

MULTI-DISCIPLINARY CASE - A DIGITAL APPROACH

Written by **Patrik Zachrisson**



Patrik Zachrisson presents a multidisciplinary case where digital technology played a key role

This 27-year-old woman was referred to me with a view to improving her alignment and replacing her retained deciduous teeth. She presented with retained URE and ULE, and missing both lower second premolars with closed spaces and mild crowding and a slight midline shift. The patient was worried regarding the treatment and particularly the thought of surgical intervention and requested a discreet and minimally invasive approach.

On examination large deciduous teeth with a questionable prognosis were retained and a mild crowding of the permanent teeth were noted. She had no symptoms from her deciduous teeth but was very worried about the long-term aspects of keeping them and was keen to proceed with orthodontic treatment to improve the alignment of her teeth.

TREATMENT PLANNING

No significant medical problems were present, no smoking habits and low alcohol intake was noted. In recent years she had no significant amount of dental treatment. On examination the patient showed good oral hygiene and no major dental work.

Intraoral radiographs were taken (Figure 6). The radiograph revealed wide upper deciduous molars with short roots and an unerupted upper left wisdom tooth that risked the future health of UL7, as well as showing she was missing all her second



Figure 1: Pre-treatment situation

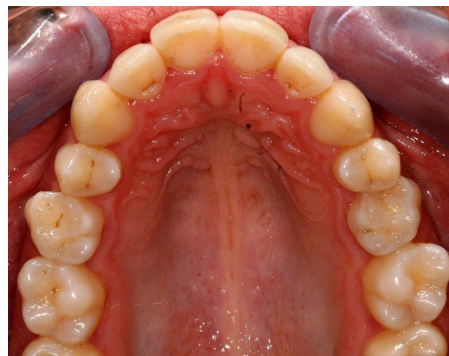


Figure 2: Upper arch showing wide retained upper deciduous molars



Figure 3: Lower arch presented with mild lower anterior crowding

premolars and had her upper second deciduous molars retained, with all gaps closed.

The treatment options were explained to the patient and in view of the abundant space available if the deciduous teeth were removed it was agreed that orthodontic treatment was to be carried out first, followed by implant treatment when the alignment had improved. The patient declined any treatment on UL8 area for now.

TREATMENT CARRIED OUT

For a complete assessment of the initial situation and for the provision of the Invisalign treatment, a panoramic radiograph and intraoral photographs were taken and an intraoral scan using Cerec Ortho software and a chairside Cerec Omnicam scanner was carried out. The scan was uploaded to

Invisalign and a treatment plan was done based on the information. The patient was able to view the treatment plan in the Invisalign ClinCheck software prior to committing to the treatment. The plan was used to determine the space available at

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Patrik graduated as a dental surgeon from the Karolinska Institute in Stockholm, Sweden in 1996, and has worked in Britain ever since. He provides general dental care for a broad patient base, focusing mainly on aesthetic treatments and preventive dentistry, with a particular interest in digital restorative dentistry, Invisalign orthodontics and implant dentistry. He is a principal dentist at the Wensleydale Dental Practice, a nine-surgery mixed private with CBCT, CEREC Omnicam, and on-site laboratory in Huntingdon, Cambridgeshire. Patrik has fellowship status in The International Congress of Oral Implantologists FICOI and has recently become a key opinion leader with Cerec by Dentsply Sirona.

WEBSITE: www.wensleydaledental.co.uk

MATERIALS USED

CEREC OMNICAM: Sirona

CBCT 3GXS: Sirona

SMOP: Swissmedia

TSIII IMPLANTS: Osstem implants

INVISALIGN FULL CASE: Align Technology

VIVERA RETAINERS: Align Technology

VENUS PEARL: Kulzer

WHITE DENTAL BEAUTY: Optident

LABORATORY (SURGICAL GUIDE): NimroDental

LABORATORY (CROWNS): Milford & Mason



Figure 4: OPG showing no upper second premolars present, retained deciduous ULE and URE

