

FUTURE TREND

A L L - O N - 4<sup>®</sup>

3

# Complication Scenarios



*20 Years Later: Curse or Cure?*

ALBERT LUI BSC DDS

## OPINION

In 2003, NOBEL BIOCare introduced the world to the concept of 'All-on-4' – a full-arch dental implant protocol.

As an early adopter I was smitten with this concept as this represented a culmination of the ULTIMATE ANSWER to the age-old problem of permanent fixation of teeth on for many long-suffering senior citizens

Your see, a long time ago, I worked as an orderly in a...

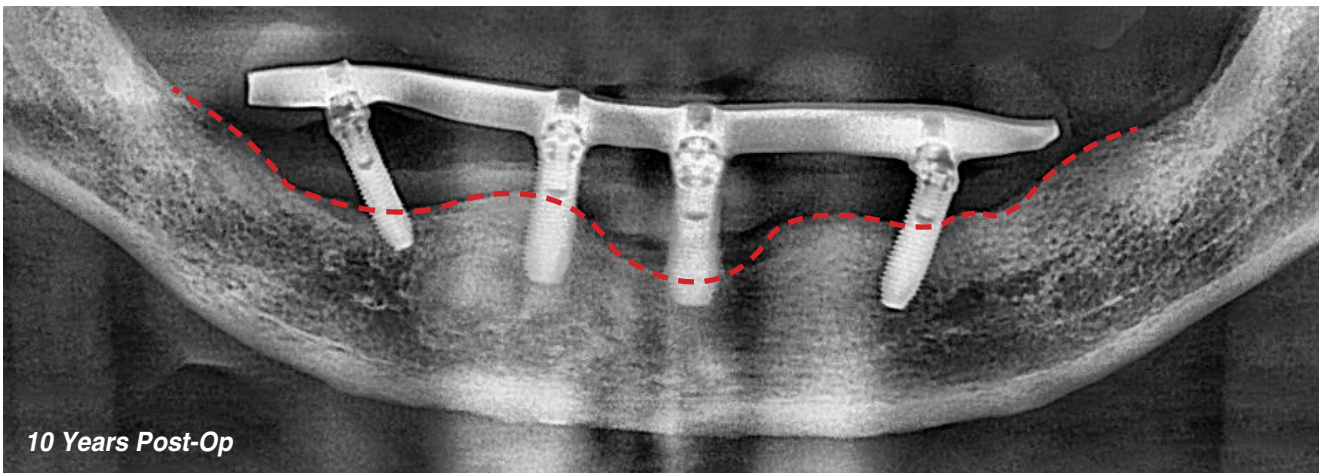
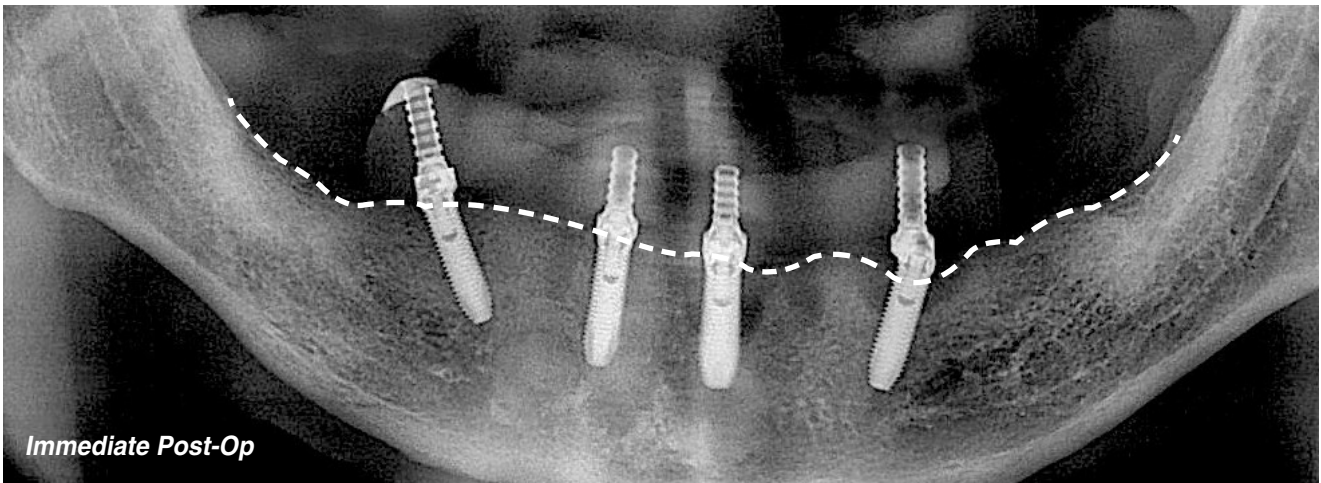
# ALL - ON - 4® FAILURES

