Biography
Sylvain Chamberland

D.M.D. (Docteur en Médecine Dentaire), University Laval, 1983
Private practice, general dentistry 1983-1988
Certificate in Orthodontics, University of Montreal, 1990
M.Sc. in dental science, University Laval, 2008
Private practice in orthodontics since 1990

Publications
✦ Closer look at SARPE, JOMS 2008
✦ Short-term and long-term stability of SARPE, revisited, AJODO 2011
✦ Long-term dental and skeletal changes following SARPE, letter to editor, OOOO 2013
✦ Functional genioplasty in growing patients, AO 2015

Lecturer in several graduate program and scientific meeting in USA, Canada, Europe

Vertical dimension and facial aesthetics
AAO 117th Annual Session
San Diego, California, USA

AAO Donated Orthodontic Services (DOS) Program

All that is missing is you!

Introduced in 2009, the DOS program provides access to care for children in need. Access to quality orthodontic care is missing in many children’s lives. The AAO DOS program mission is to serve indigent children without insurance coverage or that do not qualify for other assistance in their state of residence.

The program has expanded and offers care to children nationwide in addition to the recognized state programs in Illinois, Indiana, Kansas, Michigan, New Jersey, North Carolina, Rhode Island, Tennessee, Texas and Virginia.

In order to expand further, we need your help by volunteering to serve as a provider orthodontist or help identify orthodontists willing to lead efforts to establish a DOS chapter in your state.

Stop by the DOS booth here in San Diego to learn more about the program or contact Ann Sebaugh at asebaugh@aaortho.org with questions.

Conflict of Interest Declaration

I declare that neither I nor any member of my family have a financial arrangement or affiliation with any corporate organization offering financial support or grant monies for this continuing education presentation, nor do I have a financial interest in any commercial product(s) or services I will discuss in this presentation.
In Memoriam
Capt. Vanessa Chamberland
June 25, 1989 - November 14, 2016

Vanessa lived 10 000 days.
It seemed like a moment.
The next 10 000 days that I, Carole,
Pier-Eric and Richard will live will be an eternity.

Hyperdivergent tendency
Morphological characteristics
✦ Excessive anterior and posterior dentoalveolar height
✦ Open bite
✦ Increased lower facial heights
✦ Steeper mandibular plane
✦ Larger gonial angle

Long Face
Vertical proportion
✦ Excessive lower facial third
✓ Ratio closer to ⅓ to ⅔ rather than ⅓ to ⅔
Long Face

Traditionally, long face were normalized via orthognathic surgery

Nowadays, mini-implant provide adequate skeletal anchorage for molar intrusion

✦ Can be considered a reasonable alternative to orthognathic surgery for AOB

Man-Suk Baek et al. Long-term stability of anterior open bite treatment by intrusion of maxillary posterior teeth, AJODO 2015;138:394-408.e3
Schaeffer, N.R., Proffit WR, Phillips C. Outcomes and Stability in Patients with Anterior Open Bite and Long Anterior Face Height Treated with Temporary Anchorage Devices and a Maxillary Intrusion Splint. AJODO. 2014; 145:594-602

Short Face

• Vertical proportion
  ✦ Vertical maxillary deficiency
  ✦ Shorter lower facial third
  ✓ Ratio closer to 1:1 rather than ⅓ to ⅔

Short Face

Short face need to be elongated via orthognathic surgery

✦ Inferior repositioning of the maxilla
✦ Clockwise rotation of the occlusal plan
✦ Genioplasty to increase the height of the symphysis

How Can We Intrude Molars?

Many gizmos have been proposed

Hart TP, AO 2015
Scheffer NR, AJODO 2014
Man-Suk Baek, AJODO 2010
Cope J, clinical case report 10004
What does literature say?

Most of these studies report effective maxillary molar intrusion of 2 to 5 mm.

None of these studies address mandibular molar intrusion at the same time.

