Restoration of a Three-Unit Maxillary Bridge: Integrating Surgical, Clinical, and Technical Strategies Through Early Adoption of Advanced Ceramic Materials


Yugo Hatai

By Yugo Hatai

Introduction:

This article presents the restoration of a three-unit maxillary bridge spanning teeth 14–12 in a patient with high aesthetic expectations and a complex restorative history. The case required close collaboration between surgical, restorative, and technical disciplines, with the primary objective of delivering a result that would remain visually undetectable within the surrounding natural dentition.

From the outset, the primary challenge was not procedural novelty, but integration. The adjacent dentition exhibited a high degree of natural translucency, surface character, and chromatic variation, placing significant demands on material selection and execution. In parallel, soft-tissue considerations – including ridge deficiency and the need for bone grafting – necessitated a staged and carefully sequenced approach, with each phase validated surgically, clinically, and aesthetically before progression to definitive restoration.

In contemporary restorative dentistry, the increasing reliance on monolithic, digitally driven workflows has brought efficiency and predictability, but can limit individualisation, resulting in restorations that share similar visual language in cases requiring a higher level of aesthetic control. While high-strength zirconia frameworks and digital design provide a reliable foundation, outcomes in complex aesthetic cases remain dependent on clinical judgement, material understanding, and the ability to manage form, colour dynamics, and surface anatomy beyond standardised protocols by the dental ceramist.

Within this clinical context, the case also provided an opportunity to evaluate the integration of newer ceramic refinement materials into an established workflow. The introduction of e.max Ceram Art by Ivoclar in Australia in late 2025 reflects a broader shift toward layered systems that support both optical depth and structural control, particularly as monolithic restorations have become more prevalent. Liquid ceramics, such as e.max Ceram Illusion, have already expanded chromatic possibilities; however, fine anatomical control and surface realism remain critical determinants of a natural result.

The e.max Ceram Art Structure material is of particular relevance in this regard. Rather than functioning as a corrective layer, it enables the deliberate build-up of anatomical and optical architecture, providing a medium through which individual craftsmanship can be expressed with precision. Available in white formulations for hard-tissue characterisation and pink formulations for soft-tissue integration, the material allows refinement to be introduced without disrupting an established restorative protocol.

This article demonstrates how such materials can be incorporated selectively and conservatively into a well-defined workflow, supporting enhanced depth, texture, and realism while preserving biological, functional, and aesthetic coherence.

Pre-operative Overview:

At the initial smile design consultation, it was clear that this case would require a


Figure 1: Pre-op: Close-up smile frontal view


Figure 2: Pre-op: Retracted frontal view


Figure 3: Pre-op: Close-up smile lateral view (right)


Figure 4: Pre-op: Retracted lateral view (right)


Figure 5: Pre-op: Close-up smile lateral view (left)


Figure 6: Pre-op: Retracted lateral view (left)

high level of aesthetic precision. The patient presented with strong expectations and a clear desire for an outcome that would be visually undetectable within the natural dentition – particularly on the right side of the smile.

To remain conservative, the restorative scope was limited to a three-unit reconstruction spanning teeth 14–12. The remainder of the dentition was in excellent condition, displaying a high degree of natural translucency and internal character – making material selection and integration especially critical. A diagnostic wax-up was therefore used to assess space distribution and tooth proportions, revealing a narrower available space in the upper right quadrant compared with the contralateral side. Rather than pursuing strict symmetry, the design focused on achieving optical balance and natural harmony within these constraints.

Tooth morphology was refined selectively. The existing form of tooth 12 was largely preserved in line with the patient's preference, while adjustments were made to the canine and first premolar to reduce bulk and improve spatial balance. From a technical perspective, this created a scenario where precise control of form, transition, and surface character would be essential to achieving a seamless result.

Colour planning was approached in parallel, allowing final shade evaluation to be carried out on a stable baseline prior to definitive ceramic work. This ensured predictable material behaviour during the build-up phase and provided a reliable foundation for aesthetic integration.