## THE NEXT WAVE

...hospital while preparing to enter Medical School. I was assigned to a ward of seniors where every day, it seemed someone had lost a denture. It was this experiences that made me dream of 'bolting in a set of bionic teeth'. So I became a Dentist. Eventually at the Nobel Biocare World Conference in Las Vegas 2003, All-on-4® was commercially promoted as a graft-less solution to clinicians. it seemed like the dream had become a reality.

**FAST FORWARD TWENTY YEARS LATER** and every day, I now go to my office wondering if my schedule includes yet another All-on-4® problem case. What happened? We are seeing an alarming and rising wave of first generation Full Arch Failures. Why? We now know this is due to a combination of deficiencies: technical, clinical, and biological. Multiple factors: micro-leaking connections, the flawed premise of angled implants, peri-implantitis, the lack of a soft and hard tissue foundation, and a confirmation bias in marketing and education have all contributed to this nagging crisis. Patients have made a significant financial and emotional investment. Failure? Their expectations are high for a successful resolution and, by the way, who is covering the cost for this?

Fortunately, much has improved to mitigate these failures. It is the author's experience and opinion that the current generation of implant surgeons, must have, in their skillsets, practical strategies to manage historical and upcoming All-on-4® failures.



*First generation mandibular All-on-4 case*



"ALL ON 4" MEANS "NONE ON THREE"

Dr. CARL MISCH DDS MDS

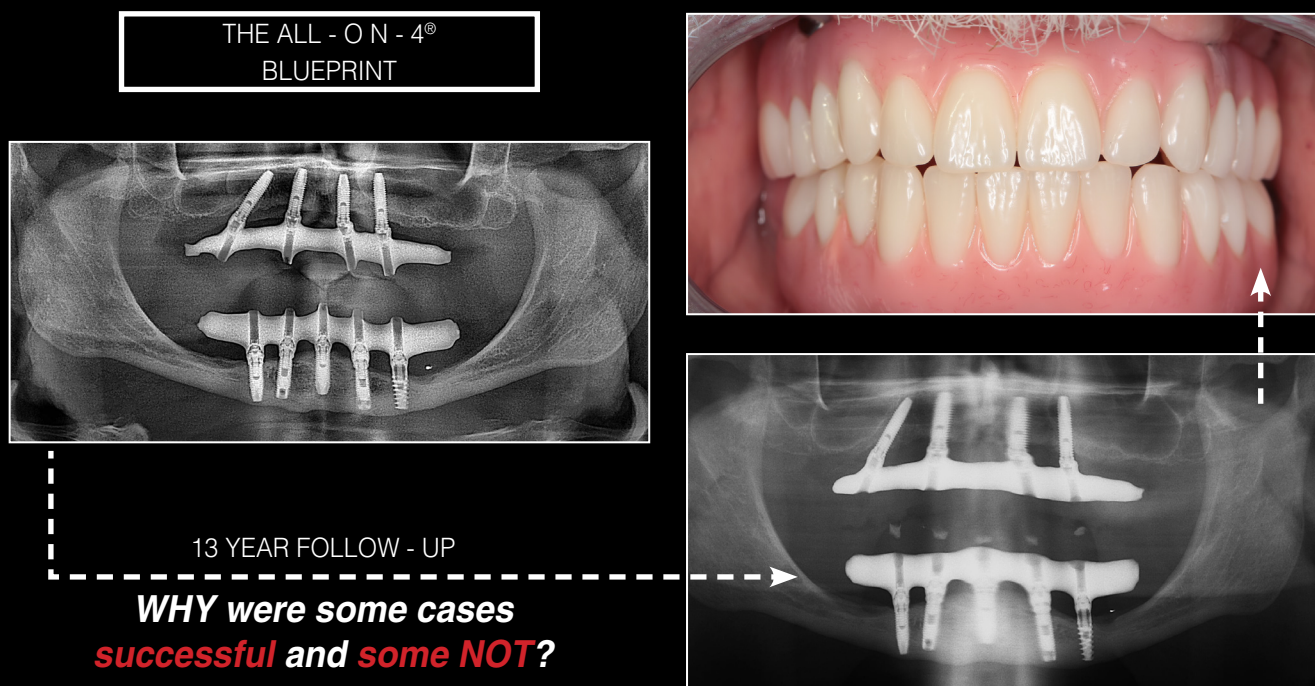
10/15/2009

"...If 8 implants were used in each arch, a 87% implant survival would be enough for all arches to have a fixed prosthesis. Therefore, since "all on 4" has a higher risk than "all on 8", the Doctor should charge twice the price for "all on 4", to compensate for the complications and treatment required.