Sheffler & Proffit report lower molar extrusion of 2 to >4 mm in 10% of the patients.

They also report that full coverage posterior bite plane impede eruption of the lower molars.

Can We Intrude Lower and Upper Molars?

Palatal Tad + TPA

Buccal Tad between /6-7 + lingual arch

Intrusion of both Mx (1.8 mm) & Md molars (1.2 mm) to increase OB by 4.2 mm on average.

What is the Orthopedic Effect of Upper and Lower Molar Intrusion?

Forward rotation of the mandible

Mandibular plane decrease

Chin move forward

Segmented approach help to prevent extrusion of anterior teeth

Once intrusion is achieved, ligature tie is used to maintain intrusion.

So, Can we Close an Open Bite with TADs?

Intrusion of the maxillary posterior teeth can give satisfactory correction of moderately severe anterior open bites, with elimination of 5 to 6 mm of open bite, but 0.5 to 1.5 mm of reeruption of these teeth is likely to occur.

Controlling the vertical position of the mandibular molars so that they do not erupt as the maxillary teeth are intruded is important in obtaining a decrease in face height.
% with Change in the Maxillary 1st Molar

Mx: 60% of the patients had the molar intruded 2 to 4 mm T1-T2
Re-eruption of 2-4 mm occurred during post treatment in 16% of the patient
✦ During tx (T2-T3), changes was largely re-eruption of intruded molars
✦ After tx (T3-T4-T5), vertical growth in younger patients was a major contributor to the change

% with Change in the Mandibular 1st Molar

During splint therapy
✦ Extrusion of 2 to > 4 mm occurs in ~10% of the patients
During post-intrusion orthodontics
✦ 17% of the patients had 2-4 mm extrusion
During posttreatment
✦ 19% of the patients had 2-4 mm extrusion

Vertical Change of the Incisors

Mx incisors extrude – 1 to 1,5 mm (Sheffler AJDDO 2014, Baek AJDDO 2010, Chunlei AG2007)
Md incisors extrude – 1,3 mm and retroclined 1,4° (Chunlei AG2007)

Is Invisalign more effective for Open Bite Treatment?

32 consecutive patients treated at U of Pacific
✦ Treatment times comparable to fixed appliances
✦ Open bite closes effectively to establish contact of anterior teeth
✦ During the 1 to 9 years post retention study period, there was less than 1 mm relapse

Boyd Robert, Comparison of Invisalign with Conventional Ortho Treatment for Anterior Open Bite. Online video Invisalign website.
The Good Question Is:

Is Invisalign therapy effective to intrude posterior teeth and decrease vertical dimension?

No study has shown changes in the skeletal vertical dimension following aligner therapy.

Expert Opinion Conclude

“Micro implants, plates or surgery may be needed in addition to Invisalign for more posterior intrusion for severe open bite treatment.”

…!

No changes in vertical dimensions
Lips are still incompetent at repose
Profile did not improve

No change in vertical dimension
Extrusion of U & L incisors
About Aligner Therapy

“My” expert opinion:

✦ Aligners therapy may be effective to close an open bite by dental movement.
✦ Aligners therapy is not effective to change the skeletal vertical dimension.
✦ There is no study that shows molars intrusion with only aligners therapy.

Where is the Best Place for Palatal Miniscrew

Optimal bone thickness 8-9 mm apical to contact point of 1st molar and 2nd premolar useful in supporting posterior intrusion.

Insertion above 8-11 mm from the bone crest should be avoid because of the sinus and thinner BL bone depth.

Left TAD was not as solid as right TAD.