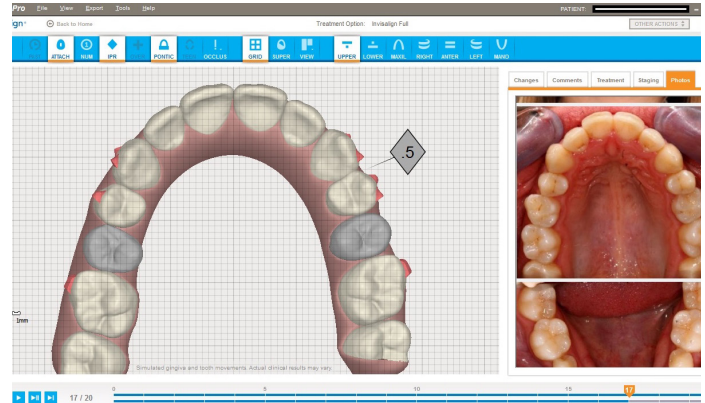


Figure 5: ClinCheck plan at aligner 17/20 where UR5 UL5 space has been created. Use of the Grid tool is useful for assessing the space

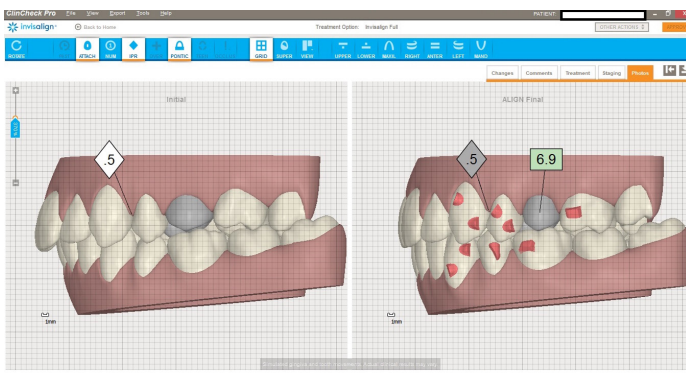


Figure 6: ClinCheck shows an illustration of space before and after and detailed prediction of space

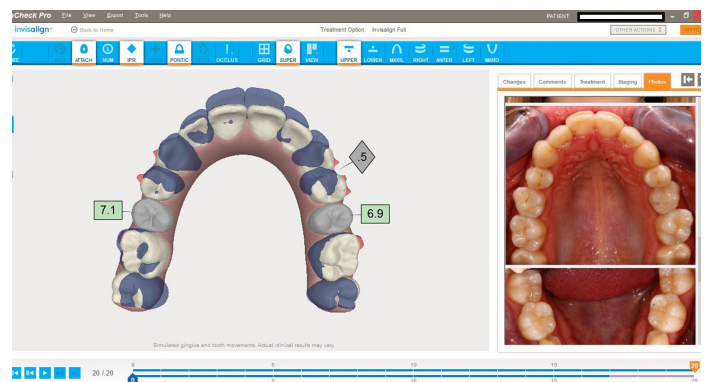


Figure 7: The Superimpose tool in ClinCheck can be a useful way of illustrating the movements to the patient and for obtaining informed consent



Figure 8: UL5 space created at aligner 17. Composite attachments are visible on UL3 and UL6

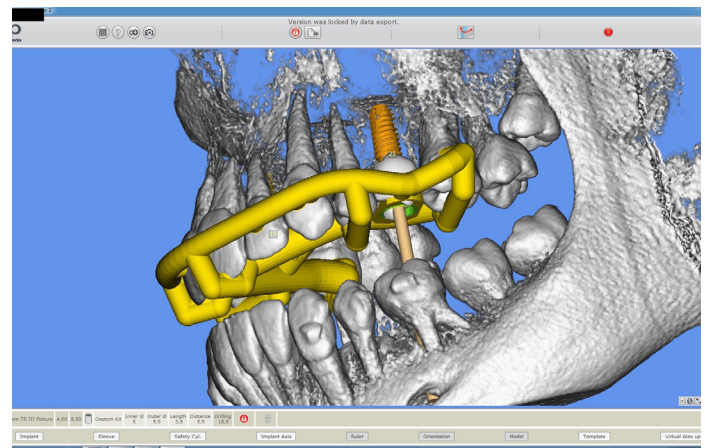


Figure 9: Implant UL5 planned in SMOP software showing the position of the surgical guide and implant in a restoratively driven position to obtain the access hole in a suitable place

the end of the orthodontic treatment and it was agreed that a suitable amount of space should be present in order to provide implants with adequate bone and room for the restorations.