In addition "all on 4" often requires cantilevers and/or long options. Both situations increase prosthetics complications of screw loosening, fracture, etc. In short - use more implants and you will save the patient and your aggravation and therefore you can charge the patient less money."

In 2009, Dr. Carl Misch was prescient in his criticism of All-on-4®. Despite some heated debate, he correctly predicted that long-term complications would result from using a reduced number of implants. Especially, if the implants were angled and the full-arch prosthetics were cantilevered.

Today, that initial wave of failures has hit the profession like an unexpected tsunami. It is profound due to the comprehensive nature of the loss. Unlike a single implant or a segment, the simultaneous loss of an entire arch in both function and aesthetics is devastating for both the patient and the clinician. An enormous amount of research was conducted by Nobel Biocare prior to their launch of 'All-on-4'. The majority of these studies proved high survival rates. While certainly impressive at first, however, beyond a decade, these rates began to drop.



This case was completed prior to Dr. Misch's comments, and it is still successful to this day. If every All-on-4® case looked this predictable more than a decade later, then this classic full-arch protocol would still be the current standard of care today. Obviously, this case was neither prone to mechanical or biological risk factors. And luck played a major role, as patient selection was the inadvertent key to this success story.

Disappointingly, success has not always been predictable for every All-on-4® case. Patient selection is like a lottery- we cannot always tell.

Even when second generation full arches moved towards more and straight implants, their non-conical connections, angled multi-unit abutments, or bone/ soft tissue deficiencies still led to failure.

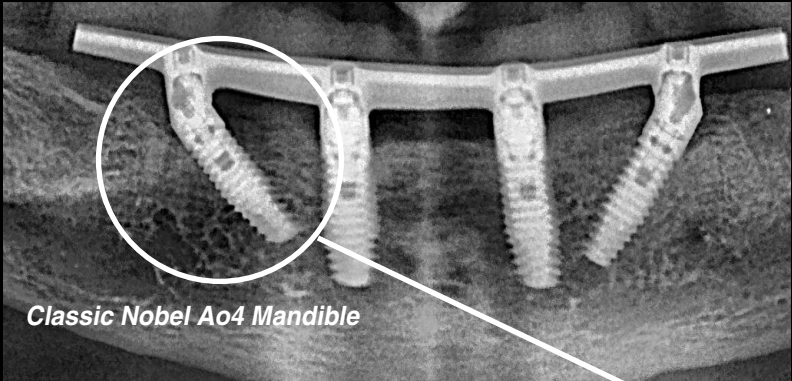
Full-arch complications continue to occur because of 'blind spots' in mechanical factors, biological factors, or a combination of both.

This results in **3 COMPLICATION SCENARIOS:**

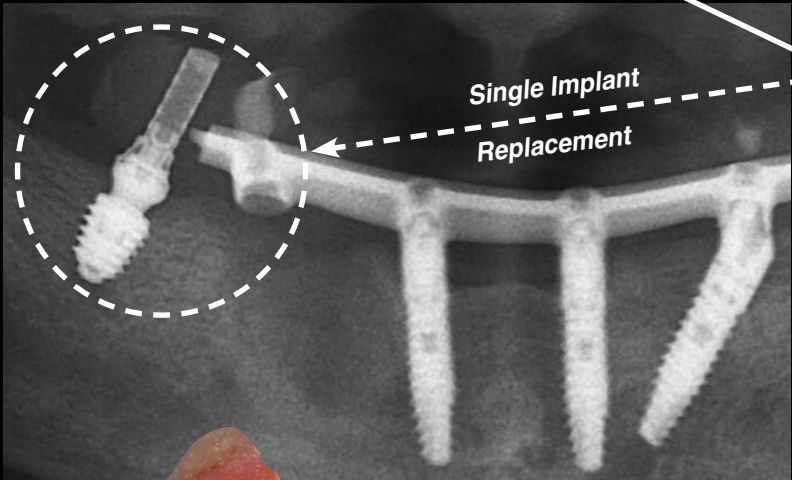
- **SINGLE IMPLANT FAILURE** (*Mechanical*)
- **DOMINO FAILURE** (*Mechanical / Biological*)
- **CLUSTER FAILURE** (*Biological*)

This article reviews some practical strategies for the management of ailing early generation cases and suggestions for partial or complete solutions.