Sinus pneumatization.
Where is the Best Place for Palatal Miniscrew

Insertion near or at midpalatal suture

Where is the Best Place for Buccal Miniscrew

Mx

✦ Greatest amount of MD bone is between 1st and 2nd premolars and canine-1st premolar,
✦ 5 to 8 mm above the alveolar crest, which means TAD will be above the mucogingival jct

Md

✦ Greatest amount MD : between 1st - 2nd premolar
✦ Greatest amount BL : between 1st - 2nd molar

What happens if you pull from Mx buccal TAD

Buccal tipping of molars

Initial

Class II div 1
Hyperdivergent
Anterior open bite
Tx exo ¾ & microimplants
Tx Goal

Reduce dentoalveolar height
Reduce LAFH
Increase chin projection

Final

Profile improved
Lip competency achieved
Class I occlusion
Surgery avoided

Significant condylar & Mx growth and minimal dentoalveolar growth help to achieve counterclockwise rotation of the mandible

What Happens if You Pull From Mx Palatal TAD

1st molar intrude more vertically
2nd molar tip buccally as intrusion occurs
Pulling from 2nd molar permits intrusion of the palatal cusp
Can we Close an Open Bite by Lower Molar Intrusion Only?

Yes, we can

Average intrusion 1.7±.91 mm and 2.8±1.05 mm for the 1st and 2nd molar respectively

Average relapse ~30%

Relative position of crestal bone to CEJ was stable during treatment

Sugawara J et al. Treatment and posttreatment dentoalveolar changes following intrusion of mandibular molars with application of a skeletal anchorage system (SAS) for open bite correction. Int J Adult Orthod Orthognath Surg 2002;17:243–253

TADs & Posterior Intrusion

Selective intrusion of buccal segments

At debond, positive overbite obtained

Tracing superposition shows

✦ Posterior intrusion
✦ Counterclockwise Md rotation
✦ Positive Overbite
+ Post genioplasty

Significant molar intrusion
Crestal bone stable

Class I, open bite
Severe ALD
Bimaxillary protrusion
Lip incompetency at repose
Gummy smile at full smile
– Normal incisor showing at repose

Tx plan

Extraction?
Orthognathic surgery?
Or ??

At 13 weeks
Tx initiated Feb. 2013. TADs placed 6 weeks later.
TPA .032 x .032 SS + paramedian TADs (Elinks)
Buccal TADs between 15-16, 25-26 (EC)
Buccal TADs between 36-37, 46-47 (lig. tie)

At 40 weeks
At 25 weeks the TPA was replaced because it impinged into the palate
At 22 weeks: Bonded .032 x .032 SS lingual arch
✦ Posterior inferior teeth are intruded with Δ EC
At 40 weeks, buccal EC is removed
At 48 weeks

Posterior openbite is obtained

Incisors retraction is going on with maximum anchorage

Note the absence of the lingual arch which will cause expansion of the molars (adverse side effect)

At 54 weeks

TADs placed anteriorly to intrude upper incisors

Palatal lingual ligature to maintain intrusion

Lower incisors are still retracting

Mx midline need shifting to the left

At 71 weeks

20x25sw U & L

Stop intruding lower teeth

Continue upper intrusion
At 86 weeks

- Removal of the TPA and intrusive links
- 2 TADs were lost or removed
- Angulation of 7s normalized by intrusion from lingual cups to the palatal TADs

TAD between 46-47 failed because it was too high.

At 88 weeks

At 93 weeks

Finishing

Outcome

Positive overbite is achieved
FMA decreased by 2.2°
ANS-Me decreased by 4 mm
Upper and lower molars intruded
1/s intruded

Vertical proportion
- Normalized vertical proportion
- Lip competency at repose
- Anterior lower facial height
  - Ratio close ⅓ to ⅔
Class I, open bite

Severe bimaxillary protrusion
Anterior vertical excess
Lip incompetence
Lower incisor display on smiling

At 13 weeks
Tx initiated February 25
+ Mx: 3 segments
At 13 weeks
+ Mx: Tomas Pin EP 8 mm + .020x.020 CuNiTi
+ Md: Tomas Pin EP 6 mm + .020x.020 CuNiTi
At 19 weeks