The use of the grid tool in the ClinCheck software gives the surgeon a good understanding of what space one can expect. A superimposed (Figure 11) view can also be useful when showing what amount of change can be expected and gives the patient a lot of data for informed consent. The surgical planning was performed with the SMOP software when the actual space had been

achieved, but as a diagnostic planning tool ClinCheck proved helpful. The patient was very keen to see the proposed result and agreed to the treatment.

An Invisalign full case treatment was started using 20 aligners. Orthodontic treatment with Invisalign is well documented and considered safe, efficient and practical.

The patient used each aligner for two weeks and had IPR (interproximal reduction) performed and attachments as planned in the ClinCheck. When aligner 17 was reached the treatment had been tracking well and no problems had been encountered. The

patient was held at this aligner and a CBCT was taken for the precise situation and an impression was made for study casts that were scanned and uploaded to the lab. The CBCT was uploaded to Nimrodental dental laboratory using the SMOP software and the DICOM (CBCT data) file was matched in the lab with STL file (scan data of teeth and soft tissue) to create a digital model in the SMOP (by Swissmedia) software. The implant treatment was planned for fixtures in UR5 and UL5 areas using Osstem TSIII implants. A surgical guide was 3D printed at Nimrodental to allow accurate fully guided placement of

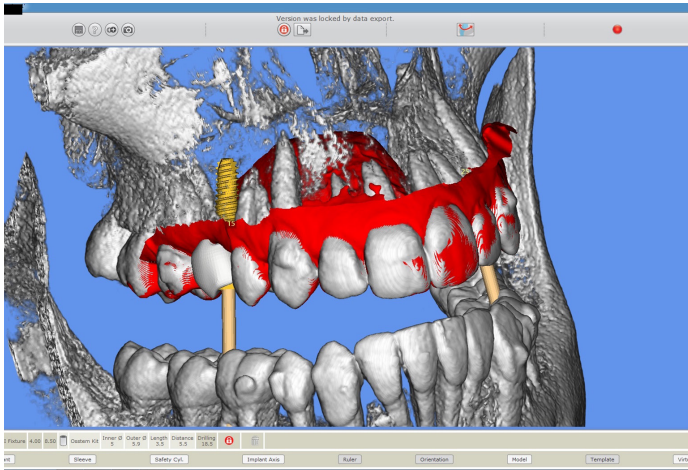


Figure 10: Implant UR5 planned showing the planned position of the crown and the soft tissue

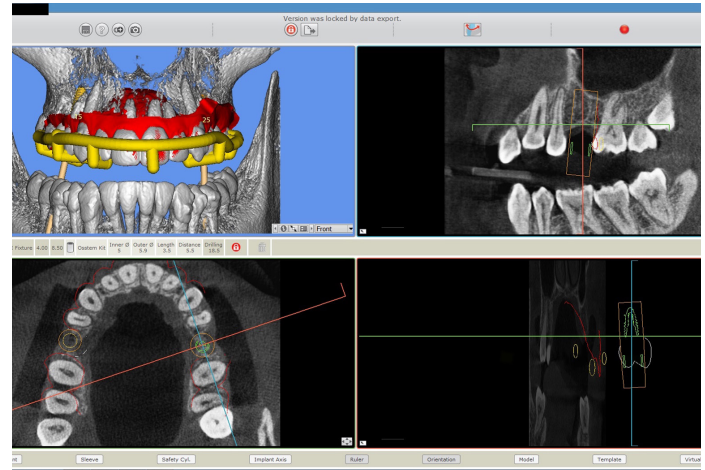


Figure 11: The SMOP software can be used for assessing the CBCT and planning the implants as well as viewing the guide

the implants.

A flapless approach was used in order to minimise the surgical intervention as the patient was worried about cutting into the gum and to reduce the surgical trauma. The guide fitted perfectly and a tissue punch was used to gain access to the bone level. The Osstem guide kit allows precise preparation on the sites using a series of surgical drills and different size keys for the fit in the guide.

The unmounted Osstem implants were placed fully guided too, using guide mounts, through the SMOP guide. The open design of the SMOP guide allows abundant flow of irrigation and also the possibility of using a full flap if the need arises during surgery. After adequate torquing of the implants and control X-rays the implants were fitted with healing caps.

The Invisalign treatment was continued,

mainly in the anterior segment as per the initial ClinCheck plan, and meanwhile the implants were left to osseointegrate as usual.