From a technical standpoint, this case offered an appropriate platform to evaluate a high-strength zirconia workflow using e.max ZirCAD Prime, where translucency is derived primarily from the material itself and refinement is achieved through controlled morphology, layering strategy, and surface characterisation.

Case Planning and Bone Grafting:

One of the patient's primary concerns from the outset was the loss of soft-tissue volume at the bridge site. This was particularly significant in the aesthetic zone, where crown margins were visible and soft-tissue deficiencies became apparent during smiling and speech. Over time, the patient had developed a subconscious habit of concealing the right side of her mouth, highlighting the psychological impact of the aesthetic compromise.

These concerns were identified through detailed clinical and technical consultations, photographic assessment, and open interdisciplinary communication. Addressing both the aesthetic and psychological dimensions of the case required a coordinated, staged approach, resulting in an extended treatment timeline – spanning several months rather than the few weeks typically associated with a standard three-unit bridge.

As part of comprehensive case planning, site-specific bone grafting and ridge augmentation were undertaken to optimise both hard- and soft-tissue conditions prior to definitive prosthetic reconstruction. Clinical evaluation of the edentulous region associated with tooth 13 revealed ridge deficiency that would have limited the ability to achieve an optimal aesthetic and functional outcome. Following assessment, ridge augmentation was recommended to increase tissue volume, support future pontic design, and enhance long-term aesthetic integration.

The ridge augmentation procedure was performed under local anaesthesia with adjunctive oral sedation. A full-thickness mucoperiosteal flap was elevated via sulcular and vertical releasing incisions extending between teeth 12 and 14. Following meticulous debridement and irrigation of the recipient site, particulate xenograft material (Bio-Oss) was placed and stabilised using a resorbable collagen membrane (Bio-Gide). Tension-free primary closure was achieved after periosteal release, with the flap coronally repositioned and secured using fine resorbable sutures.

The procedure was well tolerated, and the patient experienced an uneventful immediate post-operative recovery. Post-operative instructions were provided, and follow-up appointments were scheduled to monitor healing prior to progression into the restorative phase.

From a restorative perspective, this surgical intervention was critical in establishing a stable and biologically favourable foundation for the subsequent provisional and definitive prosthetic stages. Adequate ridge volume allowed for more controlled pontic emergence, improved soft-tissue support, and reduced reliance on prosthetic camouflage techniques at later stages of treatment. The timing and execution of the grafting procedure were therefore integral to the overall aesthetic planning and final outcome of the case.

Temporary Review and Design Validation:

The temporary review was conducted once bone grafting and soft-tissue healing had stabilised, allowing an accurate assessment of both form and gingival integration. The temporaries were fabricated directly from the diagnostic wax-up, providing a reliable reference for evaluating the proposed design in situ.

From a shape perspective, the patient was very comfortable with the overall form, and no major modifications were required. The presence of subtle natural imperfections was viewed positively,

Figure 7: Temps in situ: Close-up smile frontal view

Figure 8: Temps in situ: Retracted frontal view

Figure 9: Temps in situ: Close-up smile lateral view (right)

Figure 10: Temps in situ: Retracted lateral view (right)

Figure 11: Temps in situ: Close-up smile lateral view (left)

Figure 12: Temps in situ: Retracted lateral view (left)

as these blended well with the adjacent dentition and supported a more authentic aesthetic outcome. The soft-tissue response following grafting was also favourable, contributing to a balanced and well-supported emergence profile.

Colour evaluation was carried out on a stable baseline following completion of whitening. At this stage, the patient was satisfied with the shade of her natural dentition, establishing a clear reference point for the definitive restorations. The increased chroma evident in the canine region – particularly when compared with the contralateral side – was acknowledged by all parties, reinforcing the importance of achieving a natural transition in colour and depth within the final restorations.

From a technical standpoint, the temporary phase also highlighted subtle spatial considerations within the interproximal zone, underscoring the need for careful control of form and surface transition during the definitive ceramic build-up. These observations further emphasised the importance of material choice and layering strategy in achieving seamless integration.

Overall, the temporary phase served its intended purpose: validating the proposed design, confirming tissue behaviour, and establishing a precise aesthetic reference. This allowed the focus to shift confidently toward material execution and refinement during the final ceramic build-up.