Mx: .020 x .020 CuNiTi
Md: .020 x .025 SS
✦ Retighten lower right pin

At 25 weeks

Mx: .021 x .021 x .020 x 55 mm + Elinks #4 6-P
Md: .021 x .021 x .020 x 58 mm + E #4
✦ Replaced lower right pin

At 31 weeks

Mx: ∆ Elinks #4 6-P et E3 to palatal TADs
Md: E5 attached to 7/7s
✦ LR pin loose, lig. tie on both lower pin
Note: posterior open bite

At 37 weeks

Mx: ∆ Elinks #4 6-P
Md: E5 attached to 7/7s
✦ Retight right inf TAD, E4 TAD-2P"mI
Note: posterior open bite
At 42 weeks

Mx: ∆ Elinks #5 7-P
Md: ∆ E5 to /7s

Maximum anchorage + anterior retraction
Posterior intrusion
Note buccal tipping of 7s/…

E-links attached to 7s/ to correct buccal tipping
TPA removed, E-links removed
Patient left the country for 5 months, came back late June

Mx and Md buccal TADs removed

FMA decrease 2°
ANS-Me decrease 3.8 mm
/1-MP decrease 105° to 91°
Upper & lower molars intruded
Slight intrusion of 1/s
Vertical proportion

- Normalized vertical proportion
- Lip competency at repose
- Anterior lower facial height
- Ratio close to 1:2 to 2:3
Class I
Anterior openbite
Mandibular incisor crowding

Skeletal Hyperdivergent
Short ramus
Bimaxillary dentoalveolar protrusion
Lip incompetency at repose

Concavity of right TMJ anterosuperior surface, flattening on the left joint
Condylar resorption or arthrosis
Patient at risk…
Mx: 3 segments .020x.020 cnt. **Tomas Pin SD** 6 mm, E-links E3 P-4
Md: 2 segments .020x.020 cnt. **Tomas Pin EP** 6 mm, Hamac elastic

Mx: 3 segments .020x.025 niti. ∆ E3 P-4.
Md: ∆ Hamac

Mx: 3 segments .020x.025 niti. ∆ E3 P-4.
Md: ∆ Hamac

Vector TAS 6 & 8 mm paramedian (out of stock of Tomas Pin)
TPA .032x.032SS, E-links E6. Md: lingual arch .032x.032TMA

Δ E links E6. Δ Hamac

January 2015

**Improvement of lip seal**

Counterclockwise rotation of occlusal plane

**Bimax protrusion:**

✦ I decided to extract all 5s

January 2015

Intrusion of Mx and Md buccal segment

Counterclockwise rotation of mandibular plane
At 104 weeks

Class I occlusion
Positive OJ + OB
Space closed

FMA decrease 0.5°
ANS-Me decrease 5.5 mm
/1-MP decrease 99° to 87°

Significant intrusion
+ Mx + Md molars
Retraction of 1/ & /1
Outcome

Tx time 117 weeks

Initial May 2014 Pre genio July 2016


Vertical proportion

Normalized vertical proportion

Lip competency at repose

Anterior lower facial height

Ratio close 1/3 to 2/3
Do you have a non extraction Open Bite Case

The previous cases had both vertical excess and bimax protrusion

If one want to address the vertical dimension and not the protrusion, don’t extract
✦ Chances are that profile will not improve that much

Class I, anterior open bite
Md deviation to the right (midline to right)
Normal facial proportion

Symptoms began at age 19
TMJ pain, difficulty eating hard food
Started contraceptive pills at 19 or 19½

Concavity on the superior surface of the right condyle
Flatness of the anterior surface of the left condyle

Rheumato: ID
FTh=estradiol 84 pmol/L début cycle (n=180-550)
<73 pmol/L mid cycle (n=110-1470)
AF: positive, mouchete, tert 80 (normal)
Score TP99: Slight increased intake left TMJ
Blood test: normal
Rh factor: negative

Mx: Posterosuperior traction vector
Posterior open bite & normal OB
Mx: Midline correction