After a 12-week period of healing and integration, impressions were taken using a conventional open-tray technique and two screw-retained zirconia crowns were made at Milford & Mason laboratory. The Invisalign treatment had now been completed and the patient was in retention. The crowns were

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Figure 12: Implant URS placed, fully guided through the SMOP guide

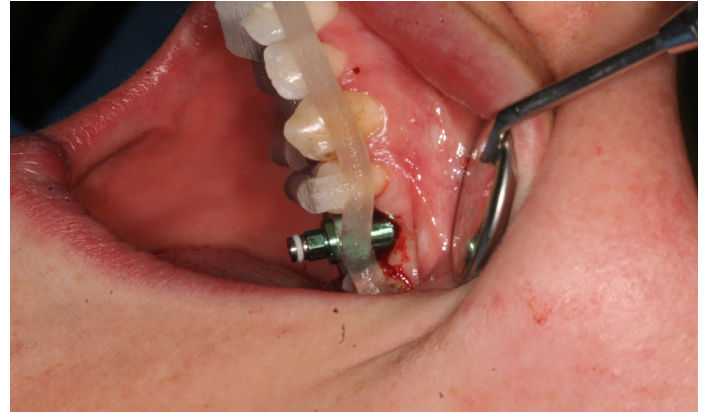


Figure 13: Implant placed UL5 fully guided through the SMOP guide. Using the guide at placement allows easy inspection and ensures correct depth

placed according to Osstem protocol and sealed with PFTE tape pellets and Venus Pearl Composite.

When the Invisalign treatment was completed and the crowns were fitted, an intraoral scan using Cerec Ortho for Viverra retainers was performed and three sets of retainers were made. The patient decided against the use of a retainer wire. The patient then had 'full-time' retention (22 hours a day) for three months, to be followed by night only retention (12 hours a night) for life, in order to prevent relapse.

The patient was very happy with the treatment and decided to also undergo some tooth whitening using White Dental Beauty 16% Carbamide peroxide gel (Optident Ltd) to improve the colour of the anterior teeth. This was done until she was satisfied with the results after two weeks of nocturnal at-home whitening in the retainer trays.

TREATMENT REVIEW

This was in some ways a simple case that could have been performed with conventional orthodontics and full flap implant treatment but as the patient wanted minimal surgical intervention and wanted to have full input in the planning process it was useful to have the digital diagnostic tools available. By using ClinCheck to get a predictable plan for the implant treatment we could be sure that there would be a suitable amount of space for the implant stage. It would also give us a good prediction of when the treatment could be carried out so the patient could fit the treatment into her diary well in advance. Furthermore, the user friendly SMOP software allowed us to plan for a restoratively driven implant treatment where the access holes for the screw retained crowns ►



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Figure 14: Implant crowns just fitted showing initial blanching of soft tissue



Figure 15: Final smile

would be in a suitable position, as well as in a favourable position in the bone.

The patient was also very relieved by the fact that we could provide treatment with a minimal surgical approach and limited swelling and post-operative pain and discomfort.

The teeth could have been restored using a scanpost and a chairside Cerec crown (for instance Emax, cemented on a Tibase) but it was decided that the crowns were to be in zirconia so a conventional impression was taken, as at the time we did not have a zirconia furnace in the practice. Following the completion of the orthodontic treatment a retainer wire and Vivera combination was advised as a precaution, but the patient decided to just have the Vivera retainers.

CONCLUSION

This flapless approach to implant placement is not suitable in every case but where it can safely be done it can provide predictable, comfortable and minimally invasive treatment. The outcome was very satisfactory and the patient was absolutely delighted with the aesthetic and functional result, as well as the comparatively comfortable treatment. Using available software such as SMOP and ClinCheck the outcome can predictably be planned. I would welcome the integration of smile design software in ClinCheck, but hope to see this in an open format on all platforms with the possibility to export STL files as I feel the rapidly developing digital approach is the way forward. ●



Figure 16: Upper arch aligned



Figure 17: Lower arch aligned

WIRED ORTHODONTICS

Patrik Zachrisson is speaking at the Digital Discovery Conference, hosted by Wired Orthodontics. The event includes lectures and hands-on workshops, and takes place at the Royal Welsh College of Music & Drama, Cardiff, on 27-28 April. Get in touch for more details or to book your ticket.

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