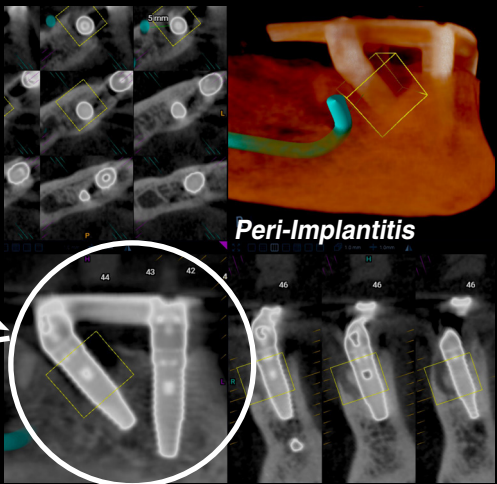
# S I N G L E I M P L A N T F A I L U R E



Classic Nobel Ao4 Mandible



Single Implant Replacement



Peri-Implantitis

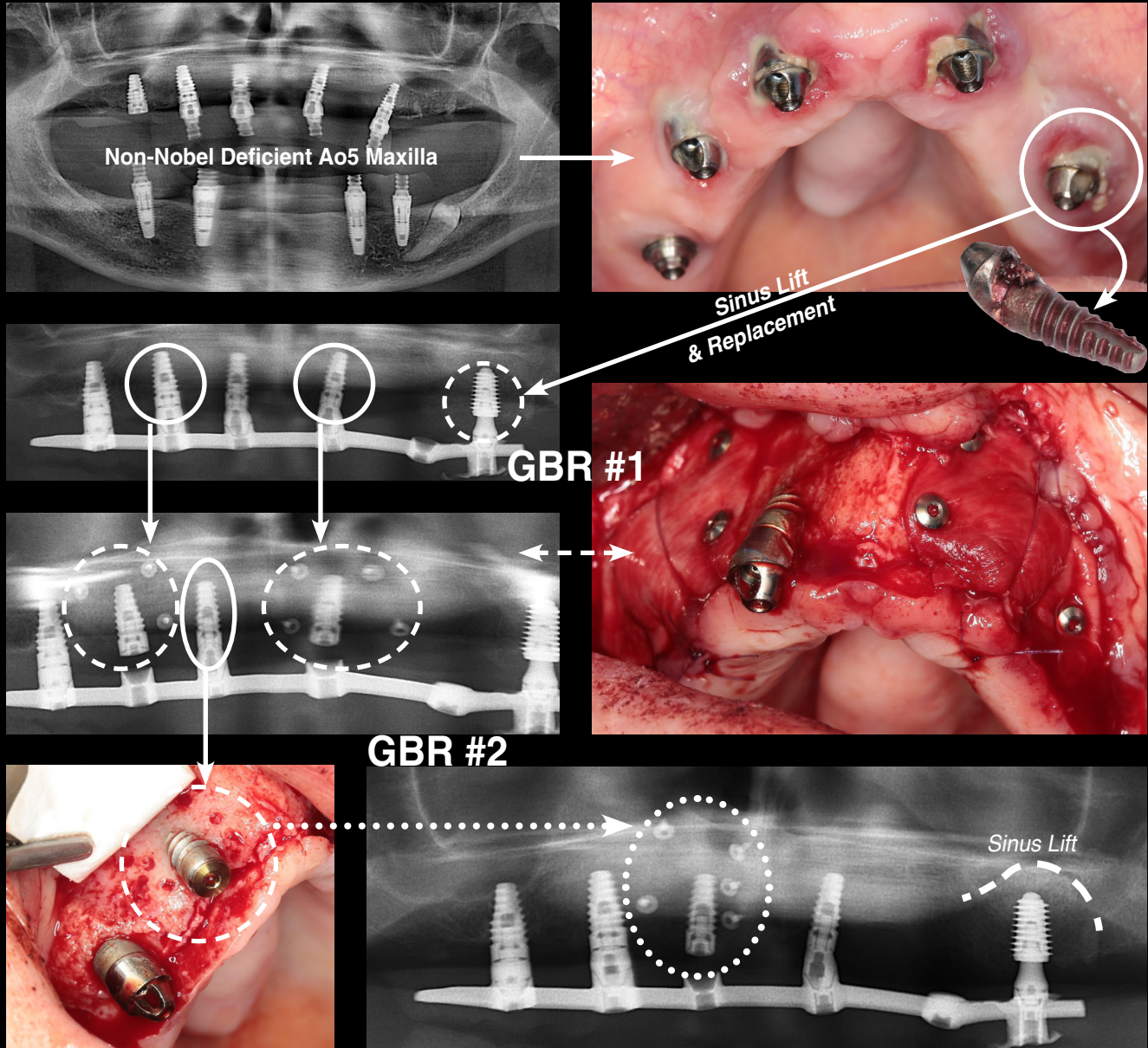
Most Single Implant failures are due to Mechanical overload and involves one of the terminus implants. Failure can also be from non-passive fit of one of prosthesis cantilevers. This scenario has a better prognosis and is more economical to the patient as revision surgery is on a single site.