At 57 weeks into tx: Ready for finishing and detailing

TPA To derotate 6's/
LLA to avoid expansion

Md forward rotation occurred

/1-MP change from 88° to 95°

Monitor root resorption
If superimpositions are accurate
✦ lower dentition intrude & advance
✦ Mx dentition:
  ✓ no posterior intrusion, no anterior extrusion
Stability...
Time will tell

Initial
Follow up 14 m in retention
Follow up 23 m in rétention

Patiente asymptomatique

Short face Syndrome
Syndrome de la Face Courte
Occlusal Plane Alteration

Clockwise rotation

• 1 occlusal plane angle
• 1 FMA
• Chin rotate posteriorly (less prominent)
• 1 PPH
• Perinasal structures advance
• 1 \( \triangle \)
• 1 \( \triangle/1 \)


Center of Rotation at ANS

Similar to CR at incisal edge

• Perinasal structures less affected
• Chin rotates more posteriorly
• 1/ move posteriorly
• Upper lip move posteriorly


Center of Rotation at PNS

Similar to CR at ANS

• Increase AFH
• 1/ less affected


Not Only Just a Matter of Occlusion
Surgery

Le Fort 1 advance +
Clockwise rotation

CR at PNS
✦ Improve lip and paranasal support
✦ Decrease chin projection
✦ Increase facial height
Genio set back

Improved Smile Display
Short face
Hypodivergent
Prominent chin
✦ Mandibular dentalveolar retraction

Class II div 1

Tx plan

Presurgery
✦ Promote maximum extrusion of mandibular molar to level the curve of Spee

Surgery
✦ Inferior repositionning of the maxilla
✦ Md advancement
✦ Genio set back + elongation
Mechanotherapy

Anterior bite plane
Intrusive arch + lingual arch

When posturing in class I a posterior open bite is created
This allows clockwise rotation of the distal segment when the BSSO is done
This reduces slightly the advancement of the chin

Face height increased
Class I relationship is achieved
C/R at PNS
Vertical proportion

- Normalized vertical proportion
- Increased LAFH
- Lower facial third
- Ratio closer to 1/3 to 2/3

Initial  Final  2y follow up

CR close to PNS

2 y Follow up

- Incisor display improved
- Self esteem improved
Class II div 1
Deep overbite + deep curve of Spee
Minor ALD

Hypodivergent
Short facial height
Minimal smile display

Tx plan

Mx
✦ Advancement
✦ Inferior repositioning at ANS
✦ Impaction at PNS
✦ Clockwise rotation 3.6°

Md
✦ BSSO
✦ Clockwise rotation of the distal segment
Preoperative Occlusal Angle = 7.7°
Simulated Postoperative Occlusal Angle = 11.2°

Post-Surgical Orthodontic Phase
Reprise en charge post chirurgicale

Box elastics and Cl II elastics
✦ To obtain posterior occlusal setting
Note screw orientation...
Extra-oral incision + submandibular drainage + i.v. antibiotic therapy
**Outcome**

- Improved LAFH
- CR near incisal edge
- Prep-Postop superposition match 3D planning

**Outcome**

- Increased facial height
- Improve facial 3rd ratio

Chamonix

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CR at or near PNS

Me: Le Fort I, advance 3 mm
Md: Maxillary osteotomizing 5 mm, posterior 5 mm, iliac bone grafting.
Md: MDH advancement 4 mm
Md: Vertical augmentation 3 mm + iliac bone graft

Final outcome

Vertical proportion

Normalized vertical proportion

✦ Increased LAFH
✦ Lower facial third

Ratio closer to ⅓ to ⅔
Conclusion

Treatment planning should address not only dental occlusion.

Vertical dimension is an important characteristic of facial esthetics.

To live is easy…
To realize that life is fragile, to admit that it is given to us as a gift and not as a right, to accept that it proceeds from a random privilege which can be withdrawn without reason or warning and to understand that it obeys no rule of justice or individual merit; This is difficult...