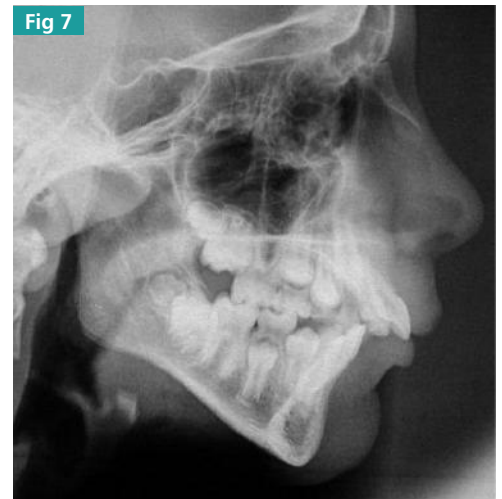


Fig 7

Fig 7: Before PUL

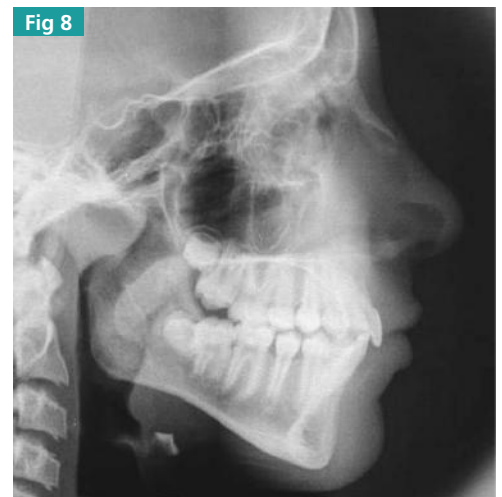


Fig 8

Fig 8: After PUL

2- In patients with **hypodivergent** (brachyfacial) growth: the mandibular propulsion and posterior nonocclusion lead to a change in the direction and neutralization of the temporo-masseter muscles and a suppression of the occlusal forces. This induces rapid Class II correction by distalizing upper lateral teeth (mandibular anchorage) and overbite correction by natural extrusion of the posterior teeth. (fig. 9)

Protocol of Treatment

Three phases:

1- PUL multi-tasking 4D harmonization of the malocclusion: sagittal (Class II), transversal (expansion), vertical (deepbite or openbite), and functional (nasal breathing, swallowing

and chewing muscles). Duration : from 6 to 12 months.

2- Fixed appliance low friction without or with few elastics. Duration: 12 months.

3- 4D stabilization by PUL retainer. Night wearing. (fig. 10, 11)

Fig 10



Fig 10: Early treatment: Hyperdivergent growth: before PUL, after PUL, and after braces

Fig 11



Fig 11: Teenager's treatment: before PUL, after PUL, and after braces

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Class II malocclusions

Class II represent more than 75% of all malocclusions that orthodontist have to treat, about 30% of these patients have hyperdivergent facial growth.

Like every medical treatment, orthodontist began with a diagnosis. The aim is to treat the causes of malocclusion before or simultaneously treating symptoms.

In almost all malocclusions, the cause of the malocclusion are the functional dysfunctions like oral breathing, thumb sucking, hypotonic muscle or atypical deglutition.

Case 1: Syndrom of Class II division 1

Amandine , a young girl of 12 years old who complains from ectopic maxillary canines and lower crowding.

Functional diagnosis: Oral breathing, snoring (sleep apnea), past thumb sucking, labial inoclusion, gummy smile and short upper lip. (fig.1, 2)

Fig 1



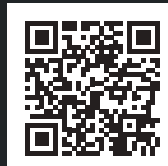
Fig 2



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Dento-maxillary diagnosis:

Full Class II, crowding, mandibular retrognathic, hyperdivergent facial growth. (fig.3, 4)

Treatment objectives are to stop the hyperdivergent growth by improving the functions and mandibular growth, and avoid extractions.



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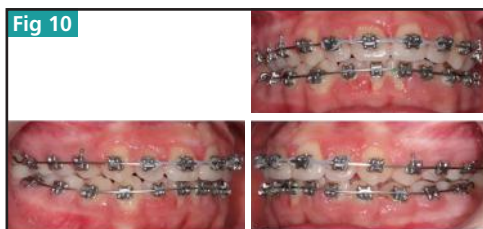


Treatment plan

1- PUL 4D harmonization: functional, sagittal, transversal and vertical. PUL multi-tasks with expansion screws, wearing 22 hours a day. Duration 9 months. (fig.5, 6, 7)



2- Alignment and finition by multibraces self ligating low friction. Duration 13 months. (fig.8, 9, 10)



3- 4D stabilization by PUL retainer anti-relapse night wearing. Duration 12 months and decreasing. (fig.11, 12, 13)



Discussion

"Changing the functions for changing the shape" Linder-Arronson

The advantage of combination of these three phases is to reduce time of treatment and improve patient's comfort and compliance thanks to the lightness of the PUL appliance. The benefit for the patient is obvious: facial aesthetics and non-extraction short treatment.



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