## SOLUTION

The affected cantilever of the prosthesis can be removed and the failed implant is explanted. A replacement implant is placed, typically in an improved vertical alignment. Once integrated the prosthesis can be re-used to pick-up the new implant as a repair. Alternatively, a brand new prosthesis may be fabricated.

# DOMINO FAILURE



A domino-type failure is really a complete failure in 'slow motion', as one implant is affected at a time and can be replaced or rehabilitated in sequence. A biological failure can lead to a mechanical failure (or vice versa) in a domino effect. If the occlusal trauma is manageable, then the case may be saved with creative surgery and prosthetic management.

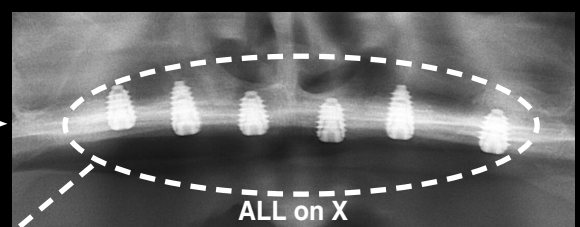
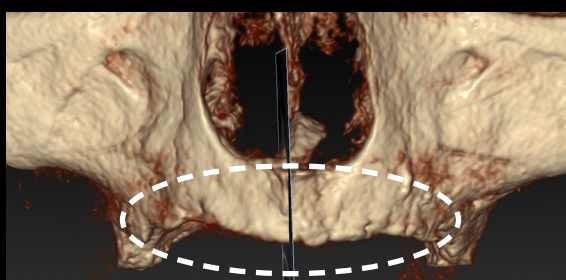
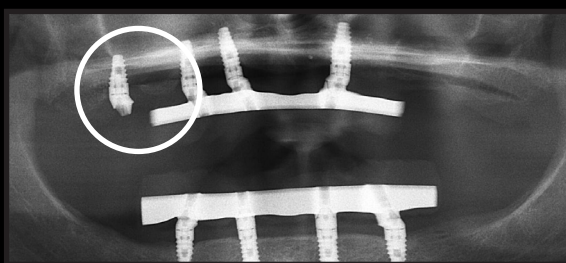
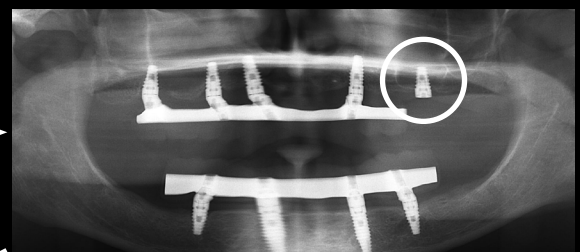
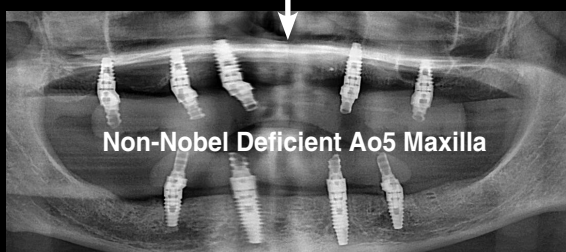
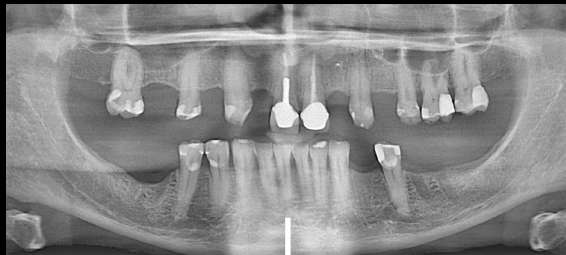
## SOLUTION

In this second generation non-Nobel full-arch maxillary case, the first implant replaced was the upper left. A sinus lift was completed with simultaneous implant placement. Two implants were then 'decommissioned', while GBR was performed to add buccal bone. Once healed, the two implants were re-engaged and a second GBR procedure was performed on the last anterior implant after it too was temporarily 'decommissioned'. In this manner, the patient, who was compliant, retained her original prosthesis throughout and only had one net implant replaced.

# C L U S T E R F A I L U R E

"Cluster (implant) failure refers to the occurrence of multiple dental implant failures in one patient ..."

[www.icoi.org](http://www.icoi.org)



A Total or Cluster failure is often a biologically-mediated failure, as both the primary and secondary stability mechanisms have collapsed. The foundation of an adequate healthy volume of supporting bone and its interface protection in the form of adequate keratinized tissue was either missing at the onset or became inadequate from various risk factors.

## SOLUTION

The patient selection criteria were not sufficiently restrictive prior to surgery. These type of cases were compromised even before surgery began. Even though this was a second generation non-Nobel case, the only meaningful solution here is starting all over again. The surgeon must recognize and correct any overlooked potential endogenous and exogenous deficiencies prior to re-treatment and incorporate updated and improved surgical and prosthetic criteria. (see next page).

## S U C C E S S F U L A L L O N X

First, the state-of-the-art concept for All on X should involve more strict screening of the overall health qualifications of the patient (oral hygiene, smoking, vitamin D deficiency, parafunction, CPAP, medications, co-morbidities etc.)

Bone and keratinized tissue augmentation procedures (GBR, sinus lifts, FGG, CTG) must also be incorporated and verified BEFORE All on X surgery.

Plus, the incorporation especially in the maxilla (5-8), conical connections, vertical angulations, the elimination of angled multi-unit abutments, incorporating more direct-to-implant connections, and precision occlusal management.

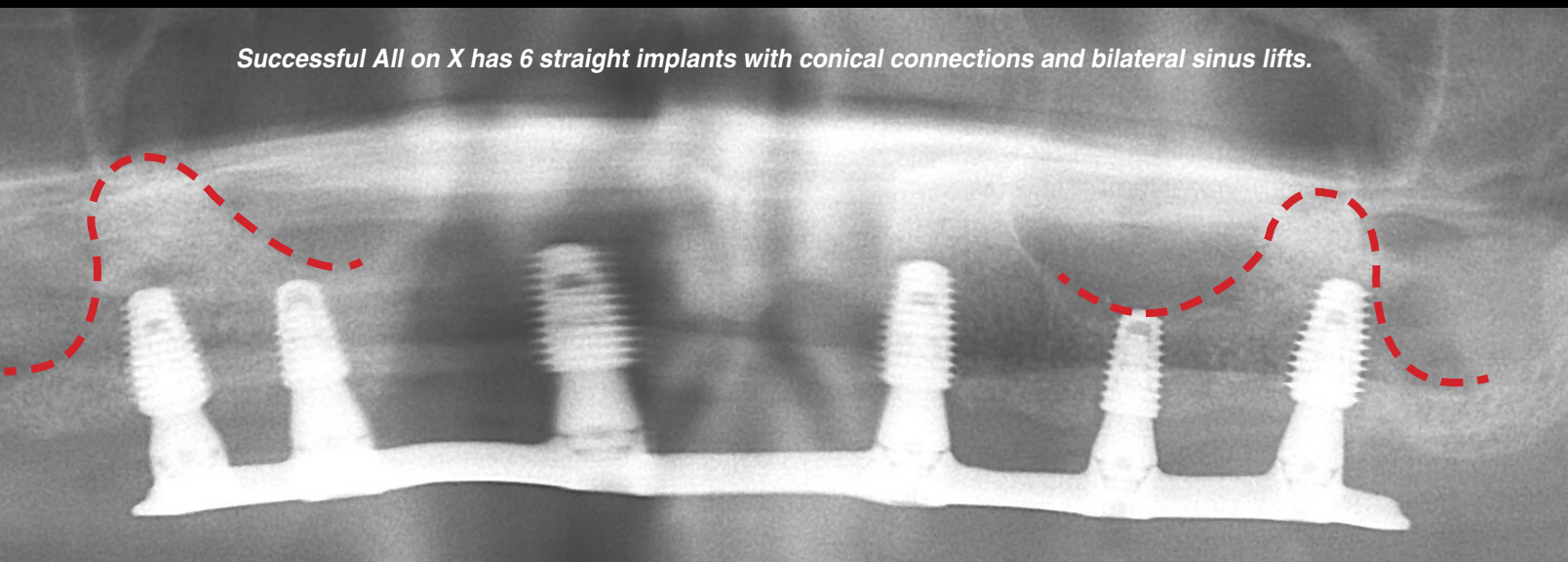
### KEYS TO SUCCESS

**PATIENT SELECTION:** *Biological*

**SOLID FOUNDATION:** *Biological/Mechanical*

**OVER-ENGINEER:** *Mechanical*

*Successful All on X has 6 straight implants with conical connections and bilateral sinus lifts.*



### NEW SURGICAL CRITERIA

- All on X (X = 5, 6, 7, 8) NOTE: robust mandibles can support straight All-on-4®.
- Guided
- Sinus lifts to avoid angled implants
- GBR for horizontal augmentation
- Conical connection implants
- Adequate keratinized gingiva (free gingival grafts/ connective tissue grafts, as needed).
- Two-stage if primary stability is compromised.

### NEW PROSTHETIC CRITERIA

- Manage occlusion
- Reduce/ eliminate angled multi-unit abutments - MUAs (use straight 0° abutments)
- Reduce/ eliminate MUAs altogether (use direct-to-implant connections)
- Ovate pontic forms/ hygienic prosthetic contouring

# S U C C E S S F U L A L L O N X

## FINAL THOUGHTS

All-on-4® was a BOLD and COURAGEOUS PARADIGM SHIFT for the permanent fixation of full-arch dentitions. 'Teeth-in-a Day®' was an attractive premise that appealed to both dental surgeons and patients alike. Because we all jumped onto the bandwagon after a flurry of initial success, we all wanted to believe, as I did, that we could finally 'bolt in bionic teeth' and everyone would live happily ever after.

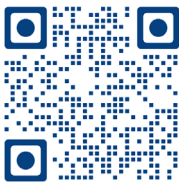
Despite the fact that its premise was vulnerable in the long term, nonetheless its originality paved the way for current sophisticated and refined parameters on which today's FULL-ARCH protocols are based. Because of All-on-4®'s pioneering influence, it accelerated demand for bone augmentation, sinus lifts, and soft tissue augmentation procedures, as well as a whole host of surgical and prosthetic upgrades.



Successful All on X FP3 Final Restoration

Those of us that were early adopters witnessed the evolution of this complex protocol unfold. It is necessary to continue to keep up with future trends and developments as we improve our delivery and success rates. It is incumbent upon us to expand our surgical skillsets, not only to provide successful outcomes, but we also have a duty to those we first served many years ago. Revision surgeries are expensive: Patient management skills and business models must be at their best to solve failures, responsibly absorb write downs and avoid legal issues.

In a trickle-down effect, more and more novice practitioners are venturing into the realm of full-arch protocols. Digital workflows are neither a shortcut nor a guarantee of surgical success. However, they are impressive magical tools that have steep learning curves and, when used properly, will make surgeries more efficient and predictable. They cannot substitute or circumvent the basic keys to success: patient selection, growing bone, managing soft tissue and holding up to para-function. If anything, they should make us respect, even more, the rules of engagement. The forecast is bright as digital dentistry will help us move into the future with better safeguards to prevent full-arch failures and uphold the original mission statement of All-on-4®.



IMPLANTOLOGIST  
CANADA PLACE DENTAL  
CALGARY, AB CANADA  
FACULTY, BITES INSTITUTE

### Contact

#### Dr. Albert Lui

Clinic name: Canada Place Dental  
Address: Suite 200, 407 2nd St. SW, 2nd floor,  
Calgary, AB, T2P 2Y3  
Email: [drlui.reception@gmail.com](mailto:drlui.reception@gmail.com)