Shade Taking Protocol:

As usual, shade taking was approached as a multi-reference process rather than relying on a single tab or viewing angle. In my workflow, three different shade tabs (with corresponding gingival holders) are assessed from two primary perspectives – frontal and lateral – with the patient positioned edge-to-edge. This approach allows for a more reliable evaluation of both value and chroma, particularly in cases where the surrounding dentition displays high translucency and natural variation.

The lateral view is especially important, as it reveals colour transitions and depth that are often underestimated from a frontal perspective alone. This becomes critical when attempting to integrate a restoration seamlessly into an existing dentition rather than creating a uniform or over-simplified appearance.

Photographs taken using polar_eyes filters form a key part of the protocol. By eliminating surface reflections, these images make it significantly easier to assess the degree of translucency, internal saturation, and natural characteristics of the enamel and dentine structure. In my experience, polarised images provide a more accurate and repeatable reference than conventional photography, particularly when subtle optical differences matter.

The eLAB protocol was used as an additional reference point to support shade communication and verification. While not relied upon in isolation, it serves as a useful cross-check – helping to minimise interpretation errors and reduce the risk of disappointment or colour mismatch at the try-in stage.

Taken together, this layered approach to shade taking establishes a stable and predictable foundation for ceramic build-up, allowing material behaviour and surface refinement to be guided by accurate visual data rather than assumption.

Figure 13: Shade taking from frontal view

Figure 14: Shade taking from lateral view

Figure 15: Shade taking from lateral view (with polar_eyes)

Figure 16: Shade taking (with polar_eyes and eLAB Grey Card)

The Fabrication of Final Restorations and Ceramic Build-up:

In today's restorative landscape, the increasing dominance of monolithic, CAD/CAM-manufactured restorations has brought undeniable efficiency and consistency, but often at the expense of individuality. As workflows become increasingly standardised, many restorations begin to share a similar visual language regardless of case-specific nuance. For ceramists seeking to operate at a high-end or master level, the ability to move beyond digital uniformity and reintroduce controlled individuality has become increasingly important.

The fabrication of the definitive 14–12 restorations in this case followed a deliberately conservative and controlled approach. As I've been demonstrating throughout my career, rather than relying on extensive post-firing adjustment, the primary objective was to maintain anatomical intent throughout the ceramic build-up phase, allowing form, optical depth, and surface character to evolve additively. This approach supports greater biological and aesthetic coherence, particularly when integrating with adjacent natural dentition exhibiting complex translucency and surface morphology.

The core ceramic build-up was completed using Noritake CZR, which remains my preferred system for establishing primary colour dynamics and foundational aesthetics on zirconia frameworks. Its handling behaviour and optical predictability provide a stable platform, particularly in cases requiring subtle transitions and refined value control. At the semi-completed stage, the restorations could have been finalised conventionally. However, closer evaluation revealed a localised interproximal challenge: the separation between the pontic and the abutment resulted in a small zone of negative space in the 13–12 region, visually exposing root form. While biologically acceptable, this presentation was aesthetically suboptimal in the context of a youthful, high-demand outcome.

When working on bridge cases – particularly where the point of separation must terminate directly over an abutment surface – the reproduction of an interdental papilla presents a recognised prosthetic limitation. Even with optimal surgical intervention and ridge augmentation, complete papilla formation in such areas is biologically constrained by the absence of a tooth–tooth or implant–tooth interface. In these situations, the use of gingival ceramic should be regarded not as a compensatory measure, but as a legitimate aesthetic strategy to restore visual continuity of the soft-tissue architecture.

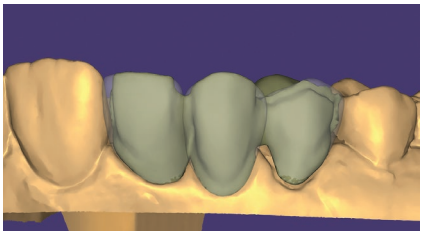

Figure 17: CAD/CAM designed restorations on 14-12

Figure 18: Modified e.max ZirCAD Prime Framework

Figure 19: Layered ceramics without shape adjustment

Figure 20: Semi-completed restorations (with Noritake CZR)

Figure 21: Application of e.max Ceram Art Illusion (after firing)

Figure 22: Application of e.max Ceram Art Structure (before firing)

Figure 23: Application of e.max Ceram Art Structure (after firing)

Figure 24: Completed restorations (after polishing)

As with any intervention at this level, the decision to introduce gingival ceramic must be deliberate, discussed, and clinically validated – often through provisional assessment, such as controlled application of pink composite during the provisional phase – before being transferred to the definitive prosthesis. In this case, while site-specific bone grafting successfully restored hard- and soft-tissue volume, reproduction of the interdental papilla in the interproximal region required a prosthetic solution. This was carefully planned and executed as part of the final ceramic build-up to achieve a harmonious and natural aesthetic integration.

It was at this refinement stage that e.max Ceram Art became particularly relevant. Rather than replacing an established ceramic system, Ceram Art functions as a complementary refinement layer. The combined use of Ceram Art Illusion and Ceram Art Structure allows optical modulation and physical architecture to be addressed independently, expanding the expressive potential of the restoration without disrupting an existing workflow.

A key advantage of Ceram Art lies in its material compatibility. Despite being part of the Ivoclar ecosystem, both Illusion and Structure integrate well with a wide range of ceramic systems on the market due to their adaptable coefficient of thermal expansion. In this case, they were layered directly over Noritake CZR without compromise. The firing protocol further supports this integration, operating at a significantly lower temperature than the primary CZR cycle, allowing refinement to be added with minimal risk of disturbing the underlying ceramic architecture.

From a behavioural standpoint, the Structure material offers an additional advantage. Its handling characteristics – stable yet mouldable – allow controlled sculpting of micro-anatomy and subtle shape refinement in a manner that feels closer to composite than conventional ceramic powders. This proved essential in this case, where the adjacent natural dentition exhibited nuanced surface texture and transitional anatomy that could not be convincingly replicated through colour application alone.

In an era where monolithic restorations risk visual homogenisation, the selective use of structure and illusion ceramics provides a means of restoring individuality to ceramic work. For ceramists seeking to differentiate themselves at a higher level, this approach offers a practical and controlled pathway to elevate outcomes – bridging digital efficiency with handcrafted refinement, without compromising biological, functional, or aesthetic principles.

Try-in and Clinical Evaluation:

The clinical try-in proceeded smoothly and predictably, confirming the accuracy of fit, overall aesthetics, and integration with the surrounding dentition. Both the seated evaluation and initial visual assessment aligned well with the objectives established during the planning and fabrication stages.

As is often the case during try-in appointments, the use of local anaesthetic resulted in a temporary alteration of soft-tissue appearance, with the gingival tissues appearing lighter than their resting condition. While this is a normal and unavoidable clinical variable, it can limit the precision with which soft-tissue colour transitions are assessed at that specific moment.

Rather than viewing this as a limitation, this stage highlighted an important consideration for future case planning – particularly when gingival ceramics and soft-tissue illusion play a role in the final aesthetics. One option in such cases is provisional or short-term temporary cementation of the restoration, allowing the tissues to return fully to their natural state before definitive aesthetic evaluation.

Figure 25: Try-in before (Stump Shade photo)

Figure 26: Try-in after (seated with a Try-in paste)

Alternatively, a dedicated follow-up appointment – conducted without local anaesthesia – can offer an ideal opportunity for further refinement. In this context, the handling behaviour of Ceram Art Structure becomes especially relevant. Due to its composite-like viscosity and sculptability, minor adjustments to the gingival architecture can be carried out clinically (with appropriate equipment, including a ceramic furnace) in a controlled and deliberate manner, allowing the soft-tissue transition to be fine-tuned directly in response to clinical conditions.

From a broader perspective, this reinforces the importance of considering material behaviour at the planning stage, not only during fabrication. As structure ceramics continue to evolve, they open new possibilities for extending aesthetic control beyond the laboratory bench and into carefully staged clinical evaluation – particularly in complex cases where hard- and soft-tissue harmony must be assessed together.

In this case, the try-in confirmed that the established workflow was sound, while also highlighting additional avenues through which the full potential of structure materials can be explored and leveraged in future treatments.

Post-operative Outcome and Reflections:

The post-operative review confirmed a highly successful outcome – clinically, technically, and aesthetically – and, ultimately, emotionally and psychologically from the patient's perspective. The patient was visibly pleased with the result, which is always rewarding, particularly in cases where expectations are high and the technical demands are significant. Considering the initial constraints, the complexity of integration with the adjacent natural dentition, and the level of scrutiny applied throughout the process, the final outcome was more than satisfying.

However, the value of this case extends beyond the immediate result. It reinforces why I continue to do what I do: not simply to meet expectations, but to exceed them, while remaining invested in the ongoing refinement of skill, judgement, and material understanding. In an era where dentistry is becoming increasingly digitised, efficient, and systematised, there is a genuine risk that human nuance – listening, interpretation, restraint, and artistry – can be diminished. This case serves as a reminder that technology and material innovation should support, not replace, the human element of aesthetic dentistry, where artistic judgement and, most importantly, communication remain central.

While digital workflows and measurements provide useful structure, they are ultimately tools and reference points, not determinants of what can be achieved for a patient. Meaningful aesthetic outcomes are shaped by decision-making, experience, and a willingness to engage critically with each case rather than defaulting to standardised solutions. That mindset does not change with age, career stage, or background. Continuing education, curiosity, and openness to evolving materials and techniques remain essential – regardless of where one sits professionally.

This case also highlights the importance of resisting complacency. Even when outcomes are successful, there is always room to reflect, refine, and explore how emerging materials – such as structure ceramics – can further expand aesthetic potential when integrated thoughtfully into established workflows. The goal is not perfection, but progress.

Figure 27: Post-op – Close-up smile frontal view

Figure 28: Post-op – Retracted frontal view

Figure 29: Post-op – Close-up smile lateral view (right)

Figure 30: Post-op – Retracted lateral view (right)

Figure 31: Post-op full face smile

Patient Testimonial

My canine tooth was impacted and, as a teenager, I went through lengthy, expensive, and uncomfortable orthodontic treatment. In the end, the canine tooth was lost, and I had to wear a small denture throughout high school. While the denture didn't look too bad, it created a lot of insecurity for me. I was mortified at the thought of someone noticing.

Teeth can be very emotional, and missing teeth can be something people feel ashamed of – even though we shouldn't. I eventually decided to explore the option of an implant. Unfortunately, there wasn't enough space or bone to support one, so a bridge was determined to be the best solution.

I always thought the original bridge looked okay, but not great. It wasn't symmetrical with the other side of my mouth because it was bulkier. I also had gum grafting at the time, which was very painful and didn't produce a good result – the gum was always a different colour to the surrounding tissue and still appeared more hollow than the other side. Most noticeably, the teeth were almost completely opaque and one flat colour, lacking the natural transparency and texture of my real teeth.

I tried not to dwell on it, but it did make me self-conscious. I felt I had a distinctly "good side" and a "bad side." I would cover my mouth when I laughed and feel awkward in photos. It was something I was always aware of, which was exhausting.

When it came time to replace the bridge, I wanted to find a cosmetic dentist who created truly natural smiles. I also felt more comfortable seeing a woman dentist. After a lot of research, I found The Paddington Dental Surgery and Dr Sophie Lee. I was impressed by the patient results – they looked natural, not overly perfect, with attractive imperfections.

Dr Sophie was wonderful throughout the entire journey. She made me feel completely comfortable and genuinely

listened to all my aesthetic preferences when developing the treatment plan. She recommended bone grafting with Dr David Grossberg to address the hollowness and asymmetry that had been bothering me, and suggested completing whitening during the healing phase while the final bridge was created by Yugo at Smile Virtuoso. She spoke very highly of Yugo, saying he was the best person to achieve a truly natural result.

My first consultation with Yugo was fantastic. Visiting his studio and gaining insight into his process made it clear that he is a true artist with a strong aesthetic eye. He creates work that is unique to each individual rather than following a standardised approach. The temporary bridge gave me a lot of confidence – the shape was more refined and immediately created better symmetry than the original bridge.

While the temporary was in place, I underwent the bone grafting procedure, which went very well. It created a more symmetrical appearance by restoring volume to the previously hollow area where the canine root would have been.

The final bridge exceeded my expectations. Yugo listened carefully to what I hoped to achieve (and I was picky!) and truly understood it. He created a bridge that completely disappears into my natural teeth. It has symmetrical shape, natural transparency, subtle colour variation, and realistic surface texture. It's incredible.

Yugo attended the fitting appointment, and I was instantly over the moon with the result. I felt that both Yugo and Dr Sophie genuinely cared about achieving a result I would be happy with long-term, and about me feeling comfortable and confident for years to come. Their attitude, interest in my case, and attention to detail made all the difference.

In the week after the final bridge was fitted, I was beeped at red lights multiple times – because every time I stopped, I couldn't resist checking my teeth in the rear-view mirror! Every mirror I walked past, I caught myself looking. I think the outcome is perfect because now I'm not really thinking about my teeth at all. All those small worries are gone. I just feel like I have nice teeth.

Acknowledgement:

I would like to sincerely thank Dr Sophie Lee of The Paddington Dental Surgery for her clinical excellence, thoughtful case planning, and collaborative approach throughout the treatment process. I would also like to acknowledge Dr David Grossberg of Sydney Periodontist Centre for his exceptional surgical management of the hard- and soft-tissue components of this case. Their attention to detail and shared commitment to achieving a refined aesthetic outcome were integral to its success.

I would also like to thank Jay Woo of Mowbray Dental for the precise CAD/CAM fabrication of the zirconia framework, which provided a reliable and accurate foundation for the subsequent ceramic work. ◆

About the Author:

Yugo Hatai is a distinguished Master Ceramist and one of Australia's most respected dental technicians. Renowned for his unparalleled ability to recreate natural teeth with an artist's touch, Yugo has transformed countless smiles. His work is celebrated by leading clinicians and technicians across the globe for its lifelike detail, emotional sensitivity, and technical precision.

In 2008, Yugo founded Smile By Yugo – a creative sanctuary where his passion for aesthetics, fashion, and function merged into a singular vision: to restore smiles with natural harmony and authenticity. His work blends the intuitive artistry of a designer with the clinical discipline of a master technician.

Over the years, Yugo has consistently elevated industry standards, serving as a thought leader and mentor within the global dental community. His commitment to excellence is unwavering – whether mentoring peers, influencing protocols, or pushing boundaries in aesthetic outcomes.

His educational journey began with a lecture on Lava (3M ESPE) in 2008 and quickly blossomed into an international speaking career, including a keynote address at NZIDT in 2009. He has contributed numerous articles to Quintessence publications and is known for his ability to distil complex topics into clear, impactful insights.

In 2011, Yugo established the School of Yugo, further solidifying his commitment to advancing the field through structured education. He has also served as a visiting clinical teacher at King's College London, contributing to the postgraduate Master's program in Prosthodontics and Aesthetics.

Yugo's ability to deliver innovative solutions is exemplified by his 2013 patent for the Aesthetic Articulator – a device that allows clinicians to visualise and communicate smile design outcomes with patients before clinical execution by showing how the diagnostic wax-up or final restoration integrates with the patient's facial aesthetics, providing accurate visuals of virtual try-ins. This innovation bridges the gap between design and delivery, enabling collaborative planning and confident decision-making. It reflects Yugo's core belief that exceptional smile design is only possible through precise, intentional communication – between technician, clinician, and patient. His ability to unify artistic vision with technical execution ensures that every restoration is not only beautiful, but also predictably aligned with the patient's expectations.

A graduate of the University of Sydney with a Bachelor of Arts, Yugo is now preparing for the 2027 intake of the Doctor of Dental Medicine (DMD) program. This next chapter will allow him to unify his decades of aesthetic and technical mastery with clinical execution – fulfilling his vision of becoming the complete smile designer: the Smile Virtuoso.