



# xive: mission accomplished!

| Marco Degidi



**Ten years have passed since the launch of the Xive implant; I have personally placed thousands of them in many different clinical cases and done years of painstaking research into Xive's characteristics and performance, so I hope that I am in a good position to assess its success.**

## **What did Xive promise when it was first launched?**

At the beginning of the new millennium, the necessity to satisfy the patient's desire for immediate function and good esthetics was long overdue. However, a less predictable outcome was not acceptable. The implant market of the late nineties was still dominated by fixtures designed for a submerged two-stage approach, which were unable to achieve high primary stability. The challenge was to develop an implant that fully met all of these requirements. The result was Xive, which promised to bring together the following advantages:

- The capacity to always achieve good primary stability regardless of bone quality, both in healed and post-extraction sites, due to the special macro design.
- A temporary abutment (TempBase) that acts as a basis for low cost provisionals for immediately loaded implants.
- Frialit-2's highly successful internal abutment connection, whose simplicity and reliability has made it a firm favorite for prosthodontists and dental technicians around the world.

The Xive TG implant was soon to follow. Designed for cases of total edentulism, overdentures and Toronto-type restorations, it summarized and further developed the idea presented by Ledermann and the subsequent Frialoc implant concept.



The next step was the introduction of a Xive implant with the tiny diameter of 3.0 mm, which was one of the world's first when it came to resolve cases with very narrow interdental spaces or very thin bone crests. The insight that success not only depends on primary but also on secondary stability, led to the development of the Friadent plus surface, which was quickly implemented to the whole implant range. The characteristics of these innovative surfaces, which to date remain unsurpassed, significantly promote more rapid and more substantial osseointegration than that achieved by previous surfaces. I had the great fortune to be one of the first to have experience with Xive; as always, I worked with Professor Adriano Piattelli, who is internationally recognized as one of the preeminent experts on implant microstructure. Together, we developed a long-term project to investigate if Xive would live up to its initial promise, and owed to our habit, to also test Xive's performance capacity to the limit; using a scientific evidence based approach for both. I have to say that the characteristic implant design of the Xive screw combined with its unique TempBase abutment revolutionized the possibilities for immediate loading; delivery of a temporary restoration immediately after surgery became a simple and predictable procedure, increasing patient satisfaction and reducing treatment costs.

## **Let's summarize what Xive promised to provide:**

1. Primary stability with all types of bone quality
2. A temporary abutment (TempBase) that also acts as a low cost provisional for immediately loaded implants
3. Excellent secondary stability due to the Friadent plus surface
4. Small diameter for narrow gaps or ridges
5. Maintaining hard and soft peri-implant tissue

One of the pluses of the Xive implant is that it provides a stable platform for the intended prosthesis in every possible clinical situation. Our study of more than four thousand Xive implants clearly evidenced that the specific condensing thread design provided the best stability in more complex cases. All available Xive implant lengths and diameters were tested in either an immediate or delayed approach, both in healed bone and post-extractive sites. Implants were placed in bone of each type of density from D I to D IV (Tab. 1 to 3). We recorded only 28 early losses out of 4,135 implants placed: a 99.3 percent success rate. Even in the challenging world of immediate implant placement, our sample of 1,184 implants showed excellent results, as predictable as those for implants placed in healed sites. This finding becomes of utmost relevance especially with single implants, where rigid splinting, for obvious reasons, is not possible, and the only pathway to success is sufficient primary stability. The clear outcome of this large scale investigation is that Xive has achieved its mission in those challenging situations as well (Fig. 1 to 7). The TempBase abutments' high performance has been demonstrated in all published studies regarding immediate temporization. No record of a TempBase fracture or impairment has ever been reported in tested implants, and it has shown itself to be a safe and predictable platform for any provisional restoration (Fig. 8 to 10). Soft, porous, low quality bone is not only present in the most distal area of the maxilla. Disease, trauma, or simply the anatomic variability of a given patient can sometimes lead to bone structures which are not suitable for the placement of an immediately loaded prosthesis even in the most unexpected regions of the mouth. As a result, the clinician has to modify, adapt or, sometimes, abandon the planned therapy. Notwithstanding its superior design, even

Tab. 1-3\_

Distribution and mean peak IT and RFA of the implants by grouped bone quality			
Bone quality	Number of implants	Mean peak IT	Mean RFA
D I – D II	2,070	40.12 ± 19.13	72.22 ± 10.49
D III – D IV	2,065	29.50 ± 18.09	70.91 ± 10.73

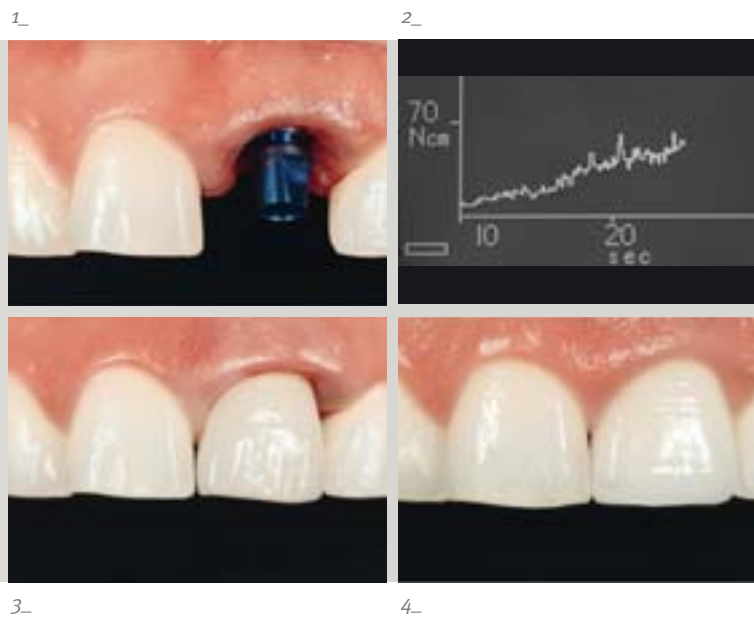
Distribution and mean peak IT and RFA of the implants by length			
Implant length	Number of implants	Mean peak IT	Mean RFA
8.0	201	36.31 ± 20.78	71.53 ± 10.93
9.5	491	35.53 ± 19.98	73.97 ± 9.89
11.0	1,031	35.75 ± 19.43	73.84 ± 10.54
13.0	769	34.73 ± 19.23	70.61 ± 10.97
15.0	1,202	32.82 ± 18.04	69.93 ± 10.68
18.0	441	36.75 ± 21.08	70.18 ± 9.67

Distribution and mean peak IT and RFA of the implants by diameter			
Implant diameter	Number of implants	Mean peak IT	Mean RFA
3.0	417	27.55 ± 15.83	70.32 ± 11.63
3.4	1,406	32.27 ± 18.79	71.59 ± 10.03
3.8	1,269	35.80 ± 19.35	71.15 ± 10.47
4.5	761	39.33 ± 19.64	71.94 ± 11.29
5.5	282	41.67 ± 20.66	74.02 ± 11.28

IT = Insertion Torque; RFA = Resonance Frequency Analysis

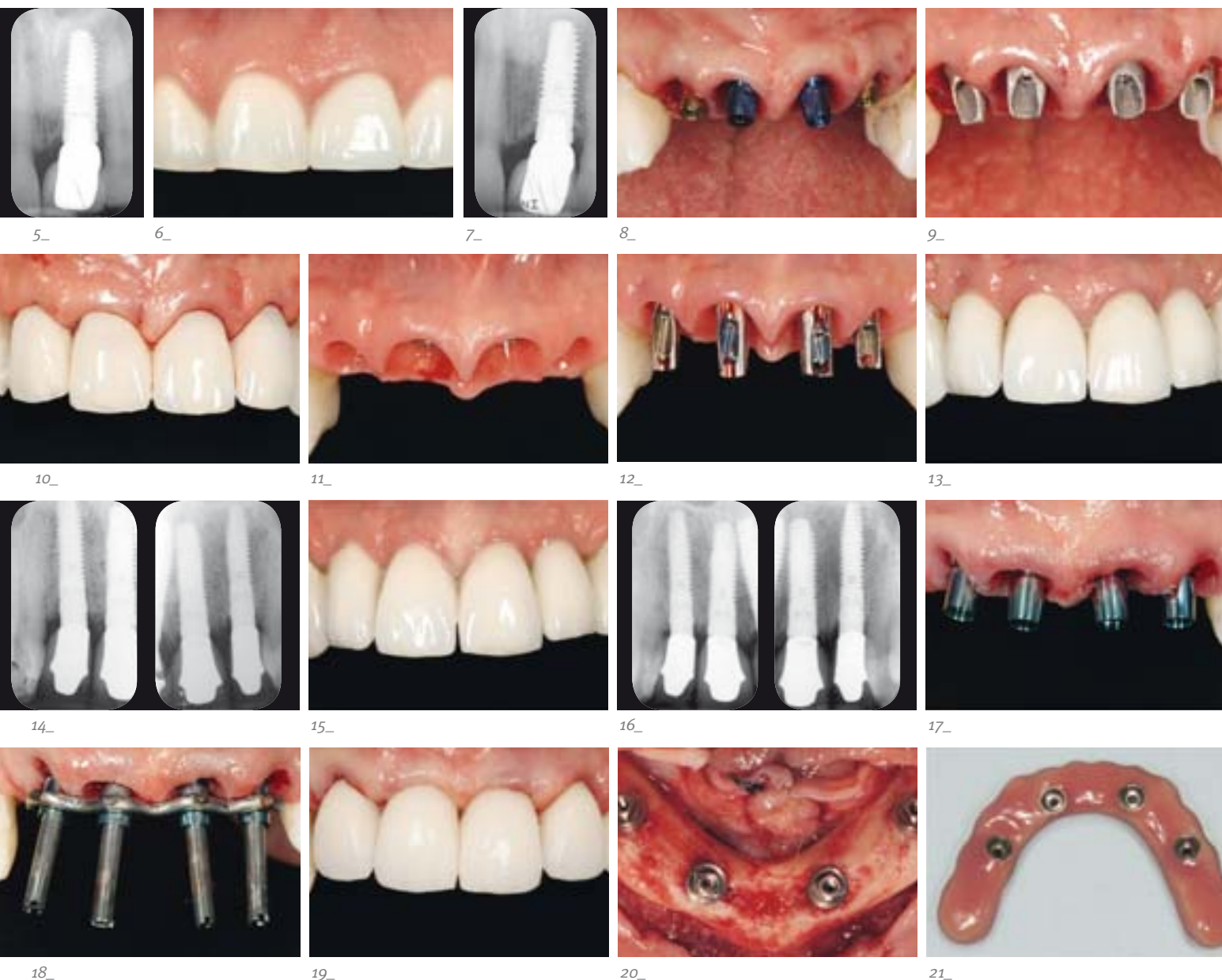
Table 1-3\_ Investigation of primary stability of Xive implant in immediate and delayed approaches, in healed bone and post-extractive sites as well as in different bone densities (D I to D IV).

- 1\_ One of the cases investigated in the study: Replacement of a left central incisor by utilizing a Xive S plus D 4.5 implant with immediate implant placement and subsequent temporization.
- 2\_ High insertion torque was achieved despite the immediate implant placement.
- 3\_ Immediate restoration basing on the TempBase abutment
- 4\_ Final situation one year after surgery



5\_The corresponding X-ray showing sufficient bone adaptation.  
 6\_Clinical case after seven years of follow-up, note the healthy and stable soft tissue situation.  
 7\_The X-ray is mirroring the stable clinical situation; there is no evidence for change of bone level in comparison to the situation at one year of follow-up.  
 8\_Immediate implant placement with immediate provisionalization on TempBase abutments in the anterior region  
 9\_In order to create sufficient red and white esthetics the TempBase abutments are shaped and sand blasted prior to the fabrication of the temporary crown.  
 10\_The temporary crowns are mounted over the modified TempBase.  
 11\_The result after soft tissue adaptation  
 12\_Insertion of the modified EstheticBase abutments to support the definitive restoration

13\_The ceramic crowns are inserted and cemented.  
 14\_The X-ray after one year reveals the preservation of the interimplant bone  
 15\_The clinical situation after seven years  
 16\_The corresponding X-ray presenting stable and healthy bony conditions.  
 17\_Immediate implant placement of four Xive S plus implants in the anterior region  
 18\_Rigid splinting of TempBase abutments with intra-orally welded framework  
 19\_Incorporated immediate temporization  
 20\_Four Xive TG implants placed in the anterior mandible  
 21\_Immediately delivered Toronto Bridge to splint and restore temporarily the Xive TG implants





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*22\_Immediate loading of the Toronto Bridge*

*23\_The histologic evaluation at six weeks shows very high osseointegration with a very high percentage of bone-to-implant contact.*

*24\_Specimen of an implant removed after eight years in situ after sinus-floor elevation with PepGen P-15: BIC is 75 to 80 percent*

*25\_Newly formed bone between implant surface and grafted particles is evident.*

*26\_Two Xive S plus D 3.0 used to immediately replace the lateral maxillary incisors.*

*27\_Final restoration seven years after implant insertion*

the Xive implant may not achieve the desired stability in this challenging clinical situation. The use of immediately restored Xive implants with splinted TempBase abutments, employing the intra-oral welding technique proved to be the elective choice. We have demonstrated that this approach has produced excellent results, with success rates and bone remodeling quality comparable to those of implants placed in the best clinical conditions (Fig. 17 to 19).

The transgingival Xive TG version proved itself to be very well suited for fully edentulous patients, preserving the tradition of the Ledermann screw and the Frialoc implant. In our study on 50 edentulous mandibles, four implants have been placed to support an immediately delivered bar for retention of an overdenture; after an average of almost four years of follow up, no implants were lost – achieving a stunning 100 percent success rate (Fig. 20 to 22).

Once primary stability is easily achieved, immediate function can be safely performed; however, osseointegration has still to proceed. This will take from four to twelve weeks and is regarded as secondary stability. The speed and the rate of new bone apposition on the implant surface is influenced by its characteristics, that's why a good surface really makes the difference among the various implant systems on the market. When the Friadent plus surface was introduced shortly after the launch of the Xive system, it was immediately clear that we were facing an exceptional superior new implant surface. We immediately started to test it and more than twenty histological and histomorphometrical studies have been carried out by our group with an unprecedented positive outcome; due to the fact that the Friadent plus surface always granted increased bone-to-implant contact levels both in healed bone and in post-extractive sites.

The micro-texture of the surface enables high speed osseointegration, which is further enhanced by immediate loading. Human histologic and histomorphometric analysis clearly showed that implants with a Friadent plus surface had a higher bone-to-implant contact percentage in such clinical conditions. A higher number of osteocytes in the peri-implant bone around immediately loaded Xive implants were also found. This result could be related to the functional adaptation created by the loading stimulus, which also explains the hypothesized involvement of the osteocytes in the maintenance of the bone matrix. When the use of a grafting material – i.e. sinusfloor elevation – is unavoidable, it is necessary to achieve initial stability by utilizing the little native bone that is available. The geometric characteristics of the Xive implant maximize the support offered by residual bone, and its specific bone-implant interface prompts the fast osseointegration in grafted sites similar to that observed with healed bone (Fig. 23 to 25).

I think that a clear example of Xive's originality is the 3.0 mm diameter implant. It retains all the peculiar characteristics of the Xive family in a reduced diameter design. This implant is at its best in situations such as those involving reduced interdental bone with a thin alveolar crest. While concerns in both animal and human studies were raised regarding the predictability of immediately loaded single implants in such an esthetically important zone, the Xive S plus D 3.0 implant proved not only to be a safe choice, but our study demonstrated that the immediate restoration protocol indeed guides soft tissue better in the early healing phase, achieving superior esthetic results compared to the classic one-stage approach (Fig. 26 to 28). The flexibility of the Xive 3.0 mm implant is demonstrated by its successful use in cases where small diameter implants were always considered risky. Knife edge alveolar ridges in posterior

edentulous areas can sometimes anticipate the placement of standard diameter implants. Invasive and technically sensitive surgical procedures such as horizontal bone volume augmentation were proposed as a measure to overcome this problem, but outcomes have not always been predictable. Our study demonstrated that a careful treatment plan utilizing the Xive D 3.0 mm diameter implant proved to be the right solution to the problem of resorbed posterior ridges, avoiding the post-op disadvantages associated with bone augmentation procedures. Today, the post-extractive approach in combination with immediate loading can be considered among the best choices for a patient requiring replacement of compromised teeth with a high esthetic demand. Immediate loading with Xive implants increases the stability of the whole peri-implant environment, as the delivery of the final restoration on the day of implant placement maximizes the achievements that would have been obtained using the classic approach of temporization. Studies that examined peri-implant tissue around Xive implants that supported an immediate temporary restoration reported unprecedented results. In the interproximal area between the implant and the natural tooth, the papilla seemed not to be affected by peri-implant bone loss, which is triggered by the manoeuvres necessary to take the final prosthetic impressions. This suggested that the

mounting of the final abutment or, better still, the positioning of the final restoration on the day of surgery could represent the key element for reducing bone peak resorption with an immediately restored implant. In multiple cases, with two or more implants adjacent to each other, immediate loading in the post-extractive site appeared to be the only procedure capable of preserving the esthetically scalloped shape of the soft tissue. This concept became paramount in the anterior maxillary sextant. While the limit of three to four millimeter distance between the contact points of the two prosthetic crowns and the bone peak was fixed as standard, the immediately loaded Xive implants placed in the post-extractive maxillary anterior sites showed themselves capable of preserving the interproximal papilla at a distance up to six millimeter (Fig. 11 to 16). As a direct consequence of those findings, the potential of the Xive implants was tested with regard to immediate and definitive rehabilitation of edentulous patients (Fig. 29 to 33). Cases that only a few years ago needed at least a year to be finalized were fully rehabilitated on the day of surgery with a time and cost effective procedure. The stability of the implant macro and micro design was optimized by the rigid splinting and of the ideal force distribution obtained with the final restoration, with the result of excellent prosthetic success rates and patient's

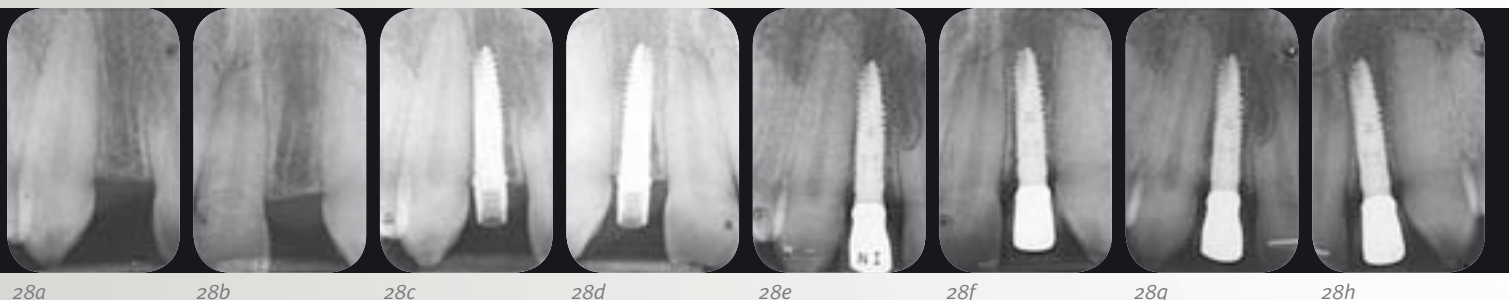
*28\_X-ray sequence of the treatment: The initial situation presenting the narrow gaps (a and b); implant placement (c and d); one year follow-up (e and f) and seven years after tooth replacement (g and h), note the unchanged bone level.*

*29\_Four Xive S plus D 3.8 placed into the edentulous mandible*

*30\_Intra-orally welded framework to splint the implants*

*31\_Insertion of the temporary Toronto Bridge*

*32\_Immediate loading of the bridge*



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satisfaction. These excellent results were obtained not only in patients with good bone volumes, but also in cases with severe atrophy of the maxilla (Fig. 34 to 38). Again, the flexibility of the Xive implant and the completeness of the prosthetic components enabled the clinician to successfully achieve the desired results in a highly complex clinical situation. Fixed, definitive, full arch prostheses with passive fit and reduced cantilever length were able to be placed: this was owed to the mix of good primary stability achieved despite of the poor bone quality. This will be completed with easy prosthetic manoeuvres on the tilted implants that could be carried out with MP abutments in the future. Originally conceived for immediate loading, the Xive implant proved itself to be one of the most valuable tools for a private practitioner's everyday cases as well as for the most demanding of surgical situations.

The inevitable scientific and the technologic progress of the next ten years will set us new challenges every day. The advent of the digital era in dentistry has made it possible to plan an entire full-arch rehabilitation with just a few mouse clicks, to manufacture customized implant components using network facilities that stretch thousands of miles; but at the same time it presents perhaps the hardest challenge at all: the constant struggle to maintain the highest possible quality

standards in times of economic and financial concerns when there is a plethora of poorly manufactured implants that are marketed without prudent scientific research and assessment. In contrast, we have Xive, whose demonstrated achievements over the last ten years represent a no-compromise success story that allows us to treat the most difficult clinical cases with a 99.3 percent success rate.

As a conclusion, I can report that all the high expectations for Xive, when it was launched ten years ago, have been quite clearly fulfilled. We have examined the implants' characteristics and performance in minute detail and tested it beyond its expected limits (Fig. 39); the results have always been most gratifying and Xive has never disappointed our great expectations. This is not to suggest that some of the characteristics of Xive cannot be improved upon in some respects. However, now that Xive's performance is not just promise but established fact, we can look ahead at the next ten years with confidence. ■

Literature on request from the author

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33\_X-ray subsequent to implant placement

34\_Six Xive S plus implants placed into the edentulous maxilla, note the angulations of the two posterior implants.

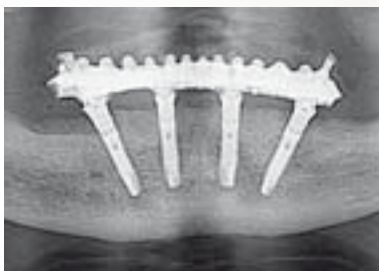
35\_Intra-orally welded framework with specific abutments for screw-retained restoration

36\_Immediately inserted screw-retained final restoration

37\_Facial view of the bridgework

38\_X-ray after implant placement and immediate restoration

39\_Pushing the envelope beyond any conceivable limit: Immediately loaded long span bridge